



ADAPTATION FUND

AFB/PPRC.22/12
11 March 2018

Adaptation Fund Board
Project and Programme Review Committee
Twenty-Second Meeting
Bonn, Germany, 20-21 March 2018

Agenda Item 8 g)

PROPOSAL FOR ECUADOR

Background

1. The Operational Policies and Guidelines (OPG) for Parties to Access Resources from the Adaptation Fund (the Fund), adopted by the Adaptation Fund Board (the Board), state in paragraph 45 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US\$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the endorsement of the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would ultimately require the Board's approval.

2. The Templates approved by the Board (OPG, Annex 4) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.

3. The first four criteria mentioned above are:

1. Country Eligibility,
2. Project Eligibility,
3. Resource Availability, and
4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:

5. Implementation Arrangements.

5. It is worth noting that since the twenty-second Board meeting, the Environmental and Social (E&S) Policy of the Fund was approved and consequently compliance with the Policy has been included in the review criteria both for concept documents and fully-developed project documents. The proposals template was revised as well, to include sections requesting demonstration of compliance of the project/programme with the E&S Policy.

6. In its seventeenth meeting, the Board decided (Decision B.17/7) to approve "Instructions for preparing a request for project or programme funding from the Adaptation Fund", contained in the Annex to document AFB/PPRC.8/4, which further outlines applicable review criteria for both concepts and fully-developed proposals. The latest version of this document was launched in conjunction with the revision of the Operational Policies and Guidelines in November 2013.

7. Based on the Board Decision B.9/2, the first call for project and programme proposals was issued and an invitation letter to eligible Parties to submit project and programme proposals to the Fund was sent out on April 8, 2010.

8. According to the Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat no less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

9. The following project document titled "Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management" was submitted by the Corporación Andina de Fomento (CAF), which is a Regional Implementing Entity of the Adaptation Fund.

10. This is the fourth submission of the proposal. It was submitted twice as a concept at the twenty-sixth and twenty-eighth meetings of the Board and was not endorsed. It was resubmitted at the twenty-ninth meeting of the Board, and was endorsed. It was submitted as a fully-developed project document in the thirtieth meeting and the Board decided:

(a) Not to approve the fully-developed project document, as supplemented by the clarification response provided by the Banco de Desarrollo de America Latina (CAF; Development Bank of Latin America) to the request made by the technical review;

(b) To suggest that CAF reformulate the proposal taking into account the observations in the review sheet annexed to the notification of the Board's decision, as well as the following issues:

(i) The proposal should provide evidence and analysis to support the project rationale and to justify why the proposed project is cost effective and sustainable in the long-term, and delivers benefits across social, economic and environmental parameters;

(ii) The proposal should ensure full compliance with the Adaptation Fund's environmental and social policy;

(iii) The proposal should provide clearer budgets and breakdowns of the implementing entity management fee and execution costs; and

(c) To request that CAF transmit the observations under subparagraph (b) above to the Government of Ecuador.

(Decision B.30/21)

11. The present submission was received by the secretariat in time to be considered in the thirty-first Board meeting. The secretariat carried out a technical review of the project proposal, assigned it the diary number ECU/RIE/Rural/2016/1, and completed a review sheet.

12. In accordance with a request to the secretariat made by the Board in its 10th meeting, the secretariat shared this review sheet with CAF, and offered it the opportunity of providing responses before the review sheet was sent to the PPRC.

13. The secretariat is submitting to the PPRC the summary and, pursuant to decision B.17/15, the final technical review of the project, both prepared by the secretariat, along with the final submission of the proposal in the following section. In accordance with decision B.25.15, the proposal is submitted with changes between the initial submission and the revised version highlighted. The proponent had also submitted a response sheet reflecting the changes made to the proposal to address the issues raised by the Board in its decision B.30/18, annexed to the present document.

Project Summary

Ecuador – Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management

Implementing Entity: CAF

Project/Programme Execution Cost: USD 180,000

Total Project/Programme Cost: USD 2,370,000

Implementing Fee: USD 119,373

Financing Requested: USD 2,489,373

Project Background and Context:

The project objective is to strengthen the adaptive capacity of the local population in the Toachi – Pilatón water system. The project focus on key drivers that will worsen the probable impact from climate change. The expected mid-term impacts are improved enabling conditions to sustain forest cover and sustainable small-scale farming in the area. In the long-term, it is expected that this will result in improved adaptive capacity. It is also envisioned that the lessons of the project are useful to other parts of Ecuador and other Andean countries.

Component 1: Conserve vegetative cover (USD 950,000)

The component includes activities that support the conservation of forests to secure key ecosystem services. Three outcomes will be generated by (i) expanding protection of existing forests under mechanisms of conservation and sustainable forest management, (ii) strengthening the management of existing protected forests and private reserves, and (iii) building artisanal sediment retention dams in key risk areas.

Component 2: Adapt farming practices to new climate change conditions (USD 900,000)

Component 2 will introduce sustainable farming practices to reduce the impact on the local water cycle and to adapt to probable conditions of reduced rainfall. One outcome will be generated by introducing best practices in about 250 ha of pasture land and 200 ha of crops (including sugarcane).

Component 3: Strengthen local capacities and share lessons (USD 340,000)

The component will strengthen private and public local capacities to implement adaptation measures. Three outcomes will be generated by (i) strengthening climate-monitoring, (ii) introducing adaptation to climate change into parish development and land use plans, and (iii) implementing public communication and education plans.



ADAPTATION FUND

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular-sized Project

Country/Region: **Ecuador**

Project Title: **Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management**

AF Project ID: **ECU/RIE/Rural/2016/1**

IE Project ID:

Reviewer and contact person: **Daouda Ndiaye**IE Contact Person: **Carolina Cortés Cardona, CAF**Requested Financing from Adaptation Fund (US Dollars): **2,489,373**Co-reviewer(s): **Dirk Lamberts**

Review Criteria	Questions	Comments on 2/2/2018	Comments on 2/2/2018
Country Eligibility	1. Is the country party to the Kyoto Protocol?	Yes	
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	Yes. Ecuador is a country that is particularly vulnerable to the impacts of climate change, largely felt through impacts related to water.	
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	Yes.	

	<p>2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?</p>	<p>Yes, the proponent has clearly outlined the climate change impacts that have been documented and that are projected. However, the proposal defines many issues in the situation analysis that it does not appear to directly address in a coherent manner. For example, the project assumes that the proposed actions will actually lead to the intended outcome – simply increasing agricultural yield does not guarantee reduced forest encroachment. Further, the rationale for the project is built on a vulnerability assessment conducted for hydroelectric plants, which may not have captured important details relevant for the livelihoods of the most vulnerable local communities.</p> <p>CR1: Please clarify how the priority restoration areas were selected and determined for component 1 – bearing in mind the livelihoods of the most vulnerable communities. Please also clarify how the cost of the restoration will be borne (seedling cost, labor, etc). Please note that the stated objective of component 1 is conservation but the main activities are restoration (para 89).</p> <p>CR2: Please clarify that per para 89, component 1's activities are taking place in already-established protected areas.</p> <p>CR3: Please substantiate why, by increasing yield, encroachment will not continue.</p>	<p>CR1: Partially addressed</p> <p>CR2: Addressed</p> <p>CR3: Partially addressed</p>
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	3. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	Partially. An initial gender assessment is announced in Annex 9 – Gender Analysis to be undertaken during the inception phase of the project. The Gender Policy requires that this be done at the earliest stage of project/programme preparation. Further, vulnerable groups have not been adequately identified. CR4: Please clarify how the project will benefit women and other marginalized groups.	CR4:Not adequately addressed. The issue of initial gender assessment has not been addressed. The added information contains generic statements of intent and recommendations but lacks concrete, effective and tangible measures to benefit women and other vulnerable groups that remain largely unidentified.
	4. Is the project / programme cost effective?	Yes.	
	5. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	Yes.	

	6. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund??	Not clear. The added information on relevant national legislation does not provide the required additional information on relevant national technical standards. CR5: Please clarify which national technical standards apply.	CR5: Partially addressed. But see CR11 on the mechanism that must deliver compliance with national technical standards for the USPs.
	7. Is there duplication of project / programme with other funding sources?	No, however, some mention of how the initiatives outlined in table 33 can support the project would strengthen the project. CR6: Please mention how identified initiatives may inform the project.	CR6: Addressed
	8. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	Yes, there is a component targeting knowledge management and learning. However, some more detail would help clarify how the mechanism will fit directly into the project. CR7: Please clarify which tailor-made communications products have been deemed to be the most effective for the context of the project (radio, posters, print, online, etc).	CR7: Partially addressed

	9. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p>Yes, consultations were held and a report was provided. However, in para 361, the document now states that as a result of the consultation process the project concept was adjusted and specific targets were set, but no further information is included.</p> <p>CR8: Please explain how the outcomes of the consultations have informed the design of the project, in particular, the ways in which the project will engage women, vulnerable groups, the private sector, and other relevant stakeholders to ensure sustainability and lasting impact of the project as a result of the consultations.</p>	CR8: Addressed.
	10. Is the requested financing justified on the basis of full cost of adaptation reasoning?	Yes, however pending the resolution of other CRs.	
	11. Is the project / program aligned with AF's results framework?	Yes.	
	12. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	<p>Yes, however, the description does not fully discuss how the various features of the project will help ensure that the communities can sustain the outcomes of the project beyond the lifetime of the project. For example, if listed in "regulatory framework" under para 390, is it assumed that the government will take ownership over this activity?</p> <p>CR9: Please describe specifically how the project will ensure sustainability</p>	CR9: Partially addressed.

		through community engagement platforms, government processes, the investment fund, among other measures. In particular, please include information on how the proposed credit mechanism will be sustained, and how the private sector (hydroelectric power plants) might be able to contribute as well.	
	13. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p>Partially and unclear. The ESMP (Annex 7) is said to “include the hydroelectric power plant construction and operation. The footnote states “The environmental and social risk analysis includes the potential risk from the Hidroelectric power plant. The project seeks to restore the environmental habitat and create protected areas, which will create an additional benefit for the operation of the hydroelectric, power plant. Therefore the project generates a win-win situation for environment and the hydroelectric sector.” The scope of the ESMP is unclear. The construction and future operation of the hydropower plant will constitute an important determining factor of the environment and social conditions, and this needs to be adequately integrated in the environmental and social baseline identifications.</p> <p>CR10: Please clearly define the scope of the ESMP specific to the activities and risks of activities</p>	<p>CR10: Addressed, the scope of the ESMP has been clarified.</p>

		<p>included in the AF-funded project.</p> <p>Section 2.6 of Annex 7 includes a number of conditions that CAF has identified for the agreement with the AF. It is unclear what these entail but they include a number of items that appear in no way related to the requested funding. E.g. fish diversity study, ecological flows study etc.</p> <p>The risks identification remains generic rather than evidence-based. E.g., the proposal states that “No vulnerable or marginalized populations will be negatively affected by the project.” And yet, nowhere is information included that would suggest that marginalized or vulnerable groups have been identified in the project area beyond generic statements of women, young and elderly. The same issues are found, mutatis mutandis, in several other places.</p> <p>CR11: Please identify risks and impacts of the project activities in line with the ESP, and prepare the required ESMP accordingly.</p> <p>The mitigation measures generally lack specificity and relevance, and are not supported by actual impacts assessments. E.g. p. 21 Annex 7: involuntary resettlement. The risk</p>	<p>CR11: Partially addressed. The references to elements beyond the scope of the project have been removed. The risks identifications element has not been addressed. Risks identification remains premature and generic rather than evidence-based. Please see also findings below regarding the ESMP.</p>
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		<p>under this ESP principle is acknowledged, yet the mitigation measures refer to unspecified guidelines ('PO 4.12').</p> <p>Amongst these resettlement mitigation measures is a statement of concern: "Within the conservation areas, determined by the project, currently small populations can be found. These populations are the product of invasions that must be displaced as the activities of these populations affect national and projects ecological conservation strategies and actions." Clearly, this shows that involuntary resettlement, which is irrespective of one's legal residence status, may be an integral component of the project. The impacts should be identified and quantified, and mitigation measures formulated in compliance with the ESP prior to submission of the funding request.</p> <p>CAR1: Please address the risk of involuntary resettlement in compliance with the ESP.</p> <p>The ESMP (Annex 7, p. 25) includes the following condition: "Social study that incorporates the results of the consultation process, and a plan for the ethnic group in the project". This seems to contradict the stated outcome of the risks identification:</p>	<p>CAR1: Not adequately addressed (para 421, Annex 7). The activity remains part of the proposal, albeit in a different wording. The inherent risk is not addressed, and proposed mitigation is generic. No further identification, characterisation or quantification of possibly affected persons has been provided.</p>
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		<p>para 416: "There is no indigenous population in the project area."</p> <p>Overall, the information and documentation provided to demonstrate ESP compliance for this project seems to be an amalgamation of information, impact assessments, risks and management measures from a number of other activities, including the construction of a large hydropower plant, associated roads and reservoir. The information that appears relevant to this present project lacks specificity, is generally not substantiated, and often contradicting. No attempt has been made to list here all the issues that were identified since that would be disproportionate. The ESMP that is required, based on presumed inherent risks and on the use of USPs, does not contain the elements that are required to ensure compliance with the ESP.</p> <p>CAR2: Please identify risks and impacts for the project submitted, and formulate the required environmental and social safeguard measures, in line with the ESP.</p>	<p>CAR2: Not adequately addressed. Risks and impacts have not been further identified in ways compliant with the ESP. The required environmental and social safeguard measures have not been formulated or are not in line with the ESP. Please see also findings below regarding the ESMP.</p>
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			<p>A new ESMP document has been submitted. No changes were tracked. The initial findings on ESP risks in the application document have not been revisited in this final review unless specifically subject to a CR or CAR.</p> <ol style="list-style-type: none">1. The ESMP is said to be developed on the basis of Manual of Basic Environmental and Social Management System procedures and functions at National Implementing Entities. This manual provides guidance on IE performance rather than guidance on ESP compliance in projects or programmes, which is provided in the Guidance document for Implementing Entities on compliance with the Adaptation Fund Environmental and Social Policy, as well as in the Guidance document for Implementing Entities on compliance with the Adaptation Fund Gender Policy.2. On p.6, it is stated that the activities of component 3 are not included in the risks identification screening, which is not compliant with the ESP that requires comprehensive risks identification. >CAR3. The process described on p. 7 onwards for risk identification does not comply with the requirements
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			<p>of the ESP. > CAR</p> <p>4. The risks findings (Table 1) lack substantiation. > CR</p> <p>5. The approach described under 2.3 Risk Evaluation is not in line with the ESP that requires that for all risks identified an impact assessment is required, commensurate to the risks.</p> <p>6. The revised ESMP still does not take the USPs into account. Risks are said to have been identified, without the USPs having been identified to the point where this is adequately possible. Elements of the ESMP based on these inadequate risks findings are not commented on here in detail. The required mechanism to review USPs in line with the ESP as and when these are identified to the point where this is possible is included but it is incomplete and unlikely to lead to adequate risks identification. As there are no obstacles identified that pre-empt the full identification of the USPs, and considering the difficulty experienced by the IE to produce an adequate ESMP, all project activities should be identified in full prior to submission of the funding application, ESP risks identified accordingly and all subsequent elements for ESP compliance</p>
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			included in the proposal.
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	Yes. The requested budget is \$2,489,373. Another project was approved by the Board and is currently implemented by the World Food Programme for a budget of \$7,449,468. Combined, the two projects will amount \$9,938,841 which is below the cap of \$10 million.	
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	Yes, 5%	
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)?	Yes, 7.6%	
Eligibility of IE	4. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	Yes, the proposal has been submitted by an accredited RIE.	

Implementation Arrangements	1. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	Yes.	
	2. Are there measures for financial and project/programme risk management?	Yes, however the number of risks identified fall short of the range of potential risks of the project. CR12: Please consider a more comprehensive review of potential risks.	CR12: Partially addressed
	3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy and Gender Policy of the Fund?	Not clear. Section III.C should describe the measures for environmental and social risk management, in line with the ESP, and in line with the risk findings presented in section II.K. CR13: Please complete section III.C with the required risk management measures, commensurate, evidence-based and comprehensively, in compliance with the ESP, taking into account the other relevant CRs. Please ensure that there is internal coherence with the other sections of the proposal.	CR13: Partially addressed. Section III.C does not include a reference to the mechanism for ESP compliance for the USPs. It only includes measures for risks that have already been identified, albeit largely prematurely and inadequately.
	4. Is a budget on the Implementing Entity Management Fee use included?	Yes, however, it appears to only account for disbursement in Year 1. CR14: Please clarify how the implementation entity management fee will be disbursed across the lifetime of the project.	CR14: Addressed

	5. Is an explanation and a breakdown of the execution costs included?	Yes, however it does not provide the budget at the adequate level of detail. CR15: Please provide a more detailed and outlined budget of the execution costs.	
	6. Is a detailed budget including budget notes included?	Yes.	
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	Yes.	
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	Yes.	
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	Yes.	

	10. Is a disbursement schedule with time-bound milestones included?	Yes, however is not aggregated by year. CR16: Please consider aggregating the disbursement schedule by year.	CR16: Addressed
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Technical Summary	<p>The proposed project aims to address main drivers of deforestation and degradation in four sub-basins in Toachi-Pilatón and enhance local communities' adaptive capacity to the adverse effects of climate change. The project is combines policy, training, and ecosystem-based measures to address acute climate stressors in the region. However, the proposal fails to meet all of the review criteria of the Adaptation Fund. The following corrective action requests (CARs) are made:</p> <p>CAR1: Please address the risk of involuntary resettlement in compliance with the ESP.</p> <p>CAR2: Please identify risks and impacts for the project submitted, and formulate the required environmental and social safeguard measures, in line with the ESP.</p> <p>The following clarification requests (CRs) are made:</p> <p>CR1: Please clarify how the priority restoration areas were selected and determined for component 1 – bearing in mind the livelihoods of the most vulnerable communities. Please also clarify how the cost of the restoration will be borne (seedling cost, labor, etc). Please note that the stated objective of component 1 is conservation but the main activities are restoration (para 89).</p> <p>CR2: Please clarify that per para 89 component 1's activities are taking place in already-established protected areas.</p> <p>CR3: Please substantiate why, by increasing yield, encroachment will not continue.</p> <p>CR4: Please clarify how the project will benefit women and other marginalized groups.</p> <p>CR5: Please clarify which national technical standards apply.</p> <p>CR6: Please mention how identified initiatives may inform the project.</p> <p>CR7: Please clarify which tailor-made communications products have been deemed to be the most effective for the context of the project (radio, posters, print, online, etc).</p> <p>CR8: Please explain how the outcomes of the consultations have informed the design of the project, in particular, the ways in which the project will engage women, vulnerable groups, the private sector, and other relevant stakeholders to ensure sustainability and lasting impact of the project as a result of the consultations.</p> <p>CR9: Please describe specifically how the project will ensure sustainability through community engagement platforms, government processes, the investment fund, among other measures. In particular, please include information on how the proposed credit mechanism will be sustained, and how the private sector (hydroelectric power plants) might be able to contribute as well.</p> <p>CR10: Please clearly define the scope of the ESMP specific to the activities and risks of activities included in the</p>
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	<p>AF-funded project.</p> <p>CR11: Please identify risks and impacts of the project activities in line with the ESP, and prepare the required ESMP accordingly.</p> <p>CR12: Please consider a more comprehensive review of potential risks.</p> <p>CR13: Please complete section III.C with the required risk management measures, commensurate, evidence-based and comprehensively, in compliance with the ESP, taking into account the other relevant CRs. Please ensure that there is internal coherence with the other sections of the proposal.</p> <p>CR14: Please clarify how the implementation entity management fee will be disbursed across the lifetime of the project.</p> <p>CR15: Please provide a more detailed and outlined budget of the execution costs.</p> <p>CR16: Please considering aggregating the disbursement schedule by year.</p> <p>The final technical review finds that the proposal fails to meet the requirements of the Adaptation Fund for approval, in particular with respect to compliance with the Environment and Social Policy of the Fund.</p>
Date:	23 February 2018

Review Criteria	Comments on 23/8/17	Comments on 13/9/17	Answer 15/01/2018
2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	<p>Yes, the proponent has clearly outlined the climate change impacts that have been documented and that are projected. However, the proposal seems to have many overlapping and inconsistent objectives and activities. For example, the proposal describes the impacts on the hydropower station but none of the activities are linked or related to hydropower. It is unclear if the project is designed and implemented in areas to benefit communities, with the reduced sedimentation impacting the hydropower station as a co-benefit, or vice versa. Further, output 1 of Outcome 1 has a target of conserving native forest but describes various activities ranging from restoration to addressing the drivers of deforestation, and often repeats the same information in different formats. Additionally, component 2 and 3 both have elements of the investment fund but don't directly link them to the project rationale in a logical manner.</p> <p>CR1: Please focus the descriptions of each outcome and output to clearly describe the specific activities that are being proposed in a coherent manner that consolidates the components around clear objectives and activities that contribute directly to those objectives.</p> <p>CR2: Please provide additional technical details across all components including selection process and criteria as appropriate.</p> <p>For example, on the types of agricultural practices that will be considered for deployment in the target areas, on the means of identification and restoration of key areas, etc.</p> <p>CR3: Please clarify if the hydroelectric companies will have any role in the investment fund and long-term financing focus of the project, as they will also indirectly benefit from the project.</p>	CR1: Mostly addressed, a new table has been provided that structures activities more clearly.	In section I we identify the 3 specific objectives that correspond to the 3 products by component paragraph 53, the specific activities of each component and their implementation costs are verified in part 3 table E and G
		CR2: Somewhat addressed, some detail has been provided across the description of the components.	The project selection criteria are based on a triangulation methodology, found in paragraph 76 literal a, b, c within Part II, Literal A. Project components. Figure 7-A shows a diagram of the methodology of the selection process. P77 contains the selection criteria for the types of agricultural practices and is included in the Annex 12 provides more details on the selection mechanism based on a case-by-case cost
		CR7: Mostly addressed, however economic evidence would be needed to strengthen the argument.	Annex 1 document B, letter process.
3. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p>Mostly, however the section makes broad generalizations about the benefits of the project without supplying any supporting evidence or analysis.</p> <p>CR4: Please clarify if issues related to land tenure have been analysed in the development of this proposal given the significant focus on activities in the forestry and agriculture sectors.</p> <p>CR5: Please justify the social, environmental, and economic claims with evidence, analysis, or other means of substantiation.</p> <p>CR6: Please clarify how the project will benefit women and other marginalized groups.</p>	CR4: Somewhat addressed.	A description is given focus in forestry and agricultural activities, corresponding to Component 1. p72 within Part II, Literal A. Project components. In p85 it indicates the areas that each GAD involves with PDOT tools For the declaration of the biocorridors, land tenure part 89, prf49, activity 1.1.1 of component 1; prf156 and item H part 1. Paragraphs that include land tenure are: p49, p160, p362 in the working groups, p370 literal b, p372
		CR5: Not addressed	CR5: Table 17: Summary of benefits by component is added to justify the socio-environmental benefits, after p83. CR6: Annex 9 Gender Analyses includes in the table 5; in the document the paragraphs 7, 22, 27, 28, 47, 121, 147, 152, 161, 163, 379, 410; tables 15, 16.

4. Is the project / programme cost effective?	<p>Not addressed. The section only includes a brief table of cost/unit but does not provide any analysis of why the selected approach and activities compare in cost-effectiveness relative to alternative approaches, nor does it explain why the cost/unit achieved by this project is an efficient way of achieving an outcome.</p> <p>CR7: Please elaborate this section significantly in line with the requirements of the Adaptation Fund to compare the proposed activities to viable alternatives in terms of cost-effectiveness.</p>	CR7: Mostly addressed, however economic evidence would be needed to strengthen the argument.	Annex 14 a complete cost-effectiveness analysis was made; in the document p291, p323 and p332. In section II, Literal C.
5. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national	<p>Yes, however the description of relevant plans and strategies is brief and leaves many potentially important strategies out.</p> <p>CR8: Please more comprehensively cover the country's NDC among other documents.</p>		Ecuador does not yet have NDC, but INDC which are further detailed in p 298-301; ACUS and SocioBosque are central strategies of the Ecuadorian government for climate change adaptation and mitigation and form the basis of the current proposal; the proposed activities of Component 1 exclusively are based on these key documents (laws) and specifically mentioned in p76, 77
6. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the	<p>Yes, however, the section is not comprehensive and provides only a superficial analysis of relevant standards.</p> <p>CR9: Please more comprehensively cover relevant standards and laws that apply in the context of this project.</p>	CR9: Somewhat addressed, the project document should be updated in the relevant section.	Incorporated in the document in annex 7, annex 13 and in document part II, letter D, which corresponds to p346.
7. Is there duplication of project / programme with other funding sources?	<p>No, however, as with other sections, the review only includes a handful of projects at a very general level.</p> <p>CR10: Please assess the portfolios of other multilateral and bilateral funding sources to provide a more robust assessment of completed or ongoing projects. The proponent may also wish to describe relevant outcomes from the Socio Bosque program.</p>	CR10: Not addressed.	In section II, section F, a summary table of relevant indications was included in the relation of the territory and climate change where the initiative, sponsor, objective, intervention zone is indicated.
8. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	<p>Yes, there is a component targeting knowledge management and learning. However, again, the description is very brief.</p> <p>CR11: Please describe how outputs of the project contributing to learning and knowledge management will fit together and be leveraged to capture and feedback lessons in the most effective way to reach the target communities.</p>	CR11: Addressed, but not in the relevant section of the project document.	In section II, literal G, a table was entered where the knowledge and knowledge of knowledge p358 is indicated by component.
9. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p>Yes, consultations were held and a report was provided in the Annex. However, it is not clear how the design of the project was shaped by the outcomes of the consultations.</p> <p>CR12: Please explain how the outcomes of the consultations have informed the design of the project, in particular, the ways in which the project will engage women, vulnerable groups, the private sector, and other relevant stakeholders to ensure sustainability and lasting impact of the project as a result of the consultations.</p>	CR12: Not sufficiently addressed in the relevant section of the project document.	The triangulation methodology literal H part II is strengthened; corresponding paragraphs are: 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371. Figures in the part II literal A includes activities for the gender and vulnerable groups integration .

12.Has the sustainability of the project/programme outcomes been taken into account when designing the project?	<p>Yes, however, the description should reference specific outputs and activities of the project that will contribute to the long-term sustainability of the project.</p> <p>CR13: Please describe specifically how the project will ensure sustainability through community engagement platforms, government processes, the investment fund,among other measures.</p>	CR13: Somewhat addressed.	In the document Section II, Literal J incorporates sustainability process. It is strengthened with figure 26 Sustainability concept and paragraphs 386, 387. In paragraph 388, 389, 390,391, 392, 393, 394, 395,; Table 35: Sustainability strategy matrix
13. Does the project / programme provide an overview of environmental and social impacts/ risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p>Not clear. Annex 16 describes an internal document to CAF that is not directly relevant to demonstrating compliance with the ESP and is not taken into consideration in the review of the proposal. Further, the narrative description in the proposal of the activities is confusingly structured in Components, Outputs and Outcomes, most of which consist of just one or two sub-level elements. A significant portion of the project is intended to finance activities (including a ‘repertoire of measures’, Annex 18) that are yet to be identified to a level where adequate ESP risk identification is possible. At the time of submission, the ESP requires that all the environmental and social risks associated with a project or programme are identified or, in exceptional and justified cases, that there is a mechanism included that will ensure compliance during implementation. The use of such Unidentified Sub-Projects (USPs) may be justified here as part of the micro-credit structures but requires a project-wide Environmental and Social Management Plan (ESMP) that will ensure that all these USPs at the time of their adoption have been subjected to the same ESP risks identification and the formulation of any subsequent mitigation or management actions.</p> <p>The proposal does not contain such an ESMP.</p> <p>CR14: Please clarify how the USPs in the proposal will comply with the ESP.</p> <p>The section II.K is internally contradicting (e.g. para 291 states that Compliance with the law will require attention during project implementation but the table under para 319 states for the same principle ‘No risk or adverse impacts. The project is in compliance with domestic and international law’). The table in para 319 states for all ESP principles that there is no risk or adverse impacts.</p> <p>The risk finding is not substantiated; the justifications provided (paras 295-319) are generic and not evidence-based as required by the ESP.</p> <p>CR15: Please identify the environmental and social risks of the proposed project in line with the ESP.</p> <p>Para graph81 describes a paradigm shift that the project will support for the management of the protected areas system.</p> <p>CR16: Please explain what the implications of this paradigm shift will be for each of the protected areas affected by the project.</p> <p>Explain what the concrete changes will be for each PA and how this will not have a negative impact on biodiversity or the achievement of the conservation objectives of the PAs.</p> <p>The project will be implemented in the vicinity of the Toachi-Pilaton Hydroelectric project that is nearing completion. The ESP risks of the project must be identified in conjunction with the ESP risks associated with the construction, operationalisation and operation of the Toachi-Pilaton Hydroelectric project. In particular secondary, cumulative and indirect risks and impacts need to be considered.</p> <p>CR17: Please clarify how the ESP risks identification and impact assessments were</p>	CR14: Not addressed. The Investment Fund ESP guidelines (Annex 19 (20?)) do not have the required elements of an ESP-compliant ESMP.	Annex 6 and 7, part K, part II and part C, part III. The findings of the Risks were developed following the UNDP-CAF methodology, it responds to the Potential Social and Environmental Risks -Screening Checklist-. The project has a moderate risk to the questions: 8. Principle 8: Involuntary Resettlement. and Principle 9: Protection of Natural Habitats.
		CR15: Partially addressed. The risks identification table is updated but the substantiations for the risks findings remain generic and not evidence based.	Annex 6 and 7, part K, part II and part C, part III. The environmental and social risks were developed from the risk matrix, more details in Annex 7-B, were answered questions 2,3,4,5 and 6 of an total 15 principles (Adaptation Fund) .
		CR16: Partially addressed. The paradigm shift is further clarified but there is no information on the specific impact or risks for the protected areas affected by the project.	Was included in p100, 102, 103, 121; diagrams have been developed to explain the paradigm shift in Figure 10, 11. The paradigm shift has a legal basis with the Organic Environmental Code of Ecuador published March 2018, supporting the Biocorredores process
		CR17: Not addressed.	Annex 6 and 7, literal K part II and part C, part III, has been developed with former Hidrotoapi technicians. In Annex 7-A Integrating of Principles to Strengthen Social and Environmental Sustainability compliance with the law. Additionally paragraph 425, which corresponds to Table 36: Associated Risks of the Adaptation Project and the Hydroelectric Power Plant was made. Finally, the impacts produced by the Hydroelectric are mitigated with the Management Plans includes in the annex 7.
		CR18: Not addressed.	Annex 6 y 7; in the document literal K part II y literal C parte III

1. Is the requested project / programme funding within the cap of the country?	Yes. The requested budget is \$2,489,373. Another project was approved by the Board and is currently implemented by the World Food Programme for a budget of \$7,449,468. Combined, the two projects will amount \$9,938,841 which is below the cap of \$10 million.		Yes, solved
2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget, before the fee?	Yes, 5%		Yes, solved
3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget?	Yes, 7.6%		Yes, solved
4. Is the project/programme submitted through an eligible Implementing Entity that has been	Yes, the proposal has been submitted by an accredited RIE.		Yes, CAF is an accredited RIE
1. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	Yes, however the proposal splits implementation arrangements across Sections I and Section II. CR19: Please consolidate information on management of the project in Section II.	CR19: Not addressed.	Annex 9, Gender Analyses includes Gender Action Plan; In the document table 6, paragraphs 55, 58, 76 (gender criteria's), 160, 222; Component 3 transversal and finally Part II literal B mainly pr.285 and 285
2. Are there measures for financial and project/programme risk management?	No, the project only identifies three risks despite having many partners, governance bodies, an investment fund component, and requisite enabling conditions. CR20: Please expand this section to demonstrate a thorough identification of risks and mitigation measures.		Annex 7 Final Report Environmental and Social risk, documents A, B, Risk Matrix and Final Inform; in the document literal K part II (table 36) and literal C parte III.
3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy and Gender Policy of the Fund?	Not clear. Section III.C should describe the measures for environmental and social risk management, in line with the ESP, and in line with the risk findings presented in section II.K. CR21: Please complete section III.C with the required risk management measures, commensurate, evidence-based and comprehensively, in compliance with the ESP, taking into account the other relevant CRs. Please ensure that there is internal coherence with the other sections of the proposal.	CR21: Not addressed	Annex 7, Final report Environmental and Social risk documents A, B, Risk Matrix and Final report; in the document literal K parte II (figure) and literal C p 440 and 441 part III.
4. Is a budget on the Implementing Entity Management Fee use included?	No. n: Please provide a budget on the Implementing Entity Management Fee.	CR22: Not addressed, a breakdown has not been provided.	Details in the final part of the table in the section III. Literal E and G (tables)

5. Is an explanation and a breakdown of the execution costs included?	No. n: Please provide an explanation and a breakdown of the execution costs.	CR23: Not addressed, a breakdown has not been provided.	Part III. Literal E and G (tables)
6. Is a detailed budget including budget notes included?	Yes, however, the structure of the table with the detailed budget is not user-friendly as the table itself provides no detail on any of the budget items. n Please improve the detailed budget table, include budget notes describing what the budget line item will fund		Annex 15 Budget; in the document Part III. Literal E and G (tables=
7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	No, table 10 includes the workplan, however only indicative costs are included. CR25: Please provide a full budget and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund.	CR25: Not addressed, full outlined budget not provided.	Annex 9 Gender Analyses includes in the table 5; in the document part III literal D p 442 table 39
8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	No. CR26: Please provide a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function.	CR26: Not addressed.	Part III. Literal E and G



ADAPTATION FUND



GOBIERNO NACIONAL DE
LA REPÚBLICA DEL ECUADOR

Letter of Endorsement by Government
Government of Ecuador
Ministry of Environment

Quito, D.M., 15th January, 2018

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject:

Endorsement for the National Project Proposal “Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management”.

In my capacity as designated authority for the Adaptation Fund in Ecuador, I confirm that the above regional project proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the country.

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the project will be implemented by Development Bank of Latin America (CAF).

Sincerely,

Lcdo. Tarsicio Granizo Tamayo
Minister of Environment
Ministry of Environment of Ecuador



PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government¹

Provide the name and position of the government official and indicate date of endorsement for each country participating in the proposed project/programme. Add more lines as necessary. The endorsement letters should be attached as annexes to the project/programme proposal.

Full Proposal project: Endorsement for the National Project Proposal "Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management"

TARSICIO GRANIZO

*National Designated Authority
Ministry of Environment of Ecuador*

Date: January 15th, 2018



¹ Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.



ADAPTATION FUND

REQUEST FOR PROJECT/PROGRAMME FUNDING FROM THE ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN P4-400
Washington, D.C., 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: afbsec@adaptation-fund.org

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Ecuador 179

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ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category:	Regular Project/Programme
Country/ies:	Ecuador
Title of Project/Programme:	Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management.
Type of Implementing Entity:	Regional Implementing Entity (RIE)
Implementing Entity:	CAF Latin America Development Bank
Executing Entity/ies:	Ministry of Environment of Ecuador (MAE)
Amount of Financing Requested:	2,489,373.00 (in U.S Dollars Equivalent)

Project / Programme Background and Context:

1. The proposed project aims at strengthening the adaptive capacity of vulnerable populations in the Río Blanco upper watershed and develop a model of adaptation to climate change that can be replicated in similar context in the country and in the region.

Overview Río Blanco upper watershed

2. The Toachi-Pilatón (Río Blanco upper watershed) water system, a 2,154.42 km² drainage basin with a total population of approximately 74,000 people (Table 1), is a system of two drainage units that originate in the steep western slope of the Andes, and flows downhill to merge in the Blanco river. It is the southernmost sub-basin of the Esmeraldas river watershed (Ecuador's fourth largest watershed), covering 10% of the Esmeraldas drainage basin.
3. The Toachi drainage unit has four sub-basins (Map 1 in Annex 3). The Toachi river is formed by several tributaries, most of them originating in the paramos (> 3,000 meters above sea level) within the Ilinizas Ecological Reserve (e.g., river Las Juntas, river Negro, river Sarapullo). The Pilatón drainage unit is about a fourth of the size of the entire system. The Pilatón river is also formed by high altitude tributaries, some of them also originate in the Ilinizas reserve (e.g., river Negro). However, both the Toachi and Pilatón rivers have a large contribution from tributaries that accumulate and channel water from the forests located on the steep hills.

Drainage unit	Province	Canton	Parrish	Total population in the Parrish	Population within the drainage unit
Toachi	Cotopaxi	Latacunga	Toacaso	7,685	7,685
		Pujili	Guangaje	8,026	8,026
			Zumbahua	12,643	12,643
		Sigchos	Chugchilan	7,811	7,811
			Isinlivi	3,227	3,227
			Las Pampas	1,943	1,943
			Palo Quemado	1,030	1,030
			Sigchos	7,933	7,933
			Sigchos	7,933	7,933
Pilatón	Pichincha	Mejía	El Chaupi	1,456	NA
	Pichincha	Mejia	Aloag	9,237	NA
			Manuel Cornejo	3,661	3,661
			Astorga (Tandapi)		
	Santo Domingo de los Tsachilas	Santo Domingo	Alluriquin	9,725	9,725
Total population in 2010				74.377	53.959

NA = Not available, but it is known to be very small

Table 1: Population in the Río Blanco system (Source: Ecuador Population and Housing Census 2010.)

- The lower part of the system is humid with annual precipitation above 2,000 mm/year (Table 2). In contrast, the upper part of the Toachi drainage unit is much drier. In Sigchos, the annual rainfall in 2012 was about 1,130 mm. There are two marked seasons, a rainy season between December and May, and a dry season between June and October (Figure 1).

Station	Data series (years)	Annual precipitation (mm/year)	Monthly minimum (mm/month)	Monthly maximum (mm/month)
Toachi AJ Pilatón	1967-1985	2,745.8	64.8	451.7
Palo Quemado	1965-1995	2,126.8	55.5	326.4
Las Pampas	1985-2006	2,126.8	33.9	353.0
Sigchos	2012	1,130.4	5.2	247.60

Table 2: Precipitation in four meteorological stations of the Río Blanco (Toachi-Pilatón watershed) system (Source: INAMHI meteorological yearbooks)

- Two provinces and six cantons share the elements of the Río Blanco upper watershed water system. Local communities depend mostly on extensive farming characterized by low productivity, sub-optimal use of economic resources and ecosystems, and negative impact on ecosystems and community vulnerability to climate change. Extensive practices are indeed not only inefficient but they also contribute to deforestation, overexploitation of water sources and sedimentation, reduction of soil quality and further, exposing smallholders to climate hazards.

Indeed due to ecosystems degradation and low economic return, smallholders have lower adaptive capacities resulting in higher climate vulnerability.

Vulnerability is not even among groups: women, with higher poverty level and lower access to income generating activities, have fewer coping mechanism and hence they are more exposed to climate change.

6. On the Toachi side, the main activities are subsistence agriculture and extensive livestock farming. In the area of Palo Quemado, farmers cultivate sugarcane to produce panela (unrefined whole cane sugar); there are about 450 ha of sugarcane plantations, 98% of the harvest is used to produce panela (GADPRPQ, 2013). 28% of population is engaged in the production of panela. According to primary data collection there are associations in the area composed of women in their entirety. Those are San Pablo Association with 6 women, Marianita de Jesús en Las Pampas composed by 18 women and Flor de Caña Association with 47 women. Panela is more profitable than other activities, but its artisanal production is based on the use of local trees for firewood. Each farmer uses about -three trees per week- to cook and reduce the sugarcane juice, contributing to deforestation, soil erosion and increasing climate vulnerability. Moreover traditional production of panela can contribute to negative health impact, due to the respiration of inorganic compounds, and local air pollution.
7. The project will focus on but not be limited to work with women associations, aiming to improve production, supporting sustainable management of ecosystems and reducing women's vulnerability. Moreover, the project will seek replication in other communities where adequate and that includes other vulnerability groups such as children and older adults.
8. On the Pilatón side, extensive livestock farming and subsistence agriculture is

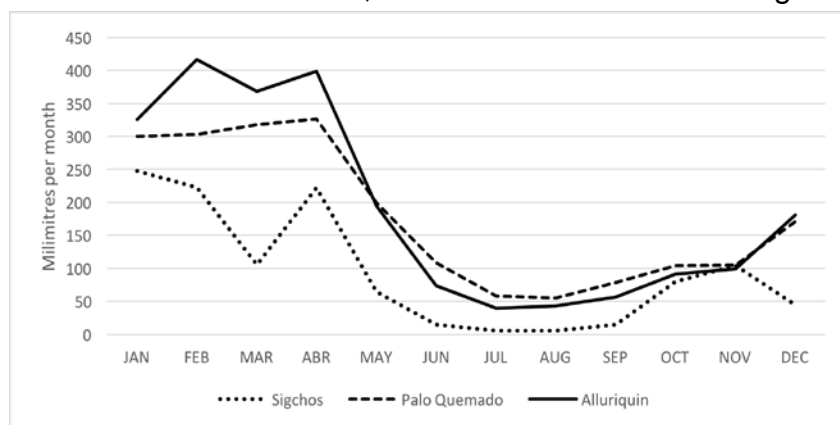


Figure 1: Monthly precipitation in three stations of the Toachi – Pilatón system (Río Blanco upper basin). Sigchos is located in the upper part of the Toachi unit (2,880 masl) (precipitation data from 2012). Palo Quemado is in the lower part of the Toachi unit (ca., 1,100 masl).

commerce and small family restaurants predominate along the Aloag – Santo Domingo road (part of route E20). This is the main road which connects the country's highlands and the coast; it runs along the west bank of the Pilatón river. Extensive livestock farming contributes to deforestation, increasing climate vulnerability, and reducing soil quality. Moreover extensive

livestock farming is economically inefficient, becoming profitable for larger properties, and hence contributing to support socio-economic inequality. The project aims to support intensification of livestock production, integration of livestock production with ecosystem conservation, e.g silvopasture production, fodder plants; resulting in economic inclusion of smaller farmers and the reduction of their climate vulnerability.

The Toachi-Pilatón hydropower station¹

¹ Information from the Hidrotoapi website at <https://www.celec.gob.ec/hidrotoapi/>

9. Rural communities, agriculture practices and ecosystems strongly depend on water access and use. To understand present and forecasted water availability is hence of major importance.
10. A hydropower plant is being built in the lower part of the Toachi-Pilatón system (i.e., HIDROTOAPI), and it is expected to initiate operation during 2019. It has two turbine systems, one based on the Toachi – Alluriquin confluence planned to produce ca. 204 MW, and the other based on the Pilatón – Sarapullo confluence planned to produce ca. 49 MW (Map 1). The total energy production will be 254.4 MW.
11. The Toachi Pilatón Hydroelectric Project in its initial studies dates back to 1963 when the National Institute of Electrification (INECEL) began a strategic policy of evaluating hydroelectric projects at various scales throughout the national territory. At the time the economic feasibility of the project was already demonstrated, however for decades it remained in plans.
12. In 1965, experts from the National Electricity Company of Chile (Endesa), proposed a development of a 108 megawatts (MW) installation. Later, in 1973 and 1974, the Swiss Consultant Motor Columbus revised the scheme and recommended to transfer the waters of the Pilatón River to the Toachi basin and install a 225 MW system, building a dam at 180 m downstream of the confluence of the Sarapullo and Toachi rivers. At the end of the 1980s with technical and financial assistance from the Canadian Government, studies were reviewed recommending a 190 MW installation. The last study in 1996 of the Egesco Consortium under the supervision of Harza Engeneering confirmed the characteristics of the project.
13. In 1997, through Executive Decree No. 18, the Provincial Council of Pichincha was granted the authority to carry out the 190 MW Toyo Pilatón Hydroelectric Project. The Provincial Council initiated a series of validations and requirements to be able to start the construction process, which ended with a neutral assessment that did not support the start of the project.
14. In 2002, the Pichincha Province Assembly resumed updating the feasibility studies in order to carry out the project, and equally carried out studies on legal, operational, administrative and technical issues of the project.
15. On August 25, 2005, the Honorable Provincial Council of Pichincha, by means of a public deed and with full powers for the formation of a corporation, subscribed the document of constitution of the denominated Hidrotoapi SA, whose main object consists in the design, construction, installation, operation and maintenance of power generation plants.
16. According to the latest Electrification Master Plan of the Ministry of Electricity and Renewable Energies (MEER) for 2016-2025, the plant will start production in 2019.
17. While the power plant will certainly have a direct impact on the socio-economic situation in the project's area of operation, and upon start of production will benefit directly from a sustainable and integrated watershed management as proposed. It is considered a co-beneficiary of the projects intended outcomes and outputs and is not expressively targeted by the project's activities. This is due to the current situation of progress of its construction and delays in recent years which led to delays in its start of operations. However, formal agreements are ongoing (Annex 1) and an environmental social risk analyses was elaborated for improving the knowledge about impact between the project and the hydroelectric central, (Annex 7).

18. Additionally, given its expected benefit generated through the implementation of the proposed project, the Hidrotoapi is identified as potential contributor to the planned establishment of an Investment Fund; and for those reasons CELEC- Hidrotoapi as consider part of the Technical Committee as support during the implementation of the project. The Investment fund targets the sustainability and development of adaptive capacity of vulnerable populations as well as the restoration and conservation of vegetational cover in the watershed and would – once the Hidrotoapi started its production – hence benefit the power plant directly.
19. In Annex 7, potential impacts of the operation of the hydrological station are presented, that will affect the ecosystems adversely and will have to be monitored closely, as suggested on a monthly basis, among others:
 - Determination of the recommended minimum ecological flow rates, i.e. the minimum flow rate recommended by the old regulation has been adopted, as 10% of the average annual flow rate through the Toachi and Pilatón rivers at the dam sites. This study will need to be updated and respective ecological flow rate regimes need to be established.
20. The actual implementation of management systems of the hydrological power station is out of the direct scope of the project, but will nevertheless be considered in the implementation of the project and resulting activities, primarily by the establishment of an investment fund, where the Hidrotoapi is expected to play a vital role by contributing to its establishment as part of the power plant's ESMP.

The socio-economic situation of local communities

21. The population has very high levels of poverty in terms of unsatisfied basic needs. Four parishes located in the upper part of the Toachi unit had poverty levels above 98% and highest level of agriculture dependency, according national census 2010:

Parish	Main Activity	Second activity	Poor Index	GINI
Aloag	Agriculture 24,2%	Manufacture industries 15,2%	28%	31%
El Chaupi	Agriculture 61,3%	Manufacture industries 7,3%	41%	29%
Manuel Cornejo Astorga (Tandapi)	Agriculture 47,8%	11,8% Commerce	64%	27%
Sigchos	Agriculture 68,6%	Manufacture industries 5,9%	62%	29%
Chugchilán	Agriculture 85,7%	Teaching 2,0%	83%	26%
Las Pampas	Agriculture 65,0%	Manufacture industries 21,7%	52%	26%
Palo Quemado	Agriculture 46,8%	Manufacture industries 28,8%	59%	26%

Table 3: Main activities by locality, based upon data from National Census (2010)

22. Even parishes with more developed economic activities like Palo Quemado, Manuel Cornejo Astorga and Aloag had poverty levels well above the national average. Poverty is a gender uneven reality, affecting more women than men.

In 2013, number of females, from the age of 20 to 59 years, living in poor households was higher than that of men, leading to a femininity index in poor households of 117.6 (CEPAL, 2013)². Lack of personal income is one of the main reasons behind high poverty ratios among women, since more than one out of every three women (35.1%

² The femininity index in poor households compares the percentage of poor women and men from the age of 20 to 59 years. Poor households typically gather a higher proportion of women in an age of a bigger productive and reproductive demand. The index shows how many times the incidence of poverty (indigence) is greater among women than among men. A figure greater than 100 means that poverty (indigence) is higher among women; a figure less than 100, the inverse situation.

from age 15 and above) do not have any sort of personal income (and no access to education beyond primary), compared to 9.1% of men (CEPAL, 2014)³.

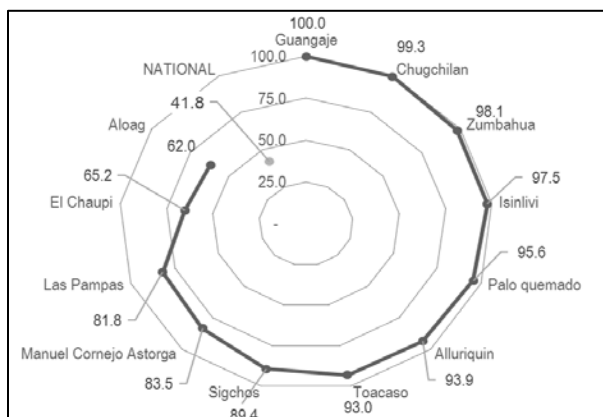


Figure 2: Poverty by unsatisfied basic needs in the parishes of Río Blanco water system (2010 census).

23. In the same line, the levels of illiteracy are above the national level (see figure 2). The highest levels of illiteracy are also concentrated in the upper part of the Toachi unit.

24. Women have higher illiteracy rates, compared to men, 21.6% compared to 19.2% respectively. Moreover, in these communities, men have more years of schooling: with on average 4.7 years of schooling for men and 4.4 years for women. This gendered bias in literacy is also present at the national level, with a wider gap in rural areas (Table 4).

Illiteracy rates			Functional illiteracy rates		Digital illiteracy rates	
Urban		Rural	Urban	Rural	Urban	Rural
Men	3.2%	4.6%	7.0%	20.2%	18.6%	34.4%
Women	10.7%	15.2%	8.9%	25.6%	24.7%	43.2%

Table 4: Illiteracy rates, Functional illiteracy rates and digital illiteracy rates (Source: Women and Gender Equality National Agenda, 2014 – 2017, based upon data from INEC (2013))

25. As per different parishes, the following figure provides an overview in the area of the project, showing the great differences and educational heterogeneity between the different parishes. This great dispersity will be taken into account when developing the awareness raising, information sharing as well as capacity building solutions within the project⁴.

³ CEPALSTAT, Gender indicators.

⁴ Executive summary, Final Environmental Impact Study, Toachi - Pilatón hydroelectric project

26. Illiteracy also affect the level of financial literacy of vulnerable propulations, usually limiting the capacity to embrace the basics of investment decision, especially with respect to the decision of investing in new technologies. Therefore, the project will also address basic components of economic analsys of suitable adaptation measures.

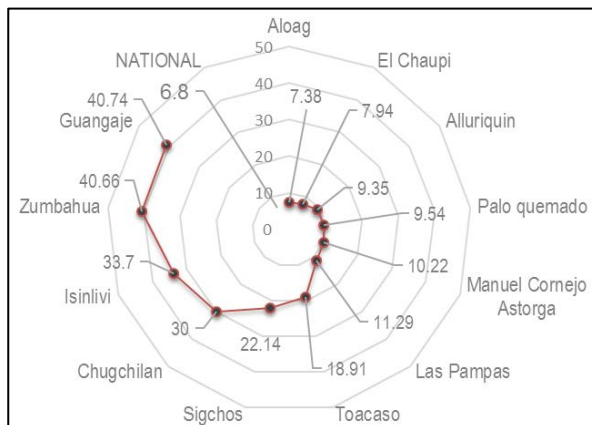


Figure 3: Percentage of illiteracy in the parishes of the Río Blanco water system (2010 census).

27. A major focus will be laid on the capacity development of women as household leaders to disseminate a deep understanding of adaptation economics and this is especially important, as women play a vital role in ensuring and managing access to water

and the household's food security (see annex 9).

Climate change effects

28. Climate change will affect local communities in the Río Blanco water system by reducing water provision for human consumption, farming production and hydroelectric energy production. Women are forecasted to be more vulnerable to these changes. They are usually indeed in charge of domestic chores, such as harvesting water and food safety, and most of the times they also do most of agricultural work. This uneven allocation of water dependent activities between men and women, exposes women to higher risks concerning lack of water provision (UNEP, 2011)⁵.

29. Figure 4 summarise the situation and the interaction with human pressures.

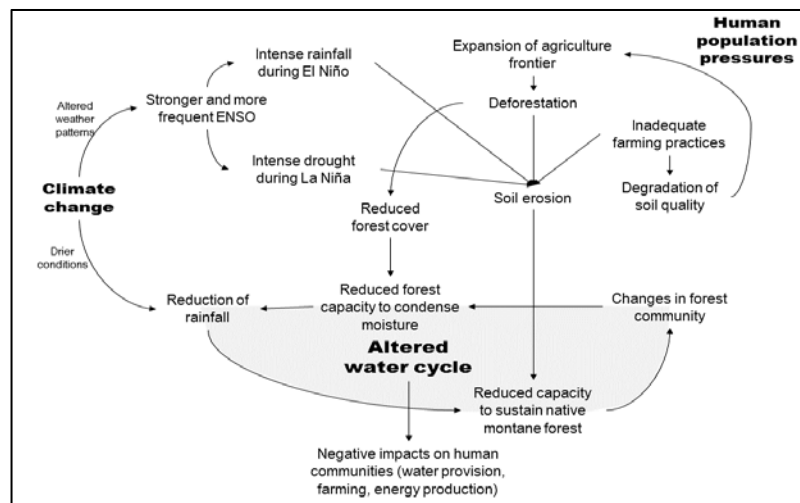


Figure 4. Conceptual diagram of climate change impacts on the water cycle of the Río Blanco water system.

⁵ Women at the frontline of climate change. Gender risks and hopes. UNEP, 2011.

Climate vulnerability of local communities

30. In the lower part of the drainage system, mainly along the hillsides, it is common to have frequent landslides mainly during the rainy season. The area along the Pilatón river has high risk of both landslides and flooding (Jiménez, 2013; Proaño, 2015). Landslides are frequent along the Aloag – Santo Domingo road. Younes & Erazo (2016) found that landslide susceptibility along this road is related to active erosive processes, soil condition and rainfall between 1,500 and 1,750 mm. Road closures and traffic restrictions produce important economic losses and access problems to local communities. On April 2015, the road was closed for 20 days and isolated the locality of Tandapi. Landslides and flooding are aggravated during El Niño conditions.
31. During the 2015 / 2016 El Niño, there were frequent and large landslides along the Aloag – Santo Domingo road. Only in April 2016, there were about 25 landslides.
32. The hillsides in the lower part of the drainage system maintain large areas of natural and intervened montane cloud forest, which are important for the water cycle and biodiversity (Annex 3-Map 2). The rest of the system is mostly used for agriculture and extensive livestock farming.
33. The forest cover is mostly included in two Protected Forests⁶: (1) Toachi – Pilatón (BP156) and (2) Sarapullo (BP165). The Toachi – Pilatón Protected Forest was created in 1987, and is a large area of about 212,000 ha. The Sarapullo Protected Forest (BP165) was created in 1986, it covers 21,585 ha. In addition, there are several private reserves that are trying to develop services like trail hiking and bird watching. The forest area has a high biodiversity conservation value. There are populations of puma (*Puma concolor*) and the spectacled bear (*Tremarctos ornatus*), which are classified, respectively, as vulnerable and endangered in Ecuador's IUCN red list of threatened species. The main threat to these species are habitat loss caused by deforestation, and hunting by farmers. In addition, a major part of the drainage system is an Important Bird and Biodiversity Area⁷ (IBA).

Climate change effects on the Hydropower station

34. The Ministry of Environment (MAE) has found that the Río Blanco water system will be strongly affected by climate change, it is foreseen that future changes in climate conditions will result in an overall marked reduction of rainfall.

⁶ Protected Forest are areas established by the Ministry of Environment with the main purpose to conserve watersheds and water sources and to contribute to protect wildlife. These can be public or private land, and managed by public entities or private landowners. The protected forests are not considered a protected area, and do not integrate the national system of protected areas.

⁷ The Pilatón drainage unit is part of the Rio Toachi – Chiriboga IBA (EC044) which cover 68,000 ha (Birdlife International, 2016). The area houses about 450 bird species, including *Pachyramphus spodiurus* which is endangered. The lower part of the Toachi drainage system is part of the Reserva Ecológica Los Ilinizas y alrededores IBA (EC045) which cover 150,900 ha (Birdlife International, 2016a). This IBA house about 257 bird species.

In addition, it is anticipated that climate change will produce stronger and more frequent El Niño–Southern Oscillation (ENSO)⁸ events (Cai et al., 2014; Cai et al., 2015). Therefore, during El Niño conditions heavy rainfall will exacerbate landslides, erosion, river sedimentation and floods. But, during La Niña conditions, there will be severe drought. These changes, alone, will be sufficient to alter the structure of the native montane cloud forests, which capture cloud moisture and feed streamflows. However, ongoing human pressures will exacerbate the impacts of climate change. The two main drivers are deforestation and soil erosion.

35. In 2014, MAE analysed the climate change risk in the watersheds where major hydroelectric plants are based⁹. In the Río Blanco system it was found that:
 - I. The change in rainfall patterns projected into future scenarios under the effects of climate change in the watershed's recharge zone has a clear downward trend, indicating and resulting in a clear reduction of water volumes (Map 3, Annex 3).
 - II. Today, the main drivers of deforestation and degradation in the basin are the expansion of pastures for livestock and small-scale agriculture. The changing trends in land use and land cover in the watershed due to human pressures such as deforestation and expansion of the agricultural frontier scenarios point toward soil degradation in the basin, which produces, under the effects of climate change, an altered hydrological cycle with its resulting lower retention of sediments under extreme weather events, as well as a clear and observable increase of sediments in the basin in future periods (Map 4, Annex 3).
36. For the previously mentioned diagnostic and projection of climate change study in the areas of interest, MAE used two lines of climate modelling:
 - An assemblage of about 23 global models provided under the CMIP5 project (MAE, 2015), and
 - The regional model REMO adjusted by the CIIFEN-MAE 2014.
37. In order to capture smaller-scale processes, limited area climate models, nested within global models ("downscaling"), were used in such a way that it is assumed that local phenomena are based on large-scale patterns resolved in global models. This work employs the regional high resolution climate model REMO-RCM (Max Planck Institute for Meteorology in Hamburg) under the framework of the CORDEX project. The modelling was carried out within three analysis periods (2016-2035; 2046-2065; 2081-2100). The climate scenarios analysed with the REMO model are the three representative pathways of concentration which, in order of emissions levels, are: CPR2.6, RCP4.5, and RCP8.5.

⁸ Irregularly periodical variation in winds and sea surface temperatures over the tropical eastern Pacific Ocean, affecting much of the tropics and subtropics. The warming phase is known as El Niño and the cooling phase as La Niña.

⁹ Project "Analysis of the vulnerability of flagship hydropower plants to the effects of climate change" (CHECC). The project was executed by MAE in collaboration with Ministry for Coordination of Strategic Sectors (MICSE), Ministry of Electricity and Renewable Energy (MEER), National Water Secretariat (SENAGUA), National Meteorological and Hydrological Institute (INAMHI), and the Electric Corporation of Ecuador (CELEC).

38. The periods and scenarios studied pointed towards a marked reduction in rainfall, which will result in a significant reduction in the flow available at the intake points of the hydroelectric plant.
39. The results obtained for temperature and precipitation readings in the feeder watershed were used as inputs for modelling flow and sediment through the Soil and Water Assessment Tool (SWAT) model. The modelling indicates that the sediments, under the effects of future climate change scenarios, will increase to about twice the current level in the hydropower station's water intakes.
40. Reduction of water availability, soil and ecosystems degradation, and extensive farming practices requiring higher volume of water, further expose local communities to food insecurity and poverty traps.
41. Climate change will hence contribute to worsen the already fragile conditions of communities living in the area.
42. Moreover monitoring capacity for weather or climate is poor in watersheds. The Toachi basin has indeed a bad monitoring system: with few meteorological stations, minimum gauging stations and no sediment stations. Therefore, it is not possible to track the flow and sediment and it is not possible easily anticipate with certainty the events.
43. In the lower part of the water system, deforestation is caused by expansion of extensive agriculture and livestock farming. Farmers invade the forests and riversides¹⁰ mainly to expand grazing areas for livestock and subsistence agriculture. Another factor which contributes to deforestation is that sugarcane farmers depend on firewood for artisanal panela production.
44. In general, farmers use inadequate agriculture practices which produces soil depletion, this reduces production and motivates further expansion of the agriculture frontier. All this contributes to soil degradation, soil erosion, and a reduction of vegetated areas.
45. As observed in other regional contexts, economic poverty regularly induces ecosystem degradation, while ecosystem degradation generates and maintains poverty traps. For example, low technification of agriculture practices leads to over-exploitation of agriculture frontier lands, while soil degradation reduces agriculture yields (leading to expansion), reduces soil cover and hence exposes plots to higher vulnerability to temperature and rain variability.
46. The foreseen reduction in runoff and the increase in sediments (from hillside erosion) will also affect HIDROTOAPI. MAE has estimated that its susceptibility may lead to a decrease of > 25% of its current annual projected generation capacity, and it may be exposed to greater risk due to reduced water flow and increased sediments.

¹⁰ According to the Ecuadorian legislation, riversides are public domain and cannot be used in order to protect the water sources.

Effects on local communities

47. Adaptation to climate change is a major challenge for local communities. The main barriers that limit adaptation in the lower basin of the Río Blanco water system are:

- Local population are not fully aware of climate-related impacts. The interviews with local stakeholders revealed that there is no clear understanding of the probable impacts to be generated by the climate change. The future climate scenarios and the probable worsening of existing risks are not in the common dialogue. This contributes to the fact that local population does not demand that elected authorities address adaptation as a priority matter.
- Local development plans do not incorporate adaptation measures. Local plans (i.e., parishes and municipalities) mention climate change, but do not have specific actions to adapt living conditions to the future scenarios nor to take action to address key drivers like deforestation, land use change and invasion of riversides. Regularly, these plans do not take a gender perspective into consideration, leaving women more exposed to climate change.
- Local production is based on extensive farming practices. Most farmers have small plots (<20 ha per plot) with very low yields and, in general, apply inadequate agriculture practices. Primary data collection allowed to identify relevant associations in the project area, developing economic activities in agriculture and animal husbandry (mainly livestock farming). These associations are currently involving groups of women, due to their active role in subsistence agriculture activities, their sensitivity for changes observed in the ecosystems, and also for their leadership role in their families.

48. Table 5 shows the important role of women in the project area, as well as their influence to develop activities related to climate change adaptation:

Parish	Association	Number of women respondents	Number of women owning land	Main economic activities	Type of crops produced
Palo Quemado	San Pablo	6	6	Panela production	sugarcane
Palo Quemado	Flor de Caña	47	NA	Panela production	sugarcane
Palo Quemado	Marianita de Jesús	18	18	Agriculture	sugarcane
Las Pampas	Las Marianitas	19	19	Livestock silage	pastures
Las Pampas	Naranjito	7	7	Livestock farming for meat production	sugarcane, pastures
Las Pampas	Aso Ganaderos	12	12	Livestock farming for meat production	sugarcane, pastures, naranjilla
Las Pampas	Asopam	15	15	Panela production	sugarcane, pastures
Las Pampas	Sembrando un futuro	5	5	Livestock farming for meat production	sugarcane, pastures, naranjilla
Las Pampas	Campo Verde	6	6	Livestock farming for meat production	sugarcane, pastures

Table 5: data collected during group discussions in workshops presentation and discussion of final project proposal (see Annex 4, C)

49. In Palo Quemado ca. 50% of the farmers only have subsistence production. Livestock farmers use extensive grazing; livestock produce about 7 litres of milk / day. It is common to clear forests to expand the grazing and agriculture areas. Sugarcane farmers clear forests to obtain firewood for panela production. At the same time these producers indicate, that the availability of the required firewood is increasingly limited, hence a more efficient and sustainable production of panela is welcome by the target co-executors of the project.
- Forest areas are not protected. The large protected forests, that are public property, are not managed and guarded. Therefore, extensive areas have been invaded and cleared to establish farms. Land tenure is an additional related issue, because invaders claim possession rights to the municipal and central governments. Private landowners of forest areas also face pressure from illegal farmers. The extent of the invaded area is unknown. Conservation Bio-corridor¹¹ will be implemented as a strategy for conservation of biodiversity, land management and sustainable development in the project area that includes an improvement of land tenure. Part of the project includes watershed population training with at least 50% of women participation. Evidence shows that women participation in forest protection mechanisms (committees, meetings, forest management and guards) leads to higher control rates. Hence, it is important to train women to be part of forest protection personnel, to assure forest protection.
 - Limited climate-related information. The monitoring of hydro-meteorological variables within the watershed has limitations in terms of quality and availability, generating less understanding of the behavior of water flows and sediments in the basin. The National Meteorological and Hydrological Institute (INAMHI) has eight meteorological stations in the Río Blanco water system (Map 5), but only two (i.e., M0362 Las Pampas, M0363 Sigchos) are operational.

Project design

50. The present project will contribute to address these barriers by developing practical adaptation actions to strengthen the resilience of local communities in the upper and middle basin of the Toachi – Pilatón water system located at the Río Blanco upper watershed (i.e., subbasins 1, 2 and 3 indicated in Annex 3):
1. To conserve forest cover, to sustain the hydrological cycle and prevent as much as possible a reduction of rainfall, and to protect hillsides from erosion.
 2. To introduce sustainable farming practices to increase the yield per hectare, in order to introduce land use efficiency and sustainability and in consequence reduce the expansion of the agriculture frontier, as well as to limit soil erosion and deforestation.

¹¹ Bio Corredores are the main strategy of the Ministry of Environment of Ecuador's approach to landscape management, biodiversity and sustainable development.

These activities can be a useful mean to empower women or women's groups within their communities, and to serve as development model for sustainable community development.

3. To mainstream adaptation into local development plans and engage the local population by increasing awareness of the impacts derived from climate change as well as for potential adaptation strategies.

51. Table 6 summarises specific actions to address the key barriers that have been identified.

Main barriers that limit adaptation	Project actions to address the main barriers
Local population are not fully aware of climate-related impacts.	To implement a public communication and education plan on the six parishes of the upper and middle basin of the Toachi – Pilatón water systems (Río Blanco upper basin) (output 7).
Local development plans do not incorporate adaptation measures.	To work with parish councils to mainstream climate change adaptation, with a gender perspective, into the parish development plans of the six parishes of the upper and middle basin of the Río Blanco water systems (output 6). The six parishes are: (1) Manuel Cornejo Astorga, (2) Aloag, (3) El Chaupi, (4) Palo Quemado, and (5) Las Pampas (6) Sigchos
Local production is based on extensive farming practices.	To work with local farmers, women and men, to introduce best practices to reduce deforestation, land degradation and improve adaptive capacities (outputs 1 and 3). The key groups to work with are livestock and sugarcane producers. Female farmers will be specifically targeted.
Forest areas are not protected.	To strengthen the means to conserve forest and vegetation cover in the watershed. Act on two fronts: 1. To work with local landowners to incentive the conservation of ca., 1000 ha of native vegetation (output 1). It will be necessary to provide incentives; the idea of establishing an investment fund (output 5) to support investment in adaptive capacities for the communities. 2. To strengthen the means to conserve the vegetation of the two existing protected forests and new areas under the Bio-corridor and ACUS categories (Toachi – Pilatón and Sarapullo, about 230,000 ha in total) (output 2).
Limited climate-related information.	To generate and disseminate hydro-meteorological information by potentiating and expanding INAMHI's hydro-meteorological network (output 6) Diffusion of best adaptive practices thanks to appropriate training (output 8), institutional learning (output 4), and diffusion of best practices through education, knowledge transfer (output 8) and lessons learnt in the project thanks to knowledge management platforms (output 9).
Difficulty of access to credit for sustainable productive activities	To work with at least 2 financial institutions supporting them to introduce specific solutions to finance adaptation (output 4). Systematically include in the credit assessment the evaluation of climate and environmental risks, aiming to integrate sustainable and climate adapted practices in the whole operations of financial institutions. Development smart incentives for finance adaptation.

Table 6: Proposed actions to address the key barriers that limit adaptation in the lower basin of the Toachi – Pilatón water system (Río Blanco upper basin)

52. The project targets to develop, test and implement solutions which will be established beyond the duration of the proposed project to ensure a sustainable approach to community- and ecosystem-based adaptation to climate change. To that end, it will incorporate successful solutions tested in comparable projects or programs in the region and elaborate solutions which can be replicated within Ecuador and beyond.

Project / Programme Objectives:

53. The proposed project general aims at strengthening the adaptive capacity of vulnerable populations, ecosystems and hydroelectric systems in the Río Blanco upper watershed and develop a model of adaptation to climate change that can be replicated in similar context in the country and in the region. The specific objectives of the Project are:
- Reduce the impact of climate change on the hydrological cycle under integrated watershed management
 - Promote sustainable agricultural practices adapted to the new conditions of climate change and efficient technology in production processes supported by credit.
54. The proposed project aims to develop multi-stakeholder coordination and implementation mechanisms to foster ecosystem- and community-based adaptation of vulnerable communities in the Río Blanco upper watershed.
55. The project focuses on key drivers that will create adverse impacts from climate change or generate opportunities that concern the most vulnerable populations. The expected mid-term impacts are improved enabling conditions to sustain forest cover and sustainable small-scale farming in the area, with a gender perspective. In the long-term, it is expected that the project's activities will result in improved adaptive capacity of the target farmers, ecosystems and hydroelectric systems. The farmers, as well as their communities, are understood as co-executors of the project and its key target.
56. Learning generated in the proposed project will be structured to be replicable and provide marketable solutions that can be applied in other watersheds or regions in the country and even beyond.
57. It is the explicit aim of both implementing as well as executing agency to integrate lessons learned from similar initiatives in the region and globally and combine proven solutions in a new set-up to strengthen the global learning process on successful ecosystem-based adaptation to climate change.

Project / Programme Components and Financing:

Project/Programme Components	Expected Outcomes	Expected Concrete Outputs	Amount (US\$)
1. Conserve vegetation cover	1. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management	1. 1,000 ha of native vegetation is conserved by sustainable forest management and conservation mechanisms.	500,000
		2. Improved management of existing protected forests and private conservation areas (ca. 230,000 ha)	450,000
2. Adapt farming practices to new climate change conditions and enable their sustainable climate smart financing	2. Sustainable farming practices and livestock adjusted to local realities are being introduced and implemented with assistance of financing mechanisms for adaptation measures	3. 250 ha of pasture and 250 ha of crops apply sustainable farming practices	340,000
		4. At least 2 institutions have introduced specific solutions and credit assessments to support the disbursement of credits for adaptation, integrating environmental and climate risks in their operations.	80,000
	3. At least 1 long term financing mechanisms has been piloted or introduced	5. One investment fund to promote sustainable development is set up and operational	420,000
3. Strengthen local capacities and share lessons	4. Local population and parish governments with increased capacity to implement climate change adaptation measures.	6. At least 6 parishes being built capacities and prepared to manage and use meteorological information.	160,000
		7. Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.	80,000
		8. Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms and markets. Plus training on adaptation finance to financial institutions.	120,000
		9. Systematisation of information gathered during the whole project design and implementation using existing informatics platforms	40,000
Total Component Cost			2,190,000
Project/Programme Execution cost			180,000
Total Project/Programme Cost			2,370,000
Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)			119,373
Amount of Financing Requested			2,489,373

Projected Calendar:

Milestones	Expected Dates
Start of Project/Programme Implementation	06/2018
Mid-term Review (if planned)	05/2020
Project/Programme Closing	06/2022
Terminal Evaluation	06/2022

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Project components

58. The project strategy focuses on implementing actions that will minimize, as much as possible, the foreseen impacts of climate change in the Río Blanco water system as presented in Part I. The main conceptual frameworks will be a sustainable livelihoods approach (Chambers & Conway, 1991; Scoones, 1998), Ecosystem-based Adaptation¹² (EbA), Community based Adaptation¹³ (CbA), and watershed management approach for climate change adaptation with a gender perspective.
59. The main rationality to base the intervention on ecosystem and community based strategies is that: ecosystems have strong influence on the vulnerability of (especially poor rural) communities, while communities naturally use to develop coping strategies to reduce their vulnerability. Rural communities depend on the conservation of ecosystem and the direct participation of communities to adaptation strategies is key to support sustainable intervention in the realm of climate change adaptation. Hence, this project aims to support adaptation through conservation of ecosystem and capitalizing on local knowledge and participation of local communities.
60. The project is organized into three components and four outcomes. 9 concrete outputs will be produced. The multiyear work plan will be developed during project preparation.
61. Conservation practices that reduce the impacts of climate change on the Río Blanco upper basin flows are based on the maintenance and management of public and private conservation areas, as well as the increase of 1,000 ha of native vegetation.

¹² Ecosystem-based adaptation uses biodiversity and ecosystem services in an overall adaptation strategy. It includes the sustainable management, conservation and restoration of ecosystems to provide services that help people adapt to the adverse effects of climate change (CBD, 2009).

¹³ Community-based adaptation (CbA) "is a form of adaptation that aims to reduce the risks of climate change to the world's poorest people by involving them in the practices and planning of adaptation" - Tim Forsyth, LSE - (see for example UNDP, GEF)

The private conservation categories must comply with the technical studies and a management plan and it will not necessary be formally part of the SNAP (National System of Protected Areas) meanwhile the public declarations¹⁴, in addition to the management plan and technical studies, it must be formalized through a declaratory from the local governments, this can be part of the SNAP. As a basis, the, Bio-corridors and ACUS scheme¹⁵ and the exclusive competences of land use granted to the municipal governments (GAD, for its Spanish abbreviation of “Gobiernos Autonomos Decentralizados, “autonomous decentralized governments”) will guide adaptation activities in respect to the conservation of the vegetation cover.

62. The following chart and subsequent paragraphs provide an overview on the main adaptation categories and strategies that will guide the project’s activities:

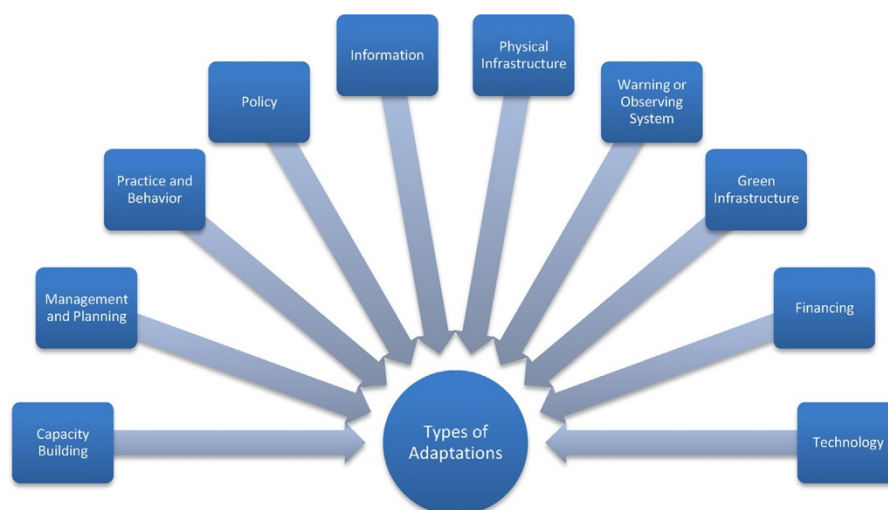


Figure 5: Adaptation to Climate Change categories, adapted from GEF, (2014).

63. The above presented adaptation categories can be specified as presented in the following table:

Adaptation category	Description	Examples of actions in category	Similar classification in literature
Capacity Building	Developing human resources, institutions, and communities, equipping them with the capability to adapt to climate change	Training/workshops for knowledge/ skills development, public outreach and education, dissemination of info to decision makers/stakeholders, Identification of best practices, training materials.	Educational/informational (Smit and Skinner, 2002; Wilbanks and Kates, 1999; Huq et al., 2003; Smit et al., 2000; Carter et al., 1994; Tompkins et al., 2010)

¹⁴ Legal instrument of territorial planning

¹⁵ ACUS – Areas de Conservación y Uso Sostenible, areas of conservation and sustainable development, a main instrument of the Ministry of Environment of Ecuador to landscape management.

Adaptation category	Description	Examples of actions in category	Similar classification in literature
Management and Planning	Incorporating understanding of climate science, impacts, vulnerability and risk into government and institutional planning and management	Developing an adaptation plan, livelihood diversification, drought planning, coastal planning, ecosystem-based planning, changing natural resource management	Administrative/institutional/organizational (Smit and Skinner, 2002; Wilbanks and Kates, 1999; Huq et al., 2003; Smit et al., 2000; Carter et al., 1994; Tompkins et al., 2010) Behavioral (Smit and Skinner, 2002; Wilbanks and Kates, 1999; Huq et al., 2003)
Practice and Behavior	Revisions or expansion of practices and on the ground behavior that are directly related to building resilience	Soil/land management techniques; climate-resilient crops or livestock practices, post-harvest storage, rainwater collection, expanding integrated pest management	Behavioral (Smit and Skinner, 2002; Wilbanks and Kates, 1999; Huq et al., 2003)
Policy	The creation of new policies or revisions of policies or regulations to allow flexibility to adapt to changing climate	Mainstreaming adaptation into development policies, land-use specific policies, improvement of water resource governance, revised design parameters, ensuring compliance with existing regulations	Legislative/Legal (Smit et al., 2000; Carter et
Information	Systems for communicating climate information to help build resilience towards climate impacts (other than communication for early warning systems)	Decision support tools, communication tools, data acquisition efforts, digital databases, remote communication technologies	Infrastructural/structural (Smit et al., 2000; Carter et al., 1994) Educational/informational (Smit and Skinner, 2002; Wilbanks and Kates, 1999; Huq et al., 2003; Smit et al., 2000; Carter et al., 1994)
Physical infrastructure	Any new or improved hard physical infrastructure aimed at providing direct or indirect protection from climate hazards	Climate-resilient buildings, reservoirs for water storage, irrigation systems, canal infrastructure, sea walls	Infrastructural/structural (Smit et al., 2000; Carter et al., 1994)
Warning or observing systems	Implementation of new or enhanced tools and technologies for communicating weather and climate risks, and for monitoring changes in the climate system	Developing, testing and deploying monitoring systems, upgrade weather or hydro-meteorological services	Research and development (Smit et al., 2000; Carter et al., 1994)

Adaptation category	Description	Examples of actions in category	Similar classification in literature
“Green” infrastructure	Any new or improved soft, natural infrastructure aimed at providing direct or indirect protection from climate hazards	Revegetation, afforestation, woodland management, increased landscape cover	Infrastructural/structural (Smit et al., 2000; Carter et al., 1994)
Financing	New financing or insurance strategies to prepare for future climate disturbances	Insurance schemes, microfinance, contingency funds for disasters	Financial (Smit and Skinner, 2002; Wilbanks and Kates, 1999; Huq et al., 2003; Smit et al., 2000; Carter et al., 1994); Market mechanisms (Smit et al., 2000; Carter et al., 1994)
Technology	Develop or expand climate-resilient technologies	Technologies to improve water use or water access, solar energy capacity, biogas, water purification, solar salt production	Technological (Smit and Skinner, 2002; Wilbanks and Kates, 1999; Huq et al., 2003; Smit et al., 2000; Carter et al., 1994)

Table 7: Overview adaptation categories

64. The proposed project intends to address all these relevant adaptation dimensions, though to differing extents in the actual implementation.

Adaptation concept and indicators for Adaptive Capacity

65. The adaptive capacity of vulnerable populations defines their vulnerability against adverse climate change impacts as a function of their exposure and sensitivity to such impacts. Figure 6 visualizes the dynamics between these components. Vulnerability results as the sum of Exposure plus Sensitivity minus Adaptive Capacity¹⁶. By “vulnerability”, we mean the propensity or predisposition to be adversely affected; by “exposure” we mean a “fixed” reality consisting in climate hazards, temperature, precipitation, soil type, etc.; by “sensitivity” we mean a “variable” reality consisting of the inherent sensitivity of the economic activity to specific exposure, as for crop sensitivity to temperature oscillations; by “adaptive capacity”, we refer instead to the ability of a system to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences, namely how are exposure and sensitivity managed.

¹⁶ Partially taken from Christoph Jungfleisch’s presentation “MEbA – Understanding Climate (Change) Risks, Financing Adaptation”.

66. Being exposure external and sensitivity inherent to the economic practice, ecosystem based adaptation works on increasing adaptive capacities to decrease community and ecosystem vulnerability as presented in Figure 6.

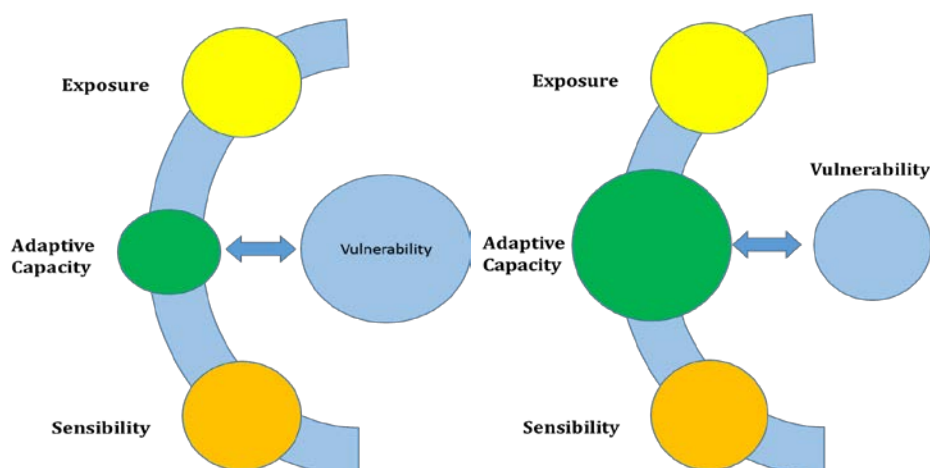


Figure 6: Influence of adaptive capacity on climate change vulnerability. Source: Engle (2011). Adapted from: Aguirre et. al. (2015).

67. The project will integrate the measurement of the adaptive capacity via established indicators that will be developed or drawn from similar approaches in the region and the national vision (MAE), mainly The National Adaptation Plan and current projects in Ecuador. Set of tools that promote the Evaluation & Monitoring and Measuring, Reporting and Verification (MRV). The present project will capitalize on such experience and define the adaptations indicators tailored to the target population and ecosystem for the project.
68. In the framework of its National Adaptation Plan, the country is developing a proprietary system for Monitoring and Evaluation of adaptation measures which will be taken into consideration, and if applicable, form the basis for the project's monitoring and evaluation activities.
69. These indicators will assess the evolution of the adaptive capacity of smallholder farmers over time. The project will promote their inclusion into day-to-day operations of project stakeholders and promote the creation of crowd-sourced insights into the target communities' adaptive capacity.
70. If applicable, and depending on subsequent coordination, the project will coordinate and include in its field activities the application and integration into operational processes of international best practices to measure the adaptive capacity of vulnerable populations, especially small farmers and cattle ranchers.
71. An example is the EbA capacity index developed by the UN Environment's MEbA project¹⁷, that allows institutions addressing the target populations as mentioned above to gather relevant data in three dimensions to generate an index that expresses a given unit's (productive unit, household) capacity to confront climate change based on Ecosystem-based Adaptation principles in three dimensions:

¹⁷ See here an overview: http://unepmEbA.org/fileadmin/user_upload/english/EbA_capacity_indexeng.pdf

- Socio-economic dimension: assessing available infrastructure and services, financial situation and social or community integration
 - Productive dimension: assessing the productive reality of the agricultural production with respect to soil quality, farming practices and integration into agricultural value chains
 - Environmental dimension: assessing the farm's or household's management of water, waste and pests among others
72. The gathering of relevant data will be integrated into field operations and processes wherever the project interferes with the target populations via
- Financing activities and credit assessment
 - Provision of technical assistance to strengthen productive processes
 - Monitoring and Evaluation activities
73. Based on this data analysis process, the project will not only be able to systemize and quantify its Monitoring and Evaluation activities across all field operations, but establish a system that allows for a monitoring of the evolution of farming practices in the area of the project over time, during and after the project implementation phase.
74. Resulting insights will be used to inform the communities in the area of the project via the channels and media presented in Component 3, and hence contribute to generate relevant knowledge to be shared with the communities in the upper Rio Blanco watersheds.
75. The capacity building resulting from such knowledge sharing will be focusing on informing target populations on:
- EbA conform and efficient agricultural practices that strengthen the health of ecosystems as the basis for sustainable agricultural production systems
 - Statistical analysis of effective agricultural practices under adverse climate change impact influence by combining data from weather stations in the watershed and data on applied agricultural practices resulting from field data gathering activities described above
 - Cost-benefit analysis resulting from a close monitoring of yield levels as a function of implemented farm practices
 - Perceptions within the community on adverse climate change impacts as well as preferred adaptation measures being implemented or carried out following the generation of crowd-sourced insights

Criteria for selecting project activities and beneficiaries

76. The selection criteria for project activities to the different components was based on a triangulation methodology, which results from the interaction between documentary information, a review of the regulatory framework, and validation of actions with co-executors in field workshops, in general this component will considerate gender equality and empowerment of women, the project will encourage the participation of women and vulnerable groups during project activities, trough the gender actin plan (Annex 9). Summarized in the following diagrams:

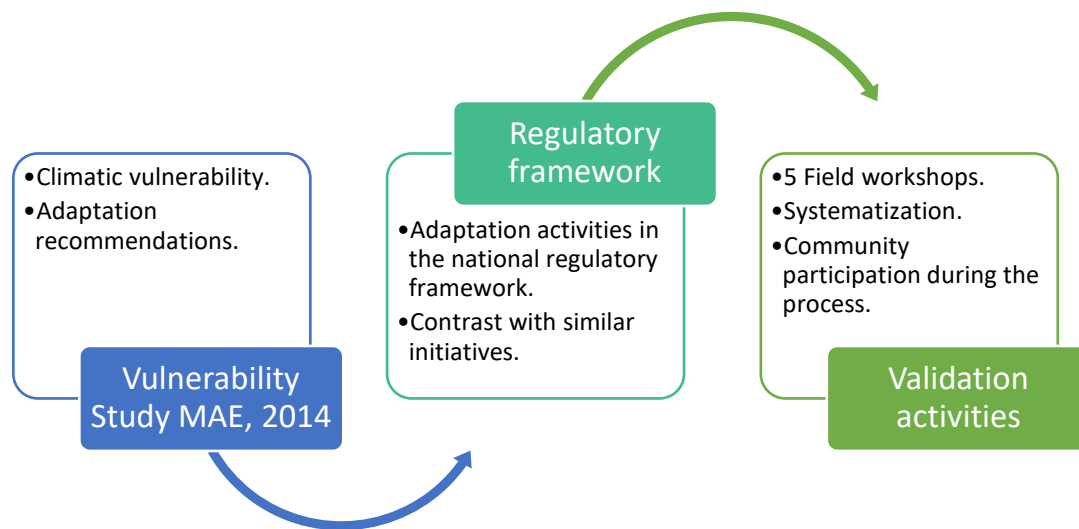


Figure 7-A: Methodology to define project actions

- a. For the beneficiaries selection the process includes the support of technical study (Annex 10), which includes an analysis of the social and environmental conditions of the basin based in the 2016 Population Census. To define the beneficiaries of the project, the following aspects will be considered:
 - i. Location of defined villages to participate.
 - ii. Obtain population data of each point in relation to the census sector where it is located.
 - iii. Vulnerable areas.
 - iv. Location of the measurements.
 - v. Deforestation 2014-2016 and
 - vi. Data of the 2010 population census (INEC).

Summarized in the following diagram:

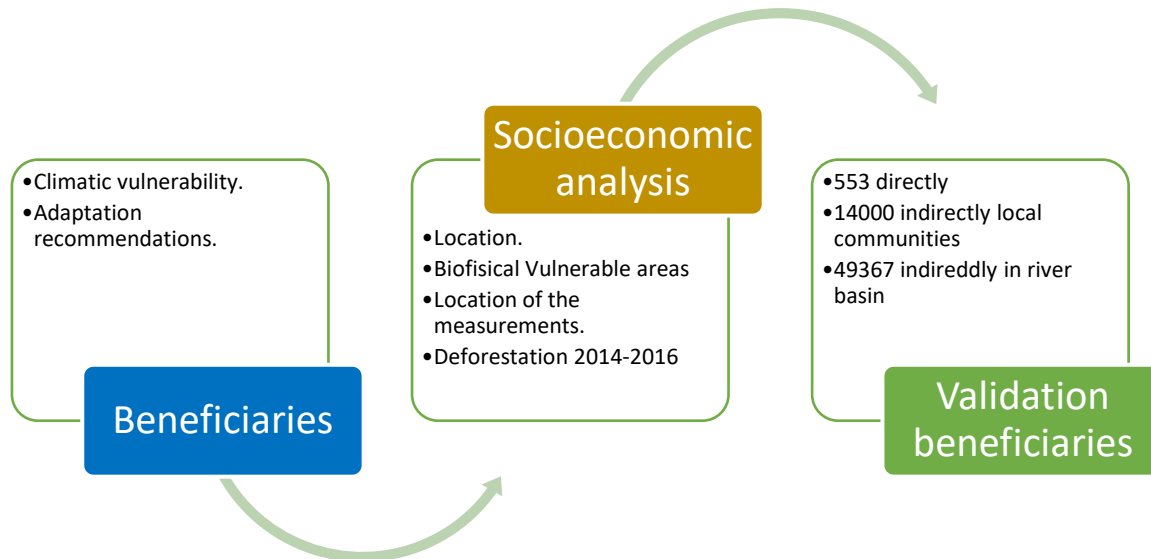


Figure 8-B: Methodology to define beneficiaries

- b. The criteria for prioritizing beneficiaries are analyzed with respect to vulnerability to climate change and social vulnerability that includes the socio - demographic - economic factors facing the beneficiary population. By linking the characteristics of the population such as: poverty, indigenous groups, minorities, disabled people and gender.
- c. The social vulnerability index is a measure proposed by the UNDP that refers to the sum of the circumstances that affect population groups, which limits their ability to fend for themselves. The factors associated with social vulnerability expressed as demographic indicators that make up the IVS are the following:
 1. The number of illiterates is an indicator of the level of delay in the educational development of a society, especially in the case of the most vulnerable groups of the population; hence the importance of associating this indicator with variables such as residence, ethnicity, age group and sex.
 2. Malnutrition is a multi-causal phenomenon directly associated to: deficiencies, excesses or imbalances in the diet; inadequate cultural habits; precarious health services; to a poverty that limits access and capacities to acquire food; as well as marginalization that does not allow access to food, among other factors
 3. The incidence of poverty refers to the deprivation of people or homes in the satisfaction of their basic needs.

4. Infant mortality, that is, the probability that children have to die during their first year of life.
5. Ethnicity refers to the cultural values and practices that distinguish groups or communities.

Summarized in the following diagram:

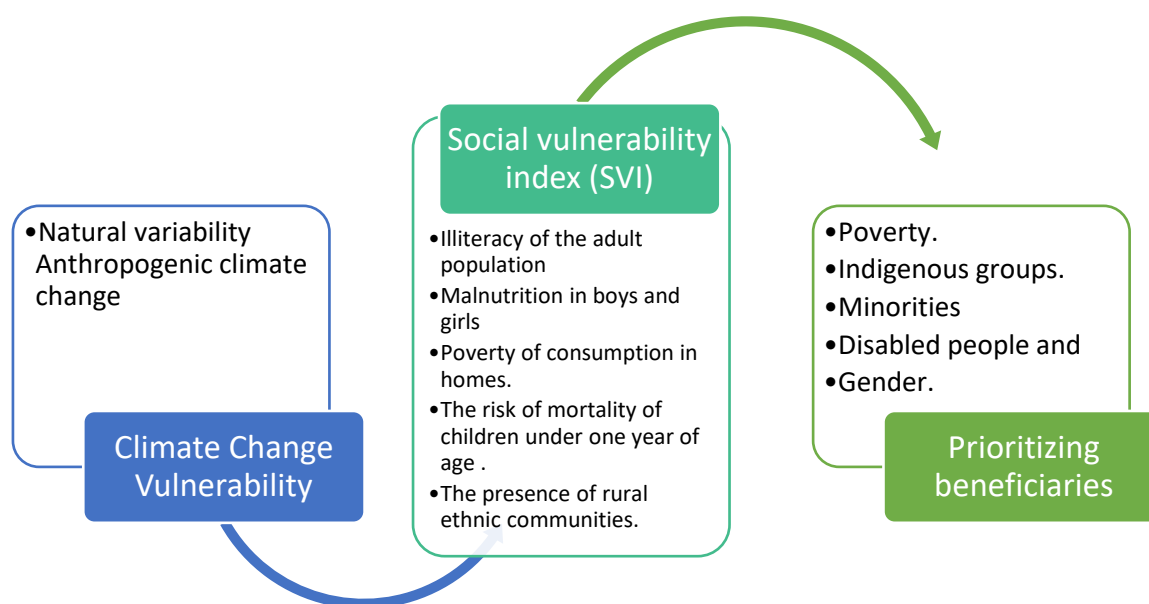


Figure 9-C: Methodology to define beneficiaries

Criteria for selecting project EbA measures

77. EbA measures are generally cost-effective. In addition to their role in reducing vulnerability and increasing the resilience of biodiversity, they tend to generate valuable additional benefits; among them: disaster risk reduction, maintenance of livelihoods and food security, carbon sequestration, water availability. On the types of agricultural practices that will be considered for the deployment in the target areas, the selection criteria of adaptation to climate change based on Ecosystems will be taken with the purpose of:
 1. Reduce the pressure on the ecosystems and the services they provide.
 2. Increase the social or economic resilience of human populations vulnerable to climate change.
 3. Reduce risks associated with climatic events in productive activities.
 4. In its implementation, protect, restore or use biodiversity and ecosystems of sustainable way.
 5. Have a positive impact on the economy of people in the short term.

The following adaptation measures have been reviewed and identified as potential solutions to be implemented with local populations in the Río Blanco upper watershed. Their selection has been done on an “a priori” basis and was drawn from the UN Environment MEbA project’s catalogue of 40 EbA measures as published on the respective website. View Annex 12.A

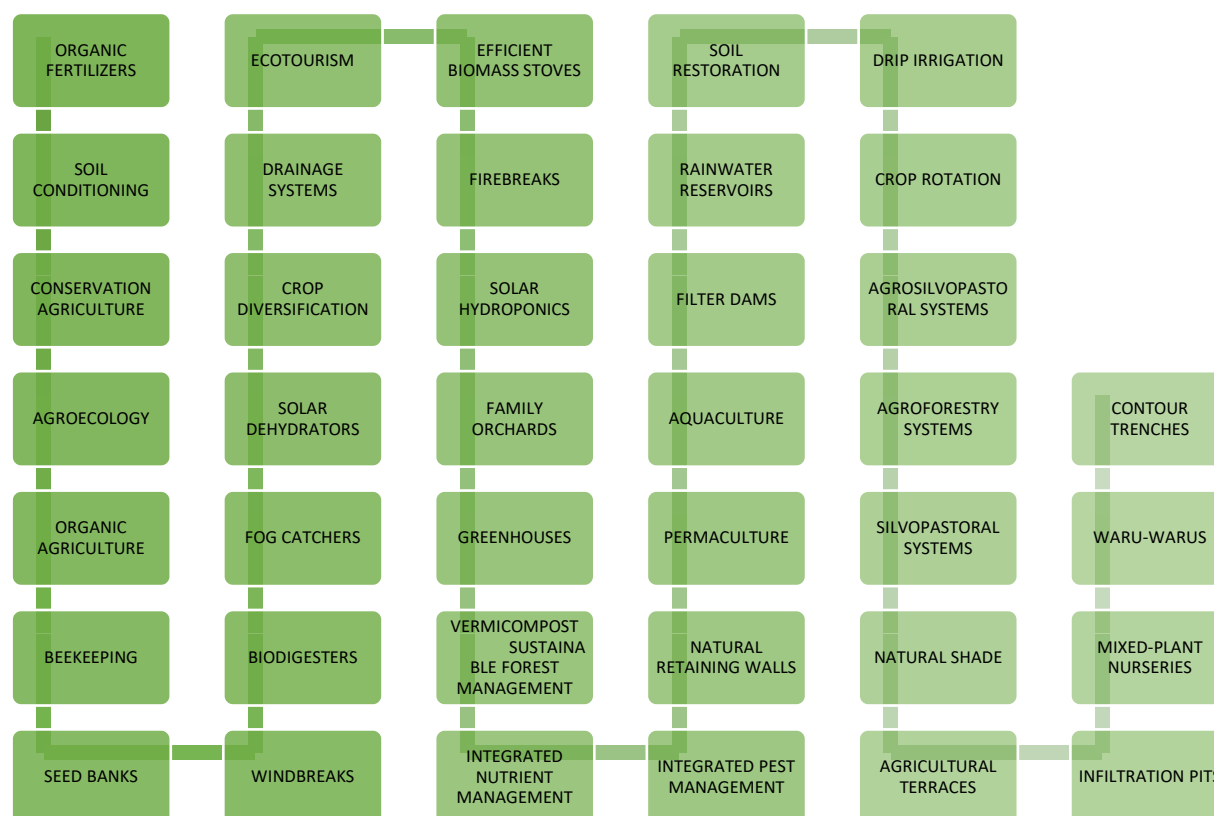


Figure 10-D: EbA measures Catalog (40)

According with the methodology (phase two contrast with similar initiatives) and evaluating the current conditions of how the Project Area is located, some impacts were identified in the base in the EbA conceptualization, as detailed below:

IMPACT OF CLIMATE CHANGE IN AGRICULTURE		
Variables and Affectation	Adaptation Alternatives EbA	Alternative description of adaptation
Temperature, precipitation, CO ₂ , Radiation Affectation Optimal development (water cycle, carbono).	EBA Ecosystems Conservation Agriculture	Indicators Tracking unit: Area under conservation agriculture (ha). Impact unit: Production (t / ha). Spending reduction in agricultural inputs (\$)

IMPACT OF CLIMATE CHANGE ON DISASTER RISKS		
Variables and Affectation	Adaptation Alternatives EbA	Alternative description of adaptation
Variables Temperature, Precipitation Affectation Landslides Erosion	Infrastructure: Agricultural terraces that will increase the resilience of the system, consists in making cuts to the steep slope to establish cultivated terraces supported by a stone wall. Ecosystem EbA	Indicators Tracking unit: Linear distance of built walls (m). Impact unit: Production area and protected housing (m2 and #, respectively).
IMPACT ON FOOD SECURITY		
Variables and Affectation	Adaptation Alternatives EbA	Alternative description of adaptation
Affectation Soil quality Pest Increase	EbA Ecosystems Crop Diversification	Indicators Tracking unit: Surface sown in mixed schemes (he has). Associated varieties planted per unit of crop (#). Impact unit: Income (\$). Varieties produced (#, t).
IMPACT OF DEFORESTATION		
Variables and Affectation	Adaptation Alternatives EbA	Alternative description of adaptation
Variables Logging of trees Affectation Sustainable forest management promotes the development of local communities, while retaining the biodiversity, capture carbon and can even eliminate deforestation and restore forest cover.	EbA Ecosystems Sustainable Forest Management	Indicators Tracking unit: Area under sustainable forest management (he has). Impact unit: Wood production (m3). Income by worker (\$). Conserved surface (ha).
EROSIÓN		
Variables and Affectation	Adaptation Alternatives EbA	Alternative description of adaptation
Variables Climate, vegetation, leaf litter, soil type, topography, flow velocity, land use. Affectation The degradation of the soil, as a consequence of erosion, affects the fertility of the soil and, ultimately, the production of the crops.	EbA Ecosystems Soil Conditioning: It consists of applying a series of techniques to restore the optimal conditions of organic matter, nutrients, biological activity and other essential elements for agricultural production.	Indicators Tracking unit: Surface with conditioning floors (ha). Impact unit: Increase in crop productivity (t / ha). Decrease in fertilizer spending (\$ / ha).

IMPACT OF MICROFINANCE ON THE POPULATION		
Variables and Affectation	Adaptation Alternatives EbA	Alternative description of adaptation
Variables Indexed insurance. Microfinance. Affectation Accurate of the existence of a structure effective financial It is not usually accessible to the most vulnerable groups	Financial: Actions regarding the provision of resources and financial incentives to share and transfer risks or improve the social and ecological bases of vulnerable systems. Credit access	EbA ¹⁸ capacity index adaptation based on ecosystems. The procedure consists of gathering information on the socioeconomic, productive and environmental dimensions of the agricultural unit through an interview with the farmer. The interview is linked to the credit evaluation process, either ex-ante, when the client requests the credit, or ex-post, as part of the follow-up to the disbursement. # credits

Table 8: General impacts in the basin of the Toachi – Pilatón water system (Río Blanco upper basin)

78. Implementing agents, according with the arrangements (Part III, B): Ministry of the Environment, Undersecretariat of Climate Change and Undersecretary of Natural Heritage; Water Secretariat (SENAGUA); CELEC Hidrotoapi; local GADs; and local productive organization. Additionally, different institution have key role for the success of the project, institutions such as Agriculture Ministry, Consortium of Provincial Councils of Ecuador (CONCOPE) and National Meteorological Institute (INAMHI), which the project will establish strategic relations during the implementation.

Component 1: Conserve vegetation cover

79. Component 1 focuses on the conservation of vegetation cover on an area of 230,000 ha, supported by the introduction of the active sustainable forest management and conservation technologies.

The methodology mentioned in figure 7, for the component 1 (Protection of Natural Coverage) the proposal of measures related to forest conservation, afforestation and climate monitoring, result from the studies "Analysis of the vulnerability of the hydroelectric power plants prioritized for the effects of climate change, Toachi Pilaton hydroelectric power plant ", developed by the Ministry of the Environment. Next phase the forestry regulatory framework and similar initiatives analyzed and finally the proposal contrasted with the workshops developed on the 24th and 25th July in the upper and lower basin of the Toachi and Pilatón River (Annex 4 A, B).

The steps that described below documentary information for the selection of activities: In the study of vulnerability to climate change of the hydroelectric power, a series of activities related to adaptation are defined that maintain and improve the provision of ecosystem services in the upper basin of the Blanco River (Annex 12A).

The adaptation recommendations identified in the study in question have the following characteristics:

¹⁸ Referencia: Acceso 17/12/17: http://unepmEbA.org/fileadmin/user_upload/Indice_de_capacidad_EbA.pdf

Manage in an integrated manner and conserve the forests and protective vegetation, as well as anthropized ecosystems corresponding to the upper basin of the Blanco River, contributing to the Toachi and Pilatón hydroelectric plant to reduce vulnerability to climate change, contributing to:

- Control of erosive processes and sediment flows.
- Regulate the ecological cycle to optimize the available water resources and its hydroelectric use.
- Sensitize and strengthen the capacities of local governments and related communities.
- Make the socio-economic development of the sub-basins compatible with the preservation of water resources. Promote the restoration and enrichment of the páramos and forests, maintaining a continuity of the Andean ecosystems and their ecological services.

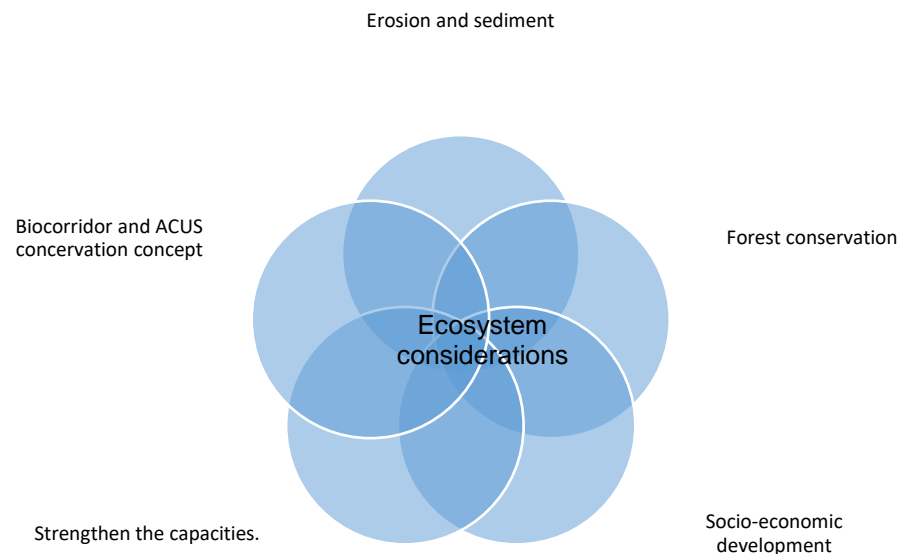


Figure 11. Key Concepts identified with the local communities for the component 1.

80. Analysis of regulatory frameworks: The identification of areas of intervention will be defined following methodologies which the Ministry of the Environment has developed in recent years through the Operational Manual of the program Socio Bosque¹⁹ and are formally disseminated through the ministerial agreements: N° 130 on 28 June 2011.
81. **The agreements define criteria for threats, eco-system services and socio-economic characteristics of the area, in the present case the previously established threats will**

¹⁹ <http://sociobosque.ambiente.gob.ec/files/MANUAL%20OPERATIVO%20SB%20UNIFICADO%202012.pdf>

incorporate the climatic threats arising from the effects of climate change, the criteria for component 1 are described below:

1. Threat levels defined through the proximity to access roads;
2. Historical patterns of deforestation;
3. Climate threats to the biophysical components of the basin (droughts, floods);
4. Environmental services: biodiversity refuge, hydrological regulation, carbon storage;
5. Poverty level.

82. In addition, information and similar interventions in the territory will be identified as they emerge to complement project activities as well as not to duplicate efforts. There is evidence of previous work by Socio Bosque (Table 8) and interventions of the GADs within the scope of their competencies that will be complemented with the proposal of Biocorredor and ACUS of this proposal.

Surface (ha) under Socio Bosque Mechanism	Characteristics	Number of beneficiaries in the zone with SB	Average surface per beneficiary
10959,83	Individual beneficiaries	93	117 ha/beneficiary

Table 9: SocioBosque interventions in the Rio Blanco watershed

83. The proposed project will coordinate with the following key stakeholders the execution of component 1 that have been identified and engaged in the project planning and preparation phase (see Annex 4 on the workshops executed).

Stakeholders	Functions	Project Implementation Role
Ministry of Environment (MAE)	Lead institution of the environment sector. Local staff of the PAs Unit are responsible for planning, management, vigilance and control within PAs.	Project executing agency. Will lead project activities in relation to the formulation of norms and strategies, the clarification of institutional roles for forest and APe management and conservation, support to GADs in processes of territorial land use planning, and support to incentive systems.
Ministry of Agriculture and Livestock (MAG)	Regulation, facilitation, control and evaluation of management of agriculture, livestock, promotion of actions which allow rural development and further the sustainable growth of the production and productivity of the sector.	Provision of training, technical assistance and monitoring of sustainable agriculture and livestock production
National Planning Ministry (SENPLADES)	Coordination of National Decentralized System for Participatory Planning, promotion of integrated development.	Coordination and consultation regarding the project's support to territorial land use planning processes and the GADs.

Stakeholders	Functions	Project Implementation Role
GADs	Generation of development and land use plans, for environmental management, declaration of parish and municipal protected areas, formulation of local environmental norms and the implementation of sustainable natural resource management projects.	Key targets for strengthening due to their responsibilities for environmental management at parish and municipal levels. Promote and support the investment fund as constituents
National Police Environmental Unit	Control of compliance with environmental norms in order to avoid its degradation of disappearance.	Guidance on application of legislation: involvement in multi-stakeholder strengthening of governance conditions.
SENAGUA	Water management authority, is an essential partner for the basin committees conformation and the investment fund.	Promoter on the River basin council.
Local communities and associations.	River basin management and zoning plans under an Integrated Watershed Management	River basin planning and implementation of Project activities.
INAMHI	Authority in the climate information generation.	Hydro-meteorological and decentralized monitoring system development.

Table 10: Key stakeholders in the Rio Blanco watershed

84. Component 1 will focus on two outputs according to a single outcome targeted.

Outcome 1. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management

85. This component will generate one outcome to be built from two outputs.

86. The objective of this outcome is the encourage conservation of the existing forest cover by promoting the conservation of 1,000 ha of native vegetation (output 1) and strengthening the management of the existing protected forests (ca., 230,000 ha) (output 2) based on two existing and proven mechanisms developed in the country: ACUS and Socio Bosque (Annex 13).

Output 1: 1,000 ha of native vegetation is conserved by sustainable forest management and conservation mechanisms.

87. The activities targeting this output will promote the conservation of 1,000 ha of native vegetation that contribute to the regulation of the hydrological cycle, and which are not currently guarded by any protective measure. An initial governance analysis will be performed in order to include all relevant stakeholders within the relevant activities of this component, promote cooperation and facilitate dialogue among each other. Strengthening governance among different actors and within the area of intervention is a key factor to firstly promote sustainability and secondly to empower the local communities. At the beginning of the project, they will play a role as beneficiaries, but the long-term intention is that they become active participants and lead the conservation process by themselves.

88. This component is based on the advancing and holistic landscape approaches implemented by the Ministry of Environment in Protect Areas (PA), nowadays called Areas of Conservation and Sustainable Use (ACUS) under the Bio-corridor category. The concept will be widely applied in the proposed concept with the active participation of local stakeholders.

These local stakeholders will mainly be the municipal governments (GAD) that execute the exclusive competence with regards to land use and communities.

89. The total biocorridor surface is 230.000 ha under a conservation category (ACUS) includes (1,000 ha) of hydrological and ecosystem importance, sites identified preliminarily according to the Territorial Organization Plans (PDOT for its Spanish abbreviation -table 11) and the vulnerability to climate change analyses (CHECC). The main idea of the component 1 is to promote the biological and functional connectivity, -is important to mention that the hydroelectric plan is downstream (figure 12,13) of the project intervention area- :

Protected area name	Area in the Project (ha)	PDOT	Main Activities	Indicator
GAD Sigchos-Las Palmas Conlindaciones ²⁰ de Sarapullo, Triunfo Bajo, Monte El Triunfo secondary Forest	356	Non-available	Updating of several Plans in the area according the National Laws (ACUS) -Execution-Management Plan -Management Model -Finance strategy	Management Plan and ACUS
GAD Sigchos Restoration in Palo Quemado	117	ACUS proposed	restoration	ACUS
GAD Sigchos rural areas	127	Recuperation Area	restoration	restoration
GAD Mejia –Tandapi	200	ACUS	restoration	Laws and ACUS
GAD Mejia –El Chaupi	75	ACUS	restoration	Laws and ACUS
GAD Mejia –Aloag	125	ACUS	restoration	Laws and ACUS

Table 11: Priority interventions ACUS in the Rio Blanco watershed

²⁰ PDOT GAD Las Palmas

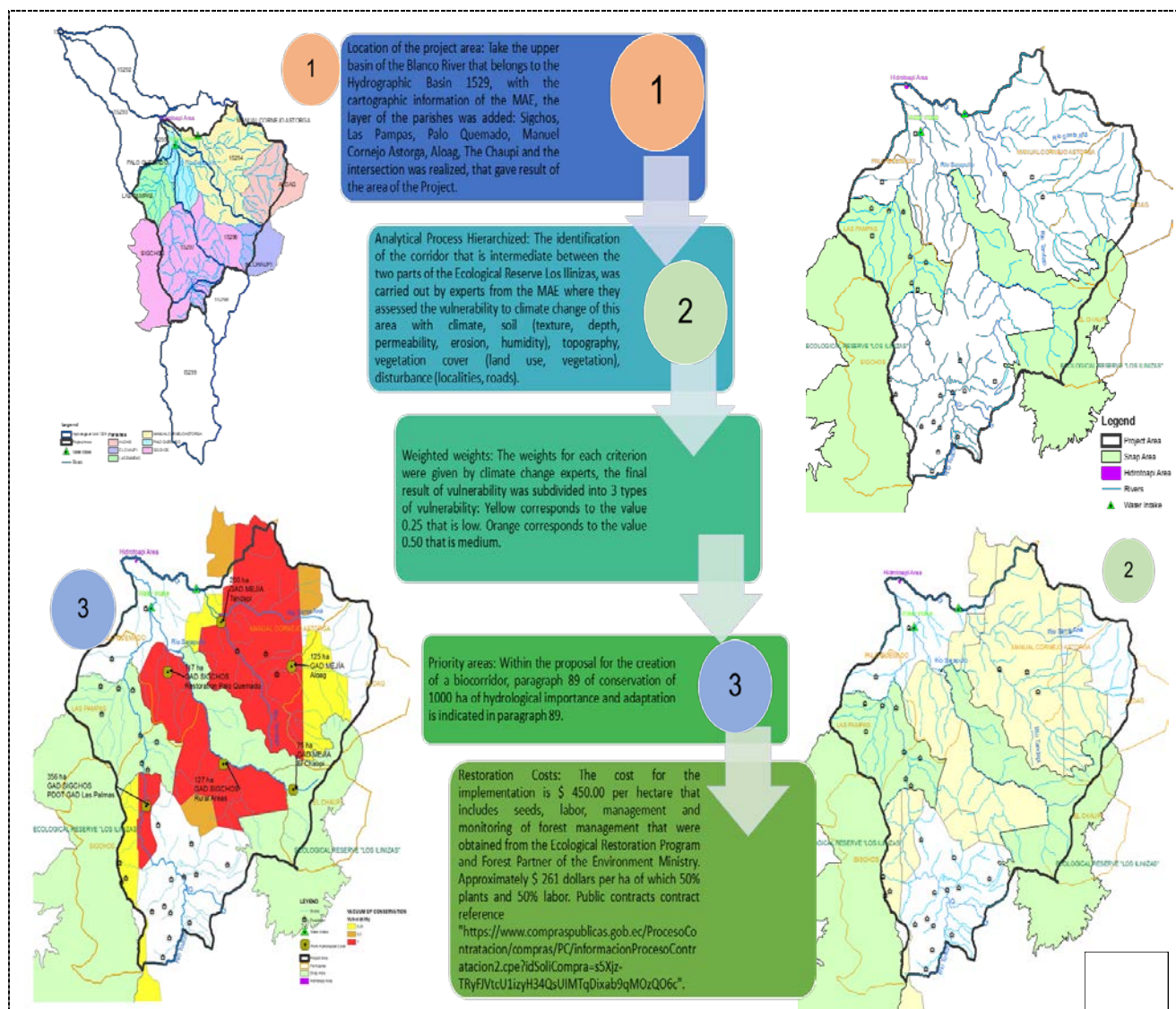


Figure 12: Biocorridor scenarios: localization, vulnerability²¹ and ecosystem selection, cost.

90. In general, the zones proposed have had an important deforestation process. Thus, in the period 2008 - 2014 the deforestation surface was 5891,33 ha., and the following period 2014 - 2016 the deforestation increased by 2200,14 ha. In total 8091 ha (2008 – 2016) have been affected in the watershed (Figure 13), the project will promote the restoration and recuperation of importance areas thought the component 1.

²¹ Analysis of the vulnerability of flagship hydropower plants to the effects of climate change (CHECC), in particular the results for the Toachi-Pilatón hydropower plant

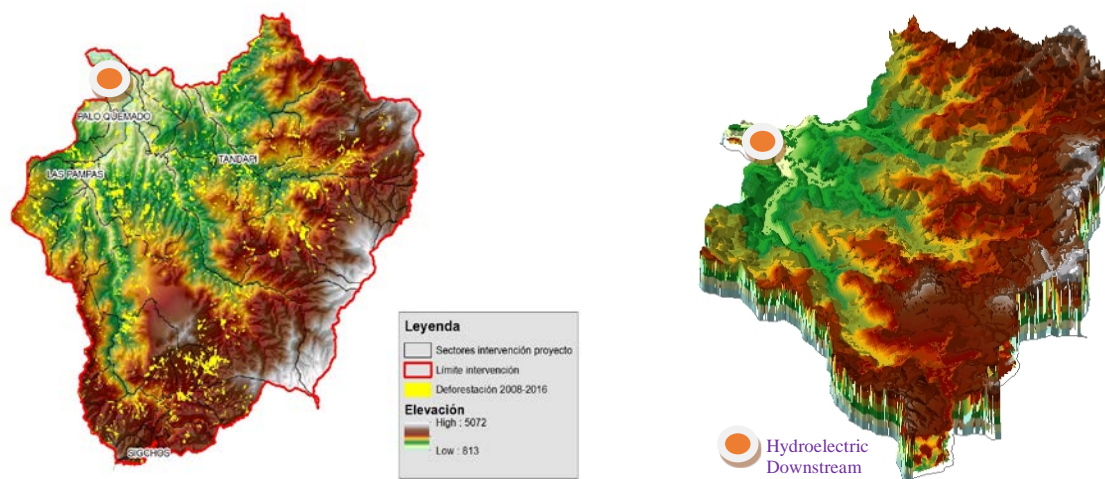


Figure 13: Accumulated Deforestation 2006 – 2016 and ramp in the Río Blanco upper watershed

91. The main way forward the output is the Municipal – Parish PAs, covering 1,000ha, in buffer zones and corridors identified as critical for reducing the impact of climate change on the watershed's hydrological cycle. The new areas for conservation will be identified in order to develop protector forest management plans and formalize through signed agreements. The plan will include ravine and shore protection activities. The intention besides protecting some areas is to recover some degraded areas where necessary.
92. The project team, working closely with MAE representatives at central and local levels, will provide local authorities (GADs) with guidance on the establishment of such reserves, in accordance with the Norm on the Subsystem of Decentralized Autonomous Governments (GADs) – Municipal Protected Areas²². This guidance will cover aspects of location and design, in order to maximize the potential of these reserves to contribute to the connectivity and habitat value of the areas located by exploring and highlighting commonalities between local interests and conservation objectives, such as the potential benefits for local water supply and the avoidance of environmental risk that may be generated through the establishment of municipal reserves to protect riparian forests and those around water sources.
93. The control capacities in wildlife and forest traffic will be strengthened in the Tandapi point of control and another point of control will be included in accordance with the National Police and Protected Areas MAE. The ratings of management effectiveness tracking tool and PGOA will be increased by applying some planning instruments such as Management Effectiveness Tracking Tools (METT)²³ evaluation and Annual Operational and Management Plan in Protected Areas (PGOA)²⁴.

²² Agreement No. 168, MAE, Official Register 319 of 12th November 2010 (Norm on the Subsystem of Decentralized Autonomous Governments (GADs) – Municipal Protected Areas).

²³ Management Effectiveness Tracking Tools Matrix developed for Protected Areas by The United Nations Development Programme GEF adopted by Ecuador Government for AP management: <http://suia.ambiente.gob.ec/documents/10179/346525/Gu%C3%ADa-Metodol%C3%B3gica-Evaluaci%C3%B3n-de-EfectividadManejoPatrimonio%C3%81reas-PG.pdf/8cd4223b-954a-42df-8b73-3490831a61c2>

²⁴ Acronym in Spanish for Annual Operational and Management Plan in Protected Areas

94. The Management Effectiveness Tracking Tool (METT) has been developed by a cooperative effort of the WorldBank and the World Wildlife Fund (WWF) and is a simple, cost-efficient and flexible tool that can give a quick overview of the effectiveness of protected area management without requiring expensive consultants or taking up too much time for managers, rangers or others responsables for governance. In Ecuador the application was introduced in 2008. The METT is usually run as a qualitative assessment and relies to a large extent on the judgment and honesty of the assessors, for Ecuadorian reports the areas: Planning, Control, Public Use, Tourism and Biodiversity management are widely used²⁵. Nowadays, the METT system is institutionalized and reported - updated every year, being accessible to the public users through the Mae website link System of Biodiversity SIB.
95. This component will be complementary to Socio Bosque program which at the moment is focused on conservation, -but it does not intend to finance SB program-. Instead, given the holistic and participatory approach applied in the ACUS and Bio-Corridors, it is expected that it can be useful to demonstrate and exemplify the benefits of applying a sustainable land management approach, so that it can motivate the current beneficiaries of Socio Bosque to gradually adopt or replicate this approach in the near future.
96. The use of wood to produce “panela” at the moment represents the main driver of deforestation in the area. In this component, the approach about alternative forest energy to reduce pressures on native forest resulting from sugarcane production will be carried, for this purpose the governance mechanisms were addressed with the aim of reducing local peoples’ motivations to destroy the forest in unsustainable manners. Instead, through the ACUS approach, it will focus on the improvement of sustainable forest use, introduce alternative and innovative technologies, e.g. equipment such as efficient sugar mills and ovens, in order to demonstrate their technical viability, financial sustainability; including supporting the access to markets to commercialize their production and ecofriendly characteristics, set of activities that have interaction with the other components supporting the strategy of improvement: the forest management, the livelihoods and sustainable production activities to climate change effects.
97. Farm plans will be developed, promoting always at least 50% of women’s active participation. It is necessary within this component to strengthen local communities’ capacities on planning strategies, conservation practices and climate change, for this purpose a cross-sector program for awareness raising and communication is considered as detailed under component 3.
98. This component will work also on strengthening the hydro-meteorological system of the Río Blanco upper basin. At the moment there are 11 hydro-meteorological stations, from which, only 2 are working properly. The intention will be to strengthen and improve the existing equipment determining its priorities and the purchase of four automatic hydro meteorological new equipment, will be considered under technical criteria in coordination with INAMHI and CELEC; the strategic localization will be

²⁵ METT tracking tools for Ecuador system: <http://suia.ambiente.gob.ec/documents/10179/346525/Gu%C3%ADa-Metodol%C3%B3gica-Evaluaci%C3%B3n-de-EfectividadManejoPatrimonio%C3%81reas-PG.pdf/8cd4223b-954a-42df-8b73-3490831a61c2>

responding the final design of the integral climate monitoring system. The managing of the hydro-meteorological system and use of the information generated, form part of output 6.

Output 2: Improved management of existing protected forests and private conservation areas (ca. 230,000 ha)

99. This output will strengthen the institutional and legal frameworks to manage the Toachi – Pilatón (ca., 212,000 ha) and Sarapullo (ca., 21,000 ha) protected forests, as well as existing private reserves²⁶.

Currently these areas do not have management strategies and are under pressure to be converted into extensive farming lands. Due to their particular natural conditions and location, the mentioned forests are vulnerable to adverse climate change effects, resulting in possible desertification and water caudal reduction.

100. To protect these areas, the status of the protected forests will be assessed, and safeguarding strategies will be designed with local partners interested in supporting the conservation of the standing forests. It is expected that interested parties contribute to the long-term conservation of these areas. This point will be complemented, where considered appropriate with other existing programs such as Socio Bosque and its different components trying to change the paradigm of conservation though concepts and tools such as inversion watershed fund, replications and finance. Possible partners may include parish governments, municipalities, provincial governments, HIDROTOAPI, water companies, SENAGUA and the Ministry of Environment. As mentioned before, the feasibility of establishing an investment fund was analysed during project preparation.
101. From the perspective of ecosystem and communities based adaptation, it is necessary to strengthen the conservation of areas that remain in good condition as an adaptation measure with a lower long-term cost.

The conservation of protected forests and private reserves contribute to maintaining connectivity between local and national conservation areas, both public and private, and all related climate and hydrological regulation services, such as sediment retention, infiltration and interception of horizontal rain, ravine and shore protection, very important in these mountainous areas.

102. In this activity, the project will support a paradigm shift in the management of the Protected Areas system from the existing site-focus to one that adopts an integrated landscape-watershed integrate management approaches under the bio-corridor concept, that improves habitat and conservation of natural heritage in benefit of the caudal in the Toachi-Pilatón Hydroelectric project, trying to improve the internally fragmented and disconnected across the broader landscape, with negative implications for water resources.

²⁶ On the first screening three private reserves were identified: [1] Reserva de Bosque Integral Otonga (1,000 ha), [2] La Hesperia Reserva Natural (814 ha), and [3] Reserva Florística Río Guajalito (1,000 ha). During project preparation an in-depth analysis will be done, because it is very likely that more private protected areas exist.

103. This paradigm shift will be expressed in the application of two key concepts in the management of protected areas the Ecuadorian government is currently promoting:

1. The integration of the “advancing landscape approaches” for the conservation of biodiversity in protected areas, promoting the conservation of biodiversity through the generation of normative instruments, capacity building and monitoring, biological monitoring of flora and fauna, creation of conservation areas and generation of sustainable productive activities. The approach was recently introduced with support of the Global Environment Facility (GEF) in the project “Advancing Landscape Approaches in Ecuador's National Protected Area System to Improve Conservation of Globally Endangered Wildlife”. In addition, the Socio Bosque National Program in its new vision for the 2017-2022 period, changes the conventional concept of conservation for the landscape management approaches, focusing on three main drivers such as: a) Conservation b) Governance and c) Community landscape management.

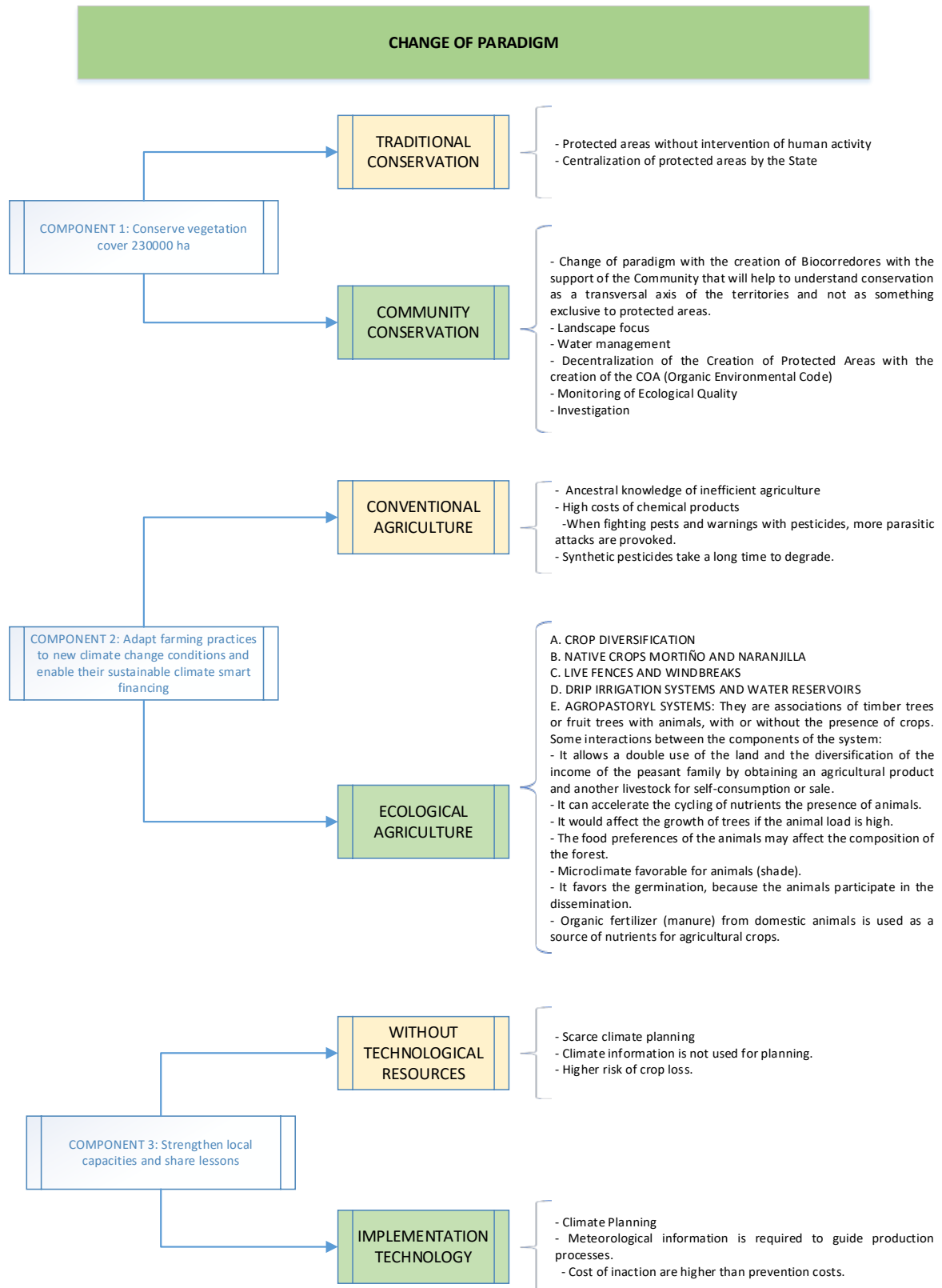


Figure 14. Parading concept, conventional practices and sustainable practices

2. The processes of decentralization in the creation of protected areas and their management (ACUS) through local governments, allows to standardize mainstream the criterion of landscape management, the strengthening of local capacities and the deconcentration of competences in the environmental management while ensuring a more efficient way to create the respective protected areas. Especially for the Ecuadorian state entities the concept supports the efficient use of available resources. It changes the centralized approach to protected area management by a territorial approach, a process that is ratified in ministerial agreement No. 083 of August 30, 2016 on "Procedures for declaration and management of protected areas in Ecuador".
104. By transferring more competencies to the local GADs in determining protected areas and ensuring capacity building of respective management, the project is aligned with the general orientation of the government while building its activities upon tested and proven methodologies and activities.

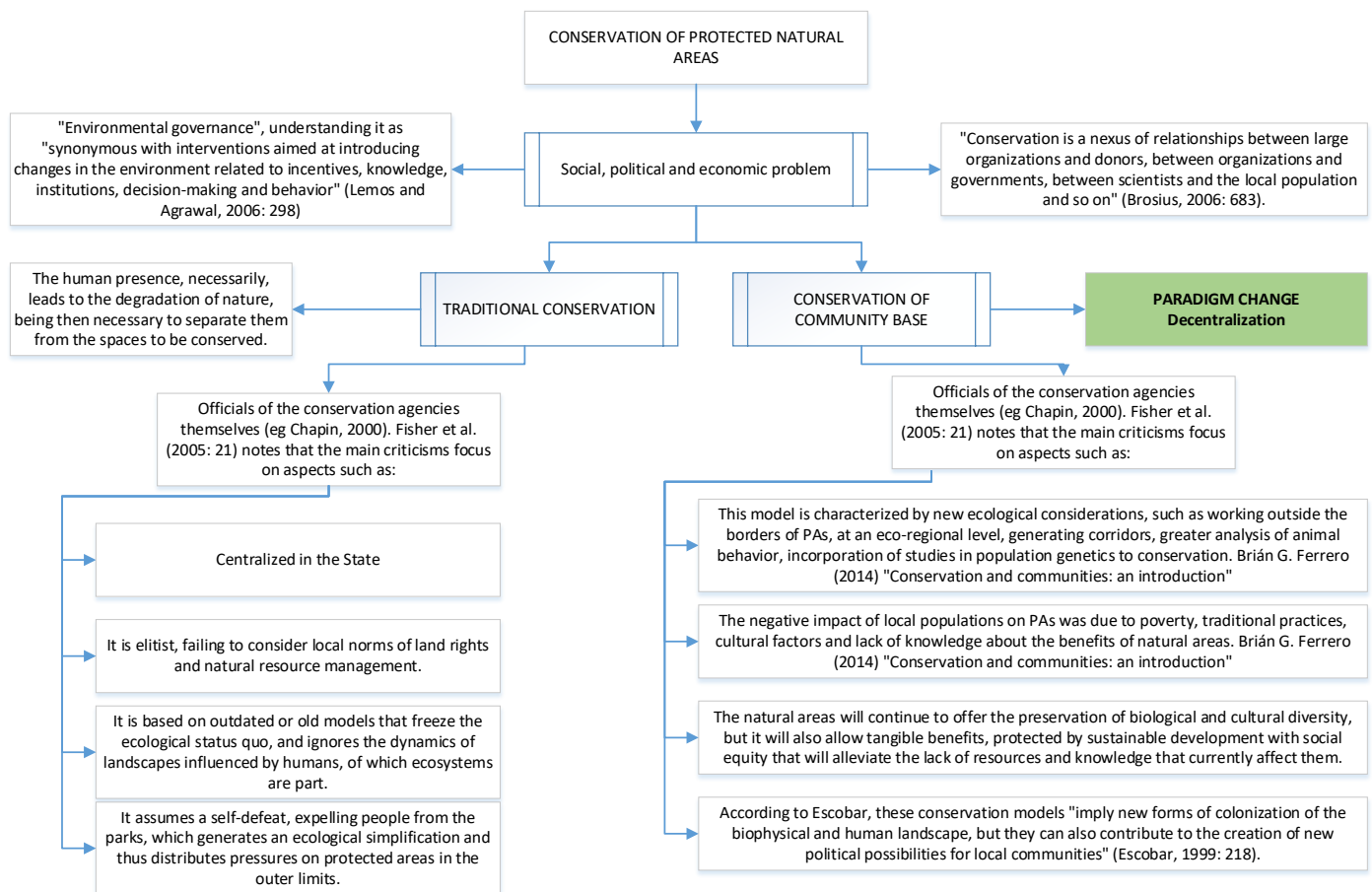


Figure 15. Parading concept, conventional conservation and decentralized conservation

105. The component will further strengthen the capacities of PA institutions and local governments to apply an integrated the landscape and watershed management approach for forest conservation into their management procedures and planning processes focusing in the formal conservation categories.

The project will work with the existing programs and categories of the law on bio-corridors and ACUS, with the aim of promoting the channeling of additional resources to private land owners for the creation, restoration and/or protection in areas of importance for biological, productive and water regulation importan.

106. According with the Territorial Land Use Plans (PDOT) of the local governments the areas proposed are:

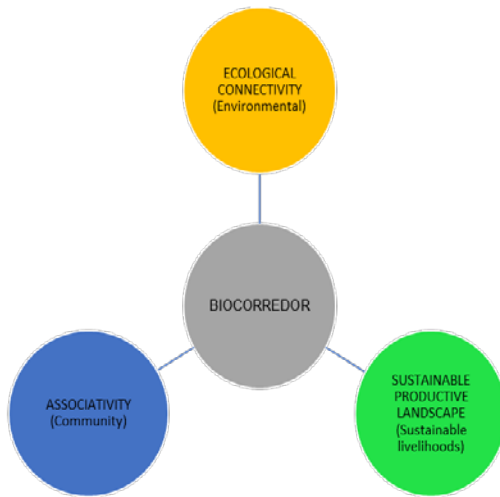
Protected area name	Area in the River Basins (ha)	Areas in the project (ha)	Date of creation (dd-mm-yyyy)	Management plan date	Main Activities	Indicator
Los Ilinizas ²⁷ Ecological Reserve	29,672	8,901	11-12-1996	2008	Implementing Management Plan	METT 70/100
	12,234	3,670				
Bosque ²⁸ protector Sarapullo	21,585	17,268	30-07-1986	N/D	Actualization of Management Plan	METT 70/100
Bosque protector Toachi Pilatón	212,000	169,600	14-09-1987	N/D	Actualization of MP	METT 70/100
GAD Sigchos	16,307	16,307	Degraded	ND	restoration	# of ha
GAD Mejia	5,021	5,021	Moderate forest intervention	ND	conservation priority	# of ha
GAD Tandapi	2,5042	9,232	Conservation priority area	ND	conservation priority	# of ha

Table 12: Protected Areas according local PDOT in the Rio Blanco watershed

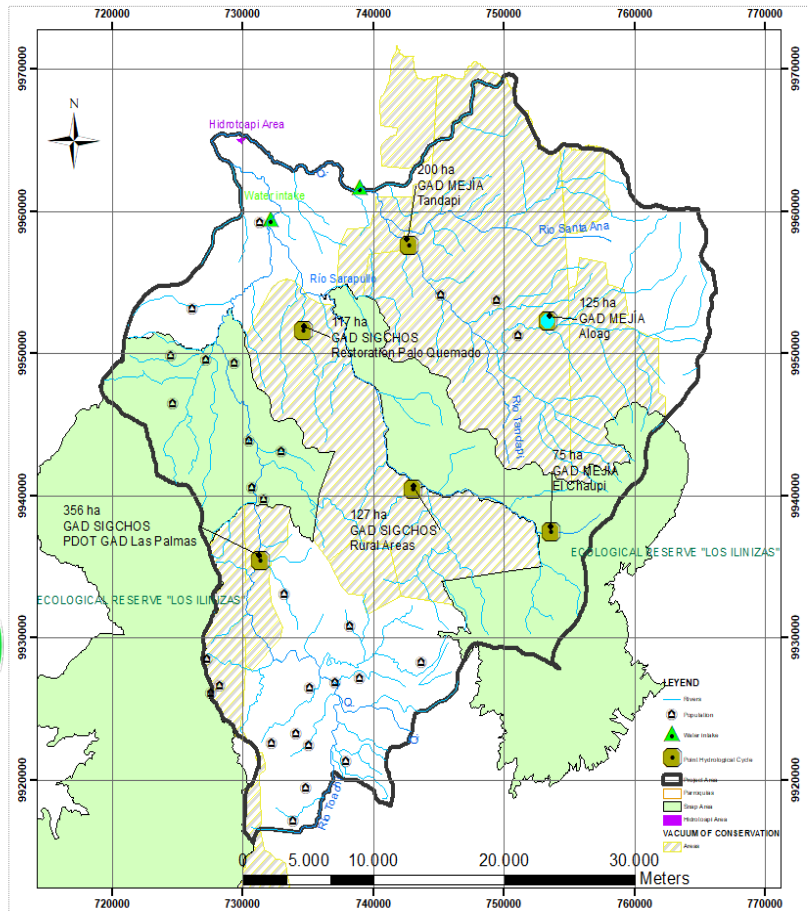
²⁷ <http://www.undp.org.ec/licitaciones/2014/001/Anexo1-PM%20ILINIZAS.pdf>

²⁸ PDOT GAD Sigchos 2015.

The Biocorredores are areas of the territory where ecological connectivity is recovered, articulating fragmented habitats, incorporating into the landscape sustainable productive activities and fostering associativity. It seeks to extend intervention strategies to a larger territory, expanding the impact of the work of communities and other social and institutional actors with a gender focus.



The main problem with invasions is that there is no land tenure study. Land tenure is the first product that will be developed within the adaptation project to ask the environmental authority for the creation of the biocorridor, with this document it will allow the provincial GAD to have a resource for the control of land use.



It is proposed to implement the creation of a Biocorridor in the space not considered by the Ecological Reserve Los Ilinizas under the legal regulations of the COA (Organic Environmental Code of Ecuador) as can be seen on the map.

Figure 16. Biocorredor 230.000 ha concept

107. The component 1 hence has a direct relationship between conservation and forest management in priority areas, mainly the areas with a high natural forest and low inhabitants index, under an integral concept of Bio-corridor and watershed management **located in the upper part of the river basin**. The priority areas are shown in the following map:

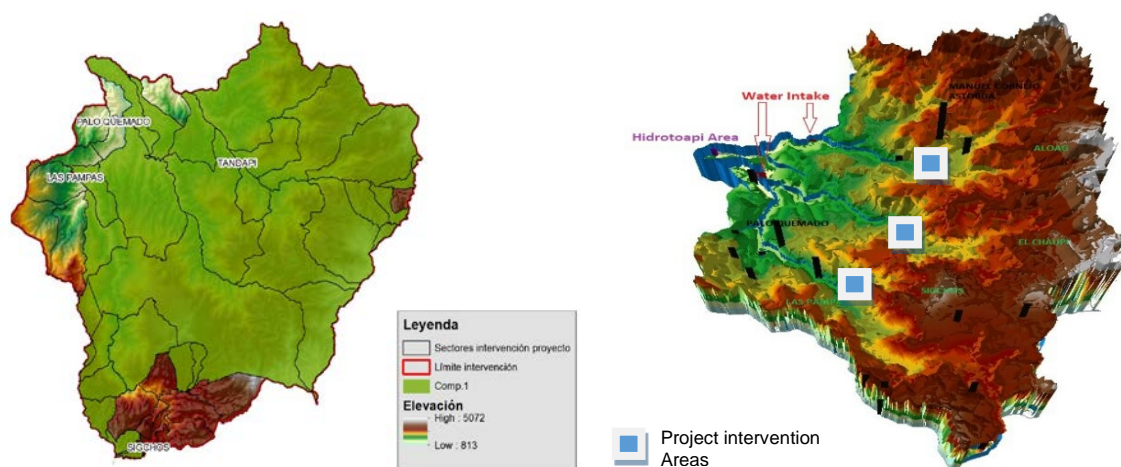


Figure 17: Priorities areas for the component 1, conservation and forest management in the Río Blanco upper watershed.

108. The Environmental Protection Unit (UPMA) of the National Police has undertaken a review of the focuses on control and regulation of the forest management and use: the entities of the central government that are involved in the control of illegal hunting and logging are the Ministry of Environment (MAE) through the Forestry Control and Wildlife Unit and the Interior Ministry (National Police) about illegal sales and use of woods in markets are further controlled through the forest control point located in Tandapi in coordination between MAE and UPMA. Despite these investments and efforts, the effectiveness of control and regulation is still severely limited, due to -in part- gaps and contradictions in the legal framework and in part due to limited cooperation between different institutions.
109. The installation of new specialized equipment (control point) and the strengthening of the Tantapi control allow the reduction of illegal wood and wildlife traffic. The project will work to achieve “automatization, control point strengthening and community participation” to conservation and sustainable forest and wildlife management through a combination of awareness-raising and community-level governance.
110. These actions will directly reduce pressures on forest from unsustainable and illegal cutting, thereby reducing the need for control and vigilance; they will also lead to increased willingness by community members to collaborate with institutions of central and regional governments mainly CELEC Hidrotoapi, UPMA and MAE provincial directions thereby reducing the need to invest in “vertical” control and vigilance.
111. The project will implement a verification system to verify the proper conservation of the designated areas and the river basin management every three months through satellite images of high resolution, which will be useful to monitor and avoid future deforestation.
112. Through the preservation mechanisms ACUS, the private and public protected areas will develop and/or to update a management plan which must include a sustainable

financial strategy with time horizon of 20 years similar Socio Bosque mechanism and for ACUS. This strategy must be in line to the investment fund (see Annex 12.C) proposed in output 5 of component 2. Part of the financial resources generated by the mechanisms of the fund will be dedicated to support forest conservation in the present outcome. The fund will also support the maintenance and operation of the control and vigilance infrastructure.

113. Regarding the number of co-executors, given that this is a component of conservation and forest management, the sectors selected are those with a higher remoteness, low population density and high pressure for deforestation. The reference coverage used in this case was the so-called "Priority Zones" defined by best-known process develop for Socio Bosque and MAE such as: a) threat levels defined through the proximity to access roads; b) historical patterns of deforestation; c) climate threats to the biophysical components of the basin (droughts, floods); d) environmental services: biodiversity refuge, hydrological regulation, carbon storage; and e) poverty level. As result, a total of 33 sectors were selected from a total of 61 existing in the project intervention area (see Table here below). In the selected areas a total of 5,620 inhabitants are living. It is estimated that a total of 840 people will benefit directly from the activities of this component.

Component	Men	Women	Total indirect co-executors	Elderly	Total direct co-executors
Conserve vegetation cover	2987	2633	5620	515	840

Table 13: Potential beneficiaries in the project

Summary Component 1: Objectives and activities

114. The following table shows the priority areas for intervention under the component 1, the objectives of the two outcomes as well as activities carried out under each.

Objective	Activity
1. 1,000 ha of native vegetation is conserved by sustainable forest management and conservation mechanisms	In the context of the river basin conservation corridor, at least 1,000 priority conservation acres will be declared as conservation areas and sustainable use ACUS through formal agreements with the local governments (GAD). As part of the bio-corridor they will count on management plans, financial sustainability strategy and a management model to be operative by the end of the project. The core of the component will be the sustainable forest management, shore river protection, water sources conservation, set of activities under the adaptation to climate change and integrated watershed management.
1.1 Functional conservation areas as part of the Toachi Pilaton (Río Blanco upper basin) basin bio-corridor have been established	The sustainable management of created conservation areas will be strengthen, such as the Bombolí, Hesperia, Otonga, Sarapullo, Toachi - Pilaton reserves with a landscape, integrated watershed management and biological connectivity approaches
1.1.1 Technical, biological and zoning file analysis has been carried out	According with ministerial agreement No. 083 of August "Procedures for declaration and management of protected areas in Ecuador ", as first phase the project will develop the Management Plan that includes planning, tenure land and zoning of ACUS-Biocorridors.
1.1.2 ACUS management plan- conservation bio-corridor have been developed	Second phase includes in accordance with the Art.13 (agreement 083 AP), the GADs and project will carry out the administration and management of the protected area in order to ensure its conservation; implement the mechanisms established in the national law; Comply with the Management Plan of the ACUS, especially with the conservation conditions established there; ensure compliance with the land use (zoning) established in the Management Plan of the protected area
1.1.3 Financial and operational sustainability strategy has been developed	As a chapter of Management Plan, the Financial strategy will be develop together with the initial consultancy (PM), the resources in this activities will guarantee the financing and sustainability of the protected area through the respective budget or the resource management mechanisms provided by the respective Government Autonomous Decentralized and the Investment fund from the project with a time horizon 20 years.
1.1.4 Management and operation model has been developed	Through the Unit Project, day-day work will be systematized (UP); compliance of the Management Plan of the protected will be shared with the Environmental Authority National, in the terms to reports the achievements and barriers; in addition, the UP provides information required by the National Environmental Authority on protected areas for monitoring and evaluation; furthermore, implement coordination mechanisms and instruments of management will be develop between MAE, UP and GAD.

Objective	Activity
1.2 Increase in # of Decentralized Autonomous Governments (GAD) with planning, regulatory and normative instruments for ACUS	The Project will promote the creation of new conservation areas and strengthen the local governments' capacities regarding the implementation of an integrated water and landscape management approach as means to adapt to climate change. Through local ordinances and planning instruments the indexes of Good local governance on conservation and climate change issues will be evaluated.
1.2.1 Key habitats, restrictions and monitoring programs, and agreements for their implementation have been identified by PA authorities and GADs	The technical unit in coordination with the project stakeholders (GAD) will define areas of importance for conservation, using the tools defined by the MAE in participatory process.
1.2.2 Standards and practices for protecting forest and implement integrated watershed management have been included in land-use planning processes	Strengthen local capacities through the generation of tools for the creation of ACUS, climate change adaptation measures and GAD administrative-environment management; the project unit will transfer knowledge to the communities involved in the project. The progress of this component will be evaluated through Good Local Governance Index
1.2.3 Municipal ordinances on conservation, land use practices, and ACUS have been agreed and published	Formalize (ordinances) and communicate the declaration of ACUS protected areas to the corresponding levels of government of the corresponding jurisdiction, for supporting the national order and planning the territory (Bottom-up);
1.3 Increase sustainable livelihoods alternatives that reduce pressure on forests.	The provision of adequate and sustainable livelihoods that count on the support and follow-up of the academy and the project management unit, will diversify the family income and increase resilience to the effects of climate change. These elements improve the Basin management in general and the adaptation to climate change
1.3.1 Incentive systems for set-asides on private and community lands based on ACUS have been strengthened	In this component, the sustainable production actions will be implemented according to the reality of each part of the Basin. For the "Pilaton" area, a change of technology with efficient kilns in the panela production process will be promoted, as well as the reduction in the use of forest in at least 30%. For the lower part, the creation of urban gardens will be promoted, sustainable productive alternatives and actions that include the participation of women and vulnerable groups.
1.3.2 Municipal PAs have been gazetted, covering 1,000ha, in buffer-zones and corridors identified as critical for the hydrological cycle	This activity will allow monitoring of the protected areas (ACUS) and to produce reports to different levels of government. Priority will be given to determine the high importance areas for regulation of the hydrological cycle and sediments reduction.
1.3.3 Promotion of habitat and connectivity-friendly production options has started	This component is aimed at the realization of sustainable livestock production activities, in coordination with the Ministry of Agriculture, with the objective of diversifying the family income and managing the livestock conflict which is the fact that wildlife species appear in the project intervention area. These actions will allow to improve wildlife conservation and to improve the living conditions of the communities, which translates into the implementation of the landscape approach for conservation.

Objective	Activity
1.3.4 Programs for reduction of human/wildlife conflicts in association with the Ministry of Agriculture have been introduced	This activity complements the productive actions that will promote income diversification and conservation of the wild fauna described in the c.1 item.
1.4 Increase in # of families in communities adjoining conservation areas in target ACUS, participating in productive activities demonstrated to reduce pressures on forest with at least 50% of women participate	The effective participation of women in decision making, farm planning and sustainability strategies process within their productive activities will generate autonomous processes of adaptation to climate change. This activity is complemented by component 1 and will be evaluated with the number of farms plans that have at least 50% of participation of women and vulnerable groups.
1.4.1 Planning and zoning of the river basin with a participatory and inclusive approach has been introduced	At both, the farm within the biocorredor level and ACUS of conservation level, it will be carried out planning and zoning, which will allow the access to credits and the strengthening of the local capacities. This activity will be mainly promoted by women.
	Promote dialogue, coordination and technical support at local level
1.4.2 Inclusion of governance activities with active women participation has started	The governance mechanisms of the productive activities, the declaration of protected areas and the functionality of the investment fund will count on the active participation of women.
1.4.3 Technology transfer agreements for sustainable practices and environmental conservation has been established with national universities.	It requires the support of a specialized legal team in order to formalize the agreements and follow up on them.
1.5 Strengthening of the hydro-meteorological system of the Río Blanco upper basin.	The purchase of climate monitoring equipment will be done in case of determining it is necessary. Given that at the moment, from the 11 existing meteorological stations in the area, only 4 are working, the purpose will be to strengthen and improve the existing ones under the integrated monitoring system, being the core of the purpose to transfer the technology and knowledge to municipal government and the administrative management to CELEC; all these elements with the support of INMAHI
1.5.1 Monitoring and evaluation as well as analysis capacities has been strengthened	This activity intends to improve the knowledge on climate topics, prevention of disasters and the use of information. The support of INAMHI is considered transversal for this component. The ultimate goal is to have an integrated climate monitoring system to be used by the co-beneficiaries; CELEC, local governments and the communities.
2. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management	The component will strengthen the capacities of PA institutions and local governments to integrate the landscape, watershed integrated management approaches for forest conservation. The project will work with the existing Bio-corridor and ACUS modalities, with the aim of promoting the channeling of additional resources to private land owners for the creation, restoration and/or protection of set-asides in areas of importance for connectivity. And water cycle.

Objective	Activity
2.1 Reduction in the use of forest wood for productive activities in the Upper and Middle Basin of the Toachi River (Landscape Las Pampas and Palo Quemado), through promoting technology change and improvement of the production process of the panela production.	During workshops with communities it was identified that the main source of income over 50 years has been the cultivation of sugar cane and its use as “panela”, this has implied the use of the forest, an average of 3 trees per month, which has resulted in deforestation processes.
	To avoid this problem, it is considered appropriate to change the technology in the productive process with the improvement of ovens and Cooking Systems to reduce at least 30% the use of wood.
	The farms plans allowed a change of paradigm about the conservation and sustainable forest use. In particular for the productive alternative (panela) the wood required for this process will be obtained from energy forest banks (zoning) created for sustainable use purposes and will be complemented by the program use one tree and plant another with 89 families integrated in the proposed from the Palo Quemado and las Pampas communities and 89 families from Tandapi in sustainable alternative production under a global scheme of Bio corridor
2.1.1 Farm’s zoning and plan elaboration.	This activity has a close relationship with item 1.4, because it requires the improvement of planning at a farm level with the active participation of women. These components and their interaction intend to benefit at least 840 people.
2.1.2 Financial strategy for the implementation of the framework (in coordination with the PA financing project)	Once that the financial strategy and the sustainability mechanisms in component one have been defined, replication tools for other localities, such as publications, will be developed within this activity.
2.1.3 Information management and decision support system based on updated and reliable data and traditional knowledge about the panela process	This component will allow the dissemination of the results and the communication of goals, mainly considering the communication strategy of the project.
2.1.4 Technology change (ovens change to promote efficiency in the production of panela)	This activity complements the investment component of the project, for the sustainable production actions will be implemented according to the reality of each part of the Basin. For the “Pilaton” area, a change of technology with efficient kilns in the panela production process will be promoted, as well as the reduction in the use of forest in at least 30%. For the lower part, the creation of urban gardens will be promoted, sustainable productive alternatives and actions that include the participation of women and vulnerable groups.
2.1.5 Definition of permitted uses and activities in different management categories, in relation to conservation.	This activity allows to hire technical staff that will be in charge of evaluating in the day to day the most suitable actions in the conservation biocorridor.
2.1.6 Strengthen capacities	This activity is related to the financing of the different workshops that will be carried out in the execution of the project which are related to the M&E plan, inception workshop and report.

Objective	Activity
2.1.7 Governance analysis performed to provide recommendations. Governance and dialogue to provide alternatives to existing barriers.	This activity pretends to provide recommendations of improvement in regard to the governance dynamic existing in the area and the possible existing conflicts related to the use of water among the different stakeholders and to promote dialogue and coordination among them. In this activity also the existing governance tools will be updated, taking into account any possible change that the declaratory of protected areas could happen in complement to the M&E plan.
2.1.8 Assessment, monitoring and evaluation of farms to perform and provide technology transfer	This activity is related to the monitoring of the project both internally, as well as by external evaluators according to the M&E plan and the measurement of means of verification of project results.
2.2 Priority conservation areas maintenance through the creation of the Toachi Pilaton Bio-corridor.	The conservation bio-corridor is an instrument approved by the Ecuadorian laws. An update will be performed to the existing lands, its use, planning, and zoning and to the Bio-corridor Management Plan.
	Equally, a financial sustainability strategy of the conservation area will be developed. It will have resources for strengthening the protected area.
	As a final product, a management model will be developed to operate within the framework of the basin's conservation bio-corridor and supported by formal agreements with the local governments (GAD).
2.2.1 Monitoring and evaluation arrangements (table 10)	Activities that allow to have a team that is in charge of the review of progress in the framework of the M & E / Mid-term Evaluation / Final Evaluation.
2.2.2 Apply and holistic landscape approach to define new Areas of Conservation and Sustainable Use (ACUS). Expanded PA management plans to include forest conservation, landscape approaches, watershed management and new zoning for dispersal corridors within Pas	This activity is related to the implementation of activities in charge of the project unit, as well as the day-to-day work within the framework of the monitoring arrangements. M & E / Mid-term Evaluation / Final Evaluation
2.2.3 Planning and zoning of the river basin with a participatory and inclusive approach. Promote dialogue, coordination and technical support at local level	This activity complements the Inception Workshop and the M&E Report, and allows the incorporation of the actor's perspectives in relation to the initiation of the project. It must be done two months after the start of the Project.

Objective	Activity
2.2.4 Management plan of the protector forest, including ravine and shore protection activities.	This activity finances the important monitoring milestones; Mid-term Evaluation / Final Evaluation.
2.2.5 Cross-sector program for awareness raising and communication	This activity will finance several workshops that allow the dissemination of results and to consolidate political and strategic alliances that contribute to the sustainability of the project.
2.3 Increase in the process of planning and zoning of farms in which at least 50% of women participate	The Project will start a territory planning process at a farm level to achieve protection, adaptation to climate change and sustainable use of resources, activities that are strongly linked to women's participation.
2.3.1 develop farm and management plans including adaptation to climate change criteria	A unit team that will carry out different activities that allow the transfer of knowledge, as well as the development of local capacities.
2.3.2 Train farmers in conservation practices and climate change	Workshops to be held during the implementation of the project.
2.3.3 Training to farmers in planning techniques and considerations	Field visits to strengthen capacities.
2.4 Increases in ratings of Management Effectiveness Tracking Tool and PGOA	The management of Protected Areas will be evaluated through the application of the METT effectiveness management assessments and the application of the Operational Management Plans of Protected Areas of Ecuador PGOA. The revision will be annual. Strengthening and replication mechanisms of the improved and protective cover management will be established in the Toachi River basin.
2.4.1 Improve practices to manage Protected areas and METT evaluation	Strengthening of the monitoring system from the PA planning tools, activities for the annual update of the METT and investments for the improvement of the protected areas management.
2.4.2 Application of PGOA and evaluation	Investments for the improvement of the PAs and ACUS management, financing of different reporting activities of PGOAs
2.5 Increases in control capacities in wildlife and forest traffic	Through the strengthening and functionality of the Tandapi control point and the creation of a mobile control post in "Las Palmas", the control process of natural resources in the area will be improved. In the same way, this activity will be complemented with training processes for the population. The National Police has an important role in this activity.
2.5.1 Equipment for environmental control mainly forest and wildlife with supporting UPMA	Strengthening of the monitoring system, investments in studies and preliminary agreements

Objective	Activity
2.5.2 Strengthen Tandapi control point	Purchase of equipment for the retention of wood and Wildlife, improvement of existing infrastructure.
2.5.3 Install a control point in las Pampas, equipment in coordination with the Police	Purchase of equipment for the fixed control post in the Pampas, which includes; control camper, registration computers, wood and wildlife retention equipment, office furniture, fuel.
2.5.4 Monitoring system, newsletter and decentralization of information.	Work equipment for capacity building on climate change and risk management, prevention of wood and wildlife traffic.

Table 14: Key activities in the component one

115. **Theory of change for avoving the deforestation driver component 1:** The ACUS conservation mechanism offers an integral approach in terms of combining land preservation activities but also taking into account supporting the livelihoods of local inhabitants. An enhanced land management allows combining preservation measures, farming practices, provision of ecosystem services while at the same time preserving biodiversity and improving the livelihood conditions of farmers located in the forests. As mentioned before, currently the main economic activity of local inhabitants is the production of panela which has caused a high level of deforestation due to the large amount of fuelwood that is used in an unsustainable way.
116. For this reason, the project is proposing to strengthen farmer's capacity in agricultural and productive sustainable practices which will produce better yielding but at the same time preserve their forest. Improving crops and production yielding implies always a risk of expansion to continue growing their incomes. That is why the project at the same time presents a strong capacity building component to train local farmers in parallel about the importance of ecosystems and its preservation and to raise awareness about the risks that implies degradation exacerbated by climate change. It is important to mention that this process will be closely and constantly advised and guided by project technicians. The constant guidance together with a strong and effective monitoring and evaluation mechanism will minimize the risk of encroachment. A well-designed mechanism with this integral approach that contributes to improve agricultural management practices and at the same time promotes conservation has a great potential of causing multiple benefits.
117. In a region where a high percentage of the population lives in poverty, to provide help for conservation is necessary, but what would create a long-term larger impact is to provide them with economic alternatives to improve their socio-economic conditions. Based on the type of activities that communities have been practicing until now, it is clear that their main priorities remain related to improving their socio-economic conditions.

Component 2: Adapt farming practices to new climate change conditions and enable their climate smart financing

118. To assure the sustainability of ecosystem conservation it is of major importance that communities are aware of the importance of ecosystems for their livelihood agricultural productive systems and that they develop income generating activities through ecosystem conservation, particularly in face of climate change. Component 2 is intended to provide the basis for this objective.

119. This component will generate the conversion to crop management in an environmentally sustainable and climate-smart way for at least 500 ha. Traditional forms of cultivation are rooted in conventional agricultural practices.

Although there are some isolated efforts to apply cultivation methods in a different way, either by applying live fences (such as "queiebrabarriga and yucaraton"), or the implementation of silvopastoral systems, these have not been widespread or considered interesting alternatives for conventional agriculture.

Those who have implemented these practices have done so, motivated by a personal attachment to the conservation of their environment, the ecosystems on which they depend, rather than economic motivations.

Although many farmers in the project's areas of influence consider it appropriate and important to implement measures to adapt to climate change in their crop management activities, their intentions are not put into practice due to the lack of knowledge on their implementation and the fear of assuming a risk that would affect their income and overall spending and payment capacity.

The selection of activities was made under the previously described triangulation scheme (figure 7-A) that results from the interaction between the documentary information, the revision of the normative-economic framework and the validation of the actions with the co-executors in the field workshops.

120. The importance of the economic viability of sustainable crop management and the implementation of adequate adaptation measures hence cannot be underestimated. Farmers need to be convinced that the implementation of such measures translates into concrete and tangible benefits, especially economically. If smallholder farmers are not informed and convinced that adaptation to climate change is possible, they are not likely to decide for investments for their adaptation and productivity enhancement. Such limitation in awareness and capacity increases the reluctance of small landholders to embark on the path to increased climate resilience and adaptive capacity.

121. Documental Review: For the selection of suitable adaptation measures to be promoted and implemented with target populations, the project will apply the Ministry of Environment's (MAE) methodology for Cost Benefit Analysis, Cost Effectiveness Analysis and Multi-criteria Analysis for adaptation measures recently developed in cooperation with the German Development Cooperation (GIZ) as well as methodologies developed in the UN Environment's MEbA project (see Annex 12.A).

Findings will be applied for prioritized adaptation measures suitable for the area and included in the respective awareness raising campaigns and monitoring and evaluation mechanisms for their verification over time. Complement to the documental review in the component, a cost-benefit analysis was carried out (Annex 14).

The importance of the economic viability of sustainable crop management and the implementation of adequate adaptation measures hence cannot be underestimated. Farmers need to be convinced that the implementation of such measures translates into concrete and tangible benefits, especially economically. If smallholder farmers are not informed and convinced that adaptation to climate change is possible, they are not likely to decide for investments for their adaptation and productivity enhancement. Such limitation in awareness and capacity increases the reluctance of small landholders to embark on the path to increased climate resilience and adaptive capacity.

122. For example, the implementation of irrigation systems, either by sprinkling or dripping, the construction of water reservoirs or introduction of crop rotation and intercropping systems, are generally not identified by the farmers when discussing possible sustainable and resilient agricultural practices. Though, the increase in productivity of crops and livestock per hectare, are considered essential elements of sustainability by local communities. This fact motivates the merging of local adaptation knowledge and practices according to international best practices and methodologies. The project's objective is to capitalize on the communities' experience, combine it with proven solutions and empower vulnerable populations with sound adaptation practices. Instead of focusing on specific adaptation practices, the project will introduce methodologies that enable the different stakeholders to promote adaptation and sustainable agricultural and livestock practices on an ongoing basis: adaptation to climate change will always be a process rather than a punctual activity and hence requires the change in agricultural practices on an ongoing basis.
123. Many farmers and ranchers agree that ecosystems in the areas of the Río Blanco upper basin are being permanently threatened by logging, in part by the constant expansion of the agricultural frontier and livestock ranches. They argue to ignore the feasibility alternatives to apply them. If communities, highly dependent on these economic activities, have convincing alternatives to sustainable agriculture and livestock, there will be a gradual migration towards these farming methods.
124. At the same time, artisanal forms of panela production, prevalent in the project's area, that are intensive in the use of wood for the combustion of their boilers, will be included in the effort to obtain means of subsistence that do not degrade the ecosystems of the zone. Promoting a technological leap, integrating boilers that use alternative energy sources (such as bagasse) and increase overall energy efficiency, under the "Best Available Technology" (BAT) approach, will relieve the pressure on surrounding forests, harmonizing with other measures to protect the ecosystems and forests of the project's areas of influence. This industrial upgrade aspect will be considered as an integral part to change the paradigm of current artisanal production, matching and complementing sustainable agriculture and

livestock practices. These activities are directly related with forest preservation efforts of component 1 of the present project due to the extensive use of firewood.

Finally, suggestions were validated and collected during the field workshops (July 24 and 25, 2017). In relation to component two, the actors identified the main activities that are summarized in the following diagram:

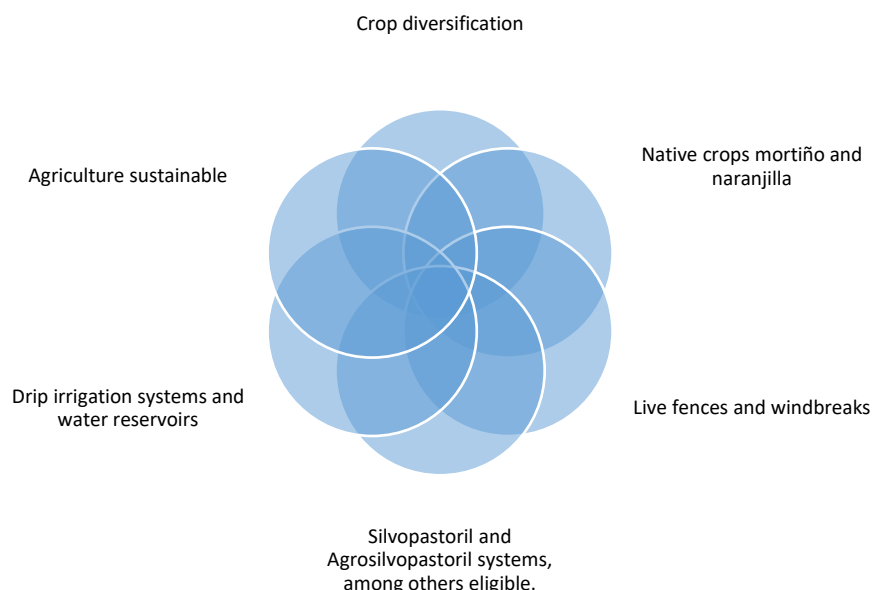


Figure 18. Main concept identified for the component 2

The adaptation measures correspond to local needs and meet the criteria of applicability, cost benefit and are in accordance with the regulatory framework of Ecuador:

- The establishment of family farms, which helps especially women as head of household to enhance the daily diet of family members and even generate additional family income by selling surplus on local markets.
- Crop diversification, which not only helps to increase biodiversity but also promotes risk mitigation of family income, where applicable relying on native varieties.
- Local native varieties will be promoted such as mortiño (*Vaccinium floribundum*) and naranjilla (*Solanum quitoense*).
- Live fences and windbreaks
- Silvopastoril and Agrosilvopastoril systems, among others eligible.
- Drip irrigation systems and water reservoirs

The following is a summary of the activities suggested by the local actors that are adapted to component two of the project:



Figure 19. Main activities identified with the communities for the component 2

125. Hence, selection criteria for the identification of suitable adaptation measures for individual farmers need to be flexible and take into account each farmer's specific situation, such as:
- Access to important infrastructure such as roads
 - Inclination of plots or grazing grounds
 - Soil texture and quality
 - Actual crops cultivated or livestock bred, including varieties and types
 - Availability of critical inputs
 - Pricing of inputs in each area
126. The combination of these critical productivity drivers will not only determine the productivity of farmers under business-as-usual scenarios in face of adverse climate impacts, but also define what actual adaptation measures promise not only the optimum results but also if their implementation is feasible at all. For example, if certain inputs for the implementation of adaptation measures are not available, cannot be transported to the farm due to the lack of access roads or are prohibitively priced, must be analyzed on a case by case basis.
127. The project will seek the cooperation with the UN Environment's Microfinance for Ecosystem-based Adaptation project, which has identified a set of 40 EbA measures specifically suitable for the implementation by smallholder farmers. The MEbA project has so far implemented almost 10,000 EbA measures (for a total financing of over USD 12 million, exclusively provided by the microfinance institutions' own funds and paid by the farmers) in cooperation with 5 microfinance institutions in Colombia and Peru and is assessing the implementation of its solutions in Ecuador.

The MEbA project is funded by the German Federal Ministry of Environment via its International Climate Initiative.

128. The MEbA project has developed tools that support the individual assessment and prioritization of EbA measures to be applied with small farmers as part of operational processes of institutions interacting with small farmers as input or service (such as technical assistance or finance) providers.
129. The project will hence promote with the communities the application of proven interventions able to:
 - Improve agricultural productivity and in consequence socio-economic resilience,
 - Conserve ecosystems and hence sustainably support agricultural production systems,
 - Increase climate resilience of vulnerable populations and the ecosystems they depend on.
130. The approach of adaptation will be introduced with at least 250 local smallholder farmers, to reduce the pressure of farming and livestock activities on native forests and ecosystems.
131. Working with farmers' organizations and other potential multipliers such as input and finance providers, best practices will be introduced to increase production using a reduced area of agricultural land. The main lines of work will be (i) cattle and pasture management, and (ii) sugarcane production. Nonetheless, other crops will also be addressed (e.g., mortiño, naranjilla,), also against the background of crop diversification as an ecosystem-based adaptation to climate change via the diversification of agricultural activities to mitigate resulting productive and economic risks. Agricultural intensification, i.e. the technologies to produce more (and of better quality) on less land, is of fundamental importance to stop deforestation and resources over-exploitation.
132. The Project will build upon existing infrastructure and processes of partner institutions to generate sustainable mechanisms targeting investments into adaptation measures. Local input providers and financial institutions will be engaged to improve their respective knowledge and awareness to engage them to participate in the activities of the project in a more proactive way. Capacity building will be implemented and reinforce such stakeholders' understanding of the risks and opportunities to include adaptation solutions in their operations.
133. In addition, an investment fund will be built to support the respective finance of adaptation investments. This financial instrument offers a mean to involve different actors on a long-term basis.

Outcome 2: Sustainable farming practices adjusted to local realities are being introduced and implemented with technical assistance of innovative financing mechanisms for adaptation measures.

134. The geographical scope of the project is broad, the participation of different cantons and parishes is confirmed.

The project area of operation comprises high Andean parts with paramo ecosystems and Andean cloud forests, down to zones with sub-tropical climate. In the same way, the topography in which the activities of agriculture and livestock are being executed is varied, comprising farms located in sites with pronounced slopes as well as farms in places with reduced slope and close to the rivers.

135. Consequently, it is not possible to define an established set of sustainable agriculture and livestock adaptation measures ex-ante. Instead, adaptation and ecosystem conservation strategies will be defined and designed during early stages of the project, considering the particularities of the different types of crops managed in the area (sugar cane, naranjilla, mortiño, among others), topographic and (micro)climate conditions, local climate change perceptions of vulnerable populations, agricultural practices implemented as well as existing experiences in the different parishes. Furthermore, the cultivation of native species (e.g. mortiño, naranjilla) in a sustainable way will fit within the biotrade (Biocomercio) initiatives that have been developed in the country and are of interest to the Ministry of Environment under the bio-economics approach.

Definition of adequate adaptation measures

136. To facilitate acceptance of proposed adaptation strategies, it is suggested to identify existing experiences with adaptation practices in the Río Blanco upper watershed and surrounding areas. Initiatives focusing on climate resilience of small landholders will be identified and evaluated, targeting the identification of already adopted adaptation strategies in local areas. Based on a set methodology, these strategies will be standardized and adjustment criteria (e.g. for different crops or climate regions) be identified. Lessons learned from other initiatives will be documented, systemized and integrated into the strategy formulation for their replication in the project. The objective is to increase acceptance in production changes by the farmers and their communities.
137. Insights drawn from such an exercise will help to develop quick wins for participating key stakeholder, i.e. defining products which can be quickly introduced by replicating existing strategies already adopted.

Furthermore, the selection methodology as presented in Annex 12 from the UN Environment's MEbA project will be applied for the customized prioritization of suitable EbA measures at an individual farmer's level with complement tools such cost benefits analysis and multicriteria matrix (Annex 14).

138. Powerful means to further support the introduction of adaptation measures will be the promotion of trial or partial introduction, where possible with leading producer within the community. Trial or partial introduction of innovative adaptation solutions allows the farmers to limit their investment on one hand, while enabling them to observe concrete benefits with their own eyes in the other hand. In such a set-up, only a minor part of a farmer's plot is managed using the new practice, while the remainder is managed in a traditional way. During harvest, and of course over the development of the crop, the performance is being monitored and documented,

especially with respect to yield levels. Such implementation approaches have been shown to increase acceptance especially in remote communities.

Financing of adequate adaptation measures

139. A major limitation for successful adaptation is the availability of financial resources for adaptation investments. Traditional financial service providers limit their exposure to the most vulnerable populations and focus on traditional agricultural practices for those farmers eligible for financing. Furthermore, in many cases no reliable agricultural service providers provide the required inputs (agricultural inputs as well as capacity building) and consequently do not limit the technological risks of innovative adaptation methodologies. Hence many of the smallholder farmers in the project area are trapped in a poverty cycle they are unable to solve by own means. Hence, the project will also be working with the service ecosystem focusing on smallholder farmers and apply a twofold strategy to support investments into adaptation as described below.
140. Where appropriate, technical assistance will be accompanied by temporary economic assistance and capacity building to convert financially excluded target populations into credit worthy clients. Being more resilient, having implemented adaptation measures, will enable these populations to receive credits and in consequence enable them to finance more important investments, with higher opportunities for increased economic return and climate resilience.
141. Communities in the target area have a certain access to credit. Nevertheless, credits do not target investments in adaptation practices, but credit is provided to traditional practices, which regularly contribute to ecosystems degradation and climate vulnerability.
142. The volume of credits, the number of beneficiaries, and the degree of financial inclusion, vary among the geographical areas targeted by the project. For example, in Las Pampas, in December 2014, USD 3,239,340 were granted in 534 lending operations, resulting in an average loan of USD 6,000. In Mejía, in 2013, USD 30,470,353 were invested in microcredit, delivered mainly by banks (61.09%) followed by cooperatives (38.91%). In Palo Quemado, 44% of the population has access to credit.
143. The intervention of the project will hence take into account the level and scope of financial inclusion among the various communities, with the aim to propose adapted solutions for each of them. While access to finance is a reality, however, expanding the credit supply is one of the elements of development that forms part of the planning of GAD's.

The project hence will promote to channel the existing credit supply towards adaptation investments assuring economic return for farmers, conservation for ecosystems, reduction of climate vulnerability for the communities, and financial return for financial institutions.

This strategy will therefore support a triple bottom line of economic, social, and environmental return for all involved stakeholders.

144. To realize such achievement the project will take into consideration the lessons learnt in two of the most innovative projects in the area of smallholder adaptation finance, that have been operated in LAC: the MEbA (see reference 1 of annex 12) and CAMBio (see reference 2 of annex 12) projects.
145. Strategies are proposed to allow a holistic approach to promote investments oriented to adaptation to climate change by providing technical and economic assistance (where needed) and financial resources directly to the farmers (via credits) on the one hand, and on the other, by creating the conditions for the development of financial mechanisms that work in the project area in the long term.
146. Financial institutions assisting farmers and ranchers in the area, do not yet have lending tools to facilitate, nor promote, a transition to sustainable agriculture and livestock management models.
147. Capacity building through the intensive training of its commercial staff at the operational and management levels, as well as the appropriate tools to facilitate the assimilation of new concepts into their credit risk assessment, are crucial to generate the interest and expectations alienated from adaptation to climate change within the financial institutions.

Output 3. 250 ha of pasture and 250 ha of crops apply sustainable farming practices

148. As previously explained, communities living in geographical zones targeted by the project, are threatened by a multitude of challenges, including poverty traps, low agricultural productivity, lack of access to water, adverse climate impacts, and environmental degradation.

To foster community adaptation capacities, it is of main importance to define, develop and implement agricultural practices that can at once generate higher income, reduce climate vulnerability and conserve ecosystems.

149. Introducing best adaptation practices in agriculture and livestock management, will be one step forward from the conventional farming towards resilient and sustainable agriculture.

The approach of (ecosystem-based) adaptation will be introduced on at least 250 local smallholder farms, to reduce the impacts of farming and livestock raising on native forests, ecosystems and land degradation. Working with farmers' organizations and other potential multipliers such as input providers or financial service providers, best practices will be introduced to increase production using a smaller area of agricultural land.

150. As examples the following practices have been identified based on the initial analysis executed, further suitable adaptations strategies will be identified according to local realities, following the methodology presented in Annex 12.A:

- The establishment of family gardens, which helps especially women as head of household to enhance the daily diet of family members and even generate additional family income by selling surplus on local markets.
 - Crop diversification, which not only helps to increase biodiversity but also promotes risk mitigation of family income, where applicable relying on native varieties.
 - Local native varieties will be promoted such as mortiño (*Vaccinium floribundum*) and naranjilla (*Solanum quitoense*).
 - Live fences and windbreaks
 - Silvopastoral and Agrosilvopastoral systems, among others eligible.
 - Drip irrigation systems and water reservoirs
151. The application of sustainability measures in agriculture and livestock is not new in the country, there are projects in which comprehensive management of farms, as a way to improve the productivity of farmers while reducing the impacts on the ecosystem.
152. In Annex 12 are some measures that can be considered part of the repertoire of actions to be implemented within a comprehensive farm managed in a sustainable way.

These EbA practices were drawn from the catalogue for EbA practices developed in the project ("MEbA Options, costs and benefits", UN Environment, 2013), and will be combined with ongoing initiatives in Ecuador such as the Ministry of Agriculture's Planification of Integrated Farm Management in the framework of the program Productive Transformation Agenda of the Amazonas.²⁹

Implementation strategy

153. The activities, as presented in Annex 12 only provide a framework and not a final solution. In particular, the possibility to include existing local agriculture practices into Ecosystem based Adaptation practices, will be assessed in detail during the first phase of the project. These will promote local practices that have already proven more resilient, and support the introduction of Community based Adaptation strategy into the overall strategy of the project.
154. As previously mentioned, a two step strategy will be implemented to introduce adaptation measures with local communities. The underlying principal is to focus on gradually upgrading vulnerable populations that are currently not having access to market-based solutions for inputs, capacity building or finance via direct and subsidized support. Once these farmers have reached a certain development level, they will become eligible clients for service providers and hence will receive

²⁹ Farming Plans, reference ATPA Program available: <http://www.agricultura.gob.ec/agenda-de-transformacion-productiva-amazonica-reconversion-agroproductiva-sostenible-en-la-amazonia-ecuatoriana/>

155. Under the first approach, the construction of sustainable management solutions in farming will focus on but not be limited to the most vulnerable populations, with specific target on women individually, or women associations where applicable. Specific vulnerability criteria for their proper selection will be defined in the early phase of the project.

Such vulnerable population will be supported only for adaptation investments that can be reached with low investment and limited capacity building effort, but allowing for interesting economic return. The project will identify suitable adaptation measures to that end following the details presented in Annex 12.

156. Moreover, the economic and technical assistance provided to build the farms in a sustainable way, at this segment, will go together with a plan to strengthen their financial literacy. So that, once the farm is reaching a state of greater resilience and hence becoming credit eligible, the respective farmers are empowered to take sound financial and investment decisions, expenses and revenues and net profits. The intention is to prepare them for managing some basic points to take care in order to get a suitable and timely loan. For vulnerable groups this step by step proposal will be the best chance to gradually become creditworthy and go on with their business in an individual way.
157. The second approach is addressed to those farmers who already have access to micro loans. For these farmers, the project will facilitate the link with financial institution that have been previously trained to disburse credit for adaptation. Such credit worthy population will take advantage of the possibility to establish more profitable EbA investments but that at the same time required more upfront capital, in this case provided by a tailored microcredit, and longer return time. Moreover, credit worthy farmers will also have the advantage to have access to more extensive training on EbA, and the training on more involved adaptive practices, tailored to their ability.
158. In the case of vulnerable groups economic resources for implementation will not have any cost and will be transferred to the suppliers in benefits of the farmers and livestock ranchers immersed in this activity. In addition, a performance bonus will be granted to those participants who, within a period of 6 months, maintain the crops according to the established sustainability model previously defined. This performance bonus will be delivered on two occasions, six months after implementation and at 12 months. Other disbursement time can be defined after a first assessment at the beginning of the project.
159. Regarding the selection of suppliers, the availability of their services to the target populations must be assessed as a lack of access to such inputs could increase farms' vulnerability if the provision of new inputs to maintain the sustainable farms, are not available.
160. Regarding the intervention of Financial Institutions in Ecuador through micro lending approach this include all credit operations addressed to small business coming from different sector: service, production, commercial and agriculture, whose maximum

consolidates debts is not larger than USD 50,000 and annually sells not over USD 100.000. Personal guaranties are the most common collateral.

161. For a better understanding of the current situation, a short survey with the participants of the socialization workshops was done, where 46% of the attendees have credit with a broad range of amounts going from USD 1,500 the minimum to USD 15,000 the maximum. Which means that the different financial institutions (mentioned more forward) are reaching these zones and disbursing credits. For now and with high confidence, these loans are addressed to reinforce farming activities in an unsustainable way.
162. The monitoring and supervision of the fulfillment of investment plan, is a crucial stage in both cases to ensure the implementation of measures and avoid diversion of funds resources, for that reason the money will go directly to the suppliers of the technology applied, using traditional means such as: transferences or certified checks. For this end, suppliers will be selected regarding the experience, reputation, prices and diversified stock of the inputs required for implementation.
163. In the areas for intervention the associations to be include in the project will be selected including criteria of gender equity and vulnerable groups mainly and under of the responsibility of autonomous governments representatives. Land tenure and child labour avoidance are social aspects to be included in the selection criteria.
164. Assuming common agricultural areas of 2 hectares per crop, and an investment in adaptation practices of around 50% of the plot, the project will reach till 250 have farmers to reach 250 ha, while for livestock an average of 20 hectares is estimated, considering that only small part of the plot will be invested at first for EbA activities, this allows the inclusion of 125 farmers for this activity, considering that only 10% of the farm will be invested in EbA practices. 50% of women both agriculture and livestock farmers chosen for this stage. The openness to show the results and the close disperction of the farms are aspects to be deeply valued before the farms's selection.
165. Finally, is worth to take into consideration that the given figure of 2 hectares does not mean that farms which have more extension will be automatically rejected. A case by case analysis will be applied.
166. The direct beneficiaries of the intervention are estimated to be between 250 and 375 according to acceptance rate and plot size. Including the rural fertility rate of 2.7 per women³⁰ that means 4.7 members per family, it is estimated that the project will reach between 1,175 and 1,763 indirect beneficiaries.
167. Due to the development of a two-step strategy presented above, that consist in distinguishing between the most vulnerable people and the ones that are credit worthy, it is of major importance to establish clear criteria for this.
168. To avoid this the community will be mobilize to commonly define the criteria. Moreover, as presented above, both group will have different benefits not provided to the other group and tailored to its own capacity.

³⁰ Men and women in stadistics III, INEC and ONU Waomen. 2010

169. This strategy aim at once to include the most vulnerable of the community, and on the other side support less vulnerable farmers with adapted interventions allowing them to capitalize on their experience. This strategy will assure social inclusion and financial sustainability at long term.

170. Figure 20 provides a schematic presentation of the intended implementation approach:

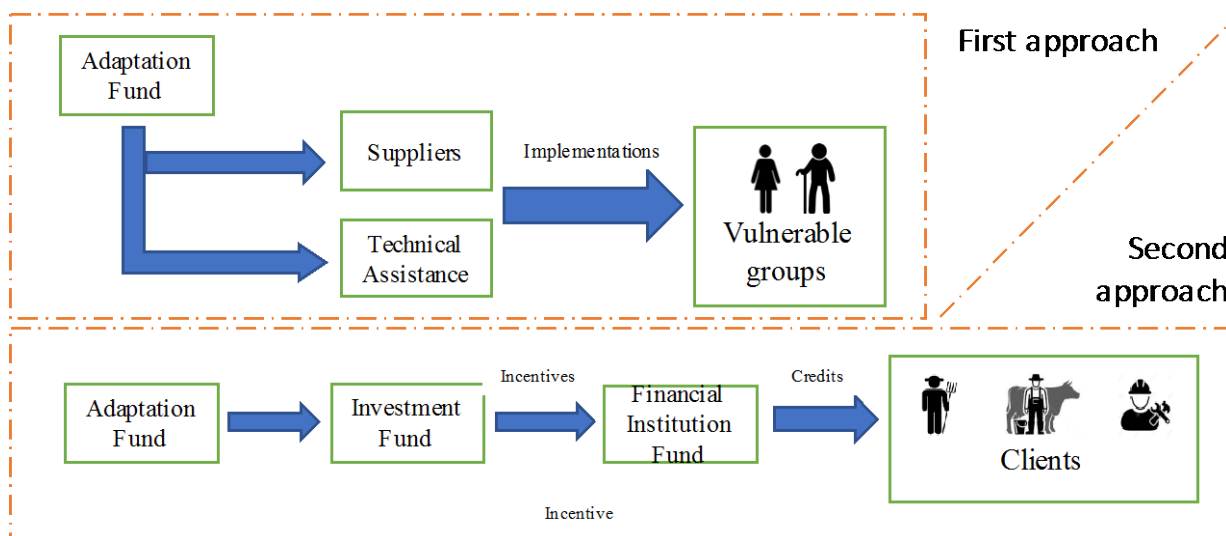


Figure 20: implementation approach

171. Details on activities to be carried out with financial institutions to support the second approach presented above, will be detailed in the next section.

Output 4. At least 2 institutions have introduced specific solutions and risk assessment methodology to support the disbursement of credits for adaptation, integrate sustainable and climate smart criteria in their whole operations.

172. The participation of the financial institutions, which have infrastructure and client portfolio in the areas of project design, can become catalysts of adequate financial resources to promote a gradual migration towards sustainable agriculture models.

173. However, the creation of appropriate financial mechanisms and products, which are attractive to both farmers (and final customers) and to the business model of the financial institution, requires prior and detailed work. Financial solutions appropriate to the credit methodology of each institution, appropriate for the segment of clients they attend and harmonic with the institutional objectives are important aspects to consider.

174. The introduction of such lending products, drawing from lessons learned in projects such as CAMBio or MEbA, regularly requires broad internal awareness raising and training campaigns and a strong support in strengthening lending processes. Nevertheless, it holds the promise to find strong partners that are serving the last mile in rural areas, and channel critical financial resources targeting adaptation

directly to end beneficiaries. Furthermore, these institutions usually collect data on the socio-economic and productive reality from these clients and can hence be key partners in increasing the understanding of the most vulnerable populations.

175. This project will support financial institution thanks to training provision and tools development. In particular the project aim to train financial institutions active in the region to understand, recognize, manage and offset when possible the climate and environmental risks of their portfolio. Specific climate smart lending methodology will be developed that will allow to include climate and environmental risk in credit assessment and disbursement. Risk management tool at client and portfolio level will be developed. Such innovative solutions will allow the financial institutions to increase their institutional knowledge of potential clients, and develop the correct price-risk policy for the EbA activities promoted by the project.
176. The development of investment catalogues that include EbA measures through information collection in the areas that would participate in the project would be an additional incentive for the financial institutions especially if they are not in charge for it. Intervention will include the detail of measures to be financed, the incorporation of software that facilitates the process of evaluation, qualification and monitoring, the construction of the reporting processes, the training of its commercial staff, and its clients, are the potential benefits for institutions that are encouraged to participate in the project.
177. The acquisition of long-term investments and a suitable interest rate for the financial institutions may also be considered as the incentive to request, in return, the placement in adaptation credits to the agricultural sector identified in the previously mentioned catalogs. The delivery of these resources will be through the Investment Fund for the Sustainable Development of the Río Blanco upper basin. This fund, once its equity has reached a suitable amount, will have the administrative and economic capacity to address these resources efficiently and well defined. So, this approach is linked with the output 5.
178. The strategy to encourage investments to consolidate more sustainable agriculture and livestock and to boost technological leaps that reduce the pressure on forests (panela producers) will go in two directions: one oriented towards the financial institutions to promote the disbursements of credits, and the other one, towards the client that the investment is concrete. For the latter case mechanisms will be structured to provide economic incentives through concessional credits including differential characteristics in the term and guarantees. As know-how on the concrete EbA actions increases via innovative and data-based information management, and productivity enhancement become more obvious, the project will gradually reduce the provision of economic incentives. In future financing, after the project's end, economic incentives will be provided to the clients in the following way:
 1. Farmers can invest into EbA via specific credit lines
 2. By investing into productivity enhancing EbA options and obtaining better economics, accompanied with a proper communication strategy (see output 8), sceptical actors will be guided to understand the investment logic via adjusted financing.

3. Financing institutions will be incentivized and enabled to introduce risk-adjusted pricing, which will favour better adapted smallholder farmers further decreasing interest rates and hence providing economic incentives.
 4. Financial institutions expand their range of financial products for adaptation and mitigation of climate change.
179. The application of benefits in the granting of credits, must be clearly explained to the clients. Its application would be temporary and unique since, once the farmers have reached a good level of knowledge of crop management with EbA measures and their yields are sufficient to maintain the continuity of agricultural production itself, access to credit would be in a conventional way onwards.
180. From the financial institution point of view the positive aspects to implement specific credit liens for adaptation will be:
1. The verification and documentation of the use of funds is vital to generate trust of interested investors as well as satisfy their “Know Your Client (KYC)” requirements. There exists an increasing appetite in international financial markets for triple-bottom line investments, i.e. providing financial, social and environmental returns that can be strongly addressed via the financing of adaptation activities, if these are documented.
 2. Reducing overall operational costs and risk, and improving beneficiaries’ knowledge will result in an overall gain for the participating institutions and communities. The project will identify and engage a software solution provider capable of providing solutions that are especially designed to reduce cost and capitalize institutional understanding and strategies on monitoring.
181. To assure the financial sustainability of the project financial institutions will be included and incentivized to provide financial support to smallholders.
182. During the project two financial institutions will be involved: one public and the other private. The present project does not aim *per se* to provide the credit lines to the financial institutions, while it will work with the financial institutions to channel part of their existing funds, or to have access to international funds such as GCF, towards smallholders. The incentive of the present project would be:
1. Provision of climate risk management methodologies and tools to the financial institutions able to reduce their risk in agriculture lending and reduce their operational cost to assess and monitor agriculture credits
 2. Provision of tailored technical assistance to financial institutions aiming to train them on environmental and climate risk, and the implementation of dedicated credits for smallholders, based on best and proved international standards for green lending.
183. Currently, there are few financial institutions that include aspects of sustainability in their operations. 10 private banks in Ecuador adhered to the Sustainable Finance Protocol promoted by the Association of Banks (ASOBANCA), in the area of cooperatives, there is still no such initiative.

184. The proposal at the national level for the management of financial sustainability approach rests on three specific aspects:

1. Internal environmental management: measurement of the consumption of resources inside the financial institutions to elaborate baseline, establish actions of mitigation and compensation. It involves the training of all the staff of the institution and the creation of internal mechanisms to identify the main direct and indirect environmental impacts and the way in which they must be managed. The launching of internal committees and environmental management policies are part of this process.
2. Environmental and Social Risks Assessment (ESRA): It consists of the implementation of mechanisms to identify environmental risk in the economic activities that are financed. Manage them by requesting additional requirements or even rejecting the loan if proper corrective measures are not taken to mitigate the environmental impact. This mechanism and its evaluation processes will be harmonized, as far as possible, with financial institution's credit methodology, and will be incorporated into screening process and decision-making activities (credit committee).
3. Green lending: this is a new element in the financial mechanisms of the country, very few financial institutions have specific tools to address issues of environmental protection, energy efficiency and renewable energy. The main obstacle is the lack of awareness of the opportunities of this market.

185. In addition, another effort in the same direction has been developed in the country, the Environmental and Social Management Programme for Financial Institutions ("Programa de Gestión Ambiental y Social para Instituciones Financieras" - PGASIF).

An initiative headed by the CAF since 2012 and mainly oriented to share lessons and provide technical assistance to improve the environmental aspects inside the whole financial operations. Important steps have been taken in Ecuador with the PGASIF support, such as the Financial Sustainability Protocol, an initiative promoted and implemented by CAF together with with the National Banking Association ASOBANCA. So far, 10 leading banks have ratified the protocol.

186. To assure the environmental impact of the project, smart incentives will be implemented. A possible scheme will be: the farmers are required to invest in their farms through a credit, after a defined period of time the sustainable agriculture investments will be verified by an external party. If it is confirmed that investment have been realized appropriately and that the agricultural practices are being implemented properly as well as in line with environmental sustainability criteria, a percentage of the investment will be returned to the farmers as ecosystem incentive. This allows to align incentives between farmers and financial institutions and to provide a financial subsidy of the credit only for successful implementation of the adaptive practice.

187. Proyecto CAMBio, as presented in the Reference 2 in Annex 12, has first developed such incentives in the region and it will be used as framework to establish consistent and adapted ecosystem incentives for the present project.

The financial institutions' environment

188. In Ecuador 696 cooperatives are active and 26 commercial banks. With about 22% market coverage Ecuador is far above international benchmarks in financing smallholder farmers. The cooperatives are divided into segments, and distributed accordingly, as follows:

Segment	Total assets (USD)	#
1	Greater than 80,000,000	26
2	From 20,000,000 to 80,000,000	33
3	From 5,000,000 to 20,000,000	84
4	From 1,000,000 to 5,000,000	183
5	Up to 1,000,000	370
	Savings bank and associations, communal banks	unknown

189. The project has identified the following institutions as being active in or around the Río Blanco upper watershed. Potential partners in that activity already identified therefore could be:

1. Cooperativa CACPECO: Segment 1 cooperative
2. Cooperativa Manantial de Oro: Segment 3 cooperative
3. Cooperativa Maquita Cushunchig Ltda.: Segment 2 cooperative
4. Cooperativa San Miguel de Sigchos: Segment 4 cooperative
5. Cooperativa Unidad y Progreso: Segment 3 cooperative
6. BanEcuador: state-owned rural development bank
7. Banco Pichincha: market-leading commercial bank with a microfinance subsidiary ("Credife")

190. In Manuel Cornejo Astorga there also are present:

1. Banco Solidario, specialised in microlending
2. Cooprogreso, segment 1 cooperative

191. Further institutions identified are:

1. Las Pampas livestock ranchers' association to introduce improved livestock and pasture management practices in 250 ha.

2. Flor de Caña Association (sugarcane producers) to introduce improved practices for sugarcane production in 250 ha and to explore forms to improve panela production units to reduce the use of firewood.
 3. The association of producers from Quinticusig who grow and process mortiño (*Vaccinium meridionale* Swartz).
 4. The Women association Marianita de Jesús en Las Pampas composed by 18 women
192. The project will foster data-smart process management (provision and financing) to create a multi-stakeholder support ecosystem that will be attractive to financing from market players. Details on respective activities are being presented below.
193. Direct beneficiaries of the respective activities will be two financial institutions with established presence of operations in the area.

Mechanism for lending approach:

Beneficiaries	Type	Units (hectares / producers)	Investment (per hectares or units). Average	Mechanism			Technical Assistance (15% o 10%)	Charge to Adaptation Fund
				Credit	Grant (70%)	Bonus 15% farmers + 5% MFI		
100	Crops	100 ha	\$ 1.000,00	\$ 100.000,00	0	\$ 20.000,00	\$ 15.000,00	\$ 35.000,00
150 (vulnerable groups)	Crops	150 ha	\$ 1.000,00		\$ 105.000 + (\$ 45.000 farmers contribution)		\$ 22.500,00	\$ 127.500,00
125	Livestock	250 ha	\$ 500,00	\$ 125.000,00	0	\$ 25.000,00	\$ 18.750,00	\$ 43.750,00
10	Panela producers	10 units	\$ 10.000,00	\$ 100.000,00	0	\$ 20.000,00	\$ 10.000,00	\$ 30.000,00
				\$ 325.000,00	\$ 105.000,00	\$ 65.000,00	\$ 66.250,00	\$ 236.250,00

Resources from output 3	\$ 105.000,00
Resources from output 3	\$ 66.250,00
Resources from output 4	\$ 65.000,00
	\$ 236.250,00

194. In order to achieve the goal of 500 hectares managed sustainably for agriculture and livestock and including the production of panela, we have the expected number of hectares (in the case of agriculture / livestock) and units (in the case of manufacturers). The average investment for sustainability measures per hectare is estimated at around USD 1,000 per crop, USD 500 for livestock ranches. It is assumed, that only 10% of the cattle ranch area will be dedicated to new measures; and that USD 10,000 of average amount of investment for the artisanal manufacture of panela will be necessary. For farmers with access to credit, a 20% incentive is proposed, 15% over the capital borrowed and 5% for the capital lent by financial institution. For the case of sustainable crops of vulnerable groups (including entrepreneurs of this group) the grant mechanism is used in a much focused way, the investment in sustainable measures will be addressed 70% assumed by the grant as incentive and the remaining 30% as beneficiary contribution (workforce).

195. In the case of livestock and the manufacture of panela is contemplated granting donations because the nature of their business shows that the entrepreneurship itself would be costly without applying even sustainable measures. On average, the cattle ranch requires 20 hectares, which leaves little room for entrepreneurs. Therefore in this case we will apply a similar 15% performance bonus (105 livestock rancher and 5%MFI) on the principal of the credit as a unique mean of incentive.
196. The case of the panela producers is similar, usually these businesses are already constituted and with a certain trajectory. For them, investments of USD 10,000 are estimated, to invest in the most efficient furnaces (which use another source of fuel like bagasse) and if the investment plan is fulfilled a 20% bonus is applied with similar structure mentioned above.
197. In all cases technical assistance amount is estimated and added to the resources needed, however, this aspect is part of output 3 budget together with amount for grants. The resources of credit implementation under the figure of bonus is part of the budget of output 5 realized by the establishment of an investment fund.
198. The figures estimated are conservative and leave a room for the inclusion of more participants, as the intention is at least to reach 500 hectares with sustainable management but if possible even more areas could be introduced.
199. The methodology to manage climate lending risk and to develop financial instruments like green lending expected to be introduced in the two financial institutions is not intended only to be used in the scope of the current adaptation project, but in all operations at national level.
200. Two institutions will be supported via specific consultancy as well as training measures. Where possible, the project will seek the coordination and the cooperation with the UN Environment project microfinance for Ecosystem-based Adaptation to climate change (MEbA) and participate in workshops and knowledge sharing lessons organized by CAF's PPGASIF project and other similar initiatives.

Implementation with financial institutions

201. The component will be outsourced to a specialized consulting company for microfinance or south –south cooperation, where possible in coordination with the UN Environment's MEbA project. UN Environment's office in Panama is currently assessing to replicate the MEbA project in Ecuador, where several institutions have expressed their interest to gain access to the project's developed solutions (see Annex 12.C for more details on these solutions).
202. The following details as well as implementation plan for these activities over time is presented below. The implementation of climate-smart lending and EbA financing product development will be organized in different phases with their own activities which are laid out below and summarized with different activities in the work plan.

- **Phase 1 - Initial screening**

The initial screening serves as starting point and targets the review of a partner institution's existing data available, experience in green inclusive finance as well as existing lending products and processes.

Based on these findings, a project framework or strategy is defined and a detailed work plan elaborated.

- **Phase 2 - Framework definition**

During phase 2 the general framework is developed, with a specific focus on the identification and engagement of strategic partners such as training or input providers, if applicable. Term sheets to guide a future cooperation agreements are elaborated together with the partner institutions and then discussed and negotiated with identified prospect strategic partners.

Once the partnership set-up is agreed upon with one or several partners, respective cooperation agreements are drafted and finally signed.

- **Phase 3a - Implementation awareness and capacity**

During this phase, suitable EbA options are being identified according to available information and experience in the local markets and based on the EbA options and methodologies presented in Annex 12, among others. The selection of suitable EbA options follows the Cost-Benefit Analysis in detail and prioritization methodology presented in that same Annex 14. Other criteria to be considered are previous experiences with EbA activities in the area of the proposed project, the Rio Blanco upper watershed.

Based on the defined options, training materials are being developed as well as internal employees and external agents trained in the overall set-up as well as the promotion and capacity building offers of specific EbA options.

- **Phase 3b - Implementation lending support**

Lending support will be promoted via specific lending software. The supporting, cooperation or consulting firm to be selected will ensure the versatility of such lending software to incorporate future developments in best practices in lending and EbA. The software solution will work on mobile devices in order to allow for on-site data gathering in a structured way.

Resulting crowd-sourced insights, i.e. insights gained by a multitude of co-executors (farmers) based on data gathered via different channels, will feed into the

- **Phase 3c - Implementation financial products**

Once the initial EbA options to be promoted are defined, the product design is to be developed. It is assumed that MEbA products (i.e. the financial product financing EbA options) will follow the same rules than “traditional” generic

agricultural lending products, focusing on either input finance or asset investments.

Hence most focus around the product design will be on the development of marketing materials and adjusted manuals and procedures.

- **Phase 4 - Pilot review and adjustments**

Based on a predefined pilot protocol, including key performance indicators to monitor targeted outcomes such as handling and processing times as well as data quality, the pilot is started in dedicated pilot branches. Pilot assessments will be monitored and observation documented to enable ex-post assessment and adjustments if needed.

- **Phase 5 - Roll-out**

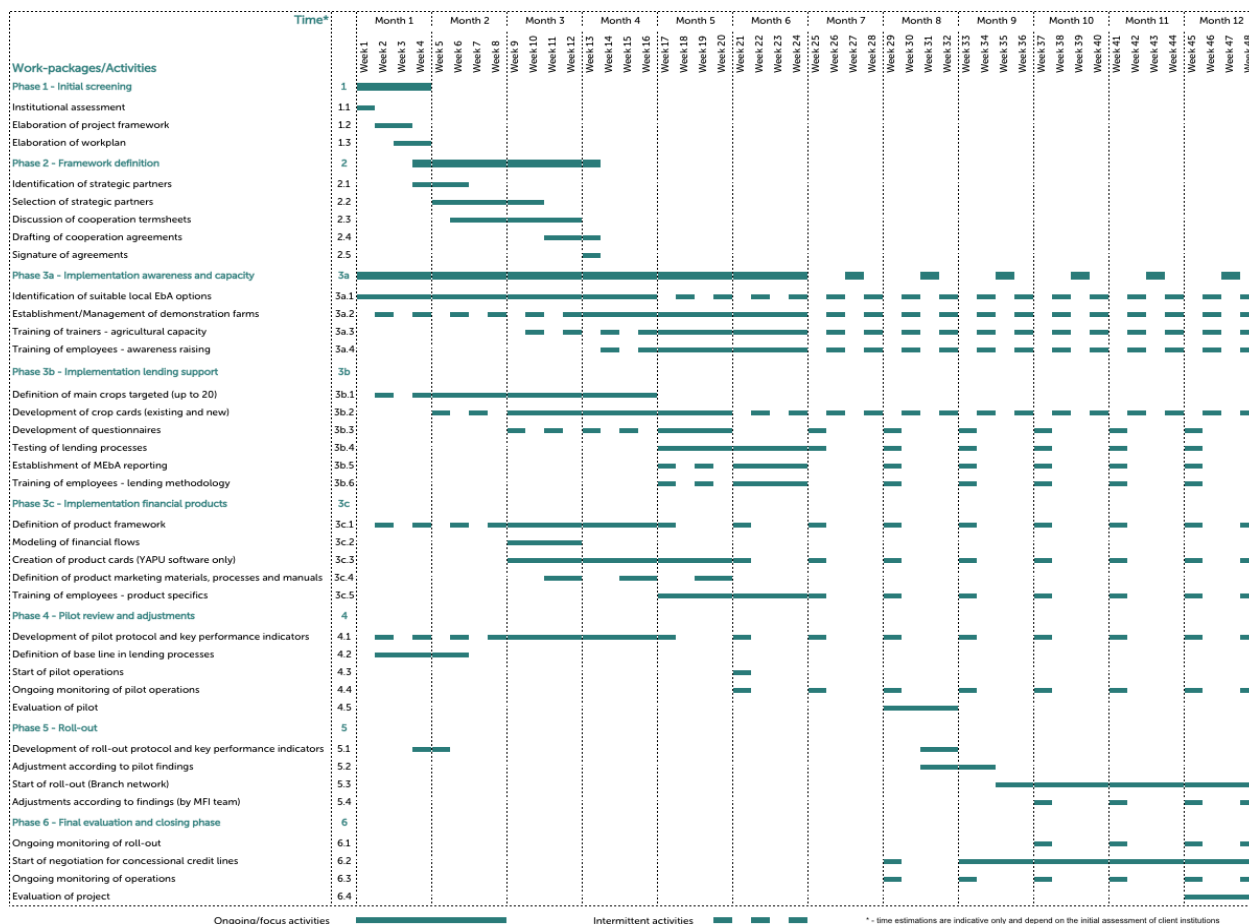
Once the pilot has been concluded necessary adjustments are worked into the standard documentation as well as the lending support software are being worked in.

- **Phase 6 - Final evaluation and closing phase**

After project activities have terminated, a final evaluation of the project will be performed. Results will be shared with UNEP ROLAC, potential donors providing financing.

The project activities to introduce climate-smart lending and EbA oriented financial products will take 12 months with each institution as presented in the below workplan.

• Workplan



Outcome 3. At least 1 long term financing mechanisms has been piloted or introduced

203. A sustainable development fund will be a useful mechanism to integrate contributions from public and private stakeholders and ensure long-term management. Ecuador has a strong experience developing and using similar schemes such as water funds and is hence in a good position to introduce such mechanisms. For instance, a leading experience is the “Fondo de agua para la conservación de la cuenca del río Paute (FONAPA)”. This fund is related to the Paute hydroelectric power station. The constituents include Cuenca’s water company (ETAPA), HIDROPAUTE (a state-owned hydroelectric company), ELECAUSTRO (the electric company that provides service to Cuenca and surrounding areas) and the national company in charge of providing electricity along the country (CELEC). In addition, CORPEI CAPITAL is an investment fund that only operates to assist the financial needs of micro and small and medium enterprises. An interesting set of financial tools are used to this end, such as: factoring, grants, investment in equity and conventional lending

204. The fund for sustainable development (FODES) of the Río Blanco upper watershed will operate under the securities market laws, since it will work through the constitution of a trust, and will be a long-term financial scheme. The resources contributed by the project will be seed capital so that more adherents join the fund. The interaction between FODES and financial institutions operating in the area will be desirable and complementary in order to underpin the financing of initiatives aimed at improving the resilience of agricultural and livestock farms and also to promote dual mitigation / adaptation projects.
205. It is worth emphasizing, in line with the consolidation of FODES, and in accordance with what is proposed in output 4, the financial institutions will build their integral environmental management systems, strengthening their institutional capacities, and becoming the ideal partners in the fund for the channeling of resources through the offer of adaptation and mitigation credit lines. In this way, resources are used efficiently, since the financial institutions operating in this place already have the necessary infrastructure (premises, staff and methodology) for the successful placement of this type of green loans.
206. Another important fact to take into consideration is that several GADs have stated in their development planning, the importance of promoting financing tools according to the needs of the inhabitants of the area, so it is very likely to have their involvement, commitment and support.

Output 5. One investment fund to promote sustainable development is set up and operational

207. The creation of an investment fund to promote the sustainable development of the area of influence of the Río Blanco upper basin will use the best-known structure in the national context, such as water funds to project its operation. The intention is that, using seed money from USD 420,000 coming from the project, the first year the operative funds will be used to set up the fund with the initial contribution of two people (a specialist and an assistant), with the infrastructure and basic equipment to do their job. USD 80,000 will be kept in very liquid financial instruments to be used for the lending incentive mentioned before. The remaining USD 327,600 will be used as assets for investments that will strengthen its capital over time.
208. This initial capital USD 420,000 will be invested in financial instruments available in the market with an interest rate of not less than 7.76%. It is worth mentioning that the “Fondo de Manejo de Páramos y Lucha contra la Pobreza (FMPLPT)” is currently invested in 20-year State Bonds with an interest rate of 8.45% per annum. The financial instruments, in which the equity is going to be invested, the interest rate, the term and the frequency of payment of interest will be the main responsibility of the director who will act under the strict supervision and authorization of the Board of Directors of the sustainable development investment fund.
209. In addition, the door will be open in the medium term to work in conjunction with financial institutions operating in the area covered by the project for investments in certificates of deposit or other financial investment mechanisms.

Although the interest of these investments is important to the fund, an important component of such investments will be the counterpart's commitment to direct resources to the same extent towards adaptation credits in the agricultural sector.

210. This mechanism has already been used in the country. For example, in 2013 CORPEI CAPITAL (a known investment fund) made a long term deposit in a private bank in the country for around of USD 500,000, under the condition to address these resources exclusively to the promotion of Bio-trade (Biocomercio) through microloans
211. Even though there are many similitudes between water funds and this proposed mechanism, we must leave clear that the scope and boundaries for action of the investment fund is broader than conventional water funds. So that, the range of potential investments to allocate the equity will include those that, even if they are not so profitable than other options, have a significant impact in the protection of the ecosystems and the rivers basin.
212. An important aspect to consider before implementation is that the contributions of constituents or adherents to the fund will be as important as the returns on their investments. The involvement of provincial, municipal and parochial governments through the regular allocation of resources is a task of political and commercial management. If there is no certainty that the contributions will materialize, the profitability of the fund will not be able to support its structure of expenses generating a gradual weakening. As equity strengthens, its economic sustainability will be more assured as will its investments in projects related to ecosystem and community-based adaptation.
213. The resources for the payment of the economic incentives addressed to the farmers who have acceded to credit, and to the IFIs that have disbursed it, will be handled through the fund of sustainable development. These resources are not a contribution to capital but rather short-term and will be transferred to the beneficiaries in the time that the project goes on with farmers. In a conservative scenario, the fund will be capable to address USD 30,000 for protection projects since the begging of the third year increasing to USD 35,000 for the fourth year and so on. In the case of that interest rates obtained are higher than expected in the current feasibility analysis, the incentives will be adjusted accordingly.
214. A diagram is presented in the following figure to illustrate the financial dynamics and flows of the investment fund:

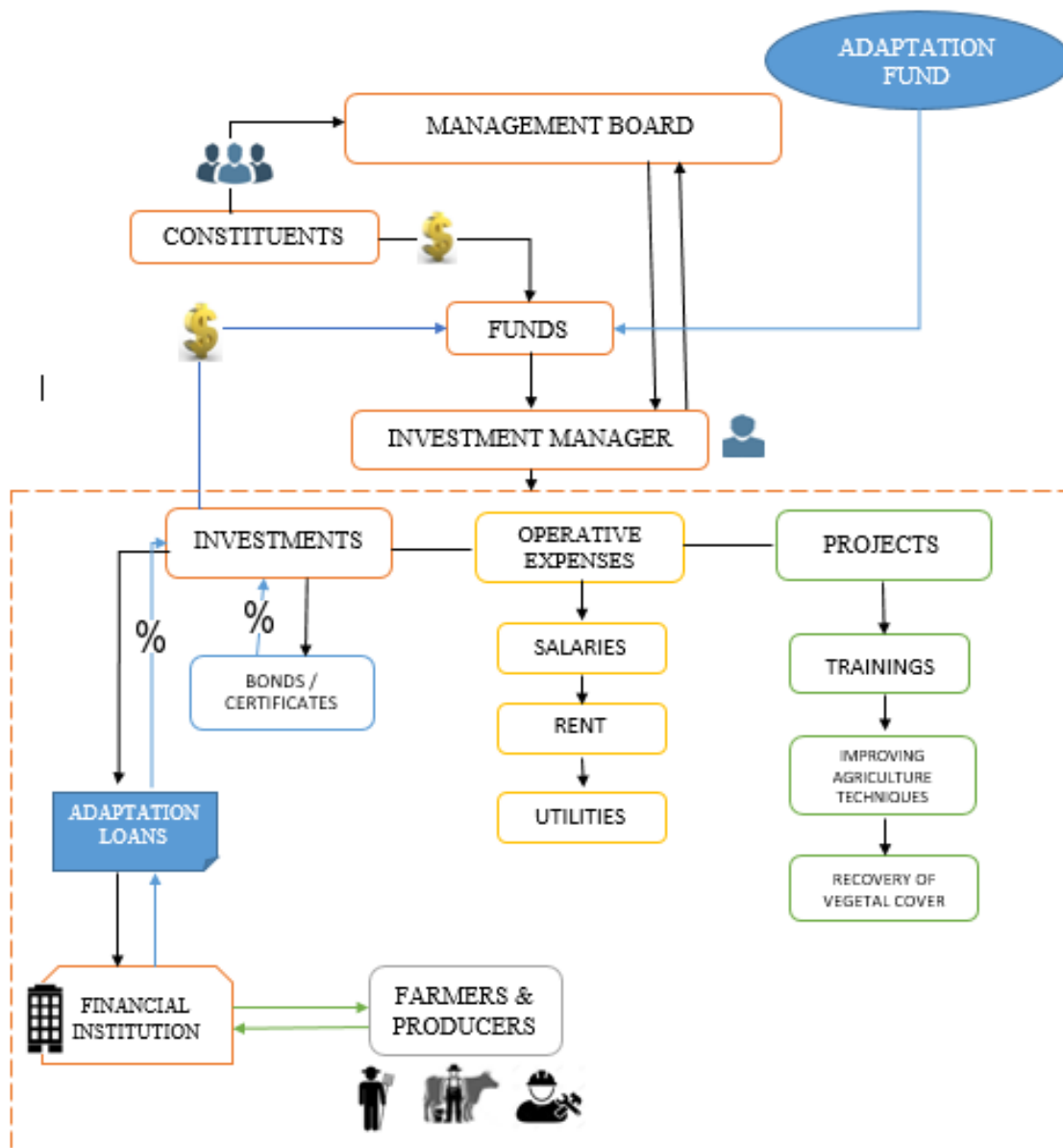


Figure 21: Financial dynamics and flows of the investment fund

215. In Annex 8 a deeper analysis is shown, an analysis of the feasibility of the fund is indicated.
216. Direct beneficiaries: Parroquial and municipal governments of Las Pampas, Palo Quemado, Manuel Cornejo Astorga, Aloag, El Chaupi y los GAD Municipales de Sigchos y Mejia. 49,367 total population of the basin.

Summary Component 2: Objectives and activities

217. The following table shows the priority areas for intervention under the component 1, the objectives of the two outcomes as well as activities carried out under each.

Objective	Activity
3. 250 ha of pasture and 250 ha of crops apply sustainable farming practices	Selection of farmers to reach at least 500 ha of sustainable cropping and livestock. Inside the group selected will be include vulnerable and women groups splited in groups to be assistance by grants and to be beneficiaries by credit lines.
3.1 Identification of adequate adaptation measures in the project area	Selection of the technical team to be in charge of identifying and defining the most suitable sustainable measures for farming and livestock; regarding micro climate, types of crops and availability of inputs to construct sustainable farms for the two main target populations.
3.2 Selection of eligible co-executors for subsidized implementation of adaptation measures	Notification of the selection process to select the participants to be part of the 500 ha of sustainable farms. Inside the group selected will be at least 150 beneficiaries who will receive grants for implementation of 75% of the investment. The remaining 25% will be counterpart contribution.
3.3 Selection of input and servcie provider to provide inputs for the implementation of adaptation option	Identification of the suppliers under criteria of access, stock and prices in order to ensure easy access to items for implementation of sustainable farms with better prices.
4. At least 2 institutions have introduced specific solutions and credit assessments to support the disbursement of credits for adaptation, integrating environmental and climate risks in their operations	There are several public and private financial institutions operating in the zone, however their lending criteria has not adaptation approach at all, thus the credits disbursed for agriculture are, in many cases, to promote non sustainable practices.
4.1 Selection of suitable consultancy providers, definition of general framework with financial institutions and initial institutional analysis.	To build the technical team with financial background to establish the suitable, tools to finance credits oriented to adaptation
4.2 Development of the methodological framework for climate-smart lending management and the introduction of adaptation finance	Construction of the climate risk assessment for all credit portfolio addressed to economic activities, based on software for structured data gathering and including state-of-the-art data analytics solutions; IT tools to facilitate identification, qualification and report of the credits disbursed to adaptation
4.4 Capacity building for partner institutions	Development of internal governance structures and procedures; development of financial products; Disbursement of adaptation credit addressed to sustainable farming. At least 235 people will benefit of this resources; Reporting of green lending oriented to promote sustainable measures in agriculture.

Objective	Activity
5. One investment fund to promote sustainable development is set up and operational	To build an investment fund to gather financial resources and transfer them into sustainable project in the zone. The permanent flow of resources will persist in the long term to the project.
5.1 Selection and constitution of the trust	Obtaining legal opinion of current regulation; definition of legal framework to be applied; constitution of the fund;
5.2 Identification and renting of premises and other infrastructure	Prepare the physical set-up of the fund management, including office space, equipments and vehicles,
5.3 Recruitment of the basic personnel of the fund	At least a central manager as well as an administrative assistant will be recruited;

Table 15: Key activities component 2

Component 3: Strengthen local capacities and share lessons

218. Component 3 presents the approach to strengthen the local capacities of the six rural parishes located in the project area and share lessons learnt during the implementation of the project. A plan of action and a set of core activities were defined to achieve the expected results during project execution and that they are also sustainable in the long term. The main objective of component 3 is to increase the local capacity to implement climate change adaptation measures and enhance the project's impact thanks to capacity and knowledge transfer to the community. By institutionalizing climate change adaptation within six parishes the project aims to foster the scale of adoption of practices and procedures for climate change adaptation, and to assure the sustainability and the continuity of the project after its end. Component 3 has a particular focus on women empowerment. Indeed, because women are on average more vulnerable to climate change, by targeting women we assure higher adaptive capacity of the community and more sustainable reduction of community's vulnerability.

sustainable manner highlighting the importance of association and community organization to improve empowerment and future sustainability.

221. The training will also be directed at parish GADs, who have the responsibility to ensure compliance with article 14 of the Constitution, which guarantees the right of the population to live in a healthy, environmentally balanced environment that guarantees sustainability and Good living, Sumak Kawsay. In component three training will be provided also to financial institutions on climate vulnerability and environmental impacts.
222. To financial institutions it will be explained how to detect climatic and environmental risks within their portfolio, how these risks can manifest as credit risks, and what are effective coping strategies. By including climatic and environmental considerations within credit processes the aim is to align better financial performance, with ecosystem conservation and reduction of climatic vulnerability.
223. Environmental and climatic criteria will be introduced into financial institutions' processes and procedures, training them to recognize environmental and climatic risks and support the financing of agriculture investments that are at once more profitable, but that also better preserve ecosystems and reduce climatic vulnerability for clients and financial institutions. Demonstration farms will be implemented as well.
224. The rationality is that explicit examples are more convincing than theory. Demonstration farms will show to community's members how to implement an efficient and climate proof farm, and what are the related advantages in term of: yields, vulnerability, ecosystems. Demonstration farms will play both the role of awareness raising, but also of capacity transfer. Hence, farmers from the community will be able to receive trainings on sustainable farming directly at the demonstration farm and compare the results of their farms with the ones of the demonstration farm to understand where and how to improve.
225. In addition, parish GADs will be able to include data and information related to climate change adaptation measures, with emphasis on gender and vulnerable groups, within their development and spatial planning plans. These documents currently have relevant information to articulate and coordinate priority local development actions, so it is possible to include aspects of climate change, as established in the current ministerial agreement number 147. The agreement is based on the following general guidelines:
 1. General Data on the Autonomous Government Decentralized GAD and the Plan of Development and Territorial Ordering (PDOT).
 2. Identify climate threats and sources of information.
 3. Identify the trends of the sectors related to emissions in the GAD territory.
 4. Summarize the findings on the vulnerability of the PDOT programs and projects.
 5. Summarize the findings on mitigation opportunities in the PDOT programs and projects.

6. Suggest modifications to the PDOT's vision and development objective.
 7. Define a prioritized list of mitigation and adaptation measures.
 8. Draw up fact sheets of the measures.
226. Strengthening local capacities allows the population and parish GADs to share the lessons learned through on-site visits, use of technology tools, and exchange workshops in each parish. Efficient mechanisms to share lessons learned will be key to assure multiplier effects, and foster the instauration of learning processes within the community. This is of fundamental importance to reduce the opportunity-cost of community members that would like to get engaged into climate adaptation practices. By capitalizing on the project experiences, the risks of new coming actors will be considerably lower. This will finally allow to scaling up the project and propose to new comers sustainable and climate proof practices already locally experimented and with known outcomes.
227. For the implementation of component 3, 4 outputs have been established (key), in order to comply with the priorities defined in the logical framework of this project and the allocated budget.

Outcome 4: Local population and parish governments with increased capacity to implement climate change adaptation measures.

228. The present outcome is based on four concrete outputs described further below. The outcome 4 has the objective to transfer capacity for climate change adaptation both directly to local population, but also to parishes' institutions, and hence supporting the establishment of an enabling environment for climate change adaptation for community members.

Output 6: at least 6 parishes being trained to take care and use meteorological information generated by meteorological stations currently installed.

229. The main function of meteorological stations is to provide climatological information to the parishes located in the project area. These stations provide information on temperature, precipitation, relative humidity and wind speed, to establish climate scenarios and improve decision making. This information is useful for socio-economic activities carried out by the population located in the Río Blanco upper basin, including agriculture and livestock, and improving the quality of life of the population. This approach match very closely with output 2. The understanding and inclusion of climatic data into decisions and activities related to agriculture is of major importance.

Climate influences when and what to plant, the expected yields, production risk for smallholders and credit risks for the financial institutions, and the decision of which practices or investments to implement being economically more convenient and less vulnerable.

For example, information on temperature and precipitations: trends, averages, and oscillations allow to establish the climatic and production risk per crop, define appropriate coping mechanisms for the farmers, and adapted risk management strategies for the financial institutions.

- 230. INAMHI is responsible for the installation and operation of the meteorological stations. For this project, it will be necessary to enable and maintain the stations in strategic locations in order to ensure adequate coverage.
- 231. In addition, INAMHI will be responsible for transferring the operation of the stations and for providing the necessary technical knowledge to the GADS personnel to take control of the operations and the appropriate maintenance, from the execution of the project.
- 232. The weather stations have technical specifications, such as: data logger to store data, modem to transmit data, a power system and sensors. The data generated at each station must be stored and transmitted to a central server for interpretation. This climate information management becomes indispensable to adapt to climate change.
- 233. Local actors will be trained to interpret data obtained from meteorological stations. This training will be carried out in the field and will have as beneficiaries at least 500 people, from component one and two, of which at least 55% will be women. To train the target population focus groups, one to one trainings will be organized. The training will include the provision of generic climatic knowledge, and technical aspects on the meteorological stations.

Dedicated materials, in term of didactical guides or infographics and technical simplified guideline for the meteorological stations, will be defined and distributed during trainings.

- 234. The climatological information will be integrated with the technological platforms of the Ministry of the Environment and will be presented online and in an interactive way to facilitate the knowledge about the climate to all the population including associations of women, senior citizens and other vulnerable groups.

The information will be transmitted in the form of bulletins to be delivered through the mobile phone services network in coordination with INAMHI.

- 235. The climate information generated by the meteorological stations will be also included in the tools and methodology developed for the assessment of climate risks for financial institutions (output 4), to improve the predictability of software solutions used to assess the credits. In such a way output 6 will also contribute to strengthen the EbA investments done by the communities and the EbA credits provided by the financial institutions.

Output 7: Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.

- 236. The Territorial Planning and Development Plans (PDOTs) are planning instruments foreseen by the Constitution, and the Organic Codes for Territorial Organization,

Autonomies and Decentralization and the Planning and Public Finance Plan COOTAD and COPFP, in force since October 2010, The GADS develop the concerted management of their territory, oriented to harmonious and integral development.

237. Article 41 of the COPFP states: "Development plans are the main guidelines of the GAD regarding strategic development decisions in the territory. These will have a long-term vision and will be implemented through the exercise of their powers assigned by the Constitution of the Republic and the Laws, as well as those transferred to them as a result of the decentralization process. "
238. PDOTs are a tool used by the GADs located in the project area and are based on the approach of good living proposed by the government, in which nature has rights. Aspects of climate change are included in the ministerial agreement 137.
239. Therefore, incorporating measures for ecosystem-based adaptation to climate change in the PDOTs, is very natural and will benefit the communities in the parishes, including women, associations, vulnerable groups and the community at large. Ecosystem based adaptation measures assure the alignment between ecosystem conservation and climate change adaptation. By conserving the local ecosystems, agriculture production is strengthened as well as community resilience to climate change. The opinion of vulnerable groups regarding changes in the ecosystem will be heard and considered.
240. Moreover the inclusion of ecosystems based adaptation will be beneficial to the most vulnerable population that are the ones that are more exposed to ecosystem degradation and climatic events. Ecosystem-based adaptation will hence support inequality reduction and poverty alleviation. The inclusion of ecosystem-based adaptation to climate change in development plans will be backed by the local community thanks to the organization of community workshops.
241. During the workshops the main aspects of ecosystem based adaptation will be introduced, and then the existing ecosystem adaptation practices already in use in the community will be collected and presented by local farmers already implementing them. This will support knowledge transfer among members of the community and the possibility to adapt best international standards to what has revealed as already working. Hence a catalogue of local practices will be defined and used as base for the introduction of ecosystem based adaptation within the PDOTs.
242. The PDOT will include a guide to priority actions to address climate change. This document will help to monitor and evaluate the results and impacts achieved in a transparent manner.
243. Once finalized the PDOTs will be introduced and explained to the local actors, those interested in the project and the community in general. The document will be available in digital format from the parish GAD website, to guarantee the larger as possible spreading. Once the community actors will be trained on ecosystem based adaptation, the PDOT will be used both as strategic tool to foster adaptation, but also as monitoring and reporting tool for rural development.

By introducing elements of climate change adaptation into PDOT the aim is to assure that climate change consideration will be included into parishes' development plan.

Output 8: Strategic plan of communication, education, knowledge transference and scheme of replica

244. The strategic communication plan will ensure that the activities carried out in the project are knowledgeable for all stakeholders. In such a way, that there is an effective and fluid communication of information on the activities that are carried out in the project.
245. Communication will be done using three different approaches: through the project unit, where the project team will socialize information with the local communities on a day-to-day basis whenever they are in the field; through local strategies, where the project unit will work one to one or through focus group with key stakeholders and representatives from local organizations and institutions; and through the traditional media being MAE website and its social network Facebook and Twitter, community radio and local print media whenever considered relevant. Moreover educational material on ecosystem based adaptation, including infographics, actual examples based on the local community experience, and interactive learning material will be developed. In the plan for communication and knowledge transfer the actors that participate in the project will be included as much as possible to support community to community training and exchange. The interactive and participatory methodology will be privileged, if possible games illustrating ecosystem based adaptation will be developed or adapted and used for knowledge transfer.
246. The data and information generated in the project will be published on the website of the main technology platform of the project implemented in output 9 and on the website of the parish GADs.
247. The training will be directed according to the requirements of the population and based on the training activities established in this project, components 1 and 2, which include topics such as: Forest Protection, Water Sources, Climate Change Adaptation, Environment, Financial Access, Organizational and Associative Development.
248. Specifically with output three of component one, there is a close link, since farmers, farmers and producers of panela, who will be part of the productive sustainability project, must approve modular courses of 9 sessions, of which 4 will be in classroom and the remaining 5 will be in the field. Participation in these courses will regard gender equity and access to vulnerable groups. The trainings will be the base to later implement the demonstration farms which will be implemented in areas where points of critical social, environmental and economic vulnerability are identified.
249. This point includes the selection of six demonstration farms with measures of agricultural, livestock and production of panela. These farms would include the adaptation measures implemented, the monitoring of the productive performance and the recording of the financial dynamics including all financial movements such as sales, cost of sales, expenses, income, family consumption, final balance. The objective of demonstration farms is to show various possible solutions and combination of solutions that could at once increase yields, reduce climatic vulnerability and conserve ecosystems. The demonstration farms aim to provide to

the smallholders a real example of what their farm could look like and what are the main advantages. They aim to stimulate a feeling of proximity with adaption practices and how they can be actually implemented: translating from abstract wording into actual experiences.

- 250. It is important to remark that technical assistance and the means of access to financial resources mentioned in output 3 go hand in hand with this process of strengthening the capacities of farmers and producers,
- 251. The content of the information will be designed in an interactive format, according to the target population, including: children, youth, women and vulnerable groups. They are interested in being considered and informed of all the projects that are carried out under the Río Blanco upper basin.
- 252. Output 8 will also promote Exchange site visits among parishes participating in the project, as part of the exchange and replication of knowledge.
- 253. Moreover output 8 will contribute to strengthen the capacity of financial institutions to introduce climate and environmental aspects into their portfolio. This is of key importance to assure the medium term financial sustainability of the project. Indeed awareness raising and direct capacity building will be provided to financial institutions to assess environmental and climatic risks for clients and portfolio, and develop and finance ecosystem based adaptation farm investments.
- 254. Tailored training on environmental strategies and climate risks will indeed be provided to the management team and loan officers of financial institutions engaging in the project as per output 4. Generating the buy in of loan officers is key, because they are the one that actually interact with the clients and do the credit assessment and provide advices to the clients. Supporting capacity building of the management team is important as well, to assured that environment and climate are included in all the layers of procedures and assessment of the financial institution. Training will be provided during dedicated workshop and small group session. Guided round tables of discussion with loan officers and management team will be organized.

Output 9: Systematisation of information gathered during the whole project design and implementation using existing informatics platforms

- 255. The project will have a main technological platform, which will ensure the systematic capture and dissemination of data, information, lessons learned and good practices generated in the project.
- 256. The platform will be implemented using disruptive technologies, such as: Cloud Computing and BIG DATA, to ensure the handling of a large amount of data and information of different formats and their online availability to all stakeholders and the general population.
- 257. With Cloud Computing, data and information will be available online to be accessed from any mobile device and from anywhere within the project area.
- 258. With big data methodologies, it will be possible to handle a large volume and variety of data, in a fast and agile way, with which it is possible to model and monitor climate information generated by meteorological stations and platforms used by the Ministry of Environment Promote adaptation measures to climate change.

259. The platform will be integrated with the current technological platforms of the Ministry of Environment, and the Ministry will have a main role for the technical integration of the platforms.
260. The integration of the platforms will allow access to the stakeholders in a centralized way to the data and information generated by the meteorological stations, parish GADs, and the Ministry of the Environment.
261. The use of the software solutions for credit and risk assessment of financial institutions (output 4) of farmers' practices will contribute to generate data that will be shared through the above-mentioned platform. This will hence contribute to transfer the institutional learning of financial institutions to the community and support replication of the present project to other locations and with other financial institutions in the country.
262. The following activities and beneficiaries are targeted by the component:

Summary Component 3: Objectives and activities

263. The following table shows the priority areas for intervention under the component 3, the objectives of the two outcomes as well as activities carried out under each.

Objective	Activity
6. At least 6 parishes being built capacities and prepared to manage and use meteorological information.	Climate and meteorological data is key to identify suitable adaptation options as well as identify potential threats. Activities will focus on creating the necessary capacities with communities and GADs
6.1 Capacity building of GADs	Training in use and maintenance of meteorological stations for technical staff of each GAD.
6.1.2 Governance of climate data management	Changing administrative operations (decentralization) from INAMHI to GAD technical personal staff.
6.1.3 Capacity building for communities	Training 500 families in the use of climate data and their application in activities, such as: agriculture and livestock. This training will be address for 55% percent of women. Including field visits, food and transportation. An appropriate mechanism to transmit climate information to the population will be developed.
6.1.4 Development of training and information material	Designing of interactive content, infographics and generation of newsletters to training GAD population in the area including women associations, older adults and vulnerable groups. Policy briefs will be elaborated for policy makers.

Objective	Activity
6.1.5 Developing a communication strategy	Integrating the digital media technologies for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
7 Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.	Acquired know-how and capacity will translate into concrete application in the GADs
7.1 Selection of suitable adaptation options	Conducting a technical study to determinate which climate change adaptation measures that must be added for development and territorial planning plans.
7.2 Integration of adaptation options into territorial development plans	Gathering information on climate change adaptation measures to be added like indicators and statistics into the development and territorial planning plans. The indicators should include gender information and vulnerable groups for climate change.
7.3 Elaboration adjusted development plans	Developing new development and territorial planning documents adding climate change statistics and information and also including gender and vulnerable group's climate change issues.
7.4 Training to producer associations	Training for population including associations, organizations and other stakeholder of the project about climate change adaptation measures incorporated in the PDOTs.
7.5 Communication of new PDOTs	Socialize new PDOTs documents with the population of the project area including associations, organizations and the population in general.
8. Strategic plan of communication, education, knowledge transfer and scheme of replica, including demonstration farms. Plus training on adaptation finance to financial institutions.	Findings of developments throughout all components will be shared with communities to empower them to make informed (adaptation) decisions; supporting activities will be defined.
8.1 Development of a communication strategy	Developing a communication plan addressed for stakeholders in the project including specific women associations and organizations.
8.2 Integration of ICT solutions and social media	Integrating the digital media technologies and different approaches for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
8.3 Establishment of demonstration farms	Sharing lessons learned and experiences with project stakeholders, and replicate knowledge to other similar projects in the country through demonstrative farms applying sustainable methods for agriculture, livestock and panaola production and market access.

Objective	Activity
8.4 Development of training materials of sustainable agricultural practices	Training modular courses on sustainable agriculture and good agricultural practices, open to associations and selected farmers to participate. 12 modules, 6 theorists, 6 in the field and an on-site supervision within 6 months of completing the course. 50% women
8.5 Training of microfinance institutions	Training for all Microfinance Institution (MFI) staff participating in climate risk, green credit and climate change issues with a focus on microfinance
8.6 Certification of agricultural practices	Certification of organic crops or good agricultural practices for the production of panela, mortiño wine or crops of sugar or naranjilla, of those graduates with better performance in their crops.
9. Systematization of information gathered during the whole project design and implementation using existing informatics platforms	The project will interact with a multitude of actors and gather data on the productive reality in the field; data will be gathered electronically to enable its further processing to several ends, such as identifying suitable adaptation practices over time
4.4.1 Development of a technological platform	Developing a technological platform to manage knowledge and information about climate change adaptation, using disruptive technologies like: big data and cloud computing.
4.4.2 Integration of platforms - existing and project	Integrating technological platform into others technological platforms used by the Ministry of Environment.
4.4.3 Awareness raising on the new platform	Sociability of the technological platform with all stakeholders in the project including associations and organizations.

Table 16: Key activities in the component three

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

264. The ecological vulnerability of the watershed supposes also a socioeconomic vulnerability of the societies living in these areas especially those already vulnerable like women, children and indigenous people (vulnerable groups). By historical and socioeconomic issues these groups are the most exposed in any society and particularly in those of frontier where social life depends of direct natural resource extraction. In this understanding the climate change phenomenon and the expected

impacts on nature and society will particularly affect watersheds and women and indigenous people as the most vulnerable in natural and social environments.

265. Considering the issues of social and natural vulnerability and the expected effects of climate change, the annex 9 and the following paragraphs present a quick concept to identify the benefices to vulnerable groups by the different project activities (figure 23) pointing the situation of the rural jurisdictions in which lie the critical part of this area and identifying stakeholders and their perceptions regarding weather and climate change issues as presented below.

Beneficiaries

266. Direct beneficiaries or co-executors are defined as those residents, organizations or institutions that will receive a transfer of resources or technology from the project's funds. Within this group of principal beneficiaries are:

- Parish governments of Las Pampas, Palo Quemado, El Chaupi, Aloag and Manuel Cornejo Astorga and Municipal government of Sigchos that will mainstream the climate change variable and adaptation measures in their planning and land use zoning. It is also expected to mainstream adaptation, with a gender perspective, into the plans for the rural area of Sigchos³¹. These parishes will also have improved forest conservation, better agriculture production, access to hydro-meteorological information, and enabling conditions for multi-level dialogue and collaboration. The population in the rural areas is about 10,542; and 6,167 in populated area, with a very similar proportion between men and women.
- At least 30 technical staff, promoting women's participation to reach at least 50%, of participants, from the parish governments and municipality of Sigchos will benefit from training on adaptation to climate change.
- At least 200 stakeholders will benefit from the exchange of experiences. Women's groups and/or organizations will be identified and targeted to benefit from these activities.
- At least 375 farmer families will benefit sustainable farming and livestock practices and the river basin management. Female-headed households and female-led farms will be identified and targeted to benefit from these activities. If needed, extra training will be provided to level access for women.
- Vulnerability groups identified in the Stackholders (2016) and Gender analyzes (2017).

267. Indirect beneficiaries are those persons or institutions that will participate in the project's activities without directly receiving project funds. Within this group the principal beneficiaries are:

³¹ Sigchos is a canton formed by four rural parishes (i.e., Chugchilán, Isinlivi, Las Pampas and Palo Quemado) and an urban parish (Sigchos). The urban parish is very large, but the urban centre is small. In 2010, the canton had 21,900 people, 91.1% was rural population. Rural parishes have a parish government, but the urban parish is managed by the municipality.

- Water users, particularly women, from the Río Blanco drainage basin.
- About 49,367 including people who live in rural areas and populated spots of the drainage basin.
- HIDROTOAPI hydroelectric plant and the users of the electricity it will generate.

On the next table a set of activities and benefices to vulnerable groups is detailed:



Figure 23. Key activities and benefices to vulnerable groups

268. Moreover the project is designed to support broader impact within the ecosystems and the communities. The project targets indeed key actors in the communities able to generate multiplier effects with positive impact on the full community and the ecosystems it depends on. For this reason it will work also with technical providers, financial institutions, agronomists, value chains actors in agriculture, private and

public local institutions, with the aim to generate systemic changes towards sustainable and adapted practices.

Economic benefits

- 269. Farmers that apply sustainable farming practices will benefit from an increased yield and income, and at the same time will reduce the risk of losses due to agricultural practices not adapted to adverse climate impacts. It is expected that these farmers will catalyse the use of improved practices by a larger number of producers.
- 270. As the respective adaptation options will be selected following the methodology presented in Annex 12, only activities that will increase the farming household's economics will be promoted, ensuring a sustainable increase in household income. By gradually increasing the livelihoods of subsistence farming units to make them subjects of lending eligibility, will help to further strengthen their economic development and diversify as well as strengthen economic income activities.
- 271. While strengthening of ecosystems is usually defined as an environmental benefit, it also bears an economic dimension: as studies show
- 272. Furthermore, enhanced hydro-meteorological information will support and contribute to prevent adverse effects in agriculture and livestock, and give relevant climate information to be considered into the development plans (PDOT).
- 273. HIDROTOAPI will benefit from ensuring sufficient water flow for power generation and will avoid a significant increase in maintenance costs due to increased frequency in changing out parts or doing major maintenance or overhauls due to the expected increase in suspended solids.
- 274. The parishes will benefit of a growing rural economy, able to attract financial service providers and scaling up sustainable practices for the entire community.

Environmental Benefits

- 275. The conservation of a large vegetation cover will sustain the water cycle by ensuring condensation in the cloud forest and related flora. In addition, these areas will continue to support local biodiversity (including high-value conservation species) and connectivity among diverse habitats and ecosystems.
- 276. The Andean Cloud Forests are vital in the uptake and regulation of water within the hydrological cycle. They capture moisture from the cloud cover, acting like a sponge that absorbs and retain water during the wet season and release it during the dry season. This is why maintaining the most possible forest cover is crucial to withhold the impacts of the foreseen climate change.
- 277. Conserving the vegetation cover of the Río Blanco upper watershed will also contribute to protect valuable biodiversity. The Andean Cloud Forest on the western slopes of the Ecuadorian Andes is very rich in biodiversity. There is limited information about the cloud forest of the project area, but an in-depth analysis in a close area identified 1,640 species of vascular plants. In the Rio Guajalito Reserve about 2,800 vascular plant species have been reported; of these about 100 species are endemic.

278. In the Río Toachi-Chiriboga IBA, 450 bird species have been reported. The area host threatened species like *Pachyramphus spodiurus* and *Ognorhynchus icterotis* (both classified Engangered in the IUCN Red List). In addition, in Rio Guajalito Reserve about 40 species of mammals have been reported, including the spectacled bear (*Tremarctos ornatus*) and the pacarana (*Dinomys branickii*) – both classified Endangered in the Ecuadorian Red List --, and the neotropical otter (*Lontra longicaudis*) (classified Vulnerable in the Ecuadorian Red List).
279. In the Reserva Ecológica Los Illinizas y alrededores IBA, about 257 bird species have been reported. The area host threatened species that are endemic of the cloud forests like *Grallaria gigantea*, *Grallaria alleni* (both classified Vulnerable in the Ecuadorian Red List), and *Haplophaedia lugens* (classified Near Threatened in the Ecuadorian Red List). The area also host threatened mammals like the spectacled bear, the puma (*Puma concolor*) (classified Vulnerable in the Ecuadorian Red List), the collared peccary (*Pecari tajacu*) (classified Near Threatened in the Ecuadorian Red List), and the endemic Ecuadorian spiny pocket mouse (*Heteromys teleus*) (classified Endangered in the Ecuadorian Red List).
280. The project will promote two main implementation strategies, on one hand supporting forest conservation, and on the other hand fostering the development of more sustainable agricultural activities making a responsible use of ecosystems
281. Hence the community will appreciate ecosystems not only as landscape but also as a basis for their production, a mean to reduce their vulnerability. This will contribute to sustain the protection of ecosystems and to strengthen community links needed for their economic and social development.

Social Benefits

282. Stakeholders from the lower part of the water system will benefit from increased social capital. This can be a powerful catalyst for further action to improve the livelihoods of local groups. The improved dialogue, networking, and collaboration among stakeholders will be a major contribution to local development.
283. Farming families will benefit from improved practices. The project will pay particular attention to the role of women and other family members (e.g. children and the elderly) in local farms to adapt, as much as possible, the new sustainable farming practices to the dynamics of the farming families. Female farmers will be specifically targeted to benefit from all project activities.
284. Local communities will also benefit from an inclusive approach. All project actions will be, to a feasible extent, gender and age sensitive and will consider the needs of persons with disabilities
285. Mainstreaming adaptation into daily actions and decision making will also generate major benefits for local communities. This will allow them to adjust their lifestyles and livelihoods to the impacts to be generated by climate change.
286. Better hydro-meteorological information provided to the early warning systems will contribute reduce the risk of impacts from landslides and flooding.

287. In the long-term, HIDROTOAPI's greater stability in electrical generation is an additional benefit at a national level.
288. *Climate Change Gender Action Plans (ccGAPs)* build on a country's national climate change policy, plan or strategy, delving into gender-specific issues by priority sector and creating innovative action plans to enhance mitigation, adaptation and resilience-building efforts for women and men in every community. In the project context, the National Climate Change Strategy (MAE, 2012) establish the gender and vulnerable groups as a priority sector.
289. As a result of this Gender and Vulnerable Groups Analysis (Annex 9), gender entry points for project Log Frame have been identified (section E part III). To monitor project implementation, some gender-sensitive indicators have been suggested to be incorporated in the table 39 and figure 37 (M&E), the concept is below shown and the activities are described in the following paragraphs:



- -Initial Gender Assessment: to be presented before first disbursement. It should contain the following: (i) gender analysis of farming and agricultural value chains, including an assessment of gender division of labor in local farming and agricultural practices (land preparation, ploughing, manuring, seed purchase, sowing, weeding, harvesting, processing, grain storage, fodder collection, water collection, feeding, cleaning/bathing, milking cows, milk processing, dung collection, marketing). Include assessment in terms of use, access and control of natural resources differentiated by gender; (ii) gender assessment of existing differentiated needs and demands of farmers and local producers to benefit from project, this part should also mention how existing risks and problems affect differently to men, women and vulnerable groups. To establish the needs and demands the day-to-day activities of men and women should be clearly stated. Include the dynamic and use of time from children or other vulnerable groups, which will be useful to assess time availability of women for future planned training; (iii) identification of existence of gender-specific crops and products.
- Sex-disaggregated project baseline: containing, at least: heads of households; land owners; farm owners; farm workers.

- Gender-responsive participatory processes, as part of the project communications plan with communities, should recognize women as primary users of forest resources in project design, implementation and evaluation. These mechanisms should effectively engage both men and women in decision making processes, additional training targeted to women may be needed in order to ensure their full and effective contribution. Also, gender-responsive processes may include the use of women-only interviews and gender-specific focus groups and group consultations (UNREDD 2013).
- Training and capacity building activities to be implemented under project components, with either local farmers, general population, parishes and other public officers, should promote women's participation and be gender-sensitive, taking into consideration specific demands (location, adequate schedules, childcare facilities and/or other special arrangements that may encourage women's assistance).
- Land titling processes: if such mechanisms are to be established through project implementation, joint tenure of land should be promoted. Also, it should be assessed whether widowers and single women face additional restrictions to own land, and introduce corrective measures to lift these barriers.
- Financing products: when new financing products, such as credit schemes and guarantees, are to be implemented as project outputs, they should be designed taking into consideration differentiated gender needs. Women tend to have less access to credit, usually due to lack of collateral, but also to lesser understanding of finance concepts, and may prefer collective credit schemes. These special needs should be taken into account when designing these products, to ease access for women to participate.
- Institutional governance mechanisms to be created under project implementation, such as committees for a Water Fund and/or for a Seed Fund, should incorporate a female quota (i.e. 20%) in their structure. Also, gender-sensitive hiring procedures should be taken into account. The participation of women in decision-making processes should be promoted and documented.
- When sourcing staff and consultants, gender equality will be a guiding principle. Using gender-sensitive language in hiring procedures; determining a quota (i.e. 30%) or facilitating training for women so as they can access traditionally male-dominated positions, are some of the measures that could be implemented. Also, these procedures can be included as requirements for contractors to be hired to do the works.
- It would be advisable to design and implement local development plans (for the parishes) to be gender-sensitive.
- Also, if other studies and assessments need to be made, it is recommended that they incorporate a gender perspective.

Summary of benefits by component

Component/ Benefits	Social benefit	Key Indicator	Economic benefit	Key Indicator	Environmental benefit	Key Indicator
<p>Componente 1</p> <p>At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management</p>	<p>Improvement of quality of life, the data have been obtained from the web page forestmanagement and wizetime indicates that: 22 trees are required to supply the oxygen demand of a person per day. 0.41 hectares with trees (1 hectare is equivalent to 10,000 square meters, let's say an urban block), produces enough oxygen per day for 18 people.</p>	<p>6/6 GADs in target bio-corridor with TLUP that incorporate specific provisions for Bio-corridor of conservation</p> <p>Indicator: # GADs that Biocorridor has incorporated / 6 *100</p>	<p>Natural persons with property equal to or less than 20 ha, will receive a value of up to USD \$ 60 / ha / year. Equal or less than 50 hectares will receive the maximum value of USD \$ 30 / ha / year. With an area of up to 100 ha, they receive as an incentive the maximum value of USD \$ 30 / ha / year for the first 50 ha, and of USD \$ 20 / ha / year for the next 50 ha. Between 101 and 500 ha, they will receive USD \$ 30 / ha / year for the first 50 ha; USD \$ 20 / ha / year for the next 50 ha; and, USD \$ 10 / ha / year for all additional ha between 101 and 500 ha. The same mechanism will be applied for the following categories. The returns for the same hectare of land could grant US \$ 2 per year for grazing uses, for a one-time US \$ 1035 sale of commercial timber. If no action is taken to reduce emissions, each tonne of carbon emitted will cause a loss of US \$ 85 in the world economy.</p>	<p>30% of reduction of current use of wood</p> <p>Indicator: # has been destined for wood use / # has deforested * 100</p>	<p>Within the National Forest Control System Project presented to SENPLADES by the Ministry of the Environment indicates the environmental benefits of the conservation of plant cover indicates that the price of carbon fixed per hectare is \$ 134.</p> <p>17% of deforestation and forest degradation accounts for almost 17% of global greenhouse gas emissions (GHG). In 2006 a study called by the Treasury of the United Kingdom (http://www.hm-treasure.gov.uk/sternreview_index.htm) concludes that reducing deforestation offers the best alternative to reduce emissions at relatively low cost. The study showed that in eight countries, responsible for 70% of the total emissions, due to land use change, one hectare of forest can be valued as US \$ 25,000 in terms of carbon sequestered at a carbon price of US \$ 30 to US. \$ 50</p>	<p># of ha of forest conserved in the Bio-corridor</p> <p>Indicator: # ha Biocorridor / # has total conservation * 100</p>

Component/ Benefits	Social benefit	Key Indicator	Economic benefit	Key Indicator	Environmental benefit	Key Indicator
<p>Componente 2</p> <p>Adapt farming practices to new climate change conditions enable their sustainable climate smart financing</p>	<p>The increase of the agricultural production and of the income will bring an improvement of the living conditions of the producers. Experiences in other sectors tell us the benefit as it is: Good agricultural practices help improve farmers' incomes in Lao RDP³² supported by FAO by 50% than by applying conventional agriculture.</p>	<p>50% women and 50% men including also vulnerable groups.</p> <p>#women involved / total of the beneficiary population * 100</p>	<p>The gender perspective promoted by the project will improve self-consumption, small-scale income generation (agricultural activities, preparation and sale of products, off-farm work) and care of the family production unit. In the Comparative Study of production costs in organic and conventional agriculture indicates that conventional farming techniques are invested 12.7% more in raw materials, while labor costs are 13.8% higher in organic farming, this has an impact on 1.9% on variable costs and 3% on total costs.</p>	<p># institutions have trained their personnel on sustainability topics, including EbA and Climate Change/ Indicator</p> <p># total of institutions * 100</p>	<p>Erosion risks will be avoided in the occurrence of heavy rains causing the decapitation of the surface horizon and the exposure of the low permeability layers, lower content of organic matter, increase of pests.</p> <p>In an irrigation trial conducted in Chillán (central-southern Chile) during 16 years of wheat rotation with legumes and oats, in which nitrogen was never applied as fertilizer, we can highlight the higher yield of wheat rotation with legumes or oats, 31% more than the yield observed in a wheat monoculture.</p>	<p>At least 250 ha of pasture and 250 ha of crops apply sustainable farming practices</p> <p>Indicator</p> <p># has sustainable agriculture / # has total * 100</p>

³² <http://www.fao.org/in-action/good-agricultural-practices-help-raise-farmers-incomes-in-lao-pdr/es/>

Component/ Benefits	Social benefit	Key Indicator	Economic benefit	Key Indicator	Environmental benefit	Key Indicator
<p>Componente 3</p> <p>Strengthen local capacities and share lessons</p>	<p>Incorporation of the perspective of gender and indigenous peoples through the participation and dedication quotas foreseen in the project. The growth of the sector depends on the expansion of the consumption of biological products; In this sense, it is women who decide and acquire up to 90% of food, which means that they must be considered as protagonists in the decision making of food consumption. The work of Allen and Sachs (1992) is a pioneer in the analysis of the production of organic foods from the point of view of gender, in which the authors highlight the need to question and analyze the aspects of class, race and gender. in relation to sustainable agriculture so that it does not constitute only an agriculture capable of reducing environmental impacts.</p>	<p>At least 500 families trained in the use of climate date, with at least 55% women's participation</p> <p>Indicator</p> <p># families trained climate change / # families affected by the project * 100</p>	<p>Increased capacity to develop and implement approaches to efficient adaptation to climate change that leads to the protection of farmers' property and income. In 2017, farmers have benefited from the purchase of the MAGAP agricultural kit, which includes a subsidy of 40% from the Ministry and 60% financing from BanEcuador B.P. Similarly, the credit for coffee, cocoa, corn and rice is still valid to promote the development of this sector of the national economy³³.</p>	<p>At least 6 trainings provided on adaptation finance and 6 training for climate risk in two financial institution</p> <p>Indicator</p> <p># training on adaptation financing / 8 * 100</p>	<p>Greater knowledge and awareness of climate change and its impacts will help raise awareness about environmental protection.</p> <p>Within national policies, the topic of Mitigation and Adaptation to Climate Change is addressed. Framework for the preparation of the IDB's 2012-2017 Strategy in Ecuador in line with climate change mitigation, PNBV includes the following goals: a) Increase the 5% of the territory under conservation or environmental management; b) Reduce the rate of deforestation by 30%. The experience in Ecuador indicates that the annual rate of deforestation has been reduced, in the year 205 it was 1.74, 2013 in 1.22 in the year 2015.</p>	<p>7 hydro-meteorological stations providing climatic data in a regular bases and located accordingly to technical criteria by INAMHI</p>

Table 17: Benefits and indicator by components

³³ <https://www.banecuador.fin.ec/noticias-banecuador/boletines-de-prensa/banecuador-financia-adquisicion-kits-agricolas-entrega-credito-siembra-maiz/>

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

290. Within the project area, the current Business-As-Usual (BAU) agricultural development model has encroached upon forest and riverside areas. The production methods applied within the local agricultural and livestock sector remain traditional and have not been optimized for efficiency. Any growth of the local agricultural sector therefore entails a growth of its land use. Against a backdrop of climate change increasingly affecting the area, non-intervention carries a high cost of opportunity. While it is true that some GADs have incorporated isolated adaptation measures into their development plans, their impact has been extremely limited.
291. The proposed project, in turn, will directly benefit about 553 families (2,600 people) in the project area. Additionally, it will indirectly benefit the local parishes communities (ca14,000) and entire population of the Río Blanco upper watershed system (ca. 49,367 people). The project will contribute to strengthening the adaptive capacity of local stakeholders reducing the level of future impacts generated by climate change.

Component	# of Beneficiaries (families)	Assumption(s)	Activity	Target	Investment	Cost per unit target
C1. Conserve vegetation cover	178	50% from highlands and 50% lower basin	Improve management of protected forest.	230,000 ha	USD500,000	USD2.17/ha
			Increase conservation area	1,000 ha	USD450,000	USD450/ha
C2. Adapt farming practices to new climate change conditions, enabled by sustainable climate smart financing	375 (250 for crops and 125 for livestock)	1 hectare will be dedicated to this project per farmer and 10% of the average extension (20 ha) per livestock farm	Sustainable farming practices and livestock adjusted to local realities are being introduced and implemented with assistance of financing mechanisms for adaptation measures	500 ha 375 fam	USD420,000 USD420,000	USD840/ha USD1120/fam
			At least 1 long term financing mechanisms has been piloted or introduced	553 familias	USD420,000	USD759.5/fami

Component	# of Beneficiaries (families)	Assumption(s)	Activity	Target	Investment	Cost per unit target
C3. Strengthen local capacities and share lessons	553 directly 14000 indirectly local communities 49367 indirectly in river basin	Beneficiaries both component 1 and component 2	At least 6 parishes being built capacities and prepared to manage and use meteorological information.	6 parishes	USD160,000	USD26,666/parish
			Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.	14,000 people	USD80,000	USD5,75/people
			Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms. Plus training on adaptation finance to financial institutions	553 families	USD120,000	USD217/families
			Systematisation of information gathered during the whole project design and implementation using existing informatics platforms	553 families	USD40,000	USD72/families

Table 18: Cost per unit target by components

292. The project will use existing structures (such as relevant Ecuadorian laws and regulations) and actors to implement all interventions. Relevant best practices in the national and/or regional context will also be leveraged (e.g. ACUS, Socio Bosque).
293. A core element of realizing the projects' target benefits lies in impacting farming practices. To achieve this, farmers will be equipped both with specific know-how and

best practices pertaining to their area of activity in their local context as well as with the physical tools required for this purpose. As many factors influence this equation, it is evident that cost-benefit analysis needs to be conducted on an individual level to achieve maximum impact. On a project level, the focus will thus lie on putting the tools in place to efficiently conduct this case-by-case analysis and monitor relevant micro-indicators over the project duration.

294. In terms of the tools, selection multicriteria for the identification of suitable adaptation measures for individual farmers need to be flexible and take into account each farmer's specific situation based in the ABC methodology (MAE-GIZ 2017)³⁴, such as:

- Access to important infrastructure such as roads,
- Inclination of plots or grazing grounds,
- Soil texture and quality,
- Actual crops cultivated or livestock bred, including varieties and types,
- Availability of critical inputs.
- Pricing of inputs in each area, and
- Conventional panela production

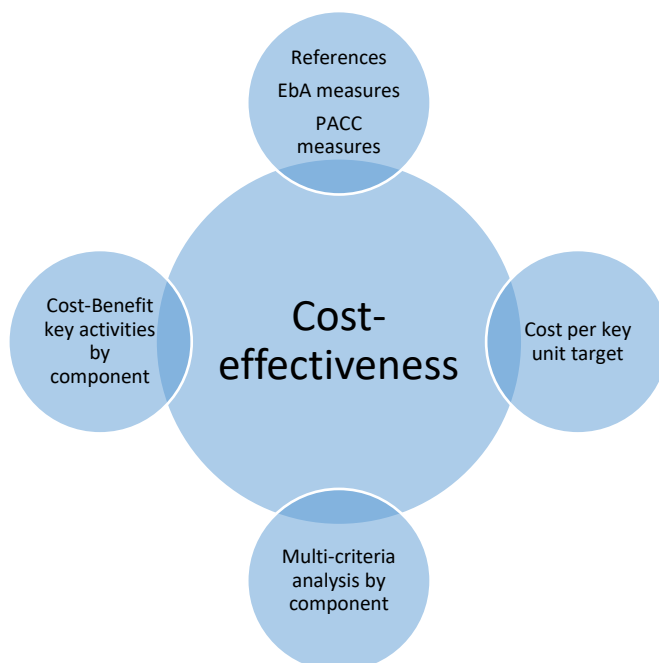
295. The combination of these critical productivity drivers will not only determine the productivity of farmers under business-as-usual scenarios in face of adverse climate impacts, but also define what actual adaptation measures promise not only the optimum results but also if their implementation is feasible at all. For example, if certain inputs for the implementation of adaptation measures are not available, cannot be transported to the farm due to the lack of access roads or are prohibitively priced, this must be analyzed and the impact taken into account on a case-by-case basis.

296. In order to take advantage of the best relevant practices, the project carried out a multicriteria analysis of the key activities to be developed, followed by a cost-benefit analysis. During the implementation of the project will seek cooperation with Microfinance of the Environment of the United Nations for Ecosystems Adaptation project, which has identified a set of 40 EbA measures specifically suited for implementation by small farmers.

Multi-criteria analysis for the definition of key activities in each of the components:

³⁴ Multicriteria Analysis. Environment Ministry - GIZ 2017

297. The Cost-effectiveness analyses, was based on four concepts, which results from the interaction between documentary information, determination of Cost per key unit target, evaluation on keys activities and finally the multi-criteria and cost benefit by component summarized in the following diagram:



Cost-Benefit Analysis Component 1

298. For the analysis of component 1 it has been considered an initial investment of \$760.000, total beneficiaries of 2800 families which gives an approximate of 14.000 people covering a total surface of 230.000 hectares, a 30% level of drought affectation and the average inflation of 4.3%. The annual maintenance cost is \$19.000 which corresponds to 2.5% of the initial investment.

299. The implementation of measures detailed in component 1, are expected to diminish the impact of drought and deforestation as well as the consequent economic losses to farmers this could imply, by increasing its crops yielding by 3%. For this analysis the three principal components to be preserved were considered conservation and carbon, and the cost of preserving sediments until a healthy level.

Total hectares	1.000										
Element	Hectare	Percentage	Yield qq/ha	Cycles	Total year production (qq)	Price per qq	Total Value	Value of Real production	Benefit of the measure by reduction of drought impact	Benefit per increase in yielding	Total Benefits
Conservation	500	50%	19,6	1	9800	30	\$ 294.000	\$ 205.800	\$ 88.200	\$ 6.174	\$ 94.374
Carbon	300	30%	5,6	1	1680	15	\$ 25.200	\$ 17.640	\$ 7.560	\$ 529	\$ 8.089
Sediments	200	20%	8	1	1600	8	\$ 12.800	\$ 8.960	\$ 3.840	\$ 269	\$ 4.109
							\$ 332.000	\$ 232.400	\$ 99.600	\$ 6.972	\$ 106.572

Table 19: Cost – benefits component 1

Source and methodology: MAE, 2016³⁵.

300. The result of the cost-benefit analysis with the aforementioned data shows that the project is profitable as it has an internal return rate of 5% which is a very reasonable number considering that this is a conservation project focused on protecting and preserving ecosystem services. This amount is without taking into account the possible increases in yield or co-benefits in other areas of agriculture for the implementation of other adaptation measures that are considered within this component addressed to improve livestock management and the improvement of ovens for panela production.
301. With the conventional panela production system, the time spent for the process is roughly six hours/580 liters of cane juice (MAGAP 2017), the new technology and measures proposed help to reduce the hours of work invested by farmers for the panela production, collecting water and in implementing inefficient low-yielding practices (four hours/580 l)¹ that could threat their surrounding landscape and ecosystem services. This last point is a non-monetary benefit that could increase their life quality since they can invest their remaining time to other productive or family activities.
302. The conservation value was calculated based on the fixed rates that Socio Bosque program has established for its operation, the amount of carbon has been determined accordingly to the price paid per hectare in the carbon market³⁶ (estimated) and the sediment value has been calculated considering the established price in referential projects to dredge due to sedimentation accumulation using as a reference the national system of public hiring Sercop: CONPC-APG-001-2014³⁷.
303. The result of the cost-benefit analysis with the aforementioned data shows that the project is profitable as it has an internal return rate of 5% which is a very reasonable number considering that this is a conservation project focused on protecting and

³⁵ Environment Ministry (MAE) and Cooperación Internacional Alemana (GIZ). 2016. Policy Brief, Manual para la valoración económica de medidas de adaptación y mitigación del cambio Climático en el Ecuador. 8. P. Mafla, S; Chiriboga, M-V; Guzmán, D; Fuertes, F; Albuja, M-V; Arroyo, J-A; Gavilanes, C.

³⁶ Carbon Market Reference: <https://www.sendeco2.com/es/precios-co2>

³⁷ SERCOP: CONPC-APG-001-2014:

<https://www.eluniverso.com/noticias/2014/05/10/nota/2940221/fiscalizacion-dragado-canal-aun-adjudicar>

preserving ecosystem services. This amount is without taking into account the possible increases in yield or co-benefits in other areas of agriculture for the implementation of other adaptation measures that are considered within this component addressed to improve livestock management and the improvement of ovens for panela production. At the same time, the implemented measures help to reduce the hours of work invested by farmers in collecting water and in implementing inefficient low-yielding practices that could threat their surrounding landscape and ecosystem services. This last point is a non-monetary benefit that could increase their life quality since they can invest their remaining time to other productive or family activities.

10 years time horizon	r=3%	r=5%	r=10%
Net present value of benefits	\$1.128.332	\$1.034.310	\$ 848.624
Net present value of costs	\$ (961.163)	\$(944.400)	\$ (911.295)
Net present value (NPV)	\$ 167.169	\$ 89.910	\$ (62.671)
Cost/Benefit relation	1,17	1,10	0,93
Internal rate of return (IRR)	8%		

Table 20: Internal rate of return component 1

304. The following table 21, shows that the initial investment with 3% of discount rate will have a return of \$1'128.332 USD from which we deduct the costs of 961.163 and the result of the NPV is \$167.169, which shows that the project is profitable under this rate of discount.

	0	1	2	3	4	5	6	7	8	9	10
	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Total
Initial investment	(\$ 760.000)										
Maintenance	\$ (19.000,00)	(\$ 19.817)	(\$ 20.669)	(\$ 21.558)	(\$ 22.485)	(\$ 23.452)	(\$ 24.460)	(\$ 25.512)	(\$ 26.609)	(\$ 27.753)	
Costs to NPV	(\$ 779.000)	(\$ 19.240)	(\$ 19.483)	(\$ 19.729)	(\$ 19.978)	(\$ 20.230)	(\$ 20.485)	(\$ 20.744)	(\$ 21.005)	(\$ 21.270)	(\$ 961.163)
Economic Benefit	\$ 106.572	\$ 111.155	\$ 115.934	\$ 120.919	\$ 126.119	\$ 131.542	\$ 137.198	\$ 143.098	\$ 149.251	\$ 155.669	
Benefit to NPV	\$ 106.572	\$ 107.917	\$ 109.279	\$ 110.658	\$ 112.055	\$ 113.469	\$ 114.901	\$ 116.352	\$ 117.820	\$ 119.307	\$ 1.128.332
NPV (DR=3%)	(\$ 672.428)	\$ 88.677	\$ 89.797	\$ 90.930	\$ 92.078	\$ 93.240	\$ 94.416	\$ 95.608	\$ 96.815	\$ 98.037	\$ 167.169

Table 21: DR3% component 1

305. The following table 22, shows that the initial investment with 5% of discount rate will have a return of \$1'034.310 USD from which we deduct the costs of 944.400 and the result of the NPV is \$89.910, which shows that the project is profitable under this rate of discount.

	0	1	2	3	4	5	6	7	8	9	10
	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Total
Initial investment	(\$ 760.000)										
Maintenance	(\$ 19.000)	(\$ 19.817)	(\$ 20.669)	(\$ 21.558)	(\$ 22.485)	(\$ 23.452)	(\$ 24.460)	(\$ 25.512)	(\$ 26.609)	(\$ 27.753)	
Costs to NPV	(\$ 779.000)	(\$ 18.873)	(\$ 18.748)	(\$ 18.623)	(\$ 18.498)	(\$ 18.375)	(\$ 18.253)	(\$ 18.131)	(\$ 18.010)	(\$ 17.890)	(\$ 944.400)
Economic Benefit	\$ 106.572	\$ 111.155	\$ 115.934	\$ 120.919	\$ 126.119	\$ 131.542	\$ 137.198	\$ 143.098	\$ 149.251	\$ 155.669	
Benefit to NPV	\$ 106.572	\$ 105.862	\$ 105.156	\$ 104.455	\$ 103.758	\$ 103.067	\$ 102.380	\$ 101.697	\$ 101.019	\$ 100.346	\$ 1.034.310
NPV (DR=5%)	(\$ 672.428)	\$ 86.988	\$ 86.408	\$ 85.832	\$ 85.260	\$ 84.692	\$ 84.127	\$ 83.566	\$ 83.009	\$ 82.456	\$ 89.910

Table 22: DR5% component 1

306. The following table 23, shows that the initial investment with 10% of discount rate will not be profitable under this rate given that the profitability of this component will be of 8% as demonstrated by IRR, but this is a project that not only brings economic results but many benefits derived from conservation and preservation of ecosystem services in the long term, that not all of them are necessarily quantified here.

	0	1	2	3	4	5	6	7	8	9	10
	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Total
Initial investment	(\$ 760.000)										
Maintenance	(\$ 19.000)	(\$ 19.817)	(\$ 20.669)	(\$ 21.558)	(\$ 22.485)	(\$ 23.452)	(\$ 24.460)	(\$ 25.512)	(\$ 26.609)	(\$ 27.753)	
Costs to NPV	(\$ 779.000)	(\$ 18.015)	(\$ 17.082)	(\$ 16.197)	(\$ 15.357)	(\$ 14.562)	(\$ 13.807)	(\$ 13.092)	(\$ 12.413)	(\$ 11.770)	(\$ 911.295)
Economic Benefit	\$ 106.572	\$ 111.155	\$ 115.934	\$ 120.919	\$ 126.119	\$ 131.542	\$ 137.198	\$ 143.098	\$ 149.251	\$ 155.669	
Benefit to NPV	\$ 106.572	\$ 101.050	\$ 95.813	\$ 90.849	\$ 86.141	\$ 81.677	\$ 77.445	\$ 73.432	\$ 69.627	\$ 66.019	\$ 848.624
NPV (DR=10%)	(\$ 672.428)	\$ 83.034	\$ 78.731	\$ 74.652	\$ 70.783	\$ 67.116	\$ 63.638	\$ 60.340	\$ 57.213	\$ 54.249	(\$ 62.671)

Table 23: DR10% component 1

307. The payback graphic shows that the investment will be recovered in approximately 8 years with a discount rate of 3%, in 9 years with a discount rate of 5%.

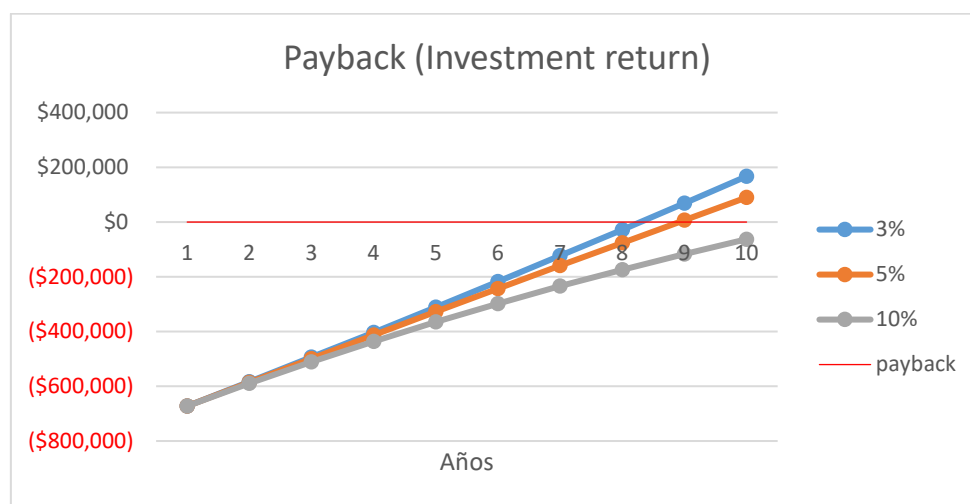


Figure 24. Investment and payback component 1

308. The following figure, allows to evidence that the contribution of the project in conservation and improving of management practices, makes preservation measures profitable, because it allows the farmers to have economic and non-economic benefits in 10 years, by reducing losses when taking measures in the face of drought and constant threat of deforestation, and the potential increase in yield due to the incorporation of techniques that improve agricultural management and forest preservation.

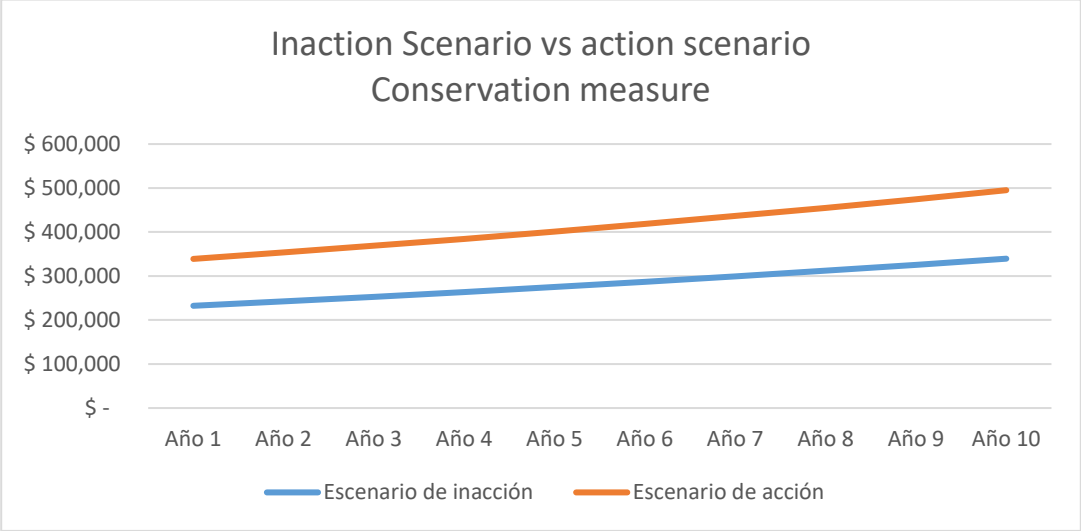


Figure 25. Comparative scenarios component 1

Multicriteria analysis

309. To analyze the measures not only from a quantitative but from a qualitative perspective as well, a multi-criteria analysis was performed. A set of criteria was established with some indicators that will allow comparing which criteria has more weight while implementing the preservation measures. This analysis is performed given that there are several benefits that are not always easy to quantify in monetary terms.

N.	Criteria	Indicators
1	Environmental: Conservation of natural landscapes	# of ha of forest conserved in the Bio-corridor
2	Economic: Reduction in the use of wood	30% of reduction of current use of wood
3	Social: Planning and PDOT	# of Decentralized Governments (GAD) with planning, regulatory and normative instruments for ACUS

Table 24: Multicriteria analysis component 1

310. A relative weight in a numeric scale is given to each criterion to determine what is more important at the moment of implementing adaptation measures, and at the same time, three benefits were chosen to make a comparison between them.
311. In relation to Table 24 generated as a result of the multicriteria analysis, it can be evidenced that the main criterion for the implementation of adaptation measures in at least 2800 families gives a higher weight to the social aspect as the principal factor for its benefit and implementation.
312. The practice of “improving sustainable production alternative to reduce pressure on forests” gives an equal weight to the three criteria meaning that all of them are important for this activity. And the third measure, establishment of functional conservation areas as part of the toachi/Pilaton corridor gives as well a higher weight to the social aspect, highlighting once more the importance of local planning to achieve the expected conservation results to benefit the population of the intervention area. So the component will bring benefits to the local population not only in terms of economic benefits from conservation of landscape and from the reduction of wood use, but also social benefits in terms of improving their capacities to plan and improve their practices with a holistic approach and with a long-term vision.

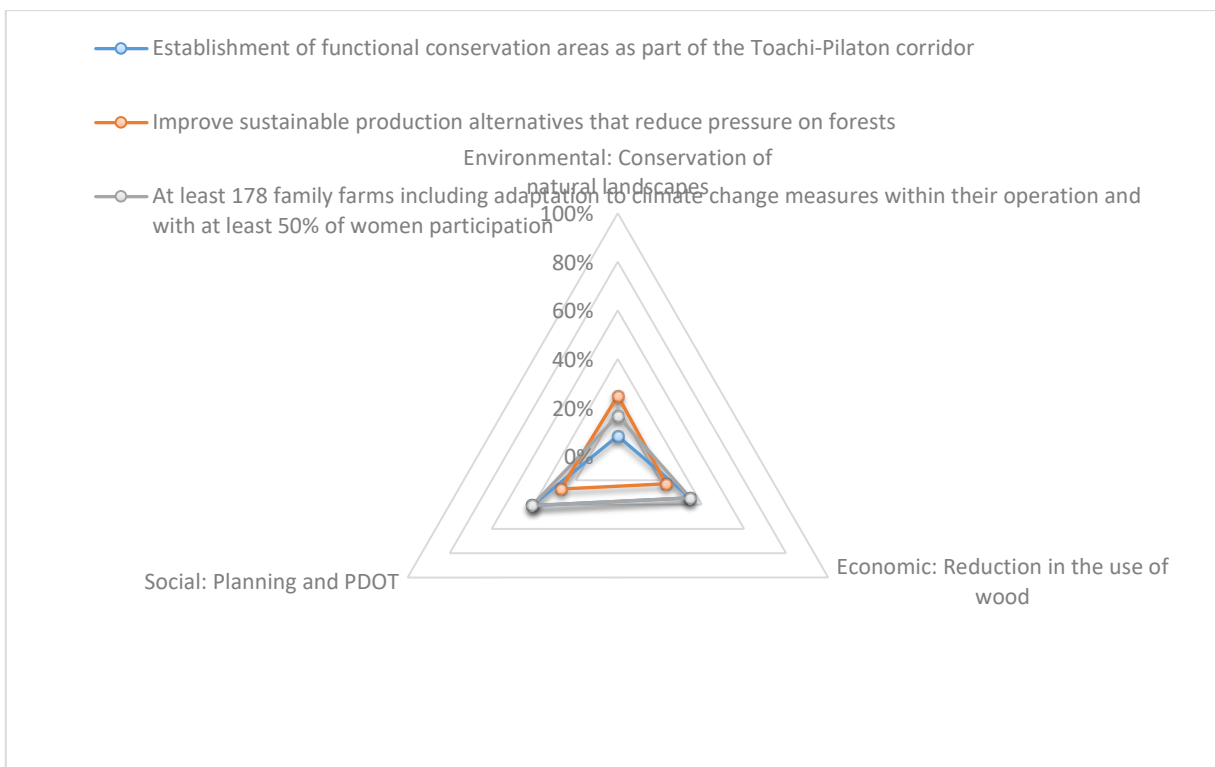


Figure 26. Multicriteria approach component 1

Cost-Benefit Analysis Component 2

313. For the analysis of component 2 a total beneficiaries of 375 families (families are conformed by 5 or 7 people) has been considered with an average of 1,33 hectares, a 20% level of drought affectation due to the natural characteristic of the area that presents many slopes and an average inflation of 4.3%.
314. The following practices have been identified based on the initial analysis executed. They will be the basis but will not be restricted only to them, in case it is considered necessary to implement complementary measures during the implementation. The amount of annual maintenance value \$7,933 comes from adding the annual individual values of the following measures:

Annual maintenance value of the measure		
1	Family gardens	1,653.00
2	Crop diversification/ agroforestry	774.50
3	Recovery of forests with fruits species	2,285.00
4	Live fences	1,365.00
5	Silvopastoril system	445.50
6	Drip irrigation system	866.00
7	Water reservoir	604.00
	Total	7,993.00

Table 25: Inputs cost – benefits component 2

Source: CEDIR (2015) ³⁸, MAGAP ³⁹

315. The implementation of these measures is expected to diminish the impact of drought and the consequent economic losses to farmers by increasing its crops yielding by 3%. For this analysis the three principal crops of the area were considered.

³⁸ CEDIR. (2015). Guía para la elaboración de planes de mantenimiento y operación de las medidas de adaptación al cambio climático de los proyectos PACC. PNUD; Environment Ministry. Cuenca.

³⁹ MAGAP/GIZ (2017), Buenas prácticas agrarias para enfrentar el Cambio Climático en Ecuador, Agriculture Ministry/ Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Total hectares	500										
	Hectare	Percentage	Yield qq/ha	Cycles	Total year production (qq)	Price per qq	Total Value	Value of Real production	Benefit of the measure by reduction of drought impact	Benefit per increase in yielding	Total Benefits
Crop											
Sugar Cane	250	50%	39.2	1	9800	15.98	\$ 156,604	\$ 125,283	\$ 31,321	\$ 3,758	\$ 35,079
Corn	150	30%	5.6	1	840	35	\$ 29,400	\$ 23,520	\$ 5,880	\$ 706	\$ 6,586
naranjilla	100	20%	16	1	1600	45	\$ 72,000	\$ 57,600	\$ 14,400	\$ 1,728	\$ 16,128
							\$ 258,004	\$ 206,403	\$ 51,601	\$ 6,192	\$ 57,793

Table 26: Cost – benefits component 2

Source and methodology: MAE, 2016⁴⁰.

316. The total production of the target area was estimated taking into account the year production cycles and the yielding (quintals per hectare) to finally determine the potential of implementing the adaptation measures. The analysis was made under the reasoning that a hectare produces that yield. Given that some lands are farms and most of them are slopes in order to be more efficient they have to diversify their crops and take the most out of their lands.

10 years time horizon	r=3%	r=5%	r=10%
Net present value of benefits	611,883	560,896	460,200
Net present value of costs	(384,626)	(377,574)	(363,648)
Net present value (NPV)	227,257	183,322	96,553
Cost/Benefit relation	1.59	1.49	1.27
Internal return rate (IRR)	18%		

Table 27: Internal return rate (IRR) component 2

317. The result of the cost-benefit analysis with the aforementioned data shows that the project is profitable for each of the three discount rates analyzed (3%, 5%, 10%), without taking into account the possible increases in yield or co-benefits in other areas of agriculture such as cattle ranching. At the same time, the measures implemented help to reduce the hours of work invested by farmers in collecting water and in implementing inefficient low-yielding practices.

⁴⁰ Environment Ministry (MAE) y la Cooperación Internacional Alemana (GIZ). 2016. Policy Brief, Manual para la valoración económica de medidas de adaptación y mitigación del cambio Climático en el Ecuador. 8. P. Mafla, S; Chiriboga, M-V; Guzmán, D; Fuertes, F; Albuja, M-V; Arroyo, J-A; Gavilanes, C.

This last point is a non-monetary benefit that could increase the life quality of local farmers since they can invest their remaining time to other productive or family activities.

318. The following table 28, shows that the initial investment will have a return of \$611.883, from which we rest \$384.626 from maintenance cost, resulting a NPV of 227.257, which shows that the project is profitable under the rate of discount 3%. The internal return rate is 18% which is very reasonable number.

	0	1	2	3	4	5	6	7	8	9	10
	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Total
Inversión inicial	(\$ 300.000)										
Mantenimiento	\$ (7.993,00)	(\$ 8.337)	(\$ 8.695)	(\$ 9.069)	(\$ 9.459)	(\$ 9.866)	(\$ 10.290)	(\$ 10.732)	(\$ 11.194)	(\$ 11.675)	
Costos a VPN	(\$ 307.993)	(\$ 8.094)	(\$ 8.196)	(\$ 8.299)	(\$ 8.404)	(\$ 8.510)	(\$ 8.618)	(\$ 8.726)	(\$ 8.837)	(\$ 8.948)	(\$ 384.626)
Beneficios económicos	\$ 57.793	\$ 60.278	\$ 62.870	\$ 65.573	\$ 68.393	\$ 71.334	\$ 74.401	\$ 77.601	\$ 80.937	\$ 84.418	
Beneficios a VPN	\$ 57.793	\$ 58.522	\$ 59.261	\$ 60.009	\$ 60.766	\$ 61.533	\$ 62.310	\$ 63.096	\$ 63.893	\$ 64.699	\$ 611.883
VPN (TD=3%)	(\$ 250.200)	\$ 50.428	\$ 51.065	\$ 51.709	\$ 52.362	\$ 53.023	\$ 53.692	\$ 54.370	\$ 55.056	\$ 55.751	\$ 227.257

Table 28: DR3% component 2

319. The following table 29, shows that the initial investment will have a return of \$560.896, from which we rest \$377.574 from maintenance cost, resulting a NPV of 183.322, which shows that the project is profitable under the rate of discount 5%.

	0	1	2	3	4	5	6	7	8	9	10
	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Total
Inversión inicial	(\$ 300.000)										
Mantenimiento	(\$ 7.993)	(\$ 8.337)	(\$ 8.695)	(\$ 9.069)	(\$ 9.459)	(\$ 9.866)	(\$ 10.290)	(\$ 10.732)	(\$ 11.194)	(\$ 11.675)	
Costos a VPN	(\$ 307.993)	(\$ 7.940)	(\$ 7.887)	(\$ 7.834)	(\$ 7.782)	(\$ 7.730)	(\$ 7.679)	(\$ 7.627)	(\$ 7.577)	(\$ 7.526)	(\$ 377.574)
Beneficios económicos	\$ 57.793	\$ 60.278	\$ 62.870	\$ 65.573	\$ 68.393	\$ 71.334	\$ 74.401	\$ 77.601	\$ 80.937	\$ 84.418	
Beneficios a VPN	\$ 57.793	\$ 57.408	\$ 57.025	\$ 56.645	\$ 56.267	\$ 55.892	\$ 55.519	\$ 55.149	\$ 54.782	\$ 54.416	\$ 560.896
VPN (TD=5%)	(\$ 250.200)	\$ 49.468	\$ 49.138	\$ 48.811	\$ 48.485	\$ 48.162	\$ 47.841	\$ 47.522	\$ 47.205	\$ 46.890	\$ 183.322

Table 29: DR5% component 2

320. The following table, shows that the initial investment will have a return of \$460.200, from which we rest \$363648 from maintenance cost, resulting a NPV of 96.553, which shows that the project is profitable under the rate of discount 10%.

	0	1	2	3	4	5	6	7	8	9	10
	Año 1	Año 2	Año 3	Año 4	Año 5	Año 6	Año 7	Año 8	Año 9	Año 10	Total
Inversión inicial	(\$ 300.000)										
Mantenimiento	(\$ 7.993)	(\$ 8.337)	(\$ 8.695)	(\$ 9.069)	(\$ 9.459)	(\$ 9.866)	(\$ 10.290)	(\$ 10.732)	(\$ 11.194)	(\$ 11.675)	
Costos a VPN	(\$ 307.993)	(\$ 7.579)	(\$ 7.186)	(\$ 6.814)	(\$ 6.461)	(\$ 6.126)	(\$ 5.808)	(\$ 5.507)	(\$ 5.222)	(\$ 4.951)	(\$ 363.648)
Beneficios económicos	\$ 57.793	\$ 60.278	\$ 62.870	\$ 65.573	\$ 68.393	\$ 71.334	\$ 74.401	\$ 77.601	\$ 80.937	\$ 84.418	
Beneficios a VPN	\$ 57.793	\$ 54.798	\$ 51.959	\$ 49.266	\$ 46.713	\$ 44.293	\$ 41.998	\$ 39.821	\$ 37.758	\$ 35.801	\$ 460.200
VPN (TD=10%)	(\$ 250.200)	\$ 47.219	\$ 44.773	\$ 42.453	\$ 40.253	\$ 38.167	\$ 36.189	\$ 34.314	\$ 32.536	\$ 30.850	\$ 96.553

Table 30: DR5% component 2

321. The payback graphic shows that the investment will be recovered in 6 years with a discount rate of 3 and 5%, and in seven years with a discount rate of 10%.

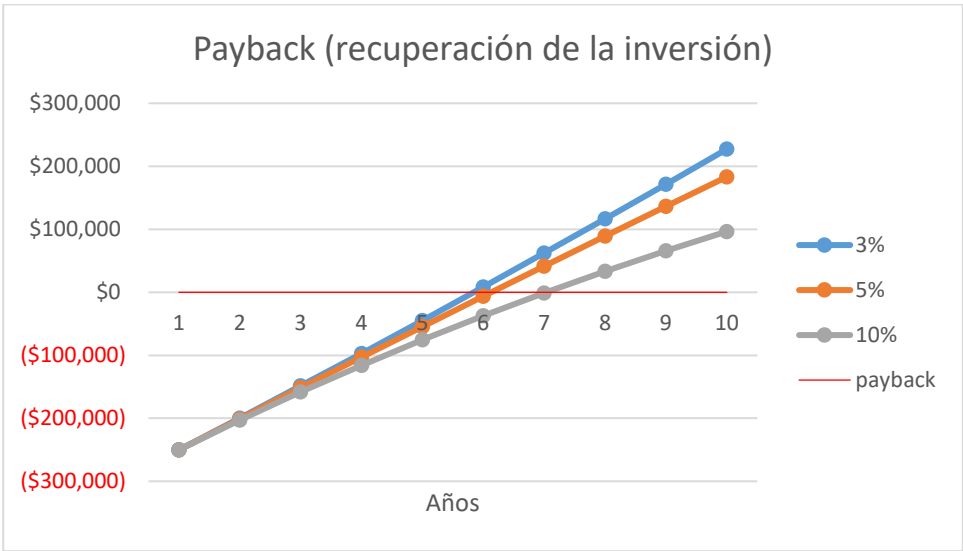


Figure 27. Investment and payback component 2

322. The graph of inaction vs. action, allows to evidence that the contribution of the project in agricultural crops, makes adaptation measures profitable, because it allows farmers to have economic in 10 years, by diminishing the risk of losses when taking measures to face of drought and inefficiency, and the potential increase in yield due to the incorporation of techniques that improve agricultural and irrigation management.

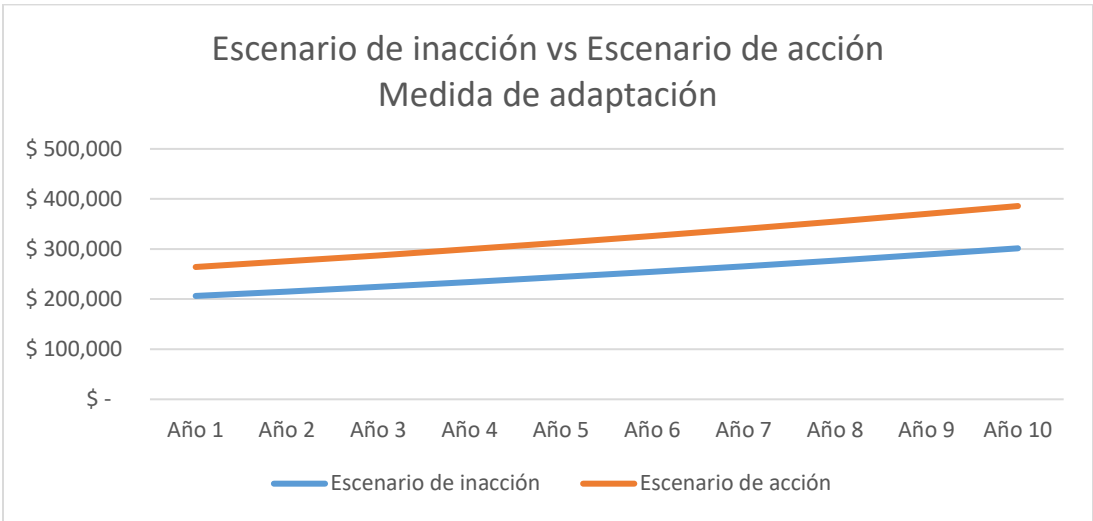


Figure 28. Comparative scenarios component 2

Multicriteria analysis

323. To analyze the measures not only from a quantitative but from a qualitative perspective as well, a multi-criteria analysis was performed. A set of criteria was established with some indicators that will allow comparing which criteria has more weight while implementing adaptation measures.

	Criteria	Indicators
1	Sustainability of the resources	Number of adaptation measures implemented focused on improving agricultural management
2	Increase in productivity	Product yield per unit area
3	Finance and social intelligence and planning	Number of people who have received reimbursable and non-reimbursable funds to implement measures based on their planning.

Table 31: Multicriteria analysis component 2

324. A relative weight in a numeric scale is given to each criterion to determine what is most important at the moment of implementing adaptation measures, and at the same time, three adaptation measures were chosen to make a comparison between them.
325. In relation to the graph generated as a result of the multicriteria analysis, it can be evidenced that the main criterion for the implementation of an adaptation measures is sustainability in the use of resources, since the adaptation measures will allow improving agricultural practices to use resources efficiently and sustainably, seeking their long-term preservation. The result of improving practices leads us to the second priority criterion, which is the increase in productivity, since the improvement in farmers' income is directly related to the improvement in their quality of life. Last, but not least, is the criterion of intelligence and financial and social planning, since the implementation of measures must always be accompanied by an adequate planning that allows its successful implementation and access to economic resources is vital to achieve the implementation of planning.
326. At the same time the graphic shows that the measure irrigation systems has a higher influence in increasing productivity, the measures incentives to reduce pressure on forest and sustainable productive practices have the same tendency but in less intensity.

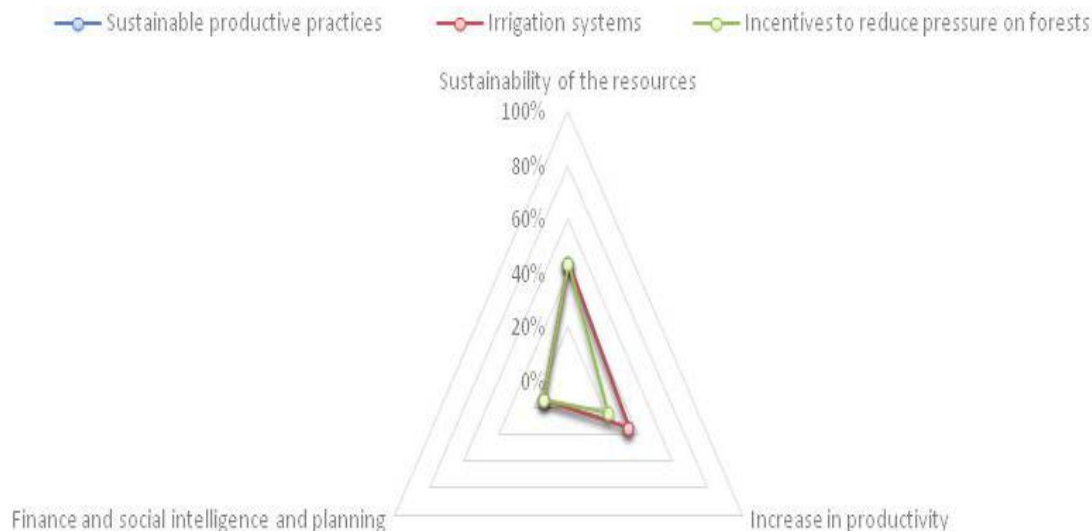


Figure 29. Multicriteria approach component 2

327. As previously mentioned, in the area of implementation of the project the main economic activity is the cultivation of sugar cane and its transformation to “panela” in an artisanal way, using as source of energy the burning of wood which causes deforestation. Due to the importance of this activity, it is contemplated within component one and two to change the technology in the productive process with the improvement of ovens and Cooking Systems. This measure does not intend to expand sugar cane cultivation in surface but to provide a more sustainable management of the crop, of the forest and to improve the efficiency of the transformation process.
328. The ovens will be constructed with a chimney that will contribute to increase the concentration and storage of heat. The chimney will be made of brick with specific technical dimensions and will be built together with two or more metallic stainless steel pan for cooking the sugar cane juice. Previous experiences from implementing this measure, demonstrates that before the measure was implemented approximately $1/2\text{m}^3$ of wood were required to cook 580 liters of juice, and after the construction of the ovens only $1/6\text{m}^3$ of wood was needed, representing a diminish of 60% in the use of wood. The estimated cost of implementation of an oven is of \$20.000, plus \$400 in hand labor for its construction⁴¹.
329. This measure presents several benefits: economic because the transformation of the product gives an added value to it, allowing families to increase their economic incomes, but it also has benefits in terms of improving their life quality for having

⁴¹ MAGAP/GIZ (2017), p. 33, 34.

more free time to be dedicate to other productive activities, and in environmental terms contributing to mitigation to climate change by reducing deforestation and the pressure on forests.

330. Additionally, the project implementation will seek the supporting of the MEbA methodology and experiences. Considering, the MEbA project has so far implemented almost 10,000 EbA measures (for a total financing of over USD 12 million, exclusively provided by the microfinance institutions' own funds and paid by the farmers) in cooperation with 5 microfinance institutions in Colombia and Peru and is assessing the implementation of its solutions in Ecuador. The MEbA project is funded by the German Federal Ministry of Environment via its International Climate Initiative.
331. The MEbA project has developed tools that support the individual assessment and prioritization of EbA measures to be applied with small farmers as part of operational processes of institutions interacting with small farmers as input or service (such as technical assistance or finance) providers.
332. For an overview of EbA measures and the related tool set, please refer to Annex 12.
333. It is assumed that all proposed EbA options have clear and measurable benefits for the health of ecosystems and the services they provide. Additional scientific data gathering will form part of the project. Its purpose is twofold:
- Firstly, to obtain granular (i.e., farm-level) data that can be leveraged to drive individual cost-benefit analysis for a given intervention. As per the nature of the benefits involved (monetizable as well as non-monetizable), this cost-effectiveness analysis will use either a Multi-Criteria or a Cost-Efficiency approach.
 - Secondly, low-level data will enable periodic reviews for Monitoring and Evaluation to support the still limited availability of academic studies on the actual impact of EbA.
334. Local and regional service providers (e.g. financial institutions) will be leveraged to collect this data.
335. The proposed mechanism for intervention, channeling funds to local farmers through the local MFI networks and an investment fund (see also sections Component 2, paragraphs), will also be instrumental in achieving cost-efficient results. The underlying principle of incorporating the entire farmer community (as opposed to only a sub-segment) according to its level of vulnerability will assure broad impact. Creating different products for those members of the group who do not have access to market-based solutions for inputs and financing and for those who do is a necessary precondition of this approach.

The former need a stronger focus on subsidized components, while the latter can afford to take on more of the intervention's cost in form of a credit.

336. Careful incentive design will be in place to assure that the more vulnerable groups can be brought into the market as far as feasible. Across groups, the program's objectives and individual incentives are aligned by providing adequate performance bonuses for all farmers.
337. By aligning incentives, leveraging market forces where possible and assuring long-term support through the proposed investment fund, cost-effectiveness will be markedly higher than in comparable projects with a stronger focus on subsidies.
338. After performing the cost benefit analysis, a comparison of the internal rate is made in 6 different management scenarios: SENPLADES Ecuadorian project, 10% bank interest rate in Ecuador, 8.68% fixed term of the Bank, 4.28% Ecuador Climate Change and Water Project (PACC), 7.22% FORECCSA Agriculture and Adaptation Project, 26% Livestock Project (Ecobona Ecuador), the project selection were focusing adaptation climate change initiatives.

Summary of scenarios

Internal Return Rate (TIR)	Ecuadorian Project SENPLADES	Ecuadorian bank interest rate⁴²	Bank fixed term	Climate change and water project Ecuador (PACC)⁴³	Agriculture and Adaptation Project FORECCSA⁴⁴	Livestock project (Ecobona Ecuador)⁴⁵
	10%	8.68%	4,28%	7,22%	26%	14,29%
C1 Conserve vegetation cover 5%	5%	5%	5%	5%	5%	5%
C2 Adapt farming practices to new climate change conditions 18%	18%	18%	18%	18%	18%	18%
Average Project	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%

Table 32-B: Summary of scenarios

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

⁴² <https://www.bce.fin.ec/index.php/component/k2/item/148-tasas-de-inter%C3%A9s>

⁴³ <http://www.ambiente.gob.ec/proyecto-pacc/>

⁴⁴ <http://suia.ambiente.gob.ec/proyecto-foreccsa>

⁴⁵ Thesis Livestock project pg 132, available: <http://www.dspace.uce.edu.ec/bitstream/25000/1974/1/T-UCE-0005-351.pdf>

339. One of Ecuador's advantages in relation to climate change is the articulation of public policies at all levels.

The project is aligned directly with current national environmental regulations. The Constitution of the Republic of Ecuador (2008) contains two articles, 413 and 414, relating to climate change management in the country. Article 414 establishes that "the state will adopt appropriate and transverse measures to mitigate climate change, by limiting emissions of greenhouse gases, deforestation and atmospheric pollution; also will take measures for the conservation of forests and vegetation and will protect the population at risk." In addition, the Constitution recognizes the need to "oversee land use planning of watersheds and encourage the creation of watershed councils, in accordance with the law."

340. The **Constitution of the Republic of Ecuador** (20th October 2008) contains a number of important provisions of relevance to this project:

- Right of the population to live in a healthy environment Art. 14, 66.
- Recognition of water as a Human Right: All citizens have the right to have safe water in sufficient quantity and quality. Articles 3, 12, 15, 32, 318, 396 and 413.
- Considers water as a strategic resource: It is the support of food sovereignty and sustainable development of the country. Articles 12, 14, 71, 72, 73, 74, 397, and 411.
- Considers water as the Right of Nature and Source of life. Articles 281 and 282.
- Finally, it recognizes water as a heritage resource: Water can not be privatized since it is part of the national heritage considered strategic for the development of the country and for public use. Articles 85, 95, 318, 319 and 419.
- The Constitution of the Republic of Ecuador, which establishes in Article 414 that "The State shall adopt appropriate and transversal measures for the mitigation of climate change, by limiting emissions of greenhouse gases, deforestation and air pollution ; will take measures for the conservation of forests and vegetation, and will protect the population at risk ".
- In addition, the 2008 constitution is an institutional umbrella under which safeguards are addressed and respected. It provides a context for the implementation of a rights-based approach associated with REDD + UNFCCC safeguards and incorporates environmental variables into production activities, ecosystem management, citizen participation in environmental discussions and climate change adaptation (Policies 2,3 and 5).

341. The **National Development Plan**, (named during the present period of the Government "**the National Plan Lifetime 2017-2021**") establishes policies and strategic guidelines related to climate change, such as:

- Objective 3: Guarantee the rights of nature for current and future generations

Policy 3.3: Promote good environmental practices that contribute to the reduction of pollution, to conservation, to mitigation and adaptation to the effects of climate change, and promote them at the global level.

- Proposed Goals for indicator homologation and construction of information: Reduce the Vulnerability Index from high to means, population, livelihoods and ecosystems, in the face of climate change and natural disasters.
 - Objective 5: Promoting Productivity and Competitiveness for Sustainable Economic Growth in a Redistributive and Solidarity way indicates that the rural population must strengthen the capacities of social interaction, that strengthens cooperation and networks collaborative as well as the resistance capacities, which respond to adverse scenarios caused by natural effects and climate change.
 - Territorial guidelines for territorial cohesion with environmental sustainability and risk management. second. Habitat management for sustainability environmental and integral management risks in b.2. Promote integral and co-responsible management of water heritage to protect its quality, availability and proper use, with recovery actions, conservation and protection of water sources, recharge zones, aquifers and groundwater, considering the equitable access of water for consumption, irrigation and production
342. **The Ministry of the Environment of Ecuador** also considers a specific policy for the management of climate change in its "Policy 3: Management of adaptation and mitigation to Climate Change to reduce social, economic and environmental vulnerability".
343. **The National Law on Water Resources, Uses and Exploitation 2014 (Water Law)**, aims to develop the human right to water, as well as regulating the authorization, management, preservation, conservation, use and use of water, included within the national territory in its different phases, forms and physical states, in order to guarantee Sumak Kawsay or good living. In this sense, the management through hydrographic basins is regulated:
- Articles 2, 7 and 17, recognizes the strategic nature of water, the participatory and community nature of its management, as well as the consideration of ecological flows in all forms of use and exploitation to achieve sustainable development.
 - Articles 12 and 65, the protection and conservation of sources is the responsibility of the State, the Single Water Authority, the decentralized autonomous governments, users, communes, communities, peoples, nationalities, peasants and property owners where water sources are located , they will be responsible for sustainable and Integrated management, as well as for the protection and conservation of said sources, considering the integrated management approach of resources as cross-cutting.
 - Article 64, propose strategies for the conservation of resources in their sources, catchment areas, regulation, recharge, outcrop and natural water channels, in

particular, snow-capped mountains, glaciers, páramos, wetlands and mangroves.

- Article 83, promotes the adoption and promotion of measures regarding adaptation and mitigation to climate change to protect the population at risk, the development of mechanisms to encourage and encourage the efficient use and exploitation of water through the application of appropriate technologies in irrigation systems

344. The national development plan (SENPLADES, 2013) states in its general objective 7 that climate change is a multi-sector problem of national scope that should be approached with programmatic actions which generate results in the short and medium term.

Specific objective 7.10 focus on implementing measures to mitigate and adapt to climate change to reduce the economic and environmental vulnerability with emphasis on priority groups. In addition, specific objective 7.6 focus on managing water resources in a sustainable and participatory manner, with a focus on watersheds and ecological flows to ensure the human right to water.

345. The project is in line with the National Climate Change Strategy (MAE, 2012), in particular with specific objectives 2 and 4. The first, focus on initiate action so that the performance levels of productive and strategic sectors and the country's infrastructure are not affected by the effects of change climate. Also 5, 6, and 8 the national strategy covers the period 2012 – 2025. It defines eight priority sectors for climate change adaptation. The present project is in line with the specific objectives of the adaptation line of work:

- Specific objective 2. The performance levels of the productive and strategic sectors and the country's infrastructure are not affected by the effects of climate change:
 - Action 1. Strengthen and consolidate the development of projects in the productive, strategic and infrastructure sectors with criteria of adaptation to climate change.
 - Action 2. Consolidate the actions that increase the resilience of the infrastructure in the face of extreme climate events attributed to climate change.
- Specific objective 4. To manage the water heritage with a comprehensive and integrated approach by the Hydrographic Unit, to guarantee the availability, sustainable use and quality of the water resource for different human and natural uses, in the face of the impacts of climate change:
 - Action 1. Consolidate the integral management of the water heritage, ensuring its availability, sustainable use and quality for the various human and natural uses in the face of the impacts of climate change.
- Specific objective 5. Conserve and sustainably manage the natural heritage and its terrestrial and marine ecosystems in order to contribute with its capacity to respond to the impacts of climate change:

Action 1. Consolidate and strengthen the implementation of measures that increase the capacity of species and ecosystems to respond to the impacts of climate change.

Action 2. Ensure that the Heritage of Natural Areas of Ecuador contributes to the response capacity of species and ecosystems in the face of the impacts of climate change

- Specific objective 6. Take measures to ensure access of priority attention groups and priority attention to the resources of the response to the impacts of climate change:

Action 1. Promote timely access to health, nutrition and infrastructure resources for the population, especially for groups defined as vulnerable and priority attention, which contribute to the response capacity of these groups in the face of the impacts on the population attributed to the change climate.

- Specific objective 8. Implement measures to increase the response capacity of human settlements to deal with the impacts of climate change. Within this objective, the project will contribute to three key actions:

Action 2. Promote public participation and social organization to facilitate the implementation of response measures to deal with extreme climate events related to climate change.

Action 3. Promote the generation of specific information and its access to the GAD on possible impacts of extreme weather events under possible climate change scenarios.

346. The project will contribute to strengthen the development and land use plans of parish governments. COOTAD 2010, through the creation of Biocorridors and ACUS as alternative to conservation.

347. The Organic Environmental Code (COA) is an advanced law, articulated to our Constitution, which recognizes nature as subject of rights, responds to current needs. He is optimistic, that is, he looks with pleasure on the use of natural rights in an intelligent rational and responsible way. Not the environmentalist look of the 70s or 80s where there was talk of preserving what it was not to touch. Today we say to the communities that live in the páramos, mangroves, fragile ecosystems, that we want them there to be our partners, conserving those beautiful ecosystems that serve all Ecuadorians.

348. The COA deals with the ownership and possession of community lands within the National System of Protected Areas; of the conservation, use and sustainable management of biodiversity and natural resources; of the protection, maintenance and development of collective knowledge associated with biodiversity; and of the practical knowledge, ancestral and cultural traditions contemplated in the 282 articles of the COA.

349. Finally, the international instruments with which the proposal is made:

- Kyoto Protocol on climate change

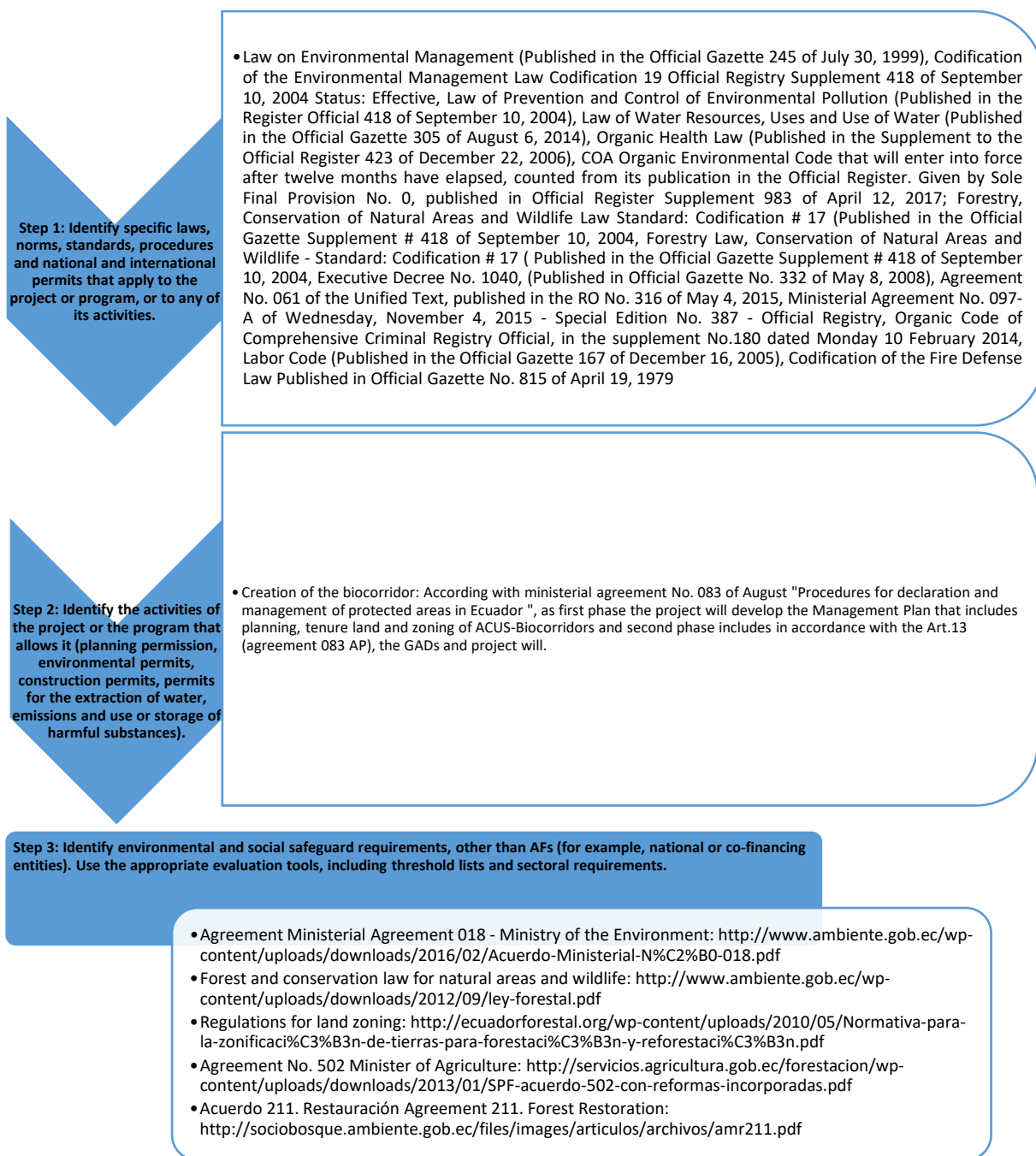
- International Convention for the Elimination of All Forms of Racial Discrimination
- Convention for the Protection and Promotion of Diverse Cultural Expressions
- Convention for the Elimination of Discrimination against Women
- Convention for Biological Diversity
- Convention to Safeguard Intangible Cultural Heritage
- United Nations Macro Convention on Climate Change - Decision 1 / CP.16
- Convention on Biological Diversity - Decision XI / 19

E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

350. MAE is the national environment authority and administer (i) the environmental impact evaluation system, (ii) forest use, (iii) protected forests, and (iv) the national system of protected areas. The project intervention will comply with the environmental regulatory framework established by the Environmental Management Law (Law 37 of 1999, coded in 2004), the environmental impact evaluation system (Executive Decree 061 of 2015), the Forestry and Conservation of Natural Areas and Wildlife law (Law 2004-017 coded in 2004) and complementary regulations.
351. The project will seek to take advantage of the recently adopted Organic Law on rural land and ancestral territories (signed on March 2016). This law establishes that rural lands must serve social and environmental functions (articles 11 and 12). The social function refers to be productive, and the environmental function refers to apply sustainable practices and conserve key habitats. It is relevant to the present project that the law:
- The law recognises that private or communal rural land fulfils the environmental function when is dedicated to conservation of renewable natural resources, including forest protection and production, conservation incentives (e.g., Socio Bosque), ecotourism and recreation. There will be incentives to those who fulfil the social and environmental functions.
 - The law states that rural state land cannot be claimed by possessors or invaders (article 18); this opens a line of action to solve certain land-tenure issues.
 - The law forbids the expansion of the agriculture frontier into fragile and threatened ecosystems (article 50), including cloud forests. However existing subsistence agriculture activities will be respected.
 - The project infrastructure will be minimal (i.e., artisanal sediment retention dams) and may not require an environmental impact assessment. Nonetheless, the design and construction will comply with pertinent building regulations.

- The meteorological stations will comply with INAMHI's required specifications and will be integrated into the national monitoring system.

352. About the national technical standards, the project has relation with several local laws, the process for evaluating the national standard consist in the following 4 steps, as shown below:



Step 4: Identify the technical or industrial standards that apply to any of the project or program activities.

- **Norms for the Sustainable Forest**
- Management of the Humid Forests (Ministerial Agreement N ° 125)
- Procedures for Authorizing the Harvesting and Cutting of Wood (Ministerial Agreement No. 139)
- Rules for the Management of Andean Forests (Ministerial Agreement No. 128)
- Standards for Sustainable Forest Management of Dry Forest (Ministerial Agreement No. 244)
- Standard for the Procedure for the Awarding of Lands of the State Forest Patrimony and Forest and Vegetation Protectors
- Annex PFE Adjudication Standard Regulations of the Forest Regency System (Ministerial Agreement No. 038)
- Right of Use of Standing Wood (Ministerial Agreement N ° 041)
- Forest Seed Standard (Ministerial Agreement No. 003)
- Instructive application tax credit payments afforestation program (Ministerial Agreement No. 75)
- Operational Manual for the Incentive for Sustainable Forest Management (Partner Management) (Ministerial Agreement No. 187)
- Instructions for granting the economic incentive for reforestation and afforestation with commercial purposes (Ministerial Agreement N ° 035)
- Regulations for the zoning of lands for afforestation and reforestation (Interministerial Agreement No. 002)
- **Technical norms INEN Ecuador**
- NTE INEN 221:1997 FERTILIZERS OR FERTILIZERS. REQUIREMENTS LABELED <http://www.agrocalidad.gob.ec/wp-content/uploads/2013/11/inen-0221-1997.pdf>
- NTE INEN 330:98 Fertilizers, fertilizers, classification <http://www.agrocalidad.gob.ec/wp-content/uploads/2013/11/INEN-330-clasificacion-de-fertilizantes-11-04-2017.pdf>
- NTE INEN - ISO 25119-2 TRACTORES Y MAQUINARIA PARA LA AGRICULTURA Y LA SILVICULTURA – PARTES DE LOS SISTEMAS DE CONTROL RELACIONADAS CON LA SEGURIDAD http://www.normalizacion.gob.ec/wp-content/uploads/downloads/2015/07/nte_inen-iso_25119-2.pdf
- NTE INEN 2331 SOLID PANEL. REQUIREMENTS http://www.normalizacion.gob.ec/wp-content/uploads/downloads/2015/07/nte_inen_2331-1r.pdf
- NTE INEN 1761:2012 FRESH VEGETABLES. CHOCLO-MAIZ TIerno. REQUIREMENTS http://www.normalizacion.gob.ec/wp-content/uploads/downloads/2013/11/nte_inen_1761.pdf

Figure 30. Four steps for evaluated the National technical standards evaluation

F. Describe if there is duplication of project / programme with other funding sources, if any.

353. No duplication with other funding sources was found. However, the project will have synergies with a number of initiatives.
354. The project will complement the Socio Bosque Programme, by promoting with local partners the development of long-term mechanisms to provide conservation incentives to local landowners.
355. The project will use the results of the following projects:

- Enhancing Resilience of Communities to the Adverse Effects of Climate Change on Food Security (FORECCSA). This project is funded by the Adaptation Fund (AF), the implementing agency is the World Food Programme, and the project partners are MAE, the Ministry of Agriculture, Livestock, Aquaculture and Fisheries (MAGAP), the Jubones River Basin Public Consortium, and the Provincial Government of Pichincha. The present project will use the experience and lessons on mainstreaming gender in rural communities for food security and adaptation to climate change.
- Adaptation to Climate Change through Effective Water Governance (PACC). This is a GEF sponsored project (GEF ID 2931) under implementation. The executing agency is MAE, and the GEF implementing agency is UNDP. It does not cover the present area of intervention, but its lessons will be useful to the present project. The present project will use the experience and lesson on mainstreaming water climate risk in local planning and application of water saving measures by farmers.
- Analysis of the vulnerability of flagship hydropower plants to the effects of climate change (CHECC), in particular the results for the Toachi-Pilatón hydropower plant. The present project is using the results of the watershed vulnerability analyses.
- Third National communication (3NC) and First Biennial Update Report (BUR). This is a GEF funded project (GEF ID 5478) under implementation in Ecuador. The executing agency is MAE, and the GEF implementing agency is UNDP.

The project objective is to prepare the third national communication on climate change and the first biennial update report. The present project will use the results of 3NC, in particular the outcomes of the climate change models and the guidelines for climate change adaptation.

356. The present project will aim for collaboration and synergies with HIDROTOAPI's Environmental Management Plan (EMP) which focus on those communities located in the direct area of influence of the hydropower plant. Actions include strengthening the provision of basic services, education, health and production development. The last element includes improving livestock and agriculture management, promoting tourism microenterprises, and afforestation and reforestation.

357. Summarized relevant indicatives in relationship between climate change and territory following table and figure:

Initiative	Sponsor	Objective	Intervention zone	Outputs	Synergy
Enhancing Resilience of Communities to the Adverse Effects of Climate Change on Food Security (FORECCSA). 2017	Funded by the Adaptation Fund (AF), the implementing agency is the World Food Programme	Adapting to climate change and ensuring food security in the highlands of Ecuador	Jubones River Basin in Loja and Azuay provinces(33 parishes); Pichincha province in Cayambe and Pedro Moncayo cantons	Vulnerability assessment methodology with emphasis on food security and climate change in the Pichincha province and Jubones River basin 2014.	Vulnerability assessment tools, adaptation measures experiences in others territories

Adaptation to Climate Change through Effective Water Governance (PACC) 2015	Funded by the Global Environment Facility (GEF), the implementing agency is UNDP	Reduce vulnerability to climate change through effective water resource management	Watersheds of Paute, Jubones, Catamayo, Chone, Portoviejo and Babahoyo	Vulnerability to climate risks in the water sector, rivers Paute, Jubones, Catamayo, Chone, Portoviejo and Babahoyo. Risk to droughts, frosts and other impacts of climate change that may affect the agricultural sector in Ecuador.	Publications and experiences in adaptation measures
Analysis of the vulnerability of flagship hydropower plants to the effects of climate change (CHECC), Currently	Public ecuadorian funds	Analyze the vulnerability to climate change of hydroelectric plants and propose measures at the level of watersheds that can be adopted to minimize the impacts of global warming on energy supply	Ecuadorian Hydroelectric, includes Toachi Pilaton watersheds	Analysis of the vulnerability of flagship hydropower plants to the effects of climate change (CHECC), in particular the results for the Toachi-Pilatón hydropower plant	Both projects CHECC and AF share the same territory, and the current initiative is based in the vulnerability information of CHECC project
The Adaptation to the Impact of Rapid glacier Retreat in the Tropical Andes (PRAA), through the Andean Community of Nations (CAN)	Funded by the Global Environment Facility (GEF),	Strengthen the resilience of ecosystems and local economies to the impacts of the glacial retreat of the tropical Andes	Napo province	Vulnerability and Adaptation Measures to Climate Change in Antisana, Quijos, Jeringa, and Papallacta Rivers.	Vulnerability assessment tools and adaptation measures experiences
Socio Bosque Programme Currently	Public ecuadorian funds	financial incentives to individual and community landowners who voluntarily commit to conserve native forests for a 20-year period	In the river Blanco basin cover 10959,83 ha with 93 beneficiaries	Conservation areas in the zone of intervention. Methodology and mechanism to forest conservations	Territory and Mechanism to forest protection based in Payments for Environment Services.
Sustainable Development of the Ecuadorian Amazon: integrated management of multiple use landscapes and high value conservation forests, Currently	Funded by the Global Environment Facility (GEF), the implementing agency is UNDP	Catalyze the transformation of land use planning and management in the Ecuadorian Amazon (CTEA) by building a governance and sustainable production framework based on a landscape approach	Provinces: Orellana, Morona Santiago, Sucumbios, Zamora Chinchipe	In execution from 2018 to 2022	Adaptation to climate change in territories different to the currently initiative. However, the methodology to implement adaptation measures and experiences are similar
Priming Financial and Land-Use Planning Instruments to Reduce Emissions from Deforestation, Currently	Funded by the Green Climate Fund (GCF), the implementing agency is UNDP	Investment to control agricultural expansion into forest areas; optimize existing financial, economic mechanisms to Implement agricultural and livestock production practices that reduce deforestation;	North Amazonia, Middle Amazonia Centro, and South Amazonia that includes Bosques Secos in Loja Province	In execution from 2018 to 2022	Currently investments to control agricultural expansion into forest areas.
Promotion of climate-smart livestock management integrating reversion of land degradation. Currently	Funded by the Global Environment Facility (GEF), the implementing agency is UNDP	To reduce soil degradation, increase adaptive capacity to climate change, and mitigate GHG emissions by implementing cross-sectorial policies and Climate-smart livestock management.	Provinces: Loja, Manabí, Guayas, Santa Elena, Imbabura, Napo, Morona Santiago.	Social, environmental and economics vulnerability in seven provinces in Ecuador	Currently sustainable livestock production

Table 33: Initiatives portfolio with relations to climate change

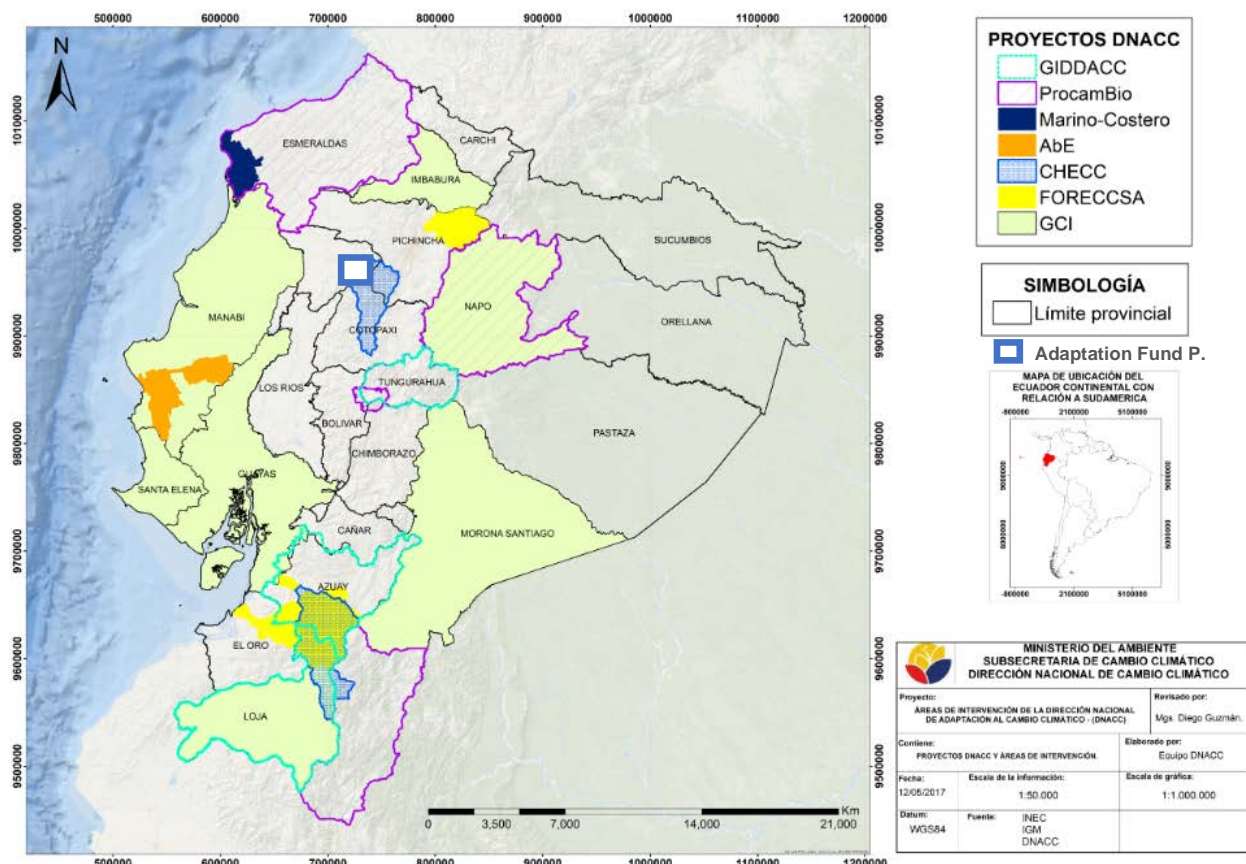


Figure 31. Adaptation climate change initiatives 2018

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

358. The proposed Project was built on the experience and lessons learned primarily from the CHECC project, which are valuable as many stakeholders in the proposed Project remain the same, but also new players are being incorporated. In this respect, considering the lesson learned that careful, early-planned partnerships with key stakeholders increase the viability and chances of Project success. The Project is supporting Government priorities in sectors where alliances at different levels (national, sub-national, local) have already been formed and multi-sector planning activities are already on their way. The project will build on the success obtained by stakeholders analysis (Annex 5) including scientists, decision-makers, water utilities, farmers and community members.
359. According to the experience of MAE from implementing previous projects at local and national level, the ability of countries to increase their CC resilience is directly linked to their capacity promote local solutions to address common problems and challenges with a holistic, cross-boundary and participatory approach.

The proposed Project has embedded local vision-activities into the design of main components. Activities in the component 3 will foster local exchanges and cross learning, systematization, tailor-made products and the understanding of opportunities for replication and up-scaling.

360. The Component 3 of the project focus on learning and knowledge management. It comprises one outcome (i.e., outcome 3) and four outputs (i.e., outputs 6, 7, 8 and 9).
361. The backbone is the public communication and education plan that will (i) raise public awareness and engagement, (ii) facilitate communication and collaboration among stakeholders and project partners, and (iii) enable dissemination of information and lessons through tailor-made communicational products. **For the context of the community it has been determined that the mass media that has bigger reception within the community is the radio, therefore radial wedges will be developed to disseminate awareness messages and promote the activities of the project to motivate more people to join this efforts. In addition, the project intends to produce infographics to show how some improved agricultural practices have to be implemented and also to give maintenance to the improved stoves. These infographics will be placed in the community meeting space.**
362. The project will disseminate information and results through MAE's website and the social networks it uses (e.g., Facebook, Twitter). MAE's policy is to upload all the information within the so-called unique system of information SUIA (for its acronym in Spanish) that belongs to MAE and in the corresponding sections of its main portal. MAE's communications office will ensure that information will be channelled to local and national media to reach a wider audience.
363. The project team will systematically document and record the advances, best practices, challenges and lessons learned, which will derive in recommendations for future replication of the experience. A monthly electronic information bulletin will be prepared and disseminate to inform the stakeholders and interest groups. It is envisioned to produce communicational material and documents like infographics of good practices and procedures to be used by local communities and stakeholders and policy briefs to provide recommendations to policy makers at different levels.
364. In the following table, the activities of Components 1 and 2 with the Knowledge Management of the Communities and the Strengthening of learning are shown:

Component 1: Component 1: At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management	
Outputs of the project	Learning and knowledge management
ha of forest conserved in the Bio-corridor	Learning - doing one of the ways in which protected areas interact with communities, the community can take care of it, with the creation of Biocorridor, community participation with a gender approach is promoted, for decision making and responsibilities in the activities of tourism, organic production, reforestation, integration in the development of Management Plans for Protected Areas. Prepared in Component 3, a technological team that aims to transfer knowledge and capabilities of natural resources to communities.
Decentralized Governments (GAD) with planning, regulatory and normative instruments for ACUS	Implementing Territorial Land Use Plans (TLUP) that incorporate specific provisions to climate change effects and it apply regulatory or normative instruments in relation to conservation and ACUS declaration, will be free access information that can serve as a replica for the implementation of other GADs
7 hydro-meteorological stations providing climatic data in a regular bases and located accordingly to technical criteria by INAMHI	The previously existing equipment improved and the proper functioning will be reinforced with a hydrometeorological monitoring system that works correctly in the data reported by the hydrometeorological stations to manage the data efficiently for sustainable agricultural planning.
Component 2. Adapt farming practices to new climate change conditions enable their sustainable climate smart financing	
Outputs of the project	Learning and knowledge management
Sustainable farming practices and livestock adjusted to local realities are being introduced and implemented with assistance of financing mechanisms for adaptation measures	At least 250 ha of pasture and 250 ha of crops apply sustainable farming practices and will include 50% women and 50% men including also vulnerable groups, will strengthen the capacities and skills of producers, producers through training in leadership, formulation of productive projects , ecological agriculture. When the project starts, the best MEBA proposals to implement in each farm will be decided depending on the location, economic situation, the beneficiary families will transfer the knowledge to their descendants.
Producers that implement better technology to decrease use of firewood of panela	At least 10 artisanal panela producers applying best available technology (BAT), could obtain better results in panela production, their income would be seen, and the pressure on the forest will be reduced. Knowledge and trust, so that the groups of producers interested in working jointly integrate their efforts (exchange of knowledge) with the purpose of executing projects that complement their productive capacities and thus obtain economic advantages in the short and medium term. (Capacity building). Infographics will be developed in this component.
Institutions have introduced specific solutions and risk assessment methodology to support the disbursement of credits for adaptation, integrate sustainable and climate smart criteria in their whole operations	Financial institutions incorporated into their business operations financial sustainability issues, including climate smart lending methodology and tools, who introduced specific EbA-focused lending products, the elements of learning and experiences will be used to promote the integration and participation of local actors. Through the learning of these new financial methodologies by the Institutions, they can be replicas for the rest of the country.

Table 34: Keys activities and knowledge

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

365. During preparation of the project concept, there was consultation with local groups and relevant government organizations. The consultation process started in 2015 by sharing the project idea and receiving feedback, impressions and recommendations from local stakeholders. The following workshops during 2016, gathered a bigger number of representatives and in 2017 the same actors were invited but also the invitation was broadened to a bigger number of local stakeholders and to more communities' representatives. It has been a gradual process where the intention was to involve each time more and more relevant actors. During 2017 workshops, a great emphasis was made on ensuring the presence of vulnerable groups' organizations or representatives (women, the elderly, the disabled, migrants, etc.) to ensure the inclusion of their opinion and the roles that they will have during the implementation of the project. During workshops, several factors were taken into account to be more time-effective, for instance to provide a comfortable environment in terms of ensuring that men and women would feel free to talk, establish a schedule of workshops that would not intervene with their normal labor activities, consider if women can bring their children to the workshop or ensure that there is an appropriate place to leave them under care and to make separate groups by sub-basin to have specific feedback. This approach of building together with local actors the project activities based on their needs and challenges was useful to inform the design of the project, ensure they will have a role and to ensure the participation not only from vulnerable groups but from the different and relevant stakeholders from different sectors. Some indicators and means of verification were defined to ensure and monitor this participation during implementation. More details are provided on the following paragraphs.
366. Local stakeholders were approached during 2015 to discuss the project idea (Annex 5). As a result from this the communities made their suggestions and expressed their expectations saying that they would be interested in a project that can protect the water sources especially in the higher basins, promote a change in production patterns especially near the rivers, identify and preserve the water springs and to strengthen association and participation processes. During this phase the local governments of Manuel Cornejo Astorga (Tandapi, Pichincha province), Palo Quemado (Cotopaxi province), Pampas de Aguilla (Cotopaxi province), recognized the project idea and expressed their will of supporting this in the near future.
367. During June 2016, the intervention area was visited to identify key stakeholders and gather initial information about their perspectives and needs. This information served to prepare the inception workshop.

368. On 15 July 2016, an inception workshop was held in Unión del Toachi (Annex 4). Participatory rural appraisal techniques were used to gather local perceptions, views and opinions.

- a) Thirty-nine people participated (14 were female, 35.8%), including the main farmer's organizations, all the parish governments, the two main municipalities (Sigchos and Mejia), local NGOs, and key government entities (e.g., MAGAP, SENAGUA, INAMHI, MAE). Transportation was provided to facilitate attendance of remote participants. Some areas are quite retired, with limited access to public transportation. Participants from Sigchos (the most distant site) had to travel for about three hours to attend the meeting. The memoir of the workshops (including list of participants) is in Annex 4 and 10.

The workshop had the following main elements:

- The existing knowledge about future weather conditions in the area, and the probable impacts of climate change were presented. The results of MAE's analyses were handed in printed maps. Participants were motivated to clarify doubts and present their views and experience.
- The initial ideas of a project concept (i.e., draft results framework and budget allocation) were presented. Participants were motivated to comment and provide initial recommendations.
- Two groups were formed, corresponding to the major sub-basins (Pilatón and Toachi). Each group prepared a participatory situation analysis, identifying the key issues, probable causes and groups involved. In plenary, priority issues were selected for each subbasin.
- The Toachi group presented among its main results a severe deforestation problem, agricultural expansion in forest areas, low yielding in farming production, weak protection of forests. Farmers have expressed that they would be incentivized to preserve the forest if they receive support for increasing their yields and they have agreed that it is important to improve the access to climate information.
- The Pilaton group highlighted the importance of strengthening the connectivity of habitats and ecosystems, to work in risk areas prone to landslides and flooding and improve meteorological information given the current lack of stations.
- The same groups identified priority actions and probable sites and local actors. The Toachi group identified in maps the potencial areas that need to improve preservation, the already existing protected areas that need to improve its management and the first steps to be taken in order to improve agricultural practices and the potential partners, they also prioritized the need to improve climate information and to include environmental training within schools. The Pilaton group identified in a talking map the location of water springs that will need to be potentially intervened first, the need to improve maps to better identify other priority areas for the project and the actors that will intervene. In plenary, proposals

- were reviewed and adjusted. Also, farmer organizations and parish governments confirmed their interest to contribute to project design and execution. There were recommendations of other key groups that need to be approached.
- To close the workshops, participants outlined a set of agreements for adjustments of the project concept, and pending elements to be addressed in the following months (e.g., prepare maps using more recent information on land use and forest cover, analyse land tenure and conflicts in protected forests).
- b) As a result of the **aforementioned** consultation process **and based on the needs and recommendations expressed there by the local institutions and communities**, the project concept was adjusted and specific targets were set.
 - c) After the inception workshop, a stakeholder analysis was prepared (Annex 4). Semi-structured interviews were applied to groups in all locations of the watershed.
 - d) Mining companies, with concessions in the area of Palo Quemado and Las Pampas, are a stakeholder that had been overseen. Mining operations are initiating; therefore, this actor can have strong influence in the social and economic dynamics of the lower basin. The role of mining companies and their integration into the project will be assessed during project preparation.
369. **To continue working on** project preparation **and with the consultation process**: on tuesday July 11 and Wednesday, July 12 of 2017, a meeting was held with representatives of the municipal governments of Sigchos and Mejía, and the parish governments of Las Pampas, Palo Quemado and Manuel Cornejo Astorga. On Friday, July 21, a meeting was held with representatives of the parish government of Aloag. During these visits, which lasted an average of one hour, ideas and concerns about the project were collected and also were informed about the progress. Attendees were also anticipated about socialization workshops scheduled for Monday, July 24 and Tuesday, July 25 remarking the importance of participation of women and vulnerable groups. Memories of the event are located in Annex 4.B.
 370. The session plan that was developed for the workshops to work closely with the stakeholders, also exclusive sole space of time of about 30 to 40 minutes was included in the agenda to work only with women and vulnerable groups. In this time period a personal survey was carried out to better understand of their impressions regarding the project.
 371. On Thursday, July 20, a visit was made to the INAMHI facilities to update their new staff members on the progress of the project. Information was also collected on the weather stations in the Toachi river area.
 372. On Thursday 20 July 2017, in conjunction with a CAF official, telephone calls were made to the principal representatives of the Municipal and Parish GADs, emphasizing the importance of the assistance of groups of women and vulnerable groups to the workshops.

373. On Friday, July 28, 2017, a visit was made to SENAGUA facilities to inform the new personnel about the progress of the project and to know the implications of a water fund in the context of the Water Law.
374. On Monday, July 24, 2017, a socialization workshop was held in the municipality of Sigchos. The event started at 10:00 a.m. and lasted 7 hours. The round trip transport was facilitated for the assistants of Palo Quemado and the Pampas. This group analyzed in detail the implications of the project for the Toachi River basin. There was an attendance of 38 of which the 42% were women. Food was provided to all attendees.
375. On July 25th, the socialization workshop was held at the meeting hall of the parish government of Manuel Cornejo Astorga (Tandapi). This workshop started at 10:00 a.m. and had a 6 hour address. This group analyzed in detail the implications of the project for the Pilatón river basin. There was an attendance of 49 people of whom 43% were women. Food was provided to all attendees.

The workshops had the following elements:

- a) A brief introduction and contextualization of the project by the authorities of the CAF, MAE and local authority.
- b) Power point presentation was made, reinforcing the conceptual basis of the adaptation project, emphasizing the effects of climate change on the region and addressing the environmental degradation problem in the Río Blanco upper basin.
- c) The presentation of the components, "outcomes" and "outputs" of the project with the respective allocation of resources is carried out. In addition, a printed document with the data of the logical framework of the project was given to everyone.
- d) Subsequently, work groups were set up to carry out a component analysis, then three groups were formed, accompanied by a moderator from the group of consultants. Big papers and markers were given to summarize and present the main points.
- e) Color maps were given to each of the groups and maps printed in A1 format were placed on the walls of the room, so that the participants could be located geographically by themselves.
- f) Each of the groups gave a presentation of the relevant topics of discussion and group analysis. Comments and suggestions have been considered for the final version of the project.
- g) At the same time, an anonymous survey on conditions of access to credit was passed to the attendees
- h) Finally, we work independently with the groups of women and vulnerable groups with whom the information of a given survey is individually filled. Survey format Annex 4.

376. The definition of activities in the territory was carried out through the execution of work meetings in the basin of the Pilato River and the communities of influence and another one in the basin of the Toachi River, the measures of July 24 and 25 respectively. 87 people participated in the meetings, 43% of them were women, the calls to the workshops promoted the participation of vulnerable groups, women and the elderly; during the execution of the workshops an activation of these characteristics is evidenced and their criteria, expectations and suggestions were reflected in the definition of activities and products. The following is a summary of the working methodology for the definition of activities by the communities participating in the project:

a) Watershed Pilatón:

1. Relevant information about the project, macro activities and estimated budgets for each activity was exposed
2. Each of the participants was asked to detail their knowledge of the environment, support maps were used.
3. Each participant was asked to share their successful experiences regarding productive and environmental issues they have developed, considering their livelihoods.
4. The facilitators shared a set of guiding questions on the subject of gender, work of vulnerable groups and associativity.
5. In the working groups it was agreed that the women would lead the work table and present the findings around the proposals for the components in the plenary.
6. During the working plenary, the women were given the floor and they commented on the proposals for the conservation of the vegetation cover in the basin.
7. It is important to mention that the working groups identified indicators and means of verification that promote the participation of women, so, the zoning and planning of farms in this project must be executed with the participation of at least 50% of women, considering their close relationship with the environment and livelihoods in the area.

Below is a brief outline of the proposals made in the Pilaton work group:



Figure 32. Community consultation evidence

b) Watershed Toachi:

1. Relevant information about the project, macro activities and estimated budgets for each activity was exposed
2. Each of the participants was asked to detail their knowledge of the environment, support maps were used.
3. The facilitators shared a set of guiding questions on the subject of gender, work of vulnerable groups and associativity.
4. Due to the participation of the Municipal GAD of Mejía and Mgtr. Jorge Campaña, specialist in linkage MAE with GADs exposed experiences at the national level for the creation of conservation areas (ACUS) biocorredores and other conservation categories that Ecuador has now undertaken.
5. In the working groups, it was agreed that the women would lead the worktable and present in the plenary the findings on proposals for the component
6. The participants proposed that, initially, the conservation bio-corridor should be declared, which should include:
 - *Study of land tenure*
 - *Environmental Management Plan*
 - *Financial Strategy for the sustainability of the proposed Biocorridor*
 - *Management model*

7. In the working group it was considered to formalize the constitution of the Conservation Areas and the Biocorridor through the support of the GADs and that in the Biocorridor priority areas are defined under existing criteria of the MAE for the 1000 ha in order to maintain the flow of the Toachi river and the reduction of sediments.
8. The need to establish fixed positions of forest control and improvement of the hydrometeorological monitoring system was highlighted.

Below is a brief outline of the proposals made in the Toachi work group:



Conservation Biocorridor 230000 ha of preserved vegetable cover

- Improvement of normative instruments
- Formal declarations of conservation GAD
- Implementation of sustainable productive activities (change of technology)
- Conservation of areas (monitoring)
- Planning and zoning of farms with the participation of women

Conservation Biocorridor that includes 1000 priority

- Formal declarations of conservation GAD
- Implementation of sustainable productive activities (change of technology)
- Accompaniment in productive activities and technology transfer

Gender, community participation, control and monitoring

- Planning and zoning of farms with the participation of women
- Promote associativity
- Work in productive activities with the women's association
- Improvement of the hydrometeorological monitoring network with INAMHI
- Installation of a fixed position of control and strengthening of the existing position

Figure 33. Community consultation evidence Toachi

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

377. The present project will allow to mainstream adaptation into local communities and implement actions to address specific threats and barriers. The AF contribution will allow to implement three key adaptation measures within a watershed perspective: (i) to conserve vegetation cover, (ii) to reduce pressure from farming activities, and (iii) to engage the local population into climate change adaptation.

Component 1. Conserve vegetation cover

Baseline

378. The two existing protected forest (Toachi – Pilaton and Sarapullo), cover a large area of the water system (ca., 230,000 ha) to safeguard the water cycle. MAE's Forestry National Directorate is responsible for managing these forest. However, these areas are not being managed and guarded. Farmers have invaded and cleared extensive areas to establish grazing areas and extensive farming systems. Some invaders have claimed possession rights to the municipal and central authorities, creating a severe land tenure issue, it will be resolved with the biocorridor process. The extent of the invaded area is unknown.
379. Some landowners have established private reserves to conserve biodiversity. There are at least three private reserves covering about 2,800 ha.
- There are limited incentives to maintain forest areas in natural condition. The Socio Bosque programme was an interesting option, but after a promising start ran into financial problems. Private landowners of forest areas also face pressure from illegal farmers.
380. It is foreseen that climate change will reduce rainfall in the Río Blanco upper water system and produce stronger and more frequent ENSO events. Deforestation and forest degradation will exacerbate climate change impacts. The reduction in water availability will affect farmers, household water use, water companies and HIDROTOAPI hydroelectric plant.

With Adaptation Fund investment

381. The project will support the protection of forest cover to mitigate, as much as possible, the impacts from climate change. The key premise is that a large forest will better withstand changes in weather conditions and will continue to capture moisture and feed river streams.
382. The project will allow to:
- Develop and implement a system of incentives to finance the conservation of the existing protected forests and to provide incentives to landowners that voluntarily commit to the conservation and protection of their native forests and vegetation. The investment fund that will be established in the project contributes to finance incentives for adaptive investments providing contributions for a better water use and invest in forest conservation (e.g., incentives to landowners, protection, reforestation), training, technical assistance, ect.
 - Strengthen the institutional and legal framework to manage and protect the Toachi – Pilaton and Sarapullo protected forest and private reserves.

Component 2. Adapt farming practices to new climate change conditions

Baseline

383. Local farmers contribute to forest degradation. Their production is based on extensive and subsistence farming and the application of inadequate practices that contribute to soil degradation and erosion. The main pressures come from livestock producers and sugarcane farmers. Livestock producers clear forests and invade river margins to establish grazing grounds. Sugarcane farmers, mainly based in Las Pampas and Palo Quemado parishes, clear forests to expand the production area and to obtain firewood for the artisanal production of panela. Each family furnace consumes about three trees per week.

With Adaptation Fund investment

384. AF support will allow to introduce sustainable farming practices to increase production per unit area, therefore reducing the need to clear forest to expand farming areas.

385. Improved farming practices will be introduced in at least 250 ha of livestock production and 250 ha of crops of sugarcane, mortiño and naranjilla, and Sustainable productions alternatives will be implanted The project will work with farmers' and women organizations in Las Pampas and Palo Quemado parishes mainly.

386. Panela production will be analysed and upgrading to the furnaces will be introduced to improve efficiency (less energy and equal or more production) and reduce the consumption of fire wood.

387. Dedicated methodology and software solution will be developed for financial institutions providing credits for agriculture activities in the area, supporting them to understand climatic risk and environmental impacts, and incorporating in their credit assessment sustainability criteria and climatic issues.

Component 3. Strengthen local capacities and share lessons

Baseline

388. The local population and stakeholders are not fully aware of the climate-related risks, and are not engaged into taking action to increase their adaptation capacities. Parish plans mention climate change, but do not incorporate concrete actions to implement adaptation measures.

389. INAMHI has eight meteorological stations in the area, but only one is functioning. Therefore, weather monitoring is very limited and the local population do not have access to sound information for decision making. In addition, INAMHI has serious financial limitations to sustain the operation of a network of meteorological stations in the area.

With Adaptation Fund investment

390. With AF support a public communication and education plan, grounded on the parish governments. It will cover about 2.035 people (553 families) of the six parishes that are part of the Río Blanco water system. In addition, the project will directly support parish governments to mainstream climate change into the local development plans. All this will allow to engage local stakeholders into climate change adaptation action, and will be a valuable catalyst to increase local resiliency and build social capital. Training will be provided also to farmers to implement adaptive investment and to financial institutions to understand climatic and environmental risks and opportunities.
391. The project will also allow to update and expand INAMHI's hydro-meteorological network in the area. Sediment samplers will be installed to monitor sediment load. Partnerships will be developed to sustain the operation of the hydro-meteorological network and to feed the information to local stakeholders. An option is to include these costs into the water fund that is being considered.

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project / programme.

392. The project will have positive environmental impacts. There will be actions to contribute to maintain vegetation cover and to reduce pressures from deforestation and expansion of the agriculture frontier.
393. The sustainability of actions has been planned based on three criteria: i) concordance with the regulatory framework; ii) availability of resources and economic criteria; 3) communities empowerment.

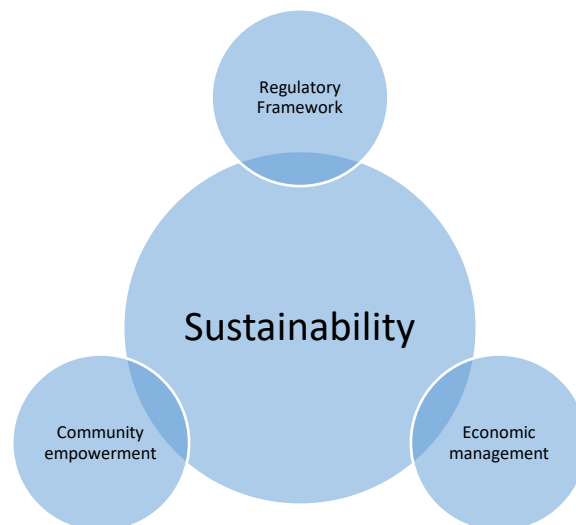


Figure 34. Initial sustainability concept in the project

394. Based on the aforementioned, a sustainability strategy is proposed for each component as described below:

Component	# of Beneficiaries (families)	Activity	Regulatory Framework	Economic management	Community Empowerment +
C1. Conserve vegetation cover	178	Improve management of protected forest.	Environmental Organic Code ⁴⁶ art, 42. Establishment of a financial strategy for the management of conservation areas (Biocorredor)	Development of a financial sustainability model: Art. 42 COA Operation of the investment fund.	A functional biocorridor management model with the participation of communities.
		Increase conservation area	Socio Bosque mechanism	Payment for Environmental Services	ACUS – Biocorridor Management Plants
C2. Adapt farming practices to new climate change conditions, enabled by sustainable climate smart financing	375 (250 for crops and 125 for livestock)	Sustainable farming practices and livestock adjusted to local realities are being introduced and implemented with assistance of financing mechanisms for adaptation measures	COOTAD Law, Good Living National Plan Sustainable Development ObjectivesObjtives principe 4	Productivity increase and marketing skills improvement. Advice on access to markets and commercialization.	CommunitiesCommunities organization
		At least 1 long term financing mechanisms has been piloted or introduced	National Water Law for Investment Fund	Operative financial mechanism mecanismo	Effective credit access and incentives
C3. Strengthen local capacities and share lessons	553 directluy 14000 indirectly local communities	At least 6 parishes being built capacities and prepared to manage and use meteorological information.	National Climate Change Strategy and COOTAD	Avoided costs of inaction in adaptation	Effective participatory planning
	49367 indiredly in river basin	Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.	National Climate Change Strategy	Avoided costs of inaction in adaptation	Effective participatory planning
	553 directluy 14000 indirectly local communities 49367 indiredly in river basin	Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms. Plus training on adaptation finance to financial institutions	National Climate Change Strategy	Improvement of productive and knowledge practices	Knowledge management
		Systematisation of information gathered during the whole project design and implementation using existing informatics platforms	National Climate Change Strategy	Replica to other initiatives	Knowledge management

Table 35: Sustainability strategy matrix

⁴⁶ Environmental Organic Law. Available in:
<http://www.asambleanacional.gob.ec/sites/default/files/private/asambleanacional/filesasambleanacionalnameuid-29/Leyes%202013-2017/102-ambiente/ro-cod-ambiente-ro-s-983-12-04-2017.pdf>

395. In the year 2017, Ecuador issues the Organic Environmental Code that defines the guidelines for the operation of the conservation areas in Ecuador, so, in its article 42 about The management tools defined for the protected areas are: 1. - The Strategic Plan of the National System of Protected Areas; 2.- Management Plans; 3.- Operational Management Plans; 4.- Management Effectiveness Evaluations; 5.- The Strategies of Financial Sustainability; and, 6.- The others determined by the National Environmental Authority.
396. To promote an active participation in the conservation processes and at the same time in the evaluation of the state of conservation as an element of control over the actions taken in the project, the elements of Financial Sustainability Strategy and Management Effectiveness, which have been included in the present project, are important.
397. Similarly, the conservation areas (1000 ha) are based on the concept and mechanism of Socio Bosque, however it will be managed and developed by the project with the support of the project implementation agencies, although it has the concept of Socio bosque, it does not include transfer of direct economic resources to the state program Socio Bosque. During the execution of the project, a post-closure strategy will be developed that will propose as an alternative that the conservation areas under the project be included in the Socio Bosque state program so that the initiated process remains 20 years in the future, such as the original mechanism.
398. Social sustainability will be based on the participatory approach and the integration of key stakeholders, where women's participation plays a major role.

Engaging both men and women to participate in decision making processes could result in a greater likelihood of sustained change (UN-REDD, 2013); however, additional training targeted to women may be needed to ensure their full contribution mainly the planning farms. The project will promote multi-level dialogue, networking and collaboration to build social capital in support of watershed conservation. **The capacity building process established in component 3 will strengthen the capacities of local communities in terms of conservation improve agricultural and productive practices and empower communities by promoting association and support a better access to markets. The project will support and accompany the process of promoting association through a better organization and through institutionalizing more frequents spaces of dialogue and interchange between them until they can consolidate this engagement and interchange spaces that will make them stronger. The fact of empowering communities, enhancing their knowledge, improving their yields through more sustainable practices and promoting association gives a leverage to ensure sustainability of these practices in the long term.**

399. Social and economic sustainability will be complemented by strengthening capacities and providing advice to the project beneficiaries in access to markets and commercialization. This is a necessary complement because after receiving training

to improve their farming, production and conservation practices, their products need to successfully reach consumers in order to increase their economic incomes contributing thus to improve their life quality.

400. The project is anchored in pertinent local and national authorities responsible for local development and climate change adaptation. Parish governments are the centrepiece of the project, but it will also involve municipal and provincial governments, pertinent sectoral authorities (e.g., MAGAP, SENAGUA) and community organizations (e.g., Flor de Caña). It is foreseen that through this networking the core elements of the project will continue in the institutional agendas. To ensure this continuity the project will seek to sign agreements of cooperation or letters of commitment between the local governments and the Ministry of Environment (during the initial consultations local governments provided a letter where they recognized the project idea and their will to support), which will provide detail of the activities that they will commit to do in the present and in the future to ensure sustainability.
401. An investment fund is considered as a financial and technical mechanism to sustain critical elements like forest conservation, technical support to local farmers and weather monitoring. It is expected that water users (especially GADs) will be motivated to contribute to the investment fund to maintain long-term key actions. The viability of this instrument will be assessed during project preparation. The project will motivate and promote the engagement of other actors like the hydroelectric to contribute to this purpose once the project is running. However, as the hydroelectric has faced some delays on the construction process, it has not started yet its activities. At the moment it is a government institution which is in charge of it and start working, the project team will work to promote their contribution for this purpose. The project will contribute to ensure that the minimum requirements to have the fund working are always in place, envisioning its permanence and it will develop long term plan for this purpose. This activity is an important step to improve the ecosystem of promoting sustainability and formal credit mechanisms for this area and at the same time an opportunity to gradually incorporate the private sector in these efforts.
402. Finally, it is foreseen that parish governments and other project partners will integrate actions into their institutional budgets to ensure post-project sustainability.

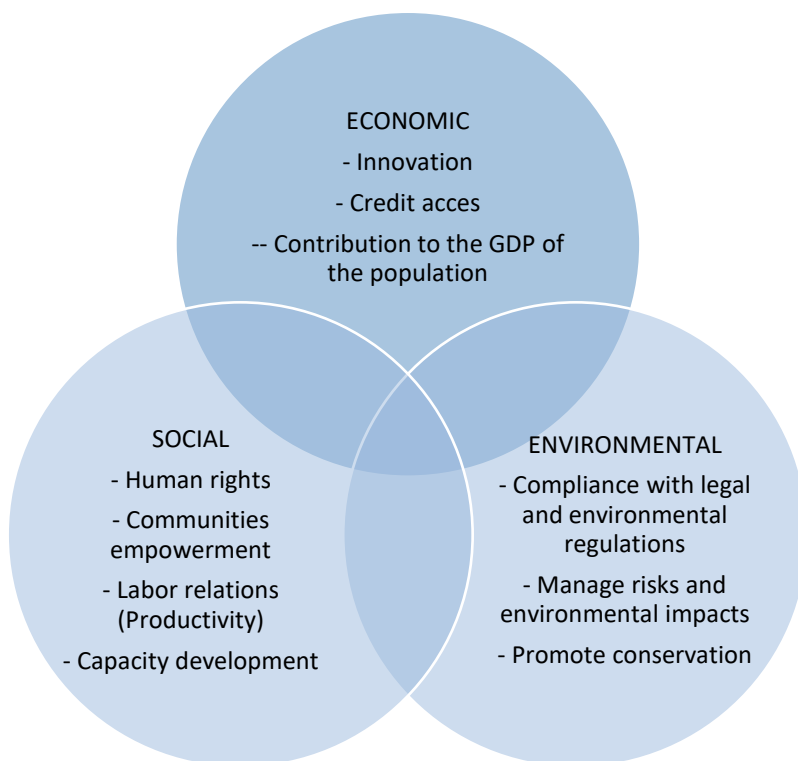


Figure 35. Final sustainably concept in the project

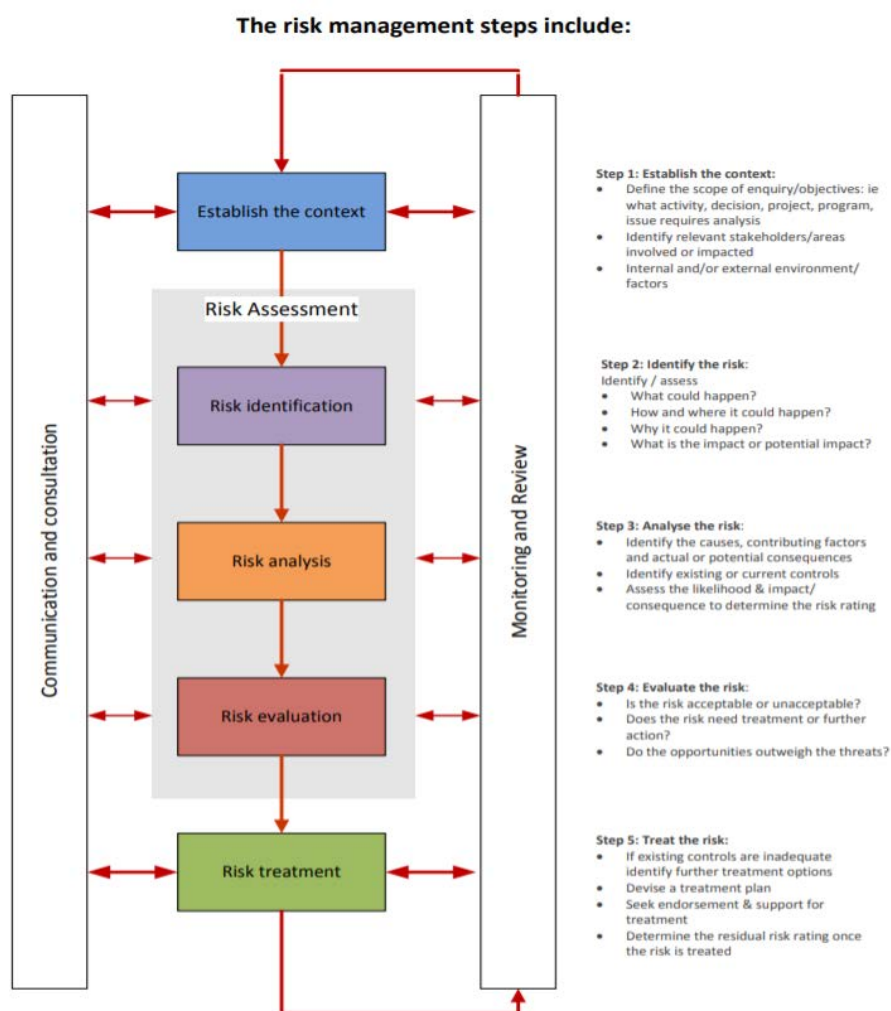
K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

403. The Adaptation Fund's Environmental and Social Policy (ESP) (AF, 2013) aims to avoid unnecessary environmental and social harms because of AF-funded projects and programmes. The ESP requires that the projects are screened for risks against the AF's 15 principles of environmental and social safeguarding, and categorised accordingly to the level of potential negative impacts. Projects that present environmental and social risks must undergo a risk/impact assessment, and prepare an Environmental and Social Management Plan (ESMP). The ESMP establish the measures to be taken to mitigate or avoid adverse environmental and social risks and impacts.
404. The present final project was screened and assessed as required by the ESP. The results of the screening process are presented in Annex 7.
405. The principle on gender equity and women's empowerment has to be considered transversal in all project outputs. During project preparation, it will be necessary to assess that actions on forest conservation and improved farming practices, do not overload the workload of women and other family members. It has been seen that local men are opting for paid jobs in Santo Domingo (capital of the de Santo

Domingo de los Tsáchilas province). Therefore, tending for the farm and animals is being delegated to other family member. In addition, it will be necessary to ensure that the adaptation actions to be mainstreamed into the local development plans and the communication and education actions are gender and age sensitive and do consider the needs of persons with disabilities, **set of elements integrated in the environmental and social impacts and risks ESMP Annex 7.**

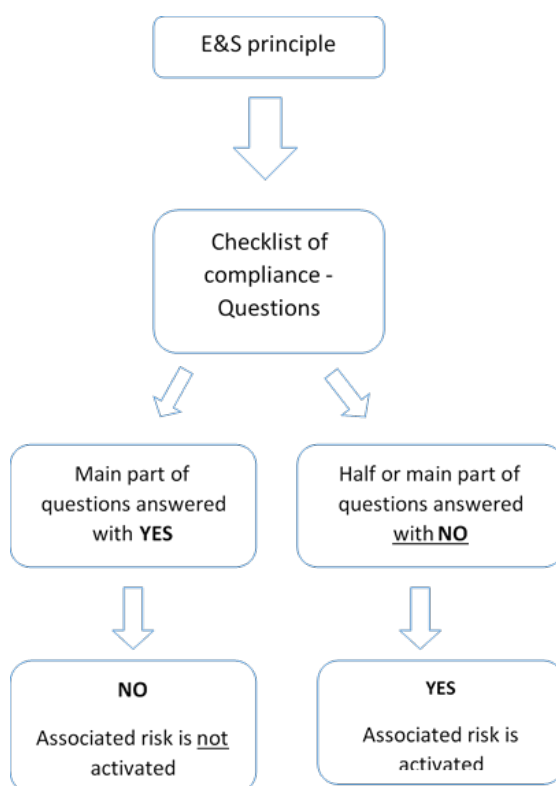
About the Annex 7, was developed based on the Manual of Basic Environmental and Social where environmental and social risks are identified, impacts are assessed and prevention and mitigation used as required, are identified and are required and based on the 15 principles of the adaptation.

The Annex (inform), consolidate the information demonstrating compliance with the ESP in a single document. The document is divided in five sections, related with: 1. Summary description of the project, 2. risk identification and categorization, 3. Environmental and social management plan. 4. Monitoring and evaluation arrangements and 5. Grievance mechanism, following the scheme:



ESP Risks Identification

The following checklist shows the compliance with the economical and social principles in force in this project. Each principle compliance is evaluated by answering with YES or NO the questions identified for each principals. The questions answered with NO indicate a potential risk for the compliance of project principals, which translates into associated risks of the project. Therefore, principals whose questions have been answered with YES, don't present associated risks, on the other hand, principals whose questions haven been answered mainly with NO, activate the associated risk indicated in the checklist.



406. In addition, screening was done using CAF's preliminary environmental and social risk analysis matrix (instrument FR-086 as presented, which is part of CAF's environmental and social management system). As stated in ESP's article 8 "implementing entities that use a different but functionally equivalent system of categorization can continue to use that system and still meet the requirements of the policy".
407. The project execution may generate few and minor potential environmental and social impacts and risks that should be reversible and easy to avoid or mitigate.

Therefore, the project is categorized as Category B, according to the categories established in the ESP.

408. A brief overview of the project compliance with the expected outcomes of the 15 environmental and social principles is presented in the following paragraphs.

Principle 1: Compliance with the Law.

409. The Bio-corridor and investment fund in the project that will require a specific coordination with the national laws about Protected Areas and Watershed Committees. The responsible for public declaratory (GAD still to be defined) will require a participative process according with the Environmental Ministry, on the other hand the water investment fund will be adapted to the national regulations in coordination with SENAGUA

Principle 2. Access and Equity.

410. An initial stakeholder analysis was prepared (Annex 5). Key stakeholders were identified, as well as existing or potential conflicts that might affect project execution. The analyses found no evidence of opposition to the project proposal, or conflicts that could affect project execution.
411. In general, the project actions will promote access to basic services and land rights. However, it is noted that measures need to be taken to ensure that local groups are adequately informed of the project intervention, mainly the actions to conserve the forest cover and the mainstreaming of adaptation measures into the local development plans.
412. During workshops that took place on Monday 23 and Tuesday 24 at Sigchos and Tandapi respectively, all the information about logical framework, outcomes and outputs were presented to all attendants. Also there were groups work to analyse deeper the way of it implementation must be done, their participation and all the suggestion about improvements. At this information was gathered by consultants and recorder in the Annex 4.
- A space for intervention of women and vulnerable groups was provided, based on a survey with specific question, which helped to identify the opinion and doubts of these groups about the project.

Principle 3. Marginalized and Vulnerable Groups.

413. No vulnerable or marginalized populations will be negatively affected by the project scope. Rather the project aims to empower vulnerable communities. However the project needs to be very careful that all the activities work with marginalized and vulnerable groups.

Principle 4. Human Rights.

414. Ecuador has ratified the core international human rights treaties. The US Department of State Country Reports on Human Rights Practices for 2015 indicate that the principal human rights problems in Ecuador are: excessive force and isolated unlawful killings by security forces; arbitrary arrest and detention; and delays and denial of due process. Violence and discrimination against women, children, minority groups, and the lesbian, gay, bisexual, transgender, and intersex (LGBTI) community; trafficking in persons; and child labour persisted.
415. Despite the general context, in the area of work no specific issues concerning human rights were identified that could be exacerbated by the project intervention.

Principle 5. Gender Equality and Women's Empowerment.

416. Ecuador ranks high in the Global Gender Gap Index. Ecuador has almost complete equality in educational attainment and health and survival, and a high level in economic participation and opportunities, but a major gap in political empowerment (WEF, 2015). The stakeholder analysis (Annex 5) found that there is strong women leadership in local organizations and parish governments. Also, women have an important role in businesses like commerce and restaurants. The condition of women in the Río Blanco upper watershed is similar to other Ecuadorian rural areas.
417. Illiteracy rates are higher for women, particularly in rural areas, and tend to have completed less years of formal education (see Gender Analysis, Annex 9). Also, female labor force participation is lower than men's (57% against 81%), which is consistent with a high proportion of women lacking any source of personal income (35%), in comparison with men (9%). There is an earnings gender gap: female's average monthly earnings represent 78% of male's average monthly earnings. Femininity index in poor households was 117.6 in 2013, meaning there were more females than males living in poor homes in Ecuador.
418. The project will promote women's participation in project activities. However, it has to be considered that men are increasingly seeking paid jobs in Santo Domingo, the nearest large city. This, in turn, increases the workload for women to tend for the farm and the animals. In rural areas, women tend to work more average weekly hours than men, 82h and 59h, respectively, most of this difference is explained by non-remunerated activities (such as domestic chores and care-taking tasks). Therefore, the project will have to be cautious to implement actions in support of gender equality and women's empowerment, and to prevent overloading women activities (outputs 1, 2 and 4). Also, it will be needed to ensure that the adaptation actions to be mainstreamed into the local development plans (output 7) and the communication and education actions (output 9) are gender and age sensitive and do consider the needs of persons with disabilities.

Principle 6. Core Labor Rights.

419. Ecuador has ratified the eight core labor conventions. The project intervention has no implication with the four fundamental principles and rights at work.

Principle 7. Indigenous Peoples.

420. ILO convention 16947 is in force in Ecuador. There is no indigenous population in the project area.

The intervention will not affect the indigenous groups or territories. Nevertheless, Ecuador in its Constitution of 2008 recognizes both indigenous peoples' land rights and livelihoods and the rights of nature. The Constitution's third part titled Rights, Duties, and Guarantees declares collective rights as they pertain to indigenous peoples. Article 84 states that the State shall recognize and guarantee indigenous peoples rights, in conformity with the Constitution, the law, human rights and collective rights.

Principle 8. Involuntary Resettlement.

421. The project intervention does not imply displacement of local population.

Within the conservation areas, determined by the project, currently small populations can be found. These populations are the product of invasions that must be improved the land tenure in harmony with the advancing landscape approach that includes production, population and conservation under holistic vision (biocorridor), not imply fiscal displacement but promote economic resettlement under sustainable practices.

Principle 9. Protection of Natural Habitats.

422. The project will strengthen the Illinizas protected area and will improve other conservation areas. Additionally, it will be important to ensure that the role of natural habitats is integrated into the adaptation measures to be mainstreamed into the local development plans (output 7).

The project seeks to reduce the main sources of deforestation and degradation, rescuing natural spaces and habitats that previously existed and that are now necessary for the recovery of flora and fauna biodiversity in the sector. It also seeks to protect forests that provide multiple benefits to communities and production sectors.

It is recognized that sustainable management, protection, conservation, maintenance and rehabilitation of natural habitats and their biodiversity and associated ecosystem functions are fundamental to UNDP efforts to support

⁴⁷ i.e., Convention concerning Indigenous and Tribal Peoples in Independent Countries.

developing countries and implement sustainable development pathways. The area of action of this project is in the Toachi Pilatón and Sarapullo protective forests, as well as part of the Ilinizas Ecological Reserve, whose national declaration allows activities to be carried out for the protection and preservation of them, thus ensuring that the project will have a positive influence in the ecosystem of the place.

Principle 10. Conservation of Biological Diversity.

423. Ecuador has signed and ratified the Convention on Biological Diversity and have a recently updated National Biodiversity Strategy. The project will not intervene areas with high value biodiversity or introduce invasive species. On the contrary, project actions will contribute to conserve forests and vegetation cover.

The Project will contribute to overcoming the barriers that limit the adaptation capacity of the lower Río Blanco basin by strengthening local communities through:

- a. Conservation of the forest area to maintain the hydrological cycle, prevent rainfall reduction and avoid erosion on the slopes of the mountains;
- b. Introduction of sustainable practices to increase production per hectare, concentrate production in smaller spaces and thus reduce the expansion of the agricultural frontier, soil erosion and deforestation;
- c. Mainstreaming of adaptation to climate change in territorial development plans and involvement of the population by increasing their knowledge of the impacts of climate change.

Principle 11. Climate Change.

424. The project does not include activities that involve a significant increase in emissions of greenhouse gases or other climate change stressors. On the contrary the implementation of sustainable agriculture practices will reduce greenhouse gas emission, contributing to climate change mitigation. Moreover, reducing community vulnerability thanks to EbA practices, the project will also contribute to support climate change adaptation for the community.

Additionally, the projects seeks to strengthen local capacities in climate change by enforcing local capacities in the use of meteorological information provided by hydro-meteorological stations. The understanding of hidrometeorological information is essential for the development of local risk reduction strategies as for example the formulation and implementation of contingency and emergency plans and early warning systems.

Principle 12. Pollution Prevention and Resource Efficiency.

425. The project does not include activities that will use large quantities of energy, water or other natural resources. Nor they will generate large quantities of residues,

emissions and discharges. Nonetheless, as indicated before, CAF will require that building contractors implement a PAAS to prevent negative impacts during construction works (mitigation measures 1 and 17). The project will contribute to improve the efficient use of energy and natural resources.

The project seeks to improve the mechanism (oven and mills) for panela production in order to reduce the emission of greenhouse gases and other noxious gases for human health and vegetation. Nowadays, as a result of the lack of maintenance of the mills motors, which leads to failures in the combustion system, smoke is produced in the production of panela. Also, in the evaporation process realized in the oven, bagasse is used which contributes to higher levels of pollutions and low resource efficiency. Because of the low efficiency of bagasse, people (producers) are forced to include other combustible materials, such as wood, tires and coal in the production process, which have an additional negative impact on the climate, environment and human health.

Principle 13. Public Health.

426. The project does not imply negative impacts on public health. Moreover supporting the use of efficient cooking systems for panela, as well as the promotion of family gardens, the project will contribute to reduce negative health impacts.

Principle 14. Physical and Cultural Heritage.

427. Ecuador is a party of the World Heritage Convention. The project will not affect or intervene physical and cultural heritage.

Principle 15. Lands and Soil Conservation.

428. The project action will contribute to soil conservation.

429. During project preparation, a detailed stakeholder and gender analysis will be prepared and details on the role of women in the farms and local organizations will be obtained. This will serve to adjust project actions to be gender, age and cultural sensitive.

430. Also, during project preparation, the project's Environmental and Social Management Plan will be prepared.

431. The hydroelectric power plant is not part of the present project, but it is worth mentioning that it has an Environmental Impact Assessment, an Environmental License, and an Environment and Social Management Plan. Its construction did not involve displacement of indigenous or vulnerable groups. The plant is under construction; it is expected to begin operation during 2019.

The Toachi Pilatón Hydroelectric Power Plant is within the Adaptation Project Area, although there are two different work fronts, the analysis of the associated risks of

the Hydroelectric Power Plant during the construction and operation phase has been carried out with the risks identified in the Project area before its implementation.

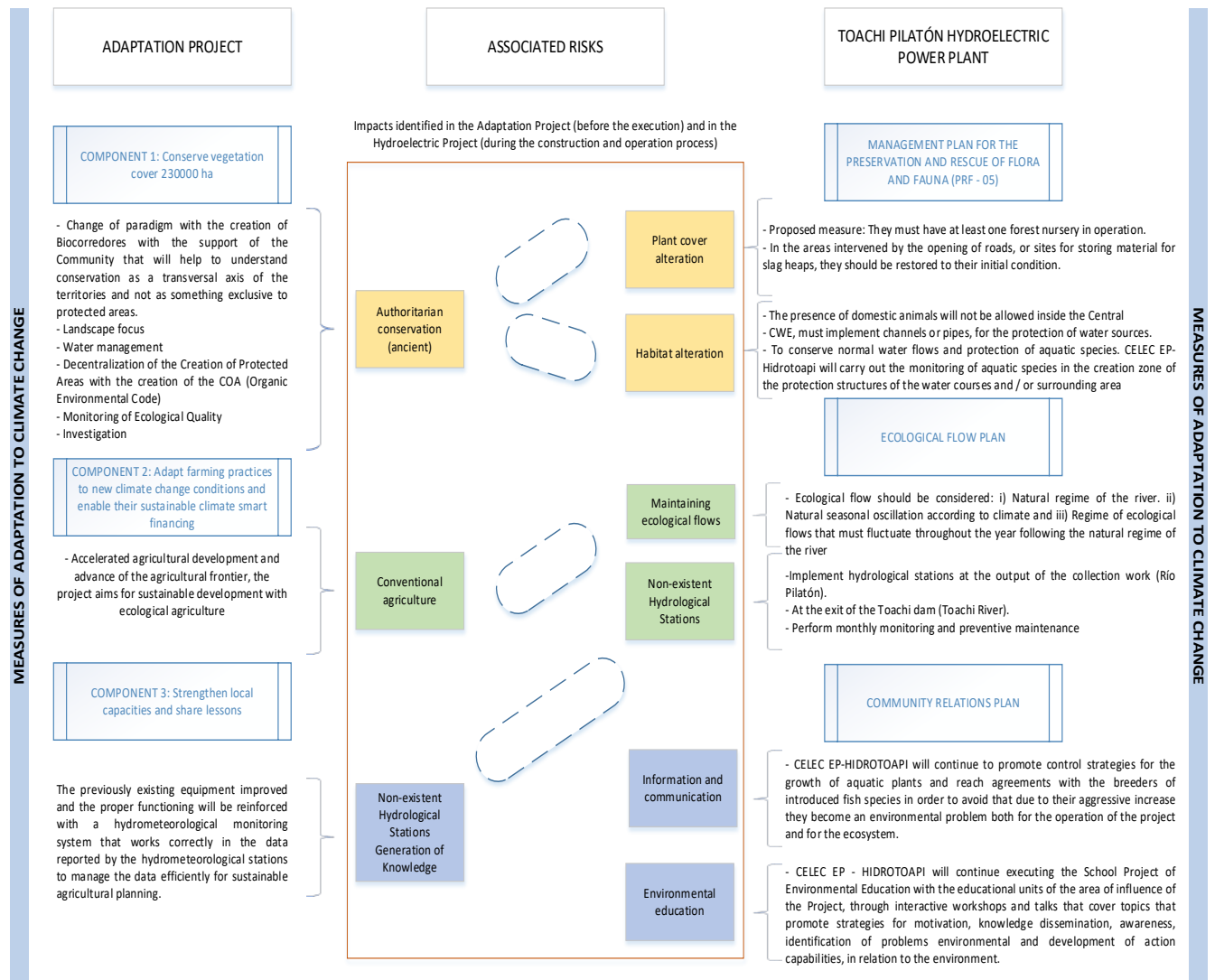


Table 36: Associated risks of the Adaptation Project and the Hydroelectric Power Plant

Risk Description	Impact (1-5)	Probability (1-5)	Significance (Low, Moderate, High)
Principle 3: Marginalized and Vulnerable Groups			
The project may impose any disproportionate adverse impacts on marginalized and vulnerable groups (including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS).	3	3	
Principle 5: Gender Equity and Women's Empowerment			
Risk that either women or men has disproportionate opportunities to participate.	3	3	
Risk that that both women and men receive incomparable social and economic benefits	2	4	
Risk that either women or men suffers disproportionate adverse effects during the development process	3	2	
Principle 8: Involuntary Resettlement			
Risk of not producing well-informed rights, consultation, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.	1	4	
Principle 9: Protection of Natural Habitats			
Risk of involving unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.	2	2	
Principle 10: Conservation of Biological Diversity.			
Risk of not avoiding any significant or unjustified reduction or loss of biological diversity or the introduction of unknown invasive species	3	3	
Principle 14: Physical and Cultural Heritage			
The project might not avoid or promote the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects or programmes should also not permanently interfere with existing access and use of such physical and cultural resources.	1	3	

Table 36.B Associated risks of the Adaptation Project

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

432. CAF will be the implementing agency and MAE will be the responsible entity. The project will be implemented following CAF's administrative and financial regulations as agreed with the Adaptation Fund.

Implementation Modality

433. The project will be implemented over a four-year period, under the National Implementation with CAF as the FA Implementing Agency (IA) and the Ministry of Environment (MAE) as Implementing Partner. In this role MAE will undertake full programmatic and administrative-financial control and responsibility for supervising the project, and will be responsible for approving deliverables prior to their reporting to FA by CAF. Capacity building priorities will be addressed at all times.

Implementing Agency

434. As FA implementing agency, CAF is ultimately accountable and responsible for the delivery of results, subject also to their certification by MAE, as Implementing Partner. CAF shall provide project cycle management services as defined by the AF Council, that will include the following:

- Providing financial and audit services to the project
- Overseeing financial expenditures against project budgets,
- That activities including procurement and financial services are carried out in strict compliance with FA procedures,
- Ensuring that the reporting to FA is undertaken in line with the requirements and procedures,
- Facilitate project learning, exchange and outreach within the FA - CAF family,
- Contract the project mid-term and final evaluations and trigger additional reviews and/or evaluations as necessary and in consultation with the project counterparts.

435. At the request of the Government of Ecuador, CAF shall also provide Direct Project Services (DPS) specific to project inputs according to its policies and convenience. These services, and the costs. In accordance with FA requirements, the costs of these services will be part of the executing entity's Project Management Cost allocation identified in the project budget. CAF and the Government of Ecuador acknowledge and agree that these services are not mandatory and will only be provided in full accordance with CAF policies on recovery of direct costs.

436. CAF will provide Project Assurance, supporting the Project Board Executive by carrying out objective and independent project oversight and monitoring functions.

437. The project partners are the parish governments of Manuel Cornejo Astorga (Tandapi), Aloag, El Chaupi, Palo Quemado, and Las Pampas, the municipal

government of Sigchos, MAGAP, INAMHI, SENAGUA and CELEC. Complementary collaboration agreements will be signed with the provincial governments of Cotopaxi and Pichincha, HIDROTOAPI and relevant local organizations through following mechanisms:

438. The Project Board is the project coordination and decision making body. It will meet quarterly to review project progress, approve project work plans and approve project deliverables. The responsibility of the Board is to see that project activities lead to the required outcomes as defined in the project document. The Board will oversee project implementation, approve work plans and budgets as supplied by the National Coordinator, approve any major changes in project plans, approve major project deliverables, arbitrate any conflicts which might arise, be responsible for the overall evaluation of the project. The Board may be convened extraordinarily by the Chair, on the request of individual members.
439. The Project Board will play a critical role in facilitating inter-ministerial coordination, project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It will ensure that required resources are committed and will arbitrate on any conflicts within the project or negotiate a solution to any problems with external bodies. In addition, it will approve the appointment and responsibilities of the National Coordinator and any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the Project Board will also consider and approve the quarterly plans and will also approve any essential deviations from the original plans.
440. The Board will consist of the following members:
 - The Executive, who will chair the Board. This role will be filled by MAE or his/her representative.
 - A representative of the Senior Supplier, who will provide guidance regarding the technical feasibility of the project. This role will be filled by CAF.
 - Senior Beneficiaries SENAGUA, institution will represent the interests of those who will ultimately benefit from the project and ensure the realization of project results from the perspective of project beneficiaries.
441. The Technical Support will advise on ensuring coordination between the project and other related initiatives such as the GAD, Communities representatives, National Adaption Direction (MAE), CELEC and MAG.
442. The structure proposed will be reviewed and potentially adjusted in the project's early stage and Operations Manual, detailing roles and responsibilities for the functionality of the Project Boar and Technical Committee, will be developed.

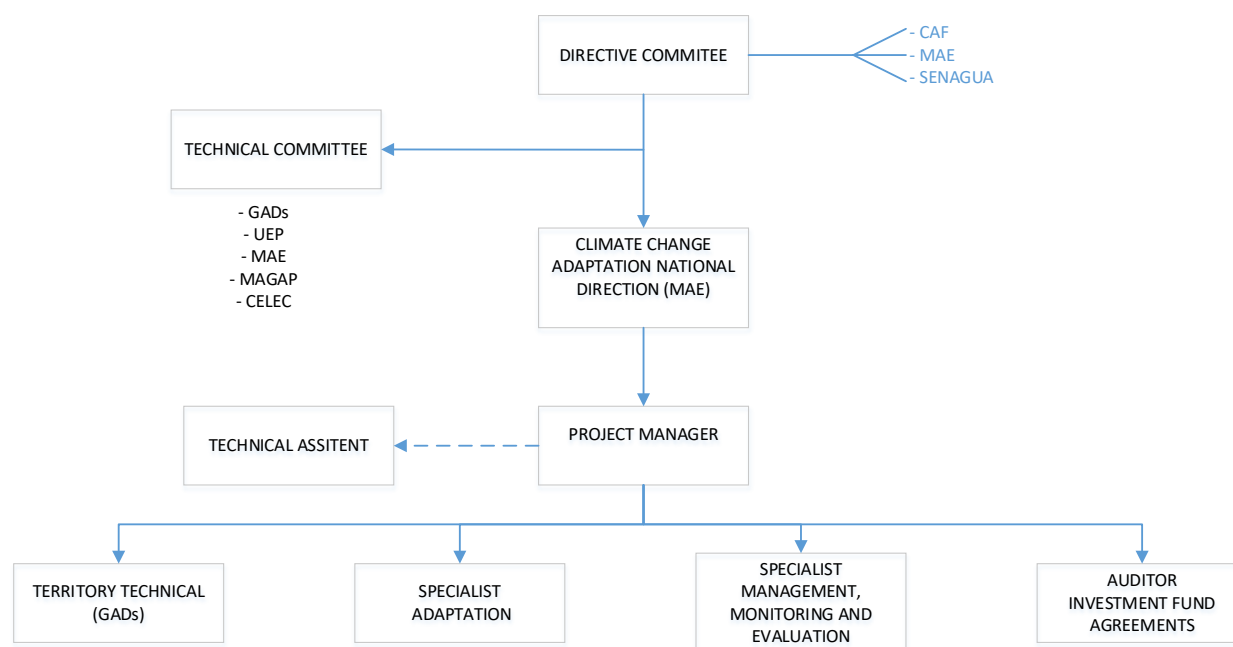


Figure 36: Organizatiuonal structure of the project

B. Describe the measures for financial and project / programme risk management.

443. The following risk have been identified for a successful project implementation. In the early stages of the project, the analysis will be updated and constantly monitored:

Project risks					
Description	Type ⁴⁸	Impact & Probability level ⁴⁹	Mitigation Measures	Respon sible	Status ⁵⁰
Change of central government in Ecuador. The new president took office in 2018 ⁵¹ , delays were caused in the development of the final project proposal.	Political	P = 5 I = 3	Present the project to new authorities in MAE	CAF	Reducing

⁴⁸ Environmental, Financial, Operational, Organizational, Political, Regulatory, Strategic, Other

⁴⁹ 1 = low / 5 = high.

⁵⁰ Over, reducing, increasing, no change.

⁵¹ During the first year of project implementation.

Project risks					
Description	Type ⁴⁸	Impact & Probability level ⁴⁹	Mitigation Measures	Responsible	Status ⁵⁰
Change of municipal government in Ecuador. The new authorities will take office in 2019 ⁵² .	Political	P = 5 I = 3	Present the project to new authorities	MAE and CAF	No change
Change of in regulatory or legal stipulations might require the adjustments of critical project components for their compliance.	Financial	P = 5 I = 3	Present the project to new authorities; to promote formal agreements	MAE and CAF	No change
Grant not being delivered and/or not being delivered on time mainly with local inclement weather problems	Financial	P = 2 I = 3	CAF's cash flow would allow to respond to disbursements in case of delays. National funds	MAE and CAF	Increasing
Increase in budget due to costs miscalculations, and/or due to overprices during project implementation.	Financial	P = 2 I = 3	Agreement signed with local counterparts to guarantee the project execution.	MAE and CAF	No change
Effect of La Niña in precipitation and local weather conditions ⁵³ .	Environmental	P = 3 I = 3	Monitor information and alerts in national meteorological entities, NOAA, and World Meteorological Organization	CAF	Increasing
The project intends to include a variety of stakeholders that need to be coordinated and engaged. There is a risk that changes in governments or management members, as well as conflicting interests put the project execution at risk.	Organizational	P = 3 I = 3	Engage stakeholder and key actors early on; provide information on project activities and clarify concrete benefits for each stakeholder;	MAE, CAF and Project Unit	Increasing

⁵² In the mid-term of Project execution.

⁵³ In Ecuador, La Niña produces dryer conditions. Currently, La Niña is favoured to develop during August - October 2016, with about a 55-60% chance of La Niña during the fall and winter 2016-2017 (NPC, 2016).

Project risks					
Description	Type ⁴⁸	Impact & Probability level ⁴⁹	Mitigation Measures	Responsible	Status ⁵⁰
Baseline studies are not up to date (climate change information dynamics)	Operational	P = 2 I = 3	Adjustment of existing designs, incorporating the climate change factor; to promote synergies with other climate change initiatives	MAE	Increasing
Lack of understanding of the project, and hence opposition from the local inhabitants.	Social	P = 3 I = 3	Effective communication strategy (C3) contemplates socialization of the project with the local communities.	MAE, Project Unit	No change

Table 37: Details project risks

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

444. The project presents a categorization B, which corresponds to a moderate risk, which can be identified in the risk assessment included in Annex 7, in the same annex the safeguard measures can be observed. All the activities are to guarantee the participation of women during the activities of capacity building, with the aim of reaching a participation of at least 50% of women during all activities. On the other hand, all activities proposed within the framework of the project take into consideration the protection of human rights and environmental sustainability. The implementation of energy efficient furnaces for panela production reduces: the CO2 pollution caused by the deforestation of the wood, the loss of natural habitat and the pressure on the remaining primary forests.
445. Annex 7 contains the mechanisms for monitoring, control, and complaints mechanism. The following table presents the measures for identified risks:

Identified risks/impacts	Environmental and Social principles	Planned mitigation measure	Responsible
The project may impose any disproportionate adverse impacts on marginalized and vulnerable groups (including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS).	<i>Principle 3: Marginalized and Vulnerable Groups</i>	<ol style="list-style-type: none"> 1. Encourage the creation of community-based committees. 2. Update the identification and quantification report of marginalized and vulnerable groups and a description of their risk of disproportionate adverse impacts with the help of community-based committees. The steps of the process: <ol style="list-style-type: none"> a. In the project area, identify the presence of marginalized or vulnerable groups. b. Quantify all groups identified using accepted methods on a base, when possible, in the disaggregated data. c. Describe the characteristics of marginalized or vulnerable groups, the identification of particular vulnerabilities that could make or excessively vulnerable to environmental impacts or negative negatives caused by the project. 3. Update the vulnerability report of the population that is in the project area 	<p>This update of the reports must be done by the 3 Project technicians: Territory Technical (Gads), Specialist Adaptation, Specialist Management, Monitoring And Evaluation</p> <p>The review will be carried out by Technical Assistant. The approval will be made: Project Manager</p>
<p>Either women or men have disproportionate opportunities to participate.</p> <p>Both women and men receive incomparable social and economic benefits</p> <p>Either women or men suffers disproportionate adverse effects during the development process</p>	<i>Principle 5: Gender Equity and Women's Empowerment</i>	<ol style="list-style-type: none"> 1. Update the report on the Identification of creation risks or the maintenance of gender inequalities and a description of the risk of disproportionate adverse impacts based on gender. The steps of the process: <ol style="list-style-type: none"> a. Identify activities or other elements in the project that are known to exclude or hinder a gender group based on legal, regulatory or customary characteristics. b. Conduct or consult a gender analysis of the project sector, which describes the actual situation of the assignment of functions and responsibilities in the project area. c. Identify the project elements that persist or exacerbate gender inequality or the consequences of gender inequality. 2. Create a report to implement each activity where gender equality is recorded, without ruling out whether you belong to the vulnerable group. 3. Training on gender equality issues where issues such as: equality, breaking barriers, opportunities 	<p>This update of the reports must be done by the 3 Project technicians: Territory Technical (Gads), Specialist Adaptation, Specialist Management, Monitoring And Evaluation</p> <p>The review will be carried out by Technical Assistant. The approval will be made: Project Manager</p>

Identified risks/impacts	Environmental and Social principles	Planned mitigation measure	Responsible
		for all, sexist culture, stereotypes, decision-making will be addressed.	
The project is not producing well-informed rights, consultation, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.	<i>Principle 8: Involuntary Resettlement</i>	<ol style="list-style-type: none"> 1. To minimize the need for involuntary resettlement, it is proposed to update the identification and quantification of the persons or communities potentially affected and to carry out the corresponding analysis of the economic benefits that they will have by adhering to the activities proposed by the Adaptation Project. 2. Talks to those involved in the change of economic activity so that they know the benefits and opportunities of the project. 	<p>This update of the reports must be done by the 3 Project technicians: Territory Technical (Gads), Specialist Adaptation, Specialist Management, Monitoring And Evaluation The review will be carried out by Technical Assistant. The approval will be made: Project Manager</p> <p>Mitigation measure 2, responsible territory Technical.</p>
Project activities cause unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.	<i>Principle 9: Protection of Natural Habitats</i>	<p>The concepts of untouchable conservation that corresponds to literal c), in the Adaptation Project there is a paradigm shift that conserves traditional conservation where the population is involved.</p> <ol style="list-style-type: none"> 1. Study of alternative activities that can be developed in the proposal of the creation of the Biocorridor with the interaction of the communities. 2. Talks with the beneficiaries of the Biocorridor to disseminate knowledge of the destination of the activities and the benefits of adapting to climate change. 3. Meeting with the beneficiaries that are within the area of Biocorredor, determination of agreements and commitment actions of the conservation of the Biocorredor with sustainable and sustainable activities. 	<ol style="list-style-type: none"> 1. Specialist Adaptation 2. Territory Technical and Specialist Adaptation 3. Territory Technical
The project is avoiding significant or unjustified reduction or loss of biological diversity or the introduction of unknown invasive species	<i>Principle 10: Conservation of Biological Diversity.</i>	<ol style="list-style-type: none"> 1. Forest technical study of the study area to implement the reforestation activity. (It should include analysis of ecosystems, analysis of native species, identification of nurseries in the area that give plants that are native and that adapt to the microclimate) 2. Technical study of adaptation measures to be implemented by farms to strengthen organic farming. 3. Training for the beneficiaries of the steps to follow for the areas that are reforested. 4. Training of farmers on farms for the installation of good agricultural practices. 	<ol style="list-style-type: none"> 1. Specialist Adaptation 2. Specialist Adaptation 3. Territory Technical and Specialist Adaptation 4. Territory Technical and Specialist Adaptation <p>The review will be carried out by Technical Assistant. The approval will be made: Project Manager</p>

Identified risks/impacts	Environmental and Social principles	Planned mitigation measure	Responsible
The project might not avoid or promote the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects or programs should also not permanently interfere with existing access and use of such physical and cultural resources.	Principle 14: Physical and Cultural Heritage	<ol style="list-style-type: none"> 1. Training for the population of the Project area of the benefits and strengths of the proposed activities for the adaptation of climate change. 2. Create a historical knowledge of the population of agricultural practices, livestock, forestry, knowledge exchange, among other things considered necessary for a historical review. 	<ol style="list-style-type: none"> 1. Specialist Adaptation 2. Territory Technical

Table 38: environmental and social risk management

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

446. Project-level monitoring and evaluation will be undertaken in compliance with standard CAF requirements as agreed with the Adaptation Fund. It is expected to prepare annual Adaptation Fund Project Performance Reports that include the Adaptation Fund Results Tracker. Monitoring and evaluation of progress in achieving project results and objectives will be done based on the targets and indicators established in the Project Results Framework. The project Monitoring and Evaluation Plan has been budgeted at USD 100,000 (see Table 10). Monitoring and evaluation activities will be undertaken in compliance with standard CAF requirements as agreed with the Adaptation Fund. The monitoring and evaluation system will also facilitate learning and replication of project results and lessons in relation to integrated management of natural resources.
447. In addition to these mandatory CAF and AF monitoring and evaluation requirements, other M&E activities deemed necessary to support project-level adaptive management, and the exact role of project target groups and other stakeholders in project M&E activities, will be finalized during the Inception Workshop and will be detailed in the Inception Report.
448. The monitoring and evaluation roles and responsibilities specifically described in the Monitoring and Evaluation Plan (table 39) will be undertaken through: (i) day-to-day monitoring and project progress supervision missions (PM); (ii) technical monitoring of indicators to measure the introduction of good practices, and the surface covered by incentive mechanisms, and the number of people trained in good practices; (iii) specific monitoring plans for implementation of good practices (component 2); (iv) mid-term and final evaluations (independent consultants and CAF Evaluation Office); and (v) monitoring and supervision missions (MAE).
449. The day-to-day monitoring of the Project implementation will be the responsibility of the PM and team and will be driven by the preparation and implementation of an AWP. The preparation of the AWP will represent to National Committee, these tool

will have actions proposed for the coming project year and provide the necessary details on output targets to be achieved. Specific inputs to the AWP will be prepared based on participatory planning and progress review with all stakeholders and coordinated through the PM and technical committee.

450. To monitor project outputs and outcomes including contributions to global environmental benefits, specific indicators have been established in the Project Results Framework (see annex 7). The Project Results Framework indicators and means of verification will be applied to monitor both project performance and impact. Following CAF-MAE monitoring procedures and progress reporting formats, data collected will be sufficiently detailed that can track specific outputs and outcomes, and flag project risks early on.

451. The CAF Country Office in Ecuador will retain all M&E records for this project for up to seven years after project financial closure in order to support ex-post evaluations that might be undertaken. There will be an independent mid-term review and a terminal evaluation to assess progress and lessons.

452. The budgeted monitoring and evaluation plan is presented as follows:

Monitoring and Evaluation action	Primary responsibility	Indicative cost ⁵⁴ (USD)	Key indicator	Time frame
1. Inception Workshop	CAF	20,000	Local stakeholder participation all components	Within two months of project document signature
2. Inception Report	Project Manager	None	NA	Within two weeks of inception workshop
3. Monitoring progress of project indicators	Monitoring and Evaluation specialist	None	Gender analyses C1 y C2	Measured biannually
4. Quarterly and annual reports (PPR)	Project Manager Responsible Entities CAF	None	Gender analyses # number of ha under conservation for all components	PPR submitted every year (no later than two months after the end of the reporting year). First PPR must be submitted one year after the start of project implementation (date of inception workshop). The last PPR shall be submitted no later than two months after the end of the reporting year.

⁵⁴ Does not include personnel.

Monitoring and Evaluation action	Primary responsibility	Indicative cost ⁵⁴ (USD)	Key indicator	Time frame
5. Oversight missions	CAF	None ⁵⁵	Visita a organizaciones de mujeres involucradas en el C1 y C2	Annually
6. Audit	CAF	25,000	NA	Annually
7. Independent mid-term review	CAF Project team	15,000	Farming plans elaborated C1 and C2	Year 2
8. Independent terminal evaluation	CAF Project team	20,000	Farming Plans Implemented which at least 50% of women participate all components	Year 4. Three months before project closure
9. Translation of mid-term review and terminal evaluation reports into English	CAF	5,000	NA	
10. Final project report	Project team CAF	None	Initiatives systematization all components	One month before project closure
11. Project Board closure meeting	CAF	15,000	Number of communities participating	Last month of project execution
Total indicative cost		100,000		

Table 39: Budgeted monitoring and evaluation plan.

The project will be monitored through the following M& E activities. The M& E budget is provided in the table above.

⁵⁵ Charged to the project cycle management fee.

a) Inception Workshop:

A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, **stockholders advancing approach**, CAF country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan, **stockholders definition-participation includes gender, beneficiaries and vulnerable groups**.

The Inception Workshop should address a number of key issues including:

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of CAF and MAE staff vis à vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.

- Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks **with gender considerations**. Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled. Discuss financial reporting procedures and obligations, and arrangements for annual audit.

- Plan and schedule Project Board meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.

b) Annually:

Monitoring progress of project indicators: This key report is prepared by the Project Coordinator to monitor progress made since project start and in particular for the previous reporting period. The Monitoring progress of project indicators includes, but is not limited to, reporting on the following:

Quarterly and annual reports (PPR): Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative), PPR submitted every year (no later than two months after the end of the reporting year). First PPR must be submitted one year after the start of project implementation (date of inception workshop). The last PPR shall be submitted no later than two months after the end of the reporting year.

Project outputs delivered per project outcome (annual); Lesson learned/good practice; Gender analyze; Risk and adaptive management.

c) Oversight missions, periodic Monitoring through site visits:

CAF and MAE will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits.

d) Mid-term evaluation:

The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (insert date). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the MAE and CAF based on guidance from FA.

e) Final evaluation:

An independent Final Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with CAF and FA guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals.

During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

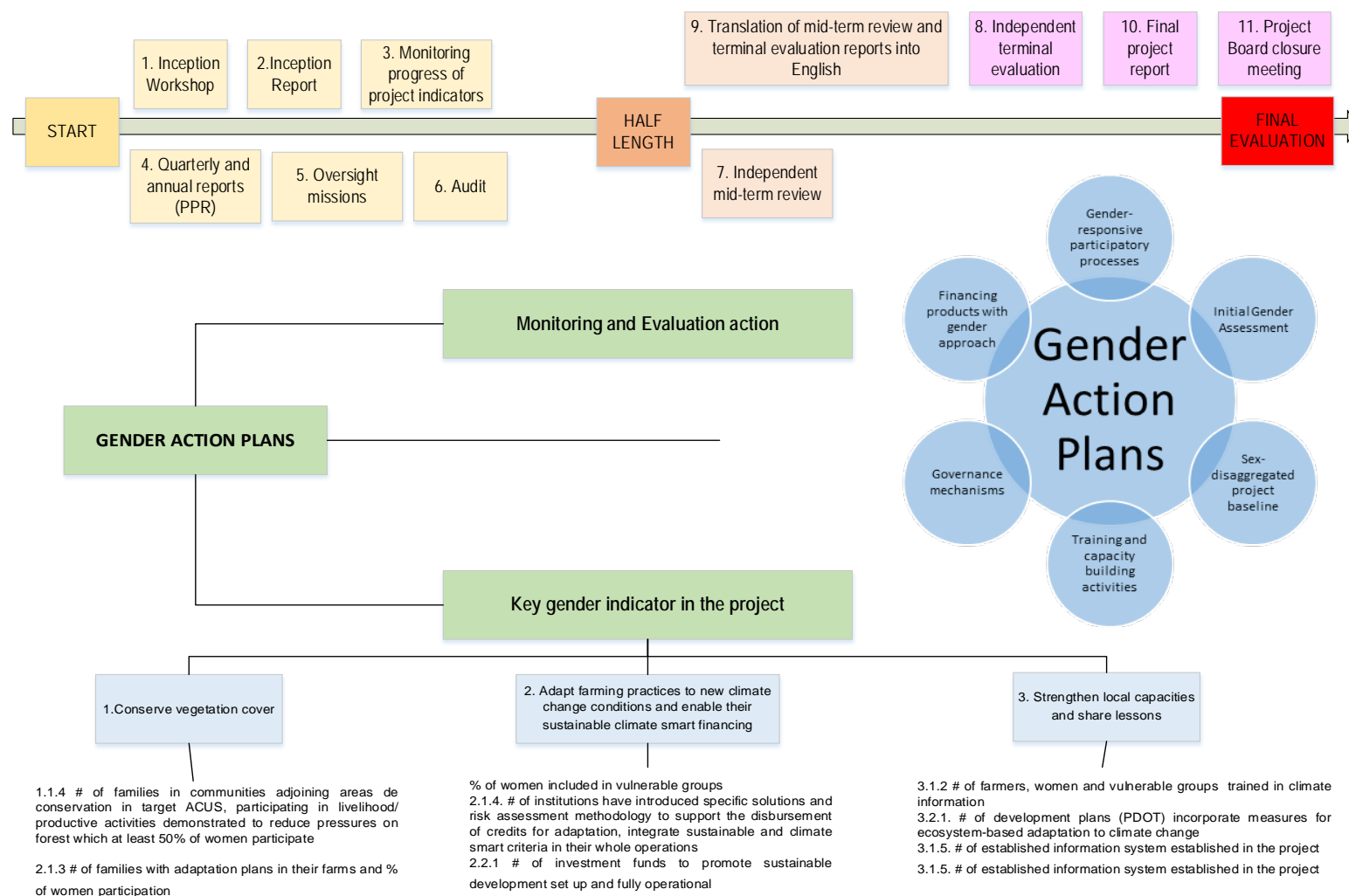


Figure 37. Monitoring and evaluation concept includes gender keys

E. Include a results framework for the project proposal, including milestones, targets and indicators.

Project Program Component	Component 1: At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management				
Expected Outcome	Indicator	Baseline	Target by project end	Sources of verification	Assumptions
C1.1. 1,000 ha of native vegetation is conserved by sustainable forest management and conservation mechanisms.	1.1.1 # of ha of forest conserved in the Bio-corridor	The forest and conservation areas of the Río Blanco upper basin have outdated management plans.	Establishment of functional conservation areas as part of the Toachi-Pilaton corridor	Ha under conservation categories with formal agreements. Satellite images of high resolution to monitor conservation areas.	The economic activity and the area of use increases. Farm plans and formal protection agreements are required.
			Bio-corridor working with at least 1,000 ha of conservation to regulate the hydrological cycle.	Administrative records of different project actors.	All the relevant actors are willing to cooperate and coordinate among them.
	1.1.2 # of Decentralized Governments (GAD) with planning, regulatory and normative instruments for ACUS	-0/6 target GADs have Territorial Land Use Plans (TLUP) that incorporate specific provisions to climate change effects	6/6 GADs in target bio-corridor with TLUP that incorporate specific provisions for Bio-corridor of conservation, ACUS and climate change adaptation harmonized with the national norm, with associated budgetary provisions.	Territorial Land Use Plans of the target provinces (PDOT)	The GADs are willing and incentivized by MAE to participate in the activity strengthening their management capacities in line with the project's objective, planned outcomes and outputs.
		-0/6 J6GADs in project landscapes have or apply regulatory or normative instruments in relation to conservation and ACUS declaration			

	1.1.3 Percentage (%) reduction of wood used for panela production:	To be determined in the first year of the project	Improve sustainable production alternatives that reduce pressure on forests	Farm's zoning and plan elaboration.	The communities in the Rio Blanco upper watershed are interested in participating.
			30% of reduction of current use of wood	Technical folder (IBA).	Financing mechanisms for efficient knils will be implemented and are productive, inputs and equipment are available.
				# of efficient knils installed according to administrative records of the project, financing institutions and service providers;	
				Governance analysis developed to identify relations among actors and avoid possible conflicts	Monitoring activities provide measurable results to verify baseline and enhancements introduced by the project.
	1.1.4 # of families in communities adjoining areas de conservation in target ACUS, participating in livelihood/productive activities demonstrated to reduce pressures on forest which at least 50% of women participate	To be determined, once target families are identified.	- At least 178 families participate in sustainable productive activities.	Field inspections in target communities	If to many target communities are joining the project, spot-sampling methodology will be applied.
		No planning is made for farms or the river basin.	- At least one technology transfer agreement signed with universities.	Questionnaires and/or focus groups to verify links of production and reductions in pressures on forest	National universities are interested and can hence be engaged in joining the project
	1.1.5. # of properly performing stations located in the river basin.	Four stations partially working.	7 hydro-meteorological stations providing climatic data in a regular bases and located accordingly to technical criteria by INAMHI	Previously existing equipment improved and working properly.	No price increases for existing spare parts or identified equipment will occur.
				Hydro-meteorological monitoring system working correctly.	
				Data reported by hydro-meteorological stations.	

C1.2. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management	2.1.1 Percentage of reduction in the use of forest wood for productive activities in the Upper and Middle Basin of the Toachi River	From the concept note 3 trees per month are being used for firewood.	30% of reduction of current use of wood for productive activities in the Upper and Middle Basin of the Toachi River through promoting technology change and improvement of the production process of the panela production	Farm's zoning and plan elaboration.	The economic activity and the area of use increases. Farm plans and formal protection agreements are required.
			Governance analysis performed	Technical folder (IBA).	Technical folder are available for all actors.
				# of farms that have experienced technology change/transfer.	All the relevant actors are willing to cooperate and coordinate among them.
	2.1.2 # of ha of priority conservation areas maintenance through the creation of the Toachi Pilaton Bio-corridor.	Toachi-Pilaton and Sarapullo protected forest already exist.	230,000ha protected in the watershed that includes ACUS, GADs areas, protected forests.	Governance analysis developed to identify relations among actors and avoid possible conflicts	
				# of acres under conservation categories through formal agreements.	Administrative records and satellite image will be available for verification.
				# of ha recovered	
				Updated management plan.	
	2.1.3 # of families with adaptation plans in their farms and % of women participation	There are 0 farm plans in the project area developed with families and communities	At least 178 family farms including adaptation to climate change measures within their operation and with at least 50% of women participation	# of farm and management plans developed, verified by administrative records of the project.	Communities are willing to engage in the project's activities.
				Inventory of farms with adaptation plans given to the management project unit.	

	2.1.4 Ratings of Management Effectiveness Tracking Tool and PGOA	Average total METT score in Illinizas PAs is 50 out of a possible 100	Reach an average total score of PAs: 70 out of a possible 100	METT evaluation carried out by the project	n/a
		PGOA developed	PGOA by 60% implemented in Illinizas	PGOA report	The project team will verify the implementation of the PGOA.
	2.1.5 # and quality of control points in wildlife and forest traffic	There is one control point in Tandapi.	-one additional control point implemented	Audit and monitoring report; project adminisitrative records	The respective authorities will comply with their initial statement of engaging with the project.
			-Tandapi control point strengthened	Training and participants' list	
				Statistics of controls made in both points	
Project / Program Components	Component 2. Adapt farming practices to new climate change conditions enable their sustainable climate smart financing				
Expected Outcomes	Indicator	Baseline	Targets by project end	Sources of verification	Assumptions
C2.1. Sustainable farming practices and livestock adjusted to local realities are being introduced and implemented with assistance of financing mechanisms	2.1.1. # of ha of pasture and # of ha of crops apply sustainable farming practices.	Application of sustainable farming practices is non existent or sporadic at best.	At least 250 ha of pasture and 250 ha of crops apply sustainable farming practices and	Inspection report of MAG officials.	Partners document gender of applicants/participants/ clients
				Adminisitrative records of project partners for sugar cane, mortiño and naranjilla, livestock describing men and women participation	
	2.1.2 % of women included in vulnerable groups	Number of women dedicated to agricultural practices	50% women and 50% men including also vulnerable groups.	Application requests for implementation of sustainable practices.	Goups of women well informed about this initiative and willing to participate
				Adminisitrative records of project partners such as training or finance providers.	Partners document gender of applicants/participants/ clients

for adaptation measures				Report of the selected farmers to be included in the project	Promotion of women participation coming from GAD's
	2.1.3 # of panela producers that implement better technology to decrease use of firewood.	0 efficient knils are being used in the project area	At least 10 artisanal panela producers applying best available technology (BAT)	Invoices with description of the machinery Monitoring report of the project/ administrative records of partners and suppliers	Partners document gender of applicants/participants/ clients
	2.1.4. # of institutions have introduced specific solutions and risk assessment methodology to support the disbursement of credits for adaptation, integrate sustainable and climate smart criteria in their whole operations	0 institutions in the project area has up-to-date smart-lending methodologies or green inclusive finance products	2 financial institutions incorporated into their business operations financial sustainability issues, including climate smart lending methodology and tools.	Climate and Environmental risk assessment reports, including operational audit report	Participation of financial institutions that show first steps towards sustainability issues
			2 institutions have introduced specific EbA-focused lending products	Climate and Environmental risk assessment reports, including loan portfolio reports	
C2.2 At least 1 long term financing mechanisms has been piloted or introduced	2.2.1 # of investment funds to promote sustainable development set up and fully operational	No investment fund for sustainable development is active in the project area and hence has no assets	The investment Fund for the care of the upper basin of Río Blanco sustainable development is active an	Constitutional documents of the fund; Audited financial statement for the period 2019-2021	The Toachi-Pilatón hydroelectric plant in full operation since 2019
	2.2.2 Assets of the investment fund in USD		A total of USD 462,314 in assets has been generated		

Project / Program Components	Component 3. Strengthen local capacities and share lessons				
Expected Outcomes	Indicator	Baseline	Targets by project end	Sources of verification	Assumptions
C3 Local population and parish governments with increased capacity to implement climate change adaptation measures.	3.1.1 # of GADs trained to use meteorological information generated by meteorological stations currently installed.	0 GADs trained	6 GADs being trained to take care and use meteorological information generated by meteorological stations currently installed.	Training and participants' list	Integration of captured data by meteorological stations in a central point.
	3.1.2 # of farmers, women and vulnerable groups trained in climate information	0 farmers from 6 parishes have been trained in use of climate information	At least 500 families trained in the use of climate data, with at least 55% women's participation	Training and participants' list	Storage and processing data to make sure is understandable for the population and other stakeholders.
	3.2.1. # of development plans (PDOT) incorporate measures for ecosystem-based adaptation to climate change	0 PDOT	6 GADs PDOTs incorporate measures for ecosystem-based adaptation to climate change.	Development and territorial planning plans published on the website of the parish GAD.	Elaboration of development and territorial planning plans on a regular basis.
	3.3.1 # of communication, education knowledge transfer and replication events organized	0 events carried out	12 events over the lifetime of the project carried out	Events' participants' list	Technological platform available for training and communication processes
	3.2.1 # of training provided to financial institutions.	0 institutions trained	At least 6 trainings provided on adaptation finance and 6 training for climate risk in two financial institution	Training and participants' list	Financial institutions have been identified and engaged.
	3.2.2 # of demonstration farms established	0 demonstration farms in project area	At least 2 demonstration farms established	Reports on demonstration farm planning and implementation	Suitable plots by public or private actors identified
	3.2.3 # of training events on EbA carried out	0 raining events on EbA carried out	At least 12 training events carried out in 6 parishes	Workshop participants' list	Training materials have been developed in a modular approach

			with at least 50% women participation		
	3.1.5. # of established information system established in the project	0 technological platforms implemented by Ministry of Environment.	At least 1 information platform collecting lessons learnt by the project and supporting knowledge sharing	Continue access and availability of technological platform for training and communication, or search data and information.	

F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
To strengthen the adaptive capacity of the local population in the Río Blanco water system	Number of people (men and women) with improved adaptive capacity [target 2600 people]	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	120,000
		Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	160,000
		Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	5.1. Number of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type and scale)	475,000
		Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure access to livelihood assets	110,000
Outcome 1. At least 230,000 ha of native vegetation is conserved to	Surface (ha) under improved management. [target 230,000 ha]	Output 5: Vulnerable ecosystem services and natural resource assets	5.1. Number of natural resource assets created, maintained or improved to withstand conditions resulting from	950,000

reduce the impact of climate change on the watershed's hydrological cycle.		strengthened in response to climate change impacts, including variability	climate variability and change (by type and scale)	
Outcome 2. At least 500 ha of agriculture land apply sustainable farming practices appropriate to the foreseen impacts of climate change	Production area (ha) under improved management [target 500 ha] Number of people (men and women) who implement sustainable farming practices [target >300]	Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	6.1.1. Number and type of adaptation assets (tangible and intangible) created or strengthened in support of individual or community livelihood strategies	840,000
Outcome 3. Local population and parish governments with increased capacity to implement climate change adaptation measures.	Number of strengthened local development plans [target 6] Number of staff (men and women) of local governments and pertinent entities trained on adaptation to climate change [target >25] Number of people (men and women) who have participated in awareness activities and events. [to be defines] Number of visitors to the project's website [to be defined]	Output 2: Strengthened capacity of national and subnational centres and networks to respond rapidly to extreme weather events	2.1.1. Number of staff trained to respond to, and mitigate impacts of, climate-related events (by gender) 2.1.2 Number of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	400.000

G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Output	Responsible entity	Canton / Parrish	Budget description	Year 1	Year 2	Year 3	Year 4	Total	Budget note	Details
1. 1,000 ha of native vegetation is conserved by sustainable forest management and conservation mechanisms.	MAE	All cantons & parishes	Contractual services company (ACUS management plan-conservation bio-corridor)	46,500				46,500	1.1	Contractual services company for the establishment of functional conservation areas as part of the Toachi Pilaton Basin Bio-corridor, the consultancy includes: Technical, biological and zoning file studies; ACUS Management Plan of Conservation Bio-corridor (MPCB).
	MAE	All cantons & parishes	Local consultants (Financial and operational sustainability strategy)		23,333	23,333	23,333	70,000	1.2	Local consultants for the Financial and Operational Sustainability Strategy according with the investment fund;
	MAE	All cantons & parishes	Contractual services individual (Management and operation model)	5,375	5375	5375	5375	21,500	1.3	Contractual services individual for implementing, monitoring the Biocorredor Management Model
	MAE	All cantons	Contractual services company (Increases in # of Decentralized Governments (GAD) with planning, regulatory and normative instruments for ACUS)	3,500	3,500	3,500	3,500	14,000	1.4	In support of the Increases in # of Decentralized Governments (GAD) with planning, regulatory and normative instruments for ACUS that includes: the joint identification (PA authorities and GADs) of key habitats, restrictions and monitoring programs, and agreements for their implementation; inclusion in land-use planning processes of specific standards and practices for protecting forest and integrated watershed management; and Municipal ordinances on conservation, land use practices, and ACUS
	MAE	All parishes	Equipment and furniture (Strengthen incentive systems for set-asides on private	62500	62500	62500	37500	225,000	1.5	Strengthen incentive systems for set-asides on private and community lands based ACUS

			and community lands based ACUS and technology change)							
	MAE	All cantons	Local consultants (Municipal PAs gazetted, covering 1,000ha, in buffer-zones and corridors identified as critical for water hydrological cycle)	3,000	3,000	3,000	3,000	12,000	1.6	Technicians in monitoring and supporting the Municipal PAs gazetted, covering 1,000ha, in buffer-zones and corridors identified as critical for water hydrological cycle.
	MAE	All parishes	Equipment and furniture (Promotion of habitat and connectivity-friendly production options)		20000	20000	20000	60,000	1.7	Equipment for the promotion of habitat and connectivity-friendly production options and programs for reduction of human/wildlife conflicts in association with the Ministry of Agriculture
	MAE	All cantons & parishes	Contractual services individual (Increases in # families in communities adjoining conservation areas in target ACUS which at least 50% of women participation)		667	8667	8666	18,000	1.8	Technicians in support the increases in # families in communities adjoining conservation areas in target ACUS, participating in livelihood /productive activities demonstrated to reduce pressures on forest which at least 50% of women participation
	MAE	All parishes	Equipment and furniture (Strengthening of the hydro-meteorological monitoring system in the Toachi-Pilaton river basin.)		8000	25000		8,000	1.9	Equipment for strengthening of the hydro-meteorological monitoring system in the Toachi-Pilaton river basin that includes maintenance of hydro-meteorological stations

			Subtotal					500,000		
2. Improved management of existing protected forests and private conservation areas (ca. 230,000 ha)	MAE	All parishes	Contractual services individual (Reduction in the use of forest wood for productive activities in the Upper and Middle Basin)	17,875	17875	17875	17875	71,500	2.1	Contractual services individual in support of the target: reduction in the use of forest wood for productive activities in the Upper and Middle Basin of the Toachi and Pilaton Rivers (Landscape Las Pampas and Palo Quemado), through technology change in the process of the panela production, that includes planning, assessment and monitoring of the process
	MAE	All parishes	Equipment and furniture (Technology change (ovens change to promote efficiency in the production of panela)	43,720	43,720	43,720	43,840	175,000	2.2	Equipment and furniture such as technology change (ovens change to promote efficiency in the production of panela); forest planning and productive alternatives
	MAE	All cantons	Contractual services company (Planning and zoning of the river basin with a participatory and inclusive approach. Promote dialogue, coordination and technical support at local level)	10,333	10,333	10,333		31,000	2.3	Planning and zoning of the river basin with a participatory and inclusive approach. Promote dialogue, coordination and technical support at local level and improvement of the protector forest.
	MAE	All parishes	Contractual services individual (Management plan of the protector forest, including ravine and shore protection activities.)		10000	10000	5000	25,000	2.4	Implementation of Management Plan of the protector forest, including ravine and shore protection activities.

	MAE	All parishes	Contractual services individual (Train farmers in conservation practices and climate change)	4,000	4,000	4,000	4,000	16,000	2.5	Increase in the process of planning and zoning of farms in which at least 50% of women participate
	MAE	All cantons & parishes	Equipment and furniture (Increases in ratings of Management Effectiveness Tracking Tool and PGOA)	15,000	15,000	15,000	15,000	60,000	2.6	Equipment and furniture relationships with increases in ratings of Management Effectiveness Tracking Tool and PGOA
	MAE	All cantons	Equipment and furniture (Increases in control capacities in wildlife and forest traffic)	35,750	35,750			71,500	2.7	Increases in control capacities in wildlife and forest traffic that includes: Equipment for environmental control mainly forest and wildlife with supporting UPMA; Strengthen Tandapi control point; Install a control point in las Pampas, equipment in coordination with the Police; and Monitoring system, newsletter and decentralization of information.
			Subtotal					450,000		
3. 250 ha of pasture and 250 ha of crops apply sustainable farming practices	MAE	All cantons & parishes	Contractual services individual	10,000	15,000			25,000	3.1	Building of the team: Selection of experts in sustainable agricultural management and climate-smart livestock; Incorporation of an industrial technician with technical background to identify options of improvement in the technology for the panela producers; Field visits by specialists to collect information on the type of crop, microclimate, vulnerabilities and resilience; Documentation: Definition of appropriate adaptation measures for farming and production areas; Monitoring visits and documentation of the progress of adaptation measures. Identification of problems

	CAF/GADs	All cantons & parishes	Grants for implementation	20,000	25,000	130,000	125,000	300,000	3.2	Grants for implementation; Selection: Identify, through the defined procedures and actors, the participants for the construction of sustainable farms; The project management board reviews the profiles of participants entering into vulnerable groups for approval; Subsidy for 150 beneficiaries of vulnerable groups receive 75% of the cost and implementation of adaptation measures as grant. 25% they will put it as counterpart (labor); Delivery to the qualified suppliers of the values for the implementation by means of transference or certified check
	MAG	All cantons & parishes	Suppliers identification	5,000	10,000			15,000	3.3	Suppliers identification; Announcement for all suppliers interested in participating for the delivery of inputs for the construction of sustainable farms. Interesting stock, good experience and reputation is a plus; Visits each of the suppliers to verify the information provided and the prices offered.
			Subtotal					340,000		
4. At least 2 institutions have introduced specific solutions and credit assessments to support the disbursement of credits for adaptation, integrating environmental and climatic risks in their operations.	MAE	All cantons & parishes	Contractual services individual	5,000	5,000	5,000		15,000	4.1	Selection of consultants who will work on the development of output 2 and 3. Knowledge and good experience in the field of software-based green lending or climate financing will be required; Identification of adequate EbA and other adaptation measures for target customers of participating financial institutions;
	MAE	All cantons	Contractual services company	5,000	10,000			15,000	4.2	ICT solution to automatically and systematically collect data in the field, software to facilitate the

		& parishes								identification, qualification, monitoring and reporting of adaptation credits.
	MAE	All cantons & parishes	Contractual services company	15,000	15,000	10,000	10,000	50,000	4.3	Development of climate smart lending management, for different crops and to be implemented in lending processes of financial institutions; Development of policies and procedures of climate risk management in the institution; Development of financial products, product design including loan terms;
			Subtotal					80,000		
5. One investment fund to promote sustainable development is set up and operational	CAF / CFN	Sigchos	Trust expenses	21,000				21,000	5.1	Legal study for the set-up of the fund
	GAD SIGCHOS	Sigchos	Renting premise	3,600				3,600	5.2	Office rent for first year
	GADs SIGCHOS Y MEJIA	All cantons & parishes	Recruitment	31,200				31,200	5.3	Recruitment of personnel of first year
	GADs SIGCHOS Y MEJIA	All cantons	Vehicle, equipment and furniture	26,000				26,000	5.4	Physical infrastructure of the investment fund
	GAD SIGCHOS	Sigchos	Miscellaneous expenses	3,600				3,600	5.5	Office supplies, administrative expenses
	GADs SIGCHOS Y MEJIA	Sigchos	Investment in sustainable development investment trust	109200	109200	109200	109200	327,600	5.6	Seed investment for the set-up of the fund
	GAD SIGCHOS	Sigchos	Economic incentives for adaptation disbursements tools	2000	2,000	2,000		6,000	5.7	Economic incentives for eligible lending customers that will invest into EbA and other adaptation options
	GAD SIGCHOS	Sigchos	Reporting				1,000	1,000	5.8	Elaboration of reporting per year, including monitoring visits of financed customers;
			Subtotal					420,000		

6. At least 6 parishes being trained to take care and use meteorological information generated by meteorological stations currently installed.	INAHMI / GADs	All parishes	Miscellaneous expenses			10,000	10,000	20,000	6.1	Training in use and maintenance of meteorological stations for technical staff of each GAD.
	INAHMI / GADs parishes	All parishes	Contractual services individual		10,000	10,000	10,000	30,000	6.2	Changing administrative operations from INAMHI to GAD technical personal staff.
	INAHMI / GADs parishes	All parishes	Miscellaneous expenses			40,000	40,000	80,000	6.3	Training 500 families in the use of climate data and their application in activities, such as: agriculture and livestock. This training will be address for 55% percent of women. Including field visits, food and transportation.
	INAHMI / GADs parishes	All parishes	Audiovisual & print production costs			5,000	5,000	10,000	6.4	Designing of interactive content and generation of newsletters to training GAD population in the area including women associations, older adults and vulnerable groups.
	INAHMI / MAE	All parishes	Contractual services individual		6,666	6,667	6,667	20,000	6.5	Integrating the digital media technologies for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
			Subtotal					160,000		
7. Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change	GADs	All parishes	Local consultants	10,000				10,000	7.1	Conducting a technical study to determinate which climate change adaptation measures that must be added for development and territorial planning plans.
	GADs	All parishes	Local consultants	5,000	5,000	5,000	5,000	20,000	7.2	Gathering information on climate change adaptation measures to be added like indicators and statistics into the development and territorial planning plans. The indicators should include gender information and vulnerable groups for climate change.
	GADs	All parishes	Local consultants		10,000	10,000	10,000	30,000	7.3	Developing new development and territorial planning documents adding climate change statistics and information and also including gender and vulnerable group's climate change issues.
	GADs	All parishes	Miscellaneous expenses		3,333	3,333	3,333	10,000	7.4	Training for population including associations, organizations and other stakeholder of the project about

										climate change adaptation measures incorporated in the PDOTs.
	GADs	All parishes	Miscellaneous expenses		3,333	3,333	3,333	10,000	7.5	Socialize new PDOTs documents with the population of the project area including associations, organizations and the population in general.
			Subtotal					80,000		
8. Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms. Plus training on adaptation finance to financial institutions.	GADs	All parishes	Contractual Individual Services	5,000	5,000	5,000	5,000	20,000	8.1	Developing a communication plan addressed for stakeholders in the project including specific women associations and organizations.
	Project Manager / GADs	All parishes	Contractual Individual Services	3,750	3,750	3,750	3,750	15,000	8.2	Integrating the digital media technologies for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
	Project Manager / GADs	All parishes	Miscellaneous expenses	6,250	6,250	6,250	6,250	25,000	8.3	Sharing lessons learned and experiences with project stakeholders, and replicate knowledge to other similar projects in the country through demonstrative farms applying sustainable methods for agriculture, livestock and panela production
	Project Manager / GADs	All parishes	Miscellaneous expenses	5,000	5,000	5,000	5,000	20,000	8.4	Training modular courses on sustainable agriculture and good agricultural practices, open to associations and selected farmers to participate. 12 modules, 6 theorists, 6 in the field and an on-site supervision within 6 months of completing the course. 50% women
	Project Manager	All parishes	Local consultants	5,000	5,000	5,000	5,000	20,000	8.5	Training for all Microfinance Institution (MFI) staff participating in climate risk, green credit and climate change issues with a focus on microfinance
	Project Manager	All parishes	Local consultants	5,000	5,000	5,000	5,000	20,000	8.6	Certification of organic crops or good agricultural practices for the production of panela, mortiño wine or crops of sugar or naranjilla, of those graduates with better performance in their crops.

			Subtotal					120,000		
9. Systematisation of information gathered during the whole project design and implementation using existing informatics platforms	MAE	All parishes	Contractual services individual	15,000	5,000	5,000		25,000	9.1	Developing a technological platform to manage knowledge and information about climate change adaptation, using disruptive technologies like: big data and cloud computing.
	MAE	All parishes	Contractual services individual	10,000				10,000	9.3	Integrating technological platform into others technological platforms used by the Ministry of Environment.
	MAE / GADs	All parishes	Contractual services individual	2,500	2,500			5,000	9.4	Sociability of the technological platform with all stakeholders in the project including associations and organizations.
			Subtotal					40,000		
Total project cost								2.190,000		
Project/Programme Execution cost								180,000		
Details	CAF	Ecuador	Direct Project Services Coordination Unit	26000	28000	28000	38000	120000	Section H	Direction Services
	CAF	Ecuador	Direct Project Services Miscellaneous expenses	12000	12000	12000	12000	60000	Section H	Direction Services
Total project cost								2,370,000		
Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)								119,373		
Details	CAF	Ecuador	Financial administration.	6250	6250	6250	6250	25000	Section H	Financial administration of project funds and accounting services.
	CAF	Ecuador	Procurement and miscellaneous expenses	9600	9600	9600	9600	38400	Section H	Procurement of goods, works and services and contract administration. Including management of project personnel and consultants.

	CAF	Ecuador	Project oversight.	6250	6250	6250	6250	25000	Section H	Project oversight. Including visits to project sites to verify quality of deliverables, and overseeing independent evaluations.
	CAF	Ecuador	Reporting		5162	5162	5162	15486	Section H	Reporting. Including technical, administrative and financial reports to the Adaptation Fund. Preparation of annual Project Performance Report (PPR)
	CAF	Ecuador	Support services to the project's management unit within CAF	3871	3871	3871	3874	15487	Section H	Provide office space and support services to the project's management unit within CAF
TOTAL								2,489,373		

H. Include a disbursement schedule with time-bound milestones.

Output	Responsible entity	Canton / Parish	Budget description	Year 1	MILESTONE	Year 2	MILESTONE	Year 3	MILESTONE	Year 4	Total and Budget note	
1. 1,000 ha of native vegetation is conserved by sustainable forest management and conservation mechanisms.	MAE	All cantons & parishes	Contractual services company (ACUS management plan-conservation bio-corridor)	46,500	ACUS Management Plan according Bio corridor for the conservation elaborated.				ACUS model implemented		46,500	1.1
	MAE	All cantons & parishes	Local consultants (Financial and operational sustainability strategy)		Improvement land tenure	23,333	Financial and operational sustainability strategy elaborated	23,333		23,333	70,000	1.2
	MAE	All cantons & parishes	Contractual services individual (Management and operation model)	5,375	Technicians for application of Management Model	5375		5375	M&E	5375	21,500	1.3
	MAE	All cantons	Contractual services company (Increases in # of Decentralized Governments (GAD) with planning, regulatory and normative instruments for ACUS)	3,500	Joint identification (PA authorities and GADs) of key habitats	3,500		3,500	PDOT implemented	3,500	14,000	1.4
	MAE	All parishes	Equipment and furniture (Strengthen incentive systems for set-asides on	62,500	Strengthen incentive systems for set-asides on private and community	62500		62500	Ha under conservation category	37500	225,000	1.5

			private and community lands based ACUS and technology change)		lands based ACUS							
	MAE	All cantons	Local consultants (Municipal PAs gazetted, covering 1,000ha, in buffer-zones and corridors identified as critical for water hydrological cycle)	3,000		3,000	Proposed for monitoring Municipal PAs covering 1,000ha, in buffer-zones	3,000	M&E	3,000	12,000	1.6
	MAE	All parishes	Equipment and furniture (Promotion of habitat and connectivity-friendly production options)		Initial studies	20000	Training communities for promotion of habitat and connectivity-friendly production options	20000		20000	60,000	1.7
	MAE	All cantons & parishes	Contractual services individual (Increases in # families in communities adjoining conservation areas in target ACUS which at least 50% of women participation)		Technical support	667	Technicians for Planning and zoning of the river basin and productive alternatives	8,667		8,667	18,000	1.8

	MAE	All parishes	Equipment and furniture (Strengthening of the hydro-meteorological monitoring system in the Toachi-Pilaton river basin.)		Initial studies	8000		25000	Equipment for strengthening of the hydro-meteorological monitoring system		33,000	1.9
			Subtotal								500,000	
2. Improved management of existing protected forests and private conservation areas (ca. 230,000 ha)	MAE	All parishes	Contractual services individual (Reduction in the use of forest wood for productive activities in the Upper and Middle Basin)	17,875	Technicians for community training, planning and Reduction in the use of forest wood for productive activities	17875		17875		17875	71,500	2.1
	MAE	All parishes	Equipment and furniture (Technology change (ovens change to promote efficiency in the production of panela))	43,720		43,720	Technology change (ovens change to promote efficiency in the production of panela) and sustainable production	43,720		43,840	175,000	2.2
	MAE	All cantons	Contractual services company (Planning and zoning of the river basin with a participatory and inclusive approach. Promote dialogue, coordination	10,333	Governance analysis performed to provide recommendations	10,333	M&E	10,333	M&E		31,000	2.3

			and technical support at local level)									
MAE	All parishes	Contractual services individual (Management plan of the protector forest, including ravine and shore protection activities.)			10,000	Assessment, monitoring and evaluation of farms to perform and provide technology transfer	10,000	5,000			25,000	2.4
MAE	All parishes	Contractual services individual (Train farmers in conservation practices and climate change)	4,000	Technical staff	4,000	Assessment, monitoring and evaluation of farms to perform and provide technology transfer	4,000		4,000		16,000	2.5
MAE	All cantons & parishes	Equipment and furniture (Increases in ratings of Management Effectiveness Tracking Tool and PGOA)	15,000	Increases in ratings of Management Effectiveness Tracking Tool and PGOA	15,000		15,000		15,000		60,000	2.6
MAE	All cantons	Equipment and furniture (Increases in control capacities in wildlife and forest traffic)	35,750	increases in control capacities in wildlife and forest traffic; Strengthen	35,750	Equipment for environmental control mainly forest and					71,500	2.7

					Tandapi control point		wildlife with supporting UPMA					
			Subtotal								450,000	
3. 250 ha of pasture and 250 ha of crops apply sustainable farming practices	MAE	All cantons & parishes	Contractual services individual	10,000	Technical staff	15,000					25,000	3.1
	CAF/GADs	All cantons & parishes	Grants for implementation	20,000	First group of participants must have been selected and initiated the training (output8)	25,000	2th group of participants selected and trained. Investment plan verified	130,000	3th group of participants selected and trained. Investment plan verified	125,000	3000,000	3.2
	MAG	All cantons & parishes	Suppliers identification	20,000	Goods for sustainable practices	10,000	M&E				30,000	3.3
			Subtotal								220,000	
4. At least 2 institutions have introduced specific solutions and credit assessments	MAE	All cantons & parishes	Contractual services individual	10,000	Technical support		5,000				15,000	4.1
	MAE	All cantons & parishes	Contractual services company	10,000	Personnel trained (output 8)	5,000					15,000	4.2

to support the disbursement of credits for adaptation, integrating environmental and climatic risks in their operations.	MAE	All cantons & parishes	Contractual services company	12,000	1) Catalog of adaptation measures developed; 2) Personnel trained (output 8)	16,000	2) Personnel trained (output 8)	11,000		11,000	50,000	4.3
			Subtotal								80,000	
5. One investment fund to promote sustainable development is set up and operational	CAF / CFN	Sigchos	Trust expenses	21,000							21,000	5.1
	GAD SIGCHOS	Sigchos	Renting premise	3,600							3,600	5.2
	GADs SIGCHOS Y MEJIA	All cantons & parishes	Recruitment	31,200	The trust is legally constituted						31,200	5.3
	GADs SIGCHOS Y MEJIA	All cantons	Vehicle, equipment and furniture	33,000	Staff hired						33,000	5.4
	GAD SIGCHOS	Sigchos	Miscellaneous expenses	3,600							3,600	5.5
	GADs SIGCHOS Y MEJIA	Sigchos	Investment in sustainable development investment trust	109200	Staff, premises and equipment's must be complete	109200	Investment fund	109200	Operating investment fund	109200	327,600	5.6
	GAD SIGCHOS	Sigchos	Economic incentives for adaptation disbursements	2,000	First group of participants must have been selected and initiated the training (output8)	2,000	2th group of participant s selected and trained. Investment plan verified	2,000	3th group of participants selected and trained. Investment plan verified		6,000	5.7
	GAD SIGCHOS	Sigchos	Reporting							1,000	1,000	5.8
			Subtotal								420,000	

6. At least 6 parishes being trained to take care and use meteorological information generated by meteorological stations currently installed.	INAHMI / GADs	All parishes	Miscellaneous expenses					10,000	50% parishes trained in meteorological stations	10,000	20,000	6.1
	INAHMI / GADs parishes	All parishes	Contractual services individual			10,000	2 GADs operating meteorological stations	10,000	4 GADs operating meteorological stations	10,000	30,000	6.2
	INAHMI / GADs parishes	All parishes	Miscellaneous expenses					40,000	50% families trained in climate data	40,000	80,000	6.3
	INAHMI / GADs parishes	All parishes	Audiovisual & print production costs					5,000	Interactive content developed and delivered	5,000	10,000	6.4
	INAHMI / MAE	All parishes	Contractual services individual			6,666	Data send from meteorological station to MAE platforms	6,667	Data send from meteorological station to MAE platforms	6,667	20,000	6.5
			Subtotal								160,000	
7. Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change	GADs	All parishes	Local consultants	10,000	Technical study finished						10,000	7.1
	GADs	All parishes	Local consultants	5,000	climate change measures defined	5,000	climate change measures defined	5,000	climate change measures defined	5,000	20,000	7.2
	GADs	All parishes	Local consultants			10,000	PDOT published	10,000	PDOT published	10,000	30,000	7.3
	GADs	All parishes	Miscellaneous expenses			3,333		3,333		3,333	10,000	7.4
	GADs	All parishes	Miscellaneous expenses			3,333	Trained population	3,333	Trained population	3,333	10,000	7.5
			Subtotal								80,000	

8. Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms. Plus training on adaptation finance to financial institutions.	GADs	All parishes	Contractual Individual Services	5,000	events of communication delivered for all population	5,000	events of communication delivered for all population	5,000	events of communication delivered for all population	5,000	20,000	8.1
	Project Manager / GADs	All parishes	Contractual Individual Services	3,750	plan communication delivered using media technologies	3,750	plan communication delivered using media technologies	3,750	plan communication delivered using media technologies	3,750	15,000	8.2
	Project Manager / GADs	All parishes	Miscellaneous expenses	6,250	Sharing lessons learned	6,250	Sharing lessons learned	6,250	Sharing lessons learned	6,250	25,000	8.3
	Project Manager / GADs	All parishes	Miscellaneous expenses	5,000	Trained farms in sustainable agriculture	5,000	Trained farms in sustainable agriculture	5,000	Trained farms in sustainable agriculture	5,000	20,000	8.4
	Project Manager	All parishes	Local consultants	5,000	trained staff of finance institutions	5,000	trained staff of finance institutions	5,000	trained staff of finance institutions	5,000	20,000	8.5
	Project Manager	All parishes	Local consultants	5,000	certificated organic crops	5,000	certificated organic crops	5,000	certificated organic crops	5,000	20,000	8.6
			Subtotal								120,000	
9. Systematization of information gathered during the whole project design and implementation using existing informatics platforms	MAE	All parishes	Contractual services individual	15,000	platform developed, installed and operating	5,000	platform maintenance and operation	5,000	platform maintenance and operation		25,000	9.1
	MAE	All parishes	Contractual services individual	10,000	platform integrated to IT MAE Systems						10,000	9.3
	MAE / GADs	All parishes	Contractual services individual	2,500	50% of population with access to platform	2,500	100% of population with access to platform				5,000	9.4
			Subtotal								40,000	

Total project cost												2,190,000
Project/Programme Execution cost												180,000
Details	CAF	Ecuador	Direct Project Services Coordination Unit	36000	Project Unit consolidation	24000	Midterm Review support	24000	Final Evaluation support	36000	Support Exit Strategy	120000
	CAF	Ecuador	Direct Project Services Miscellaneous expenses	12000	Project Unit consolidation	12000	Contract services support	24000	Communication plan support	12000	Goods and services delivery	60000
Total project cost												2,370,000
Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)												119,373
Details	CAF	Ecuador	Financial administration.	6250	Project Unit account	6250	Financial oversight	6250		6250	Operational oversight	25000
	CAF	Ecuador	Procurement and miscellaneous expenses	9600	Project Unit	9600	Office supplies and support	9600	Office supplies and support	9600	Office supplies and support	38400
	CAF	Ecuador	Project oversight.	6250	Inception support	6250	Middle Term Review support	6250	Gender report support	6250	Final Evaluation support	25000
	CAF	Ecuador	Reporting		Inception report and translation	5162	Annual report and translation	5162	Annual report	5162	Final Report	15486
	CAF	Ecuador	Support services to the project's management unit within CAF	3871	Project Unit support	3871	Project Unit support	3871	Project Unit support	3874	Operational process and closure	15487
TOTAL												2,489,373

Annual Budgeted	Year 1	Year 2	Year 3	Year 4	TOTAL
Component 1	255.553	280.054	227.304	187.089	950.000
Component 2	263.600	187.200	253.200	136.000	840.000
Component 3	72.500	75.833	128.334	123.334	400.000
Project Execution cost	38000	40000	52000	50000	180.000
Project Cycle Fee	25971	31133	31133	31136	119.373
TOTAL	655.624,3	614.219,3	691.970,3	527.559,0	2.489.373

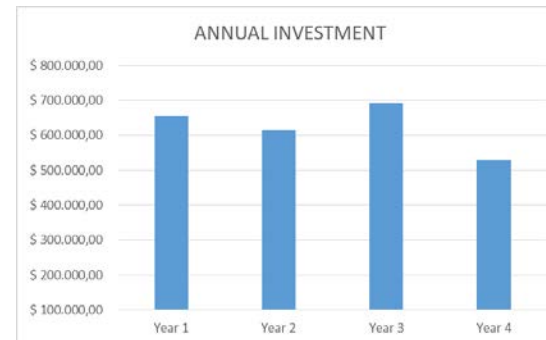
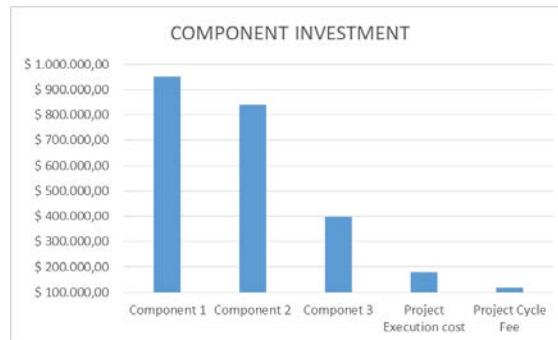
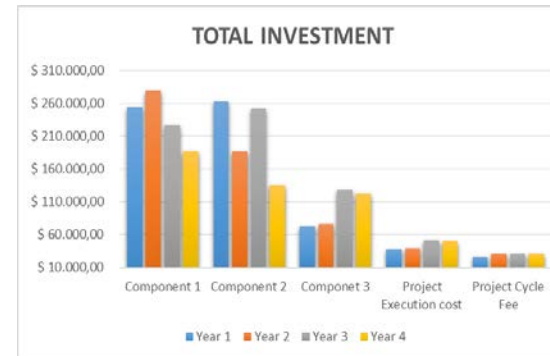


Table 40: Annual budgeted disbursement

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Annex 1.A	Ecuador Letter of Endorsement National
Annex 1.B	Implementing Entity Certification - National Project Ecuador
Annex 2.	Abbreviations and Bibliography
Annex 3.	Maps
Annex 4.A	Memoir of inception workshop in 2016
Annex 4.B	Memoir of visits to GADs and workshops 2017
Annex 5.	Stakeholders, interests and socioeconomic situation 2015
Annex 6.	Stakeholders gender and vulnerable pre 2017
Annex 7.	Environmental Social Risk Screening and Management Plan ESMP
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Annex 9.	Gender and vulnerable groups analysis
Annex 10.	Definition of beneficiaries of the Río Blanco upper basin
Annex 11.A	Alternative approaches considered but not adopted in the project
Annex 11.B	Buenas Prácticas CC
Annex 12.A	Overview adaptation measures and selection methodology
Annex 12.B	Agricultura andina frente al cambio climático
Annex 12.C	Microfinanzas
Annex 13.	Socio Bosque and ACUS mechanisms
Annex 14.A	Cost benefit analysis component 1
Annex 14.B	Cost benefit analysis component 2
Annex 14.C	Multicriteria Analysis component 1
Annex 14.D	Multicriteria Analysis component 2
Annex 15.	Project Budget

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

- A. Record of endorsement on behalf of the government⁵⁶** *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

(Enter Name, Position, Ministry)	Date: (Month, day, year)
----------------------------------	--------------------------

- B. Implementing Entity certification** *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (.....list here.....) and subject to the approval by the Adaptation Fund Board, <u>commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund</u> and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
<i>Name & Signature</i> Implementing Entity Coordinator	
Date: (Month, Day, Year)	Tel. and email:
Project Contact Person:	
Tel. And Email:	

⁶⁶. Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

B. Implementing Entity Certification

Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

I certify that the “**National Project Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management- Ecuador**” proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans of Ecuador and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.



Ligia Castro de Doens
Implementing Entity Coordinator

Date: *January 15 2018*

Tel. and email: +5717449444
lcastro@caf.com

Project Contact Person: Carolina Cortés

Tel. And Email: +59323988437 – acortes@caf.com



“Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management.”

ANNEX 2

Abbreviations and Bibliography

República del Ecuador

January of 2018

Annex 2-A. Abbreviations

AF	Adaptation Fund
CBD	Convention on Biological Diversity
CELEC	Electric Corporation of Ecuador
EbA	Ecosystem based adaptation
GEF	Global Environment Facility
INAMHI	National Meteorological and Hydrological Institute
MAE	Ministry of Environment
MAGAP	Ministry of Agriculture, Livestock, Aquaculture and Fisheries
MASL	Metres above sea level
SENAGUA	National Water Secretariat
SGR	Risk Management Secretariat

Annex 2-B. Bibliography

AF. 2012. Accessing resources from the Adaptation Fund. The Handbook. Adaptation Fund (AF). Washington DC, USA: 64 pp.

AF. 2016. Guidance document for implementing entities on compliance with the Adaptation Fund Environmental and Social Policy. Revised in June 2016. Adaptation Fund (AF) Washington DC, USA: 21 pp. Online: https://www.adaptation-fund.org/wp-content/uploads/2016/07/ESP-Guidance_Revised-in-June-2016_Guidance-document-for-Implementing-Entities-on-compliance-with-the-Adaptation-Fund-Environmental-and-Social-Policy.pdf

AF. 2016a. Manual of basic Environmental and Social Management System procedures and functions at National Implementing Entities. April 2016. Adaptation Fund (AF) Washington DC, USA: 20 pp. Online: https://www.adaptation-fund.org/wp-content/uploads/2016/07/Manual-of-basic-ESMS-procedures-and-functions-at-NIE_April-2016.pdf

BirdLife International. 2016. Important Bird and Biodiversity Area factsheet: Río Toachi-Chiriboga. Downloaded from <http://www.birdlife.org> on 22/07/2016

BirdLife International. 2016a. Important Bird and Biodiversity Area factsheet: Reserva Ecológica Los Illinizas y alrededores. Downloaded from <http://www.birdlife.org> on 23/07/2016

Boada, C. 2015. Tremarctos ornatus. En: (ed). Mamíferos de Ecuador. Quito, Ecuador. [en línea]. Versión 2015.0. Museo de Zoología, Pontificia Universidad Católica del Ecuador. Quito, Ecuador.
<<http://zoologia.puce.edu.ec/vertebrados/mamiferos/FichaEspecie.aspx?Id=658>> [Consulta: sábado, 23 de julio de 2016].

Cai, W., Borlace, S., Lengaigne, M., van Rensch, P., Collins, M., Vecchi, G., Timmermann, A., Santoso, A., McPhaden, M.J., Wu, L., England, M.H., Wang, G., Guilyardi, E. & F.F. Jin. 2014. Increasing frequency of extreme El Niño events due to greenhouse warming. Nature Climate Change 4: 111-116.

Cai, W., Wang, G., Santoso, A., McPaden, M.J., Wu, L., Jin, F.F., Timmermann, A., Collins, M., Vecchi, G., Lengaigne, M., England, M.H., Dommenges, D., Takahashi, K. & E. Guilyardi. 2015. Increased frequency of extreme La Niña events under greenhouse warming. Nature Climate Change 5: 132–137.

CDB. 2009. Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second ad hoc Technical Expert Group on

Biodiversity and Climate Change. CBD Technical Series 41. Secretariat of the Convention on Biological Diversity. Montreal, Canada: 126 pp.

Chambers, R. & G.R. Conway. 1991. Sustainable rural livelihoods: practical concepts for the 21st century. IDS Discussion Paper 296. Institute of Development Studies (IDS). Brighton, United Kingdom: 29 pp.

CEDIR. (2015). Guía para la elaboración de planes de mantenimiento y operación de las medidas de adaptación al cambio climático de los proyectos PACC. PNUD; Environment Ministry. Cuenca.

GADPRPQ. 2013. Plan de Desarrollo y Ordenamiento Territorial Parroquial Palo Quemado. Gobierno Autónomo Descentralizado Parroquial Rural Palo Quemado (GADPRPQ). Palo Quemado, Ecuador: 54 pp.

Jiménez, D. 2013. Tecnología SIG en apoyo al análisis y desarrollo metodológico de riesgos ocasionados por fenómenos naturales para el cantón Mejía, Provincia de Pichincha, Ecuador. Tesis Magister en Sistemas de Información Geográfica. Universidad San Francisco de Quito. Quito, Ecuador: 135 pp.

MAGAP/GIZ (2017), Buenas prácticas agrarias para enfrentar el Cambio Climático en Ecuador, Agriculture Ministry/ Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

Environment Ministry (MAE) y la Cooperación Internacional Alemana (GIZ). 2016. Policy Brief, Manual para la valoración económica de medidas de adaptación y mitigación del cambio Climático en el Ecuador. 8. P. Mafla, S; Chiriboga, M-V; Guzmán, D; Fuertes, F; Albuja, M-V; Arroyo, J-A; Gavilanes, C.

MAE. 2012 Estrategia Nacional de Cambio Climático del Ecuador 2012-2025. Ministerio del Ambiente (MAE). Quito, Ecuador: 143 pp.

MAE. 2014. ¿Cómo incorporar cambio climático en la planificación local? Guía Explicativa para la aplicación de los Lineamientos Generales para Planes, Programas y Estrategias de Cambio Climático de Gobiernos Autónomos Descentralizados y la inclusión de consideraciones de cambio climático en el proceso de actualización de los PDOTs. Ministerio del Ambiente (MAE). Quito, Ecuador: 119 pp.

MAE. 2015. Análisis de Vulnerabilidad de Centrales Hidroeléctricas Emblemáticas ante los efectos del Cambio Climático. Consultoría preparada por TECNALIA. Tomo I. Ministerio del Ambiente (MAE). Quito, Ecuador: 64 pp.

NPC. 2016. ENSO: Recent Evolution, Current Status and Predictions. Updated 25 July 2016. Climate Prediction Center (NPC). National Oceanic and Atmospheric Administration (NOAA). Maryland, USA: 32 pp.

Proaño, P. 2015. Análisis y evaluación de los asentamientos informales ubicados en la parroquia Manuel Cornejo Astorga, del Cantón Mejía, provincia de Pichincha. Tesis ingeniería en ciencias geográficas y desarrollo sustentable. Pontificia Universidad Católica del Ecuador. Quito, Ecuador: 91 pp.

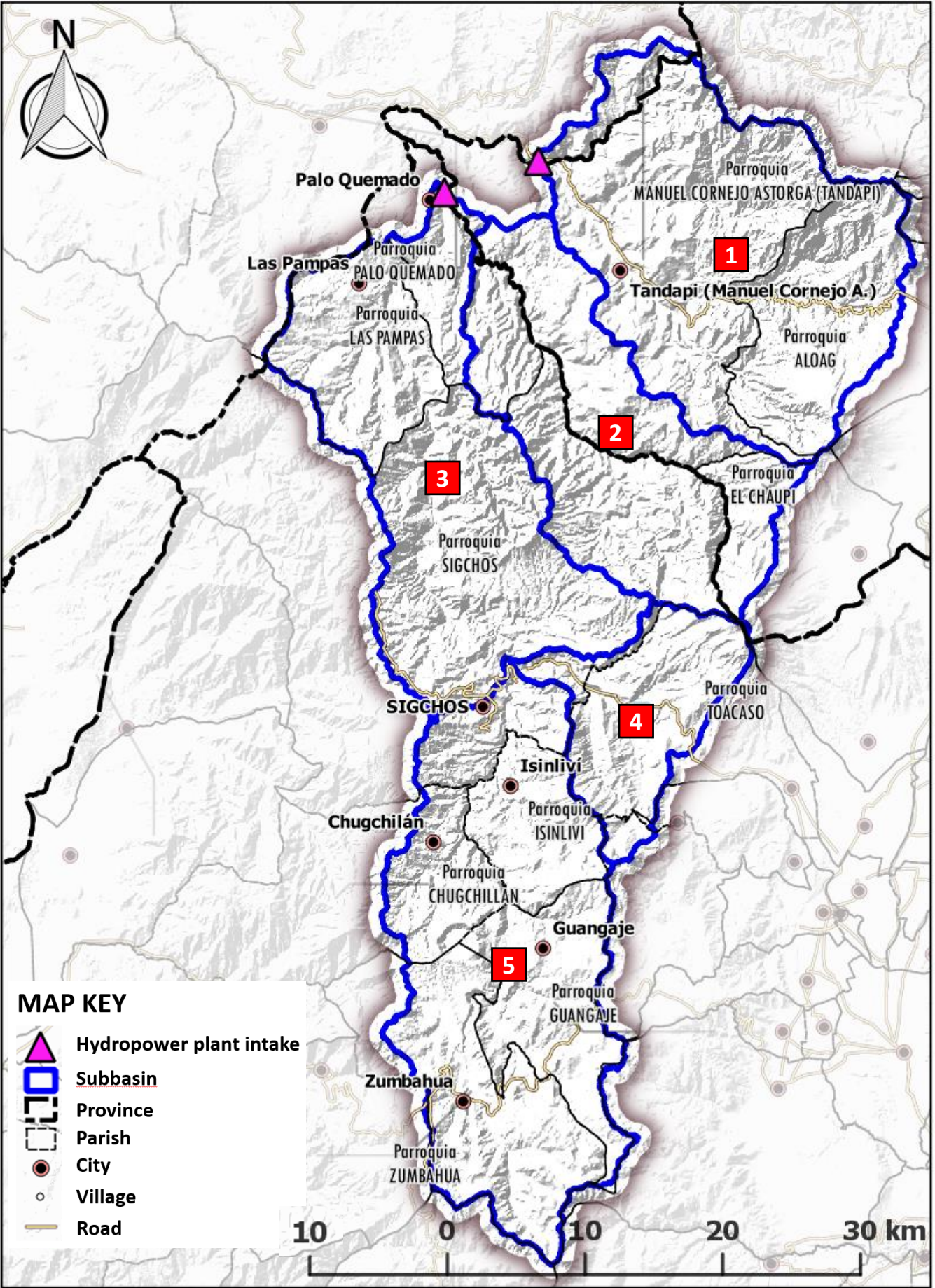
Scoones, I. 1998. Sustainable rural livelihoods a framework for analysis. IDS Working Paper 72. Institute of Development Studies (IDS). Brighton, United Kingdom: 22 pp.

SENPLADES. 2017. Plan Nacional de Desarrollo / Plan Nacional para el Buen Vivir 2017-2021. Secretaría Nacional de Planificación y Desarrollo (SENPLADES). Quito, Ecuador:

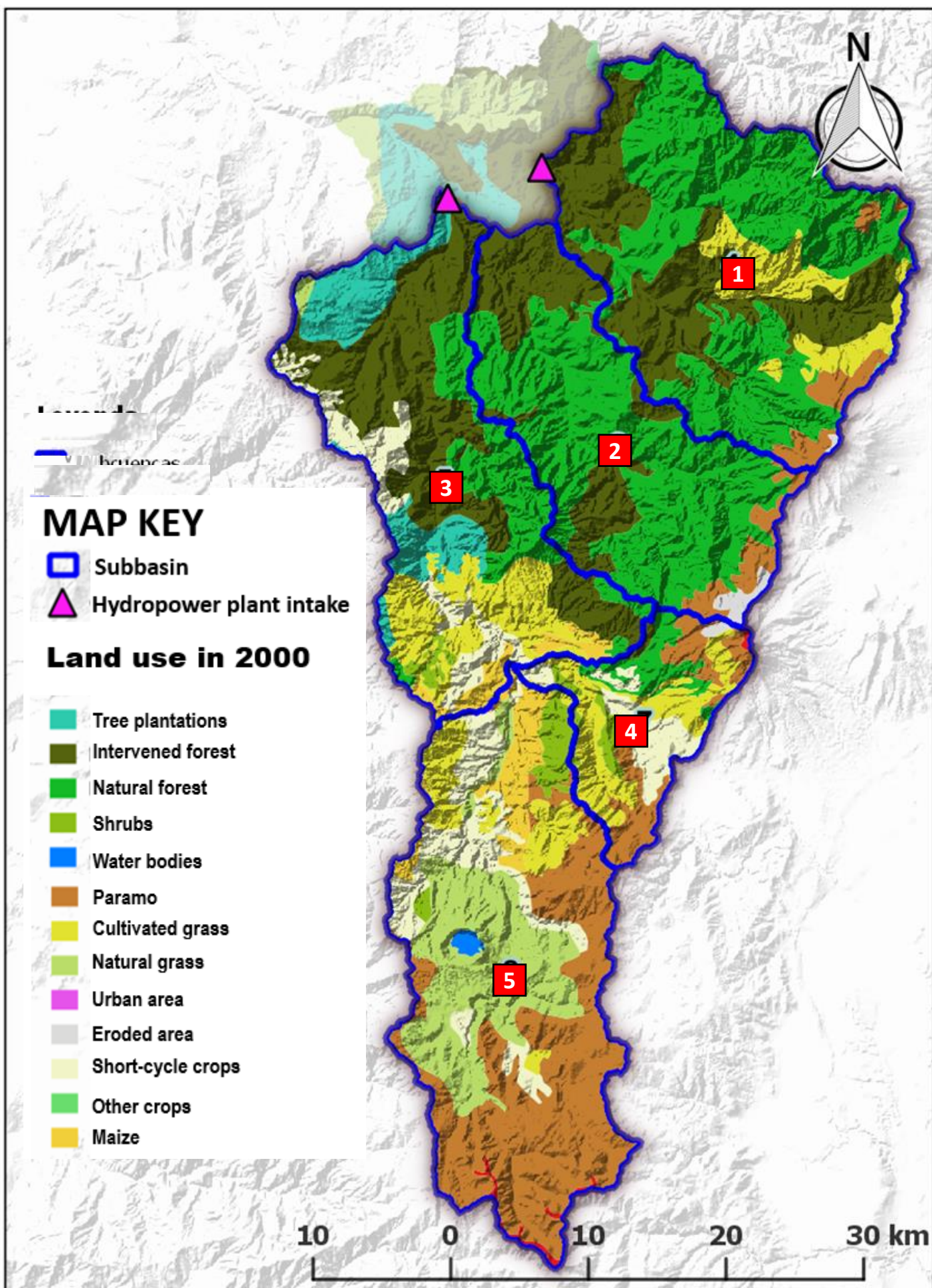
Vallejo, A.F. 2015. Puma concolor. En: (ed). Mamíferos de Ecuador. Quito, Ecuador. [en línea]. Versión 2015.0. Museo de Zoología, Pontificia Universidad Católica del Ecuador. Quito, Ecuador.
<<http://zoologia.puce.edu.ec/vertebrados/mamiferos/FichaEspecie.aspx?Id=636>> [Consulta: sábado, 23 de julio de 2016].

WEF. 2015. The Global Gender Gap Report 2015. World Economic Forum (WEF). Cologny/Geneva, Switzerland: 377 pp.

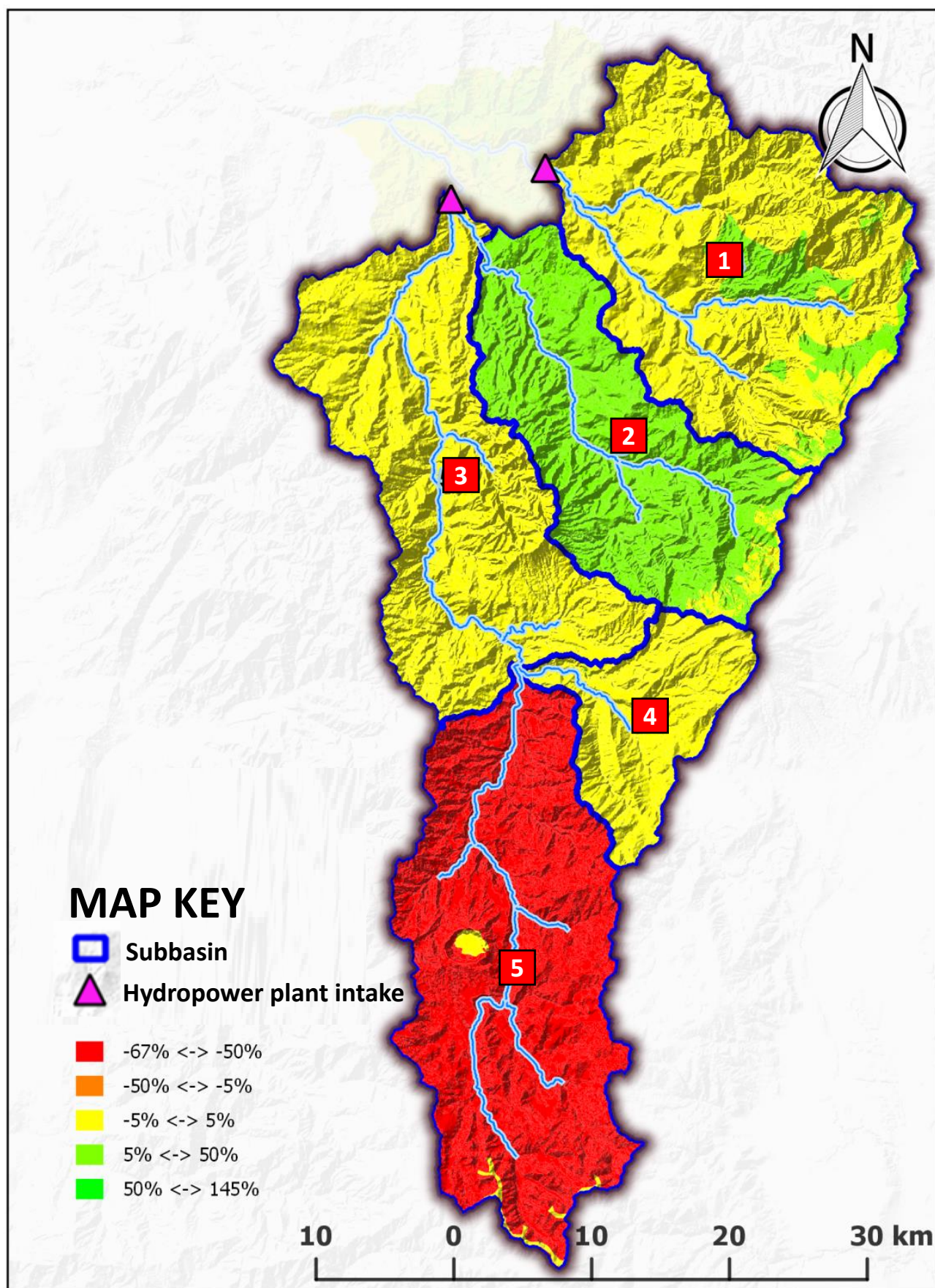
Younes, N. & E. Erazo. 2016. Landslide susceptibility analysis using remote sensing and GIS in the western Ecuadorian Andes. Natural Hazards 81(3): 1829-1859.



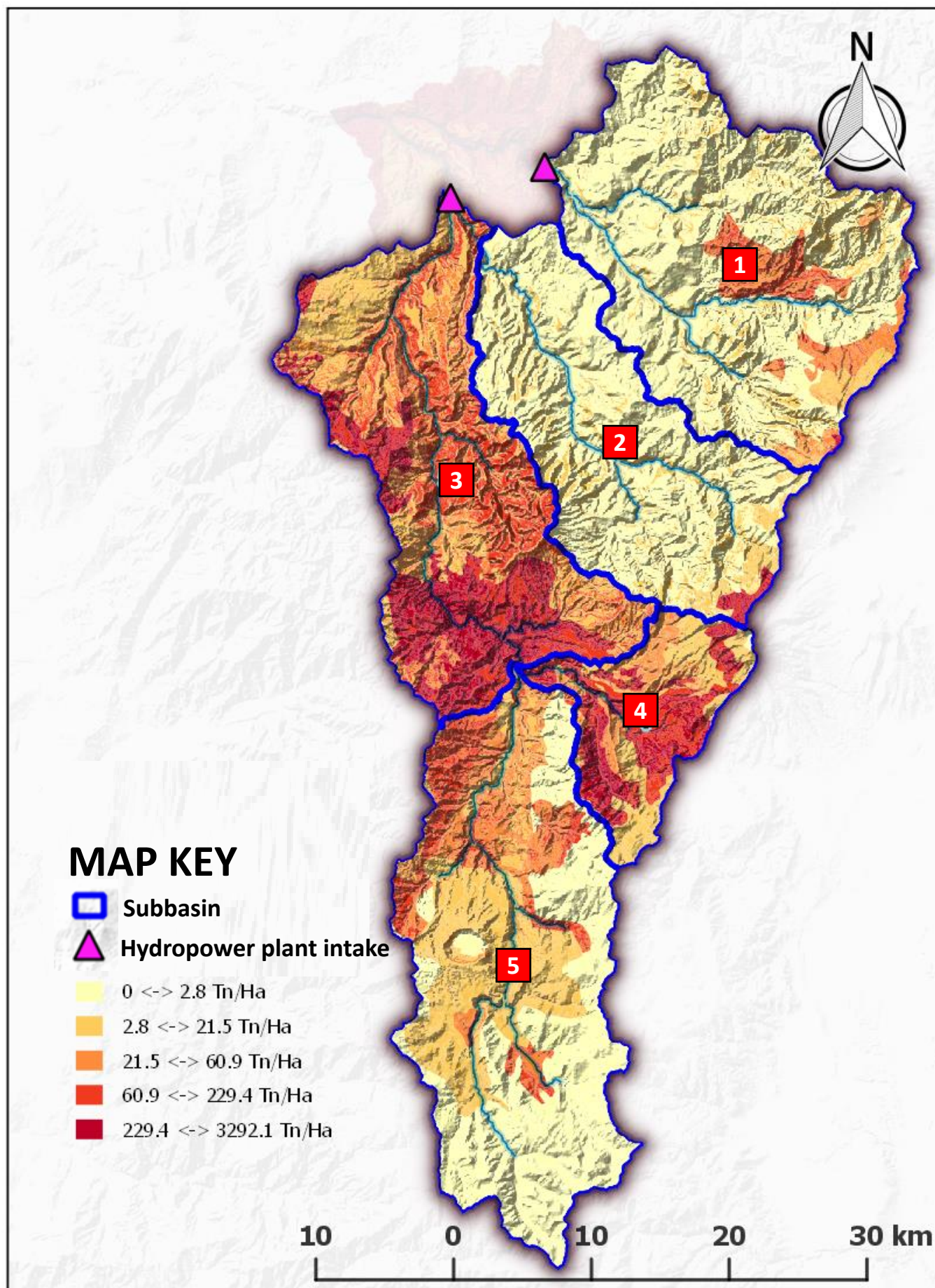
Map 1. Parishes and main localities in the Toachi - Pilatón water system.



Map 2. Land use in 2000 in the Toachi - Pilatón water system.



Map 3. Predicted change (percentage) in runoff during 2016 - 2035 with respect to the present condition in the Toachi - Pilatón water system.



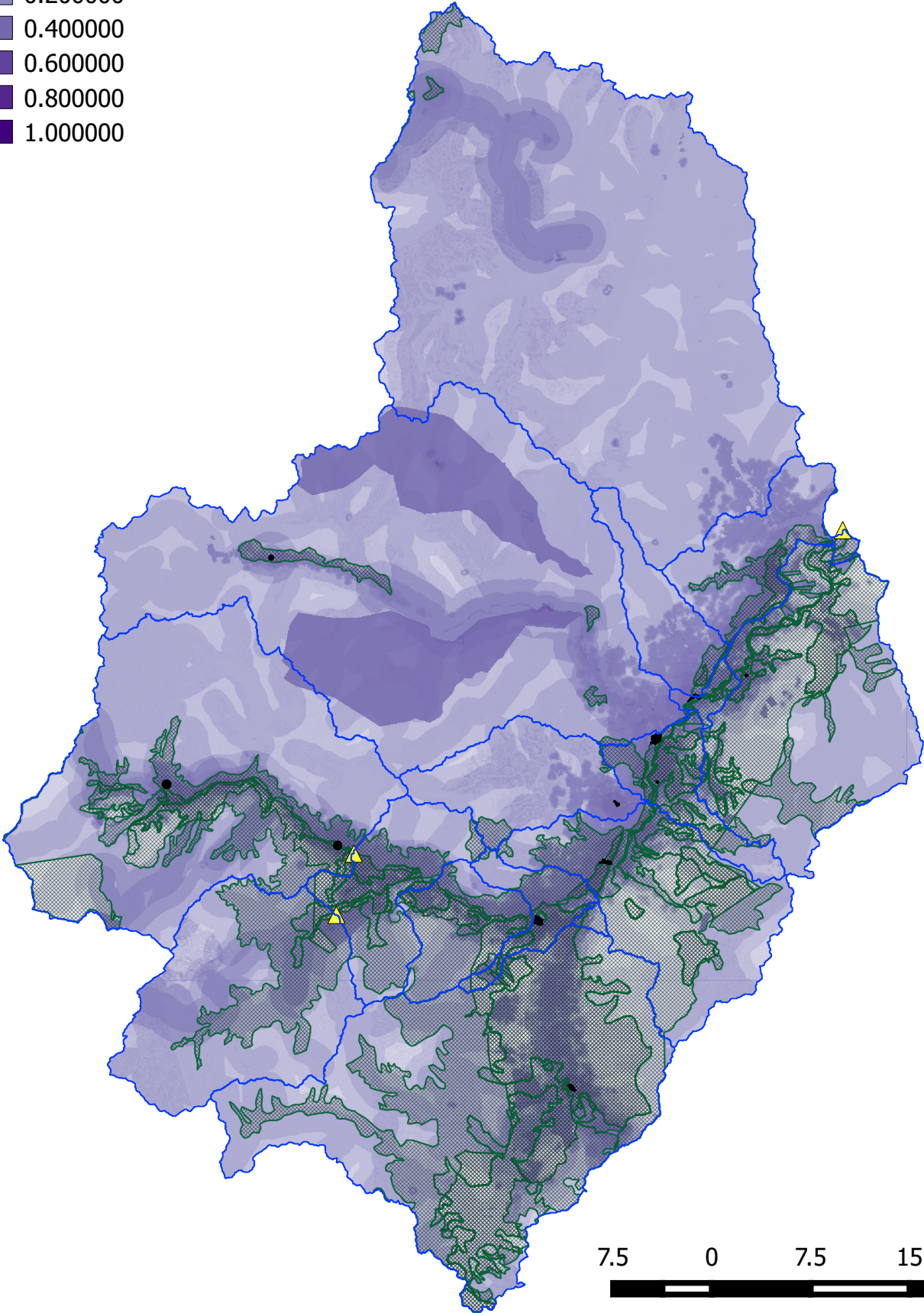
Map 4. Predicted sediment contribution (metric tonnes per hectare) during 2016 - 2035 in the Toachi - Pilatón water system.

Leyenda

- Subcuencas
- Captaciones
- Gobernanza Ambiental
- Medidas de Adaptación

PRIORIZACION

- 0.200000
- 0.400000
- 0.600000
- 0.800000
- 1.000000

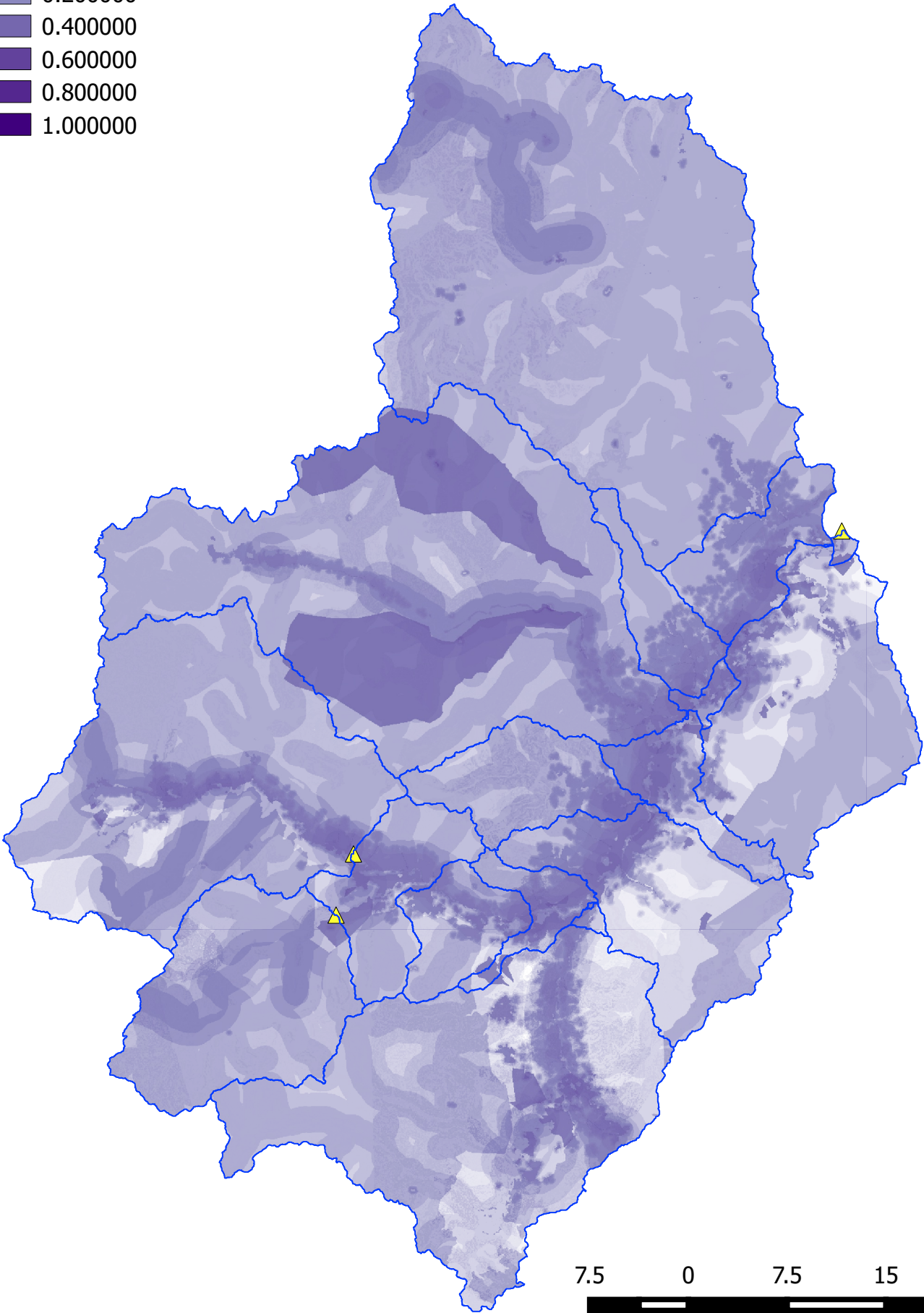


Leyenda

- Subcuencas
- Captaciones

PRIORIZACION

- 0.200000
- 0.400000
- 0.600000
- 0.800000
- 1.000000



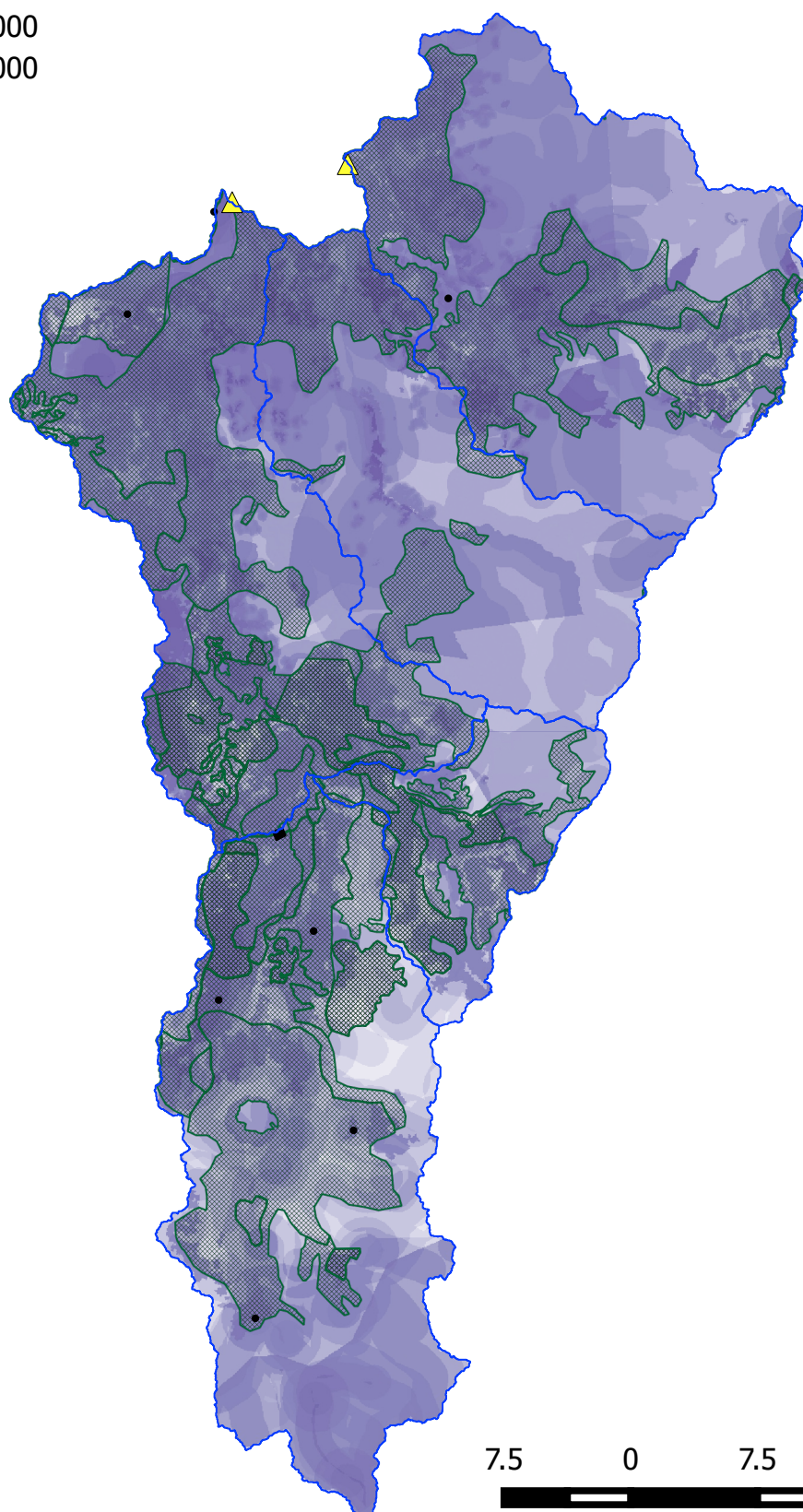
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Leyenda

- Subcuencas
- Captaciones
- Gobernanza Ambiental
- Medidas de Adaptación

PRIORIZACION

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- 0.800000
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
Leyenda


 Subcuencas


 Captaciones


PRIORIZACION

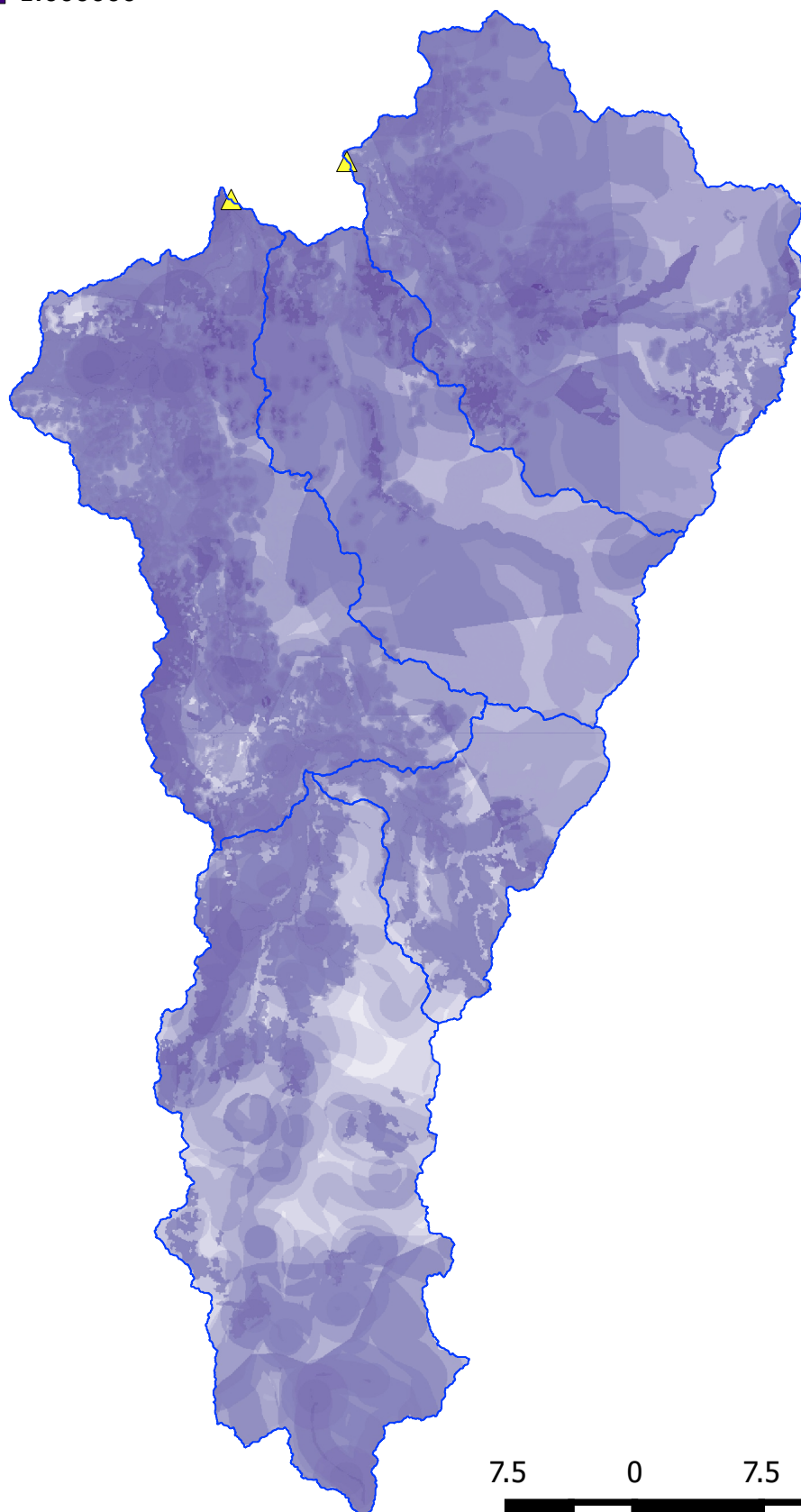
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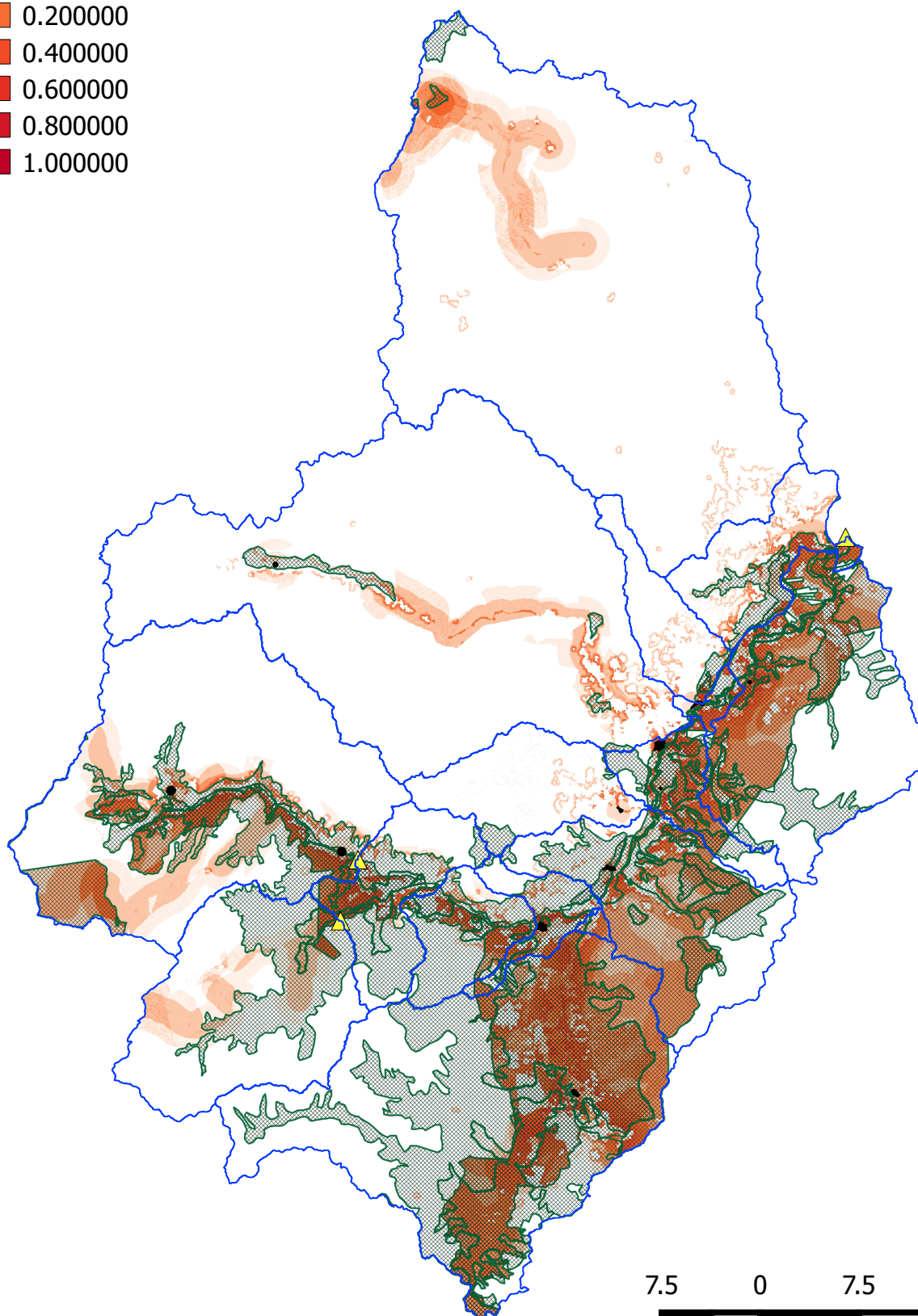


Leyenda

- Subcuencas
- Captaciones
- Gobernanza Ambiental
- Medidas de Adaptación

VULNERABILIDAD

- 0.200000
- 0.400000
- 0.600000
- 0.800000
- 1.000000



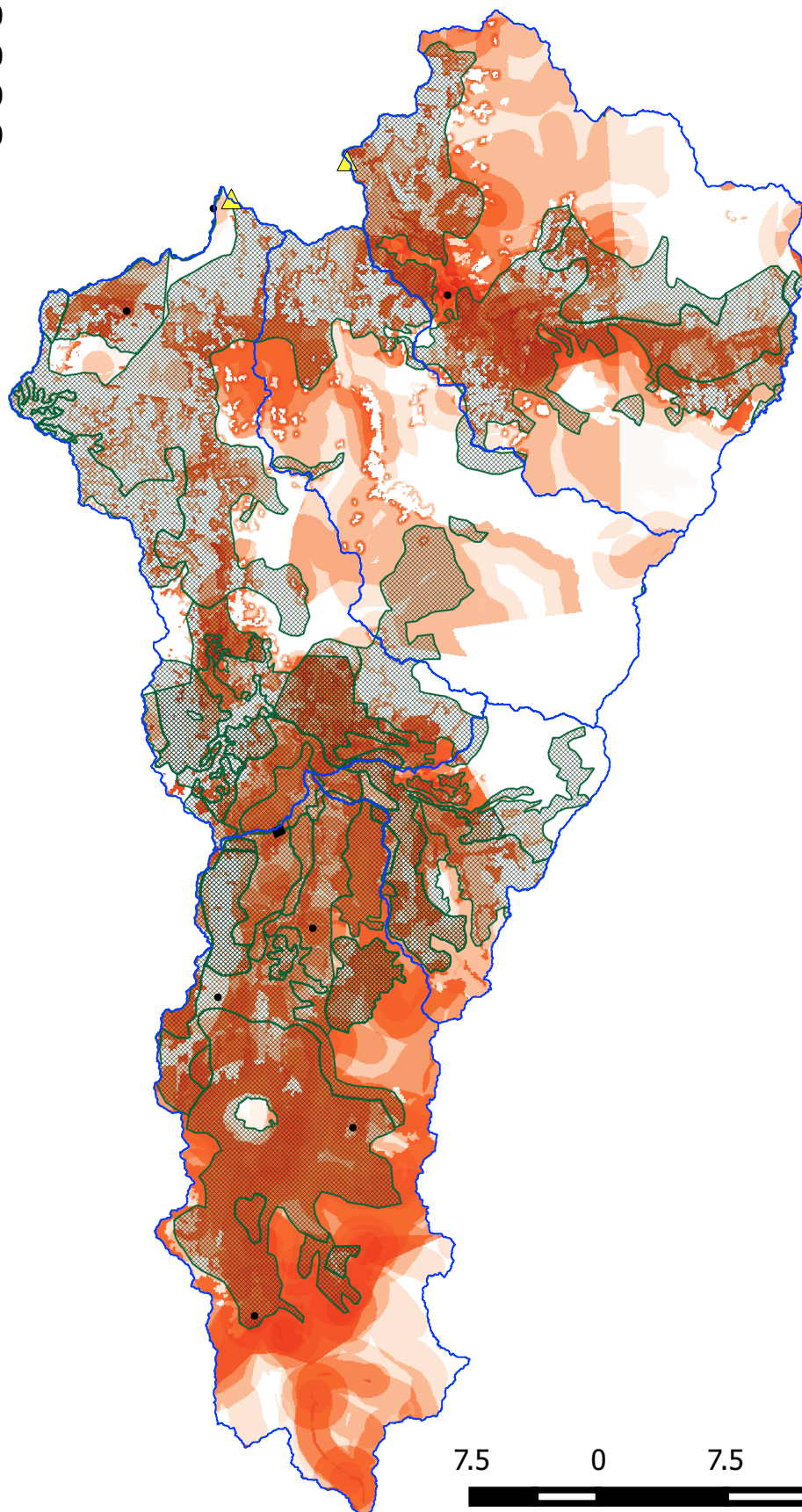
7.5 0 7.5 15 22.5 km

Leyenda

- Subcuencas
- Captaciones
- Gobernanza Ambiental
- Medidas de Adaptación

VULNERABILIDAD

- 0.200000
- 0.400000
- 0.600000
- 0.800000
- 1.000000



7.5 0 7.5 15 22.5 km



Proyecto para potenciar la resiliencia al cambio climático en
la cuenca hídrica Toachi - Pilatón

Memoria

Taller inicial de formulación

Unión del Toachi

República del Ecuador

15 de julio de 2016

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- Anexo 1. Registro de participantes
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- Anexo 3. Marco de resultados propuesto
- Anexo 4. Ubicación de las estaciones meteorológica e hidrológicas de INAMHI

Introducción

El Ministerio del Ambiente de Ecuador (MAE), en colaboración con CAF - Banco de Desarrollo de América Latina – van a presentar al Fondo de Adaptación la propuesta del proyecto para potenciar la resiliencia al cambio climático en la cuenca hídrica Toachi – Pilatón. El Fondo de Adaptación fue establecido en 2001 para financiar proyectos y programas concretos de adaptación en los países en desarrollo. El fondo es un mecanismo financiero de la Convención Marco de las Naciones Unidas sobre el Cambio Climático y el Protocolo de Kioto.

La iniciativa ha sido conceptualizada por el MAE, quien ha realizado consultas preliminares a varios actores públicos y privados. El MAE tiene información sobre el probable impacto del cambio climático en el sistema hídrico Toachi – Pilatón a partir de los resultados del proyecto “análisis de la vulnerabilidad de las centrales hidroeléctricas priorizadas ante los efectos del cambio climático” que fue realizado por la empresa TECNALIA. Complementariamente, en julio de 2016 se realizó un sondeo preliminar de los actores locales que sirva de base para realizar un primer taller de consulta para analizar las ideas iniciales del MAE.

Se prevé presentar el concepto de proyecto al Fondo de Adaptación a finales de julio de 2016 con miras a que sea aprobado en la 28 reunión de la junta directiva del Fondo de Adaptación que se realizará el 4 de octubre de 2016 en Bonn (Alemania). A efectos de avanzar en la preparación del concepto, se requiere analizar las ideas iniciales con los actores claves públicos y privados. Consecuentemente, se organizó el taller inicial en la localidad Unión del Toachi con el objetivo de presentar las ideas del concepto a los posibles socios clave, recibir retroalimentación e iniciar el proceso de preparar la propuesta de concepto para ser presentado hasta el 01 de agosto de 2016¹.

El taller se realizó en la casa comunal de la localidad Unión del Toachi (Foto 1).

Agenda

La reunión tuvo los siguientes elementos:

08:30 h Registro de participantes

09:00 h Bienvenida

09:15 h Presentación de participantes

09:30 h Revisión de la agenda

09:45 h Introducción al cambio climático

10:00 h El Fondo de Adaptación

10:15 h Cambio climático en la cuenca Toachi – Pilatón

10:30 h Concepto de proyecto

11:00 h Trabajo en grupo. Análisis de situación

¹ Fecha límite para ingresar propuestas a ser consideradas en 28 reunión de la junta directiva del Fondo de Adaptación.

12:00 h Presentación de los grupos
13:00 h Almuerzo
14:00 h Trabajo en grupo. Acciones del proyecto
15:00 h Presentación de los grupos
16:00 h Próximos pasos
16:30 h Cierre

Bienvenida

La bienvenida estuvo a cargo de Nicolás Zambrano del Ministerio del Ambiente y Dayana Vega de CAF (Foto 2 y Foto 3), quienes agradecieron la asistencia de los participantes y proveyeron información sobre el marco general de la reunión. Participaron en la reunión 39 personas, el registro de asistencia está en el Anexo 1.

Introducción al cambio climático

La presentación estuvo a cargo de Nicolás Zambrano del MAE, quien explicó el cambio climático global y sus impactos en Ecuador. También resumió el marco político e institucional en el que se desarrollan las acciones de mitigación y adaptación al cambio climático.

El Fondo de Adaptación

La presentación estuvo a cargo de Segundo Coello, consultor de CAF a cargo de la preparación del proyecto. Se explicó el alcance y forma de operación del Fondo de Adaptación. Se indicó que CAF, además de su rol como banco de desarrollo, es una Agencia Implementadora Regional y está articulando la preparación de la propuesta del presente proyecto.

Cambio climático en la cuenca Toachi – Pilatón

La presentación estuvo a cargo de Nicolás Zambrano del MAE (Foto 4), quien explicó con los mapas disponibles para los grupos (Anexo 2) que el escenario futuro podría ser disminución de la precipitación e incremento de la escorrentía de sedimentos. En porcentaje la mayor disminución de precipitación sería en la parte alta de la cuenca del río Toachi. La disminución de precipitación en la parte baja de ambas cuencas es menor en porcentaje, pero este sector tiene mucha mayor precipitación. Además, hay fuerte presión de deforestación en los bosques de la estribación, lo que agravaría la situación.

Concepto de proyecto

La presentación estuvo a cargo de Segundo Coello, consultor de CAF, quien resumió la propuesta de marco de resultados y presupuesto que se ha esbozado al momento. El proyecto tendría tres componentes: (i) conservar la cobertura vegetal existente, (ii) adaptar las actividades productivas a las nuevas condiciones derivadas del cambio climático y (iii) robustecer las capacidades locales para implementar medidas de adaptación al cambio climático. El proyecto generaría tres resultados y siete productos, tendría una

duración de cuatro años y requeriría un financiamiento de unos USD2.4 millones. Se destacó que el proyecto está a nivel de idea y que los recursos no reembolsables disponibles son limitados, por lo que es necesario priorizar estratégicamente la intervención a realizar.

Se indicó que luego de presentar el concepto al Fondo de Adaptación, se deberá trabajar en desarrollar el proyecto durante los próximos meses. Se trataría de tener listo el documento de proyecto para presentarlo al Fondo de Adaptación en diciembre de 2016, con miras a que sea aprobado en los primeros meses de 2017.

Mesas de trabajo

Los participantes conformaron dos grupos de trabajo que analizaron la cuenca del río Toachi (grupo 1) y la cuenca del río Pilatón (grupo 2). Los grupos realizaron dos sesiones de trabajo, luego de cada sesión se realizó una presentación de resultados en plenaria para tener comentarios y recomendaciones de los demás participantes.

Primera sesión de trabajo en grupo. Análisis de situación

Cuenca del río Toachi

El grupo de cuenca del río Toachi (Foto 5 y Foto 6) indicó que, en efecto, hay un severo problema de deforestación en la cuenca. A esto se suma la invasión de zonas boscosas para ampliar el área agrícola. Se indicó que los bosques protectores existen sólo en papel pues no hay manejo y están muy intervenidos. Igualmente, se indicó que la Reserva Ecológica Los Ilinizas estaría invadida en un 65%.

Los productores de caña de azúcar indicaron que cada finquero usa unos tres árboles semanales para la producción de panela. La madera ha escaseado y cada vez hay que traerla de más lejos o comprarla. La Asociación Flor de Caña de la localidad de Palo Quemado, está trabajando con Maquita Cushunchic para desarrollar la producción de panela orgánica con miras a exportación. Los finqueros están interesados en incorporar tecnología para mejorar la producción. Se está pensando en buscar un combustible alternativo para cocinar el jugo de caña.

La producción agropecuaria tiene bajos rendimientos, predominan los sistemas de producción extensivos. Es común la siembra en laderas y la invasión de las riberas de los ríos. Se considera que un incentivo para que los agricultores se interesen en reforestar y conservar el bosque es apoyarles para incrementar los rendimientos por hectárea.

Se recomendó que las acciones de reforestación se centren en las pendientes y en recuperar las riberas de los ríos principales y sus aportantes. Se resaltó que es indispensable asegurar el cuidado de las plantas que se siembren, no sólo enfocarse en plantar, sino en cuidarles los primeros dos o tres años.

Con respecto a la idea de robustecer la gestión de los bosques protectores existentes, se recomendó enfocarse en los bosques protectores Toachi – Pilatón y Zarapullo. También sería necesario considerar robustecer la gestión de la reserva Los Ilinizas que está en muy mal estado.

Con respecto a la idea de presas artesanales de retención de sólidos, los participantes consideran que tal vez no serían necesarias. Se mencionó que incluso podrían ser destruidas por las fuertes corrientes del invierno. No obstante, se recomendó no excluir la idea del concepto de proyecto. Hay que tener un mejor criterio técnico sobre la utilidad de este tipo de presas en el sistema hídrico Toachi – Pilatón. En todo caso, se destacó que, aunque sean unidades artesanales, será necesario que haya un diseño de ingeniería para asegurar su adecuado funcionamiento.

Con respecto a mejorar los cultivos, se recomendó que se cubra todo el sector desde Sigchos hasta la Unión del Toachi. De ser posible valdría considerar mejoras en los sistemas de riego e incentivar el agroturismo.

Los participantes estuvieron de acuerdo en que hay que mejorar la recopilación de información climatológica, pero destacaron que es necesario asegurar que la información llegue a los gobiernos locales y los pobladores.

Finalmente, el grupo indicó que hace falta mapas de mayor detalle para poder precisar las áreas de intervención.

Los resultados del trabajo en grupo están en la Figura 1.

Cuenca del río Pilatón

El grupo destacó que es necesario pensar en robustecer la conectividad de los hábitats y ecosistemas. Se planteó una serie de criterios para seleccionar los sitios de intervención del proyecto (Figura 2). Se planteó que el proyecto también considere intervenir en las zonas de riesgo de deslaves e inundaciones que existen en esta cuenca.

Con respecto a monitoreo climático, se recomendó repotenciar las estaciones meteorológicas existentes que no están operativas. Es probable que adicionalmente se requiera instalar alguna estación adicional, pero esto debe ser analizado con más detalle. El representante del INAMHI proporcionó un mapa de ubicación de las estaciones meteorológicas e hidrológicas en ambas cuencas (Anexo 4).

Segunda sesión de trabajo en grupo. Acciones del proyecto

Cuenca del río Toachi

Con respecto a áreas para ampliar la cobertura vegetal, el grupo anotó para cada parroquia las localidades que se deberían considerar (Figura 3). No obstante, hacen falta mapas con mayor detalle para ubicar los sitios. Se mencionó que la información sobre uso de suelo es del 2000 (Anexo 2) y no corresponde a la situación actual.

Con respecto a robustecer la gestión de áreas existentes, el grupo propuso que se considere la reserva Los Ilinizas, pero robusteciendo la gestión de la superficie existente pues hay reclamos por terrenos.

Con respecto a robustecer la producción agropecuaria, se propuso trabajar con mejoramiento de pastos en unas 250 h con la Asociación de Ganaderos de Las Pampas, y mejorar unas 200 ha de caña de azúcar con la Asociación Flor de Caña de Palo Quemado. Se recomendó incluir en el proyecto apoyar la mejora

tecnológica de la producción, en particular mejorar la eficiencia energética de la cocción del jugo de caña. También se propuso trabajar con los productores de Quinticusig (Sigchos), quienes producen vino de mortiño.

Con respecto a monitoreo climático, se sugirió incorporar dos estaciones de monitoreo en esta cuenca. Sin embargo, es necesario el criterio técnico del INAMHI.

Se estuvo de acuerdo en incorporar adaptación en los planes de desarrollo parroquial.

Finalmente, se recomendó que las acciones de comunicación y educación ambiental incorporen un componente de educación formal con escuelas y colegios. Además de considerar el uso de medios de comunicación locales y material informativo para el público en general.

Cuenca del río Pilatón

El grupo preparó un mapa hablado en el que se ubica los tributarios de la cuenca que se deberían analizar para intervención (Figura 4). Igualmente destacaron que la información de uso de suelo es muy antigua y que es necesario tener mapas actualizados con mayor detalle para poder decidir las áreas de intervención del proyecto.

Próximos pasos

Se destacó que el concepto será preparado teniendo en cuenta los resultados del taller y que será enviado al Fondo de Adaptación el viernes 29 de julio de 2016. Luego de esto se organizarán reuniones adicionales para precisar acciones con los grupos que se han identificado.

En octubre o noviembre habría un segundo taller con todos los actores clave para revisar el borrador de proyecto y preparar la versión final que se presentaría al Fondo de Adaptación en diciembre de 2016.

Cierre

La clausura estuvo a cargo de Nicolás Zambrano del MAE, quien agradeció los aportes y activa participación de los presentes.

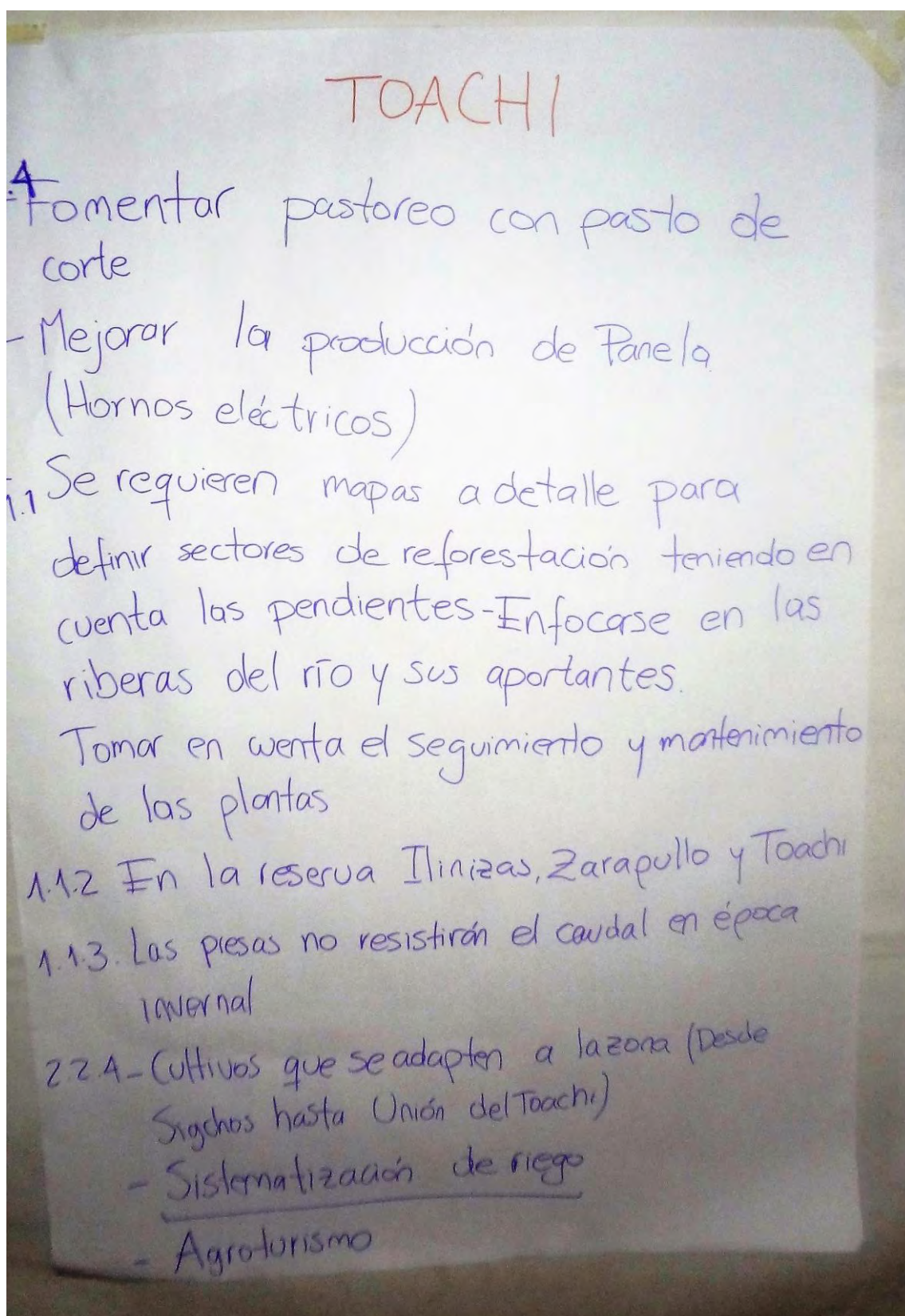


Figura 1. Resultados del trabajo del grupo 1 (cuenca del río Toachi) en la primera sesión de trabajo grupal.

TOACHI

3.5 - Invertir en aplicaciones de información a la comunidad

- Invertir en el mantenimiento, calibración y sistema de base datos
- Transmitir información en radios municipales
- Presupuesto para personal y manejo de la información (luego entregar a GAD)

3.3.6 - Ya se tiene establecido cada GAD (pasar este recurso a otro ítem)

3.3.7 - De acuerdo con la sensibilización en toda la zona. (toda la población)

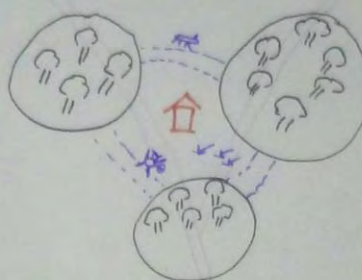
Figura 1. Continuación.

CUENCA DEL RÍO "PILATÓN"

CRITERIO DE SELECCIÓN DE ZONA GEOGRÁFICA

1. ÁREAS AFECTADAS POR INCREMENTO DE PLUVIOSIDAD
- CORREDORES ECOLÓGICOS
- PROPIEDADES PRIVADAS
2. RESERVAS PRIVADAS
- ÁREAS QUE APROVECHAN LOS SERVICIOS DEL ECOSISTEMA
3. ZONA DE MAYOR APORTACIÓN DE SEDIMENTOS
4. ÁREAS CON POTENCIAL TURÍSTICO
- ÁREAS DE PRODUCCIÓN (PUNTO VERDE)
- ÁREAS DE GANADERIA Y AGRICULTURA SUSTENTABLE
5. UNA ESTACIÓN HIDROMÉTRICA DONDE FALTA CONTROL
6. INVERSIÓN EN ZONAS DE ALTO RIESGO (DESlaves, INUNDACIONES)
7. ÁREAS RURALES - PRIORIDAD
- ÁREAS URBANAS - ALTO RIESGO

MEDIDAS RECOMENDADAS



- No Necesario en Pilatón

- Mejoramiento especies
- Productos punto verde - café, cacao
- Planificación Uso de Suelo

- Repotenciar estaciones existentes.

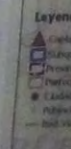


Figura 2. Resultados del trabajo del grupo 2 (cuenca del río Pilatón) en la primera sesión de trabajo grupal.

CUENCAS DEL R. TOACHI

- ① → Parroquia Tsinlivi - Incorporación de Vegetación
 - Pilapuchin, Tunguichi, Itualó, Chinoló Bajo, Guangumala, El Rodeo, Cochalo, Colaguila.

Parroquia Chugchilan

Guayama San Pedro, Guayama Grande, Sigui, Guanto, Chinoló Alto, Canjolo Alto

- Parroquia Sigchos - ~~San~~ Cochalo - Aliso - Yaló, Quinticusig, Yuncusig, Tiliguila - Tagna - Santa Rosa - Guacusig - Amaliquin - Antimpe - Guarumal - Guarumal Grande - Asache - Cutzualó

- Parroquia Las Pampas - San Juan, Sn. Pablo, La Pelicia - Campo Alegre Bajo, Las Juntas, Galapagos - Rio Tingó - Campo Alegre Alto.

- Pelo Quemado - Sarapullo (cuencas) - Praderas del Toachi - La Florida.

Los Minos - Santa Rosa.

- ② → Robustecer las ~~2200~~ Ha. de Reserva. lo existente

③ → NO APLICA!

④ → 250 Ha de gasto y
 As. Ganaderos Las Pampas.

200 Ha. para mejorar la Caña
 Asociación Flor de Caña, Sn. Pablo, Oro Pisan.

Asociación Vino de Mortiño Sigchos
 Punto Verde

- ⑤ → Ampliar el Sistema de Monitoreo en la Cuenca (2)

- ⑥ → Incorporar y Coordinar con los GAD.s Parroquiales

- ⑦ → Plan de educación Ambiental con Escuelas Locales y Medios de Comunicación
 Material Informativo

Figura 3. Resultados del trabajo del grupo 1 (cuenca del río Toachi) en la segunda sesión de trabajo grupal.

Fotos



Foto 1. Casa comunal de la localidad de Unión del Toachi.



Foto 2. Bienvenida a cargo de Nicolás Zambrano del Ministerio del Ambiente.



Foto 3. Bienvenida a cargo de Dayana Vega de CAF.



Foto 4. Presentación de Nicolás Zambrano sobre los posibles impactos del cambio climático en el sistema hídrico Toachi - Pilatón.



Foto 5. Primera sesión de trabajo, grupo 1 (río Toachi).



Foto 6. Primera sesión de trabajo, grupo 1 (río Toachi). Presentación de resultados.



Foto 7. Primera sesión de trabajo, grupo 2 (río Pilatón).



Foto 8. Primera sesión de trabajo, grupo 2 (río Pilatón). Presentación de resultados.



Foto 9. Segunda sesión de trabajo, grupo 1 (río Toachi).



Foto 10. Segunda sesión de trabajo, grupo 1 (río Toachi). Presentación de resultados.



Foto 11. Segunda sesión de trabajo, grupo 2 (río Pilatón).



Foto 12. Segunda sesión de trabajo, grupo 2 (río Pilatón). Presentación de resultados.

Anexo 1. Registro de participantes



Ministerio
del Ambiente

Taller inicial formulación del proyecto para potenciar la resiliencia al
cambio climático en la cuenca hídrica Toachi - Pilatón

Unión del Toachi, 15 de julio de 2016



BANCO DE DESARROLLO
DE AMÉRICA LATINA

POR FAVOR ESCRIBIR EN LETRA DE IMPRENTA

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Ministerio
del Ambiente

Taller inicial formulación del proyecto para potenciar la resiliencia al
cambio climático en la cuenca hídrica Toachi - Pilatón

Unión del Toachi, 15 de julio de 2016



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Taller inicial formulación del proyecto para potenciar la resiliencia al
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Unión del Toachi, 15 de julio de 2016



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Taller inicial formulación del proyecto para potenciar la resiliencia al
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Unión del Toachi, 15 de julio de 2016



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Taller inicial formulación del proyecto para potenciar la resiliencia al
cambio climático en la cuenca hídrica Toachi - Pilatón

Unión del Toachi, 15 de julio de 2016

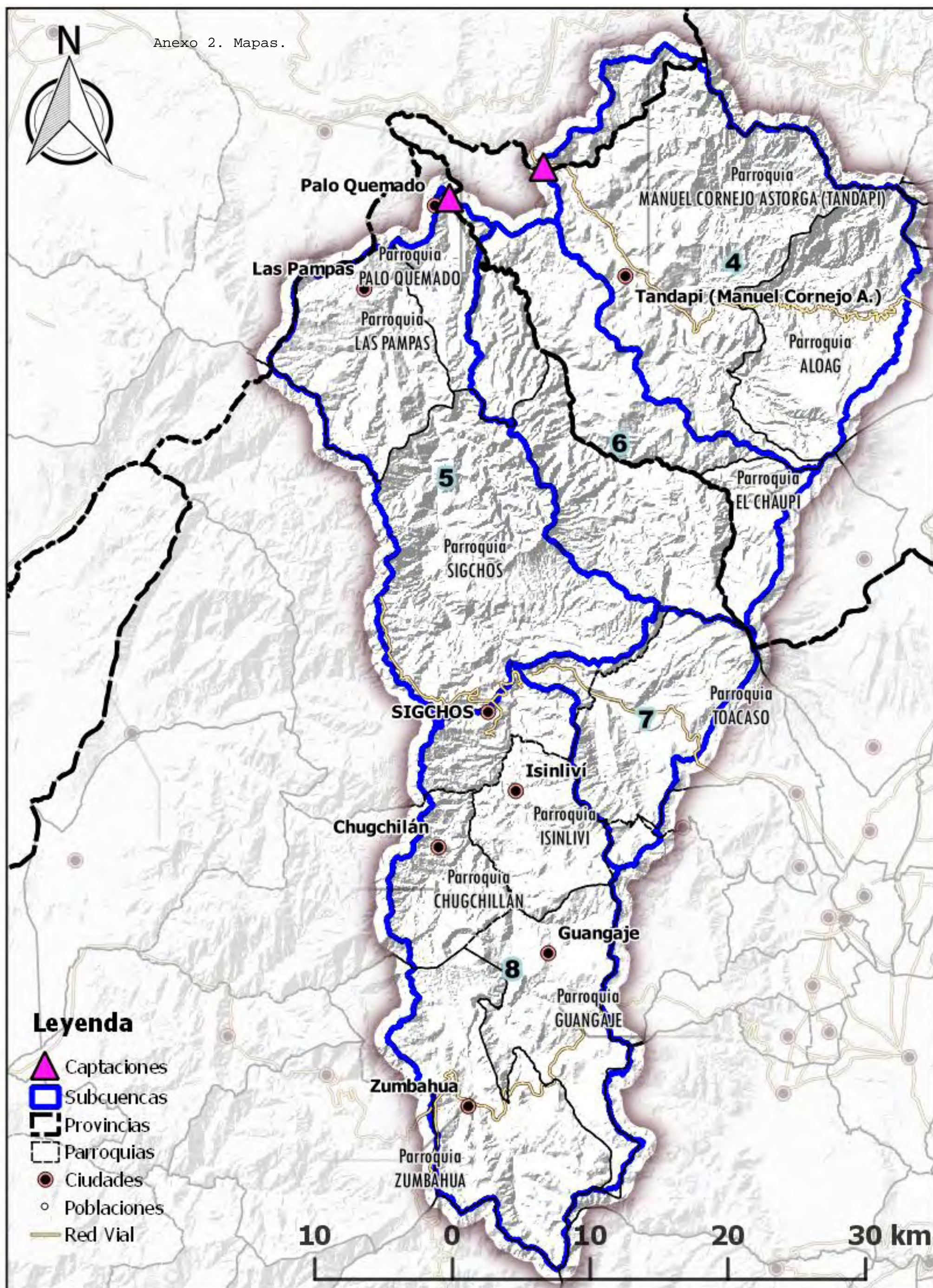


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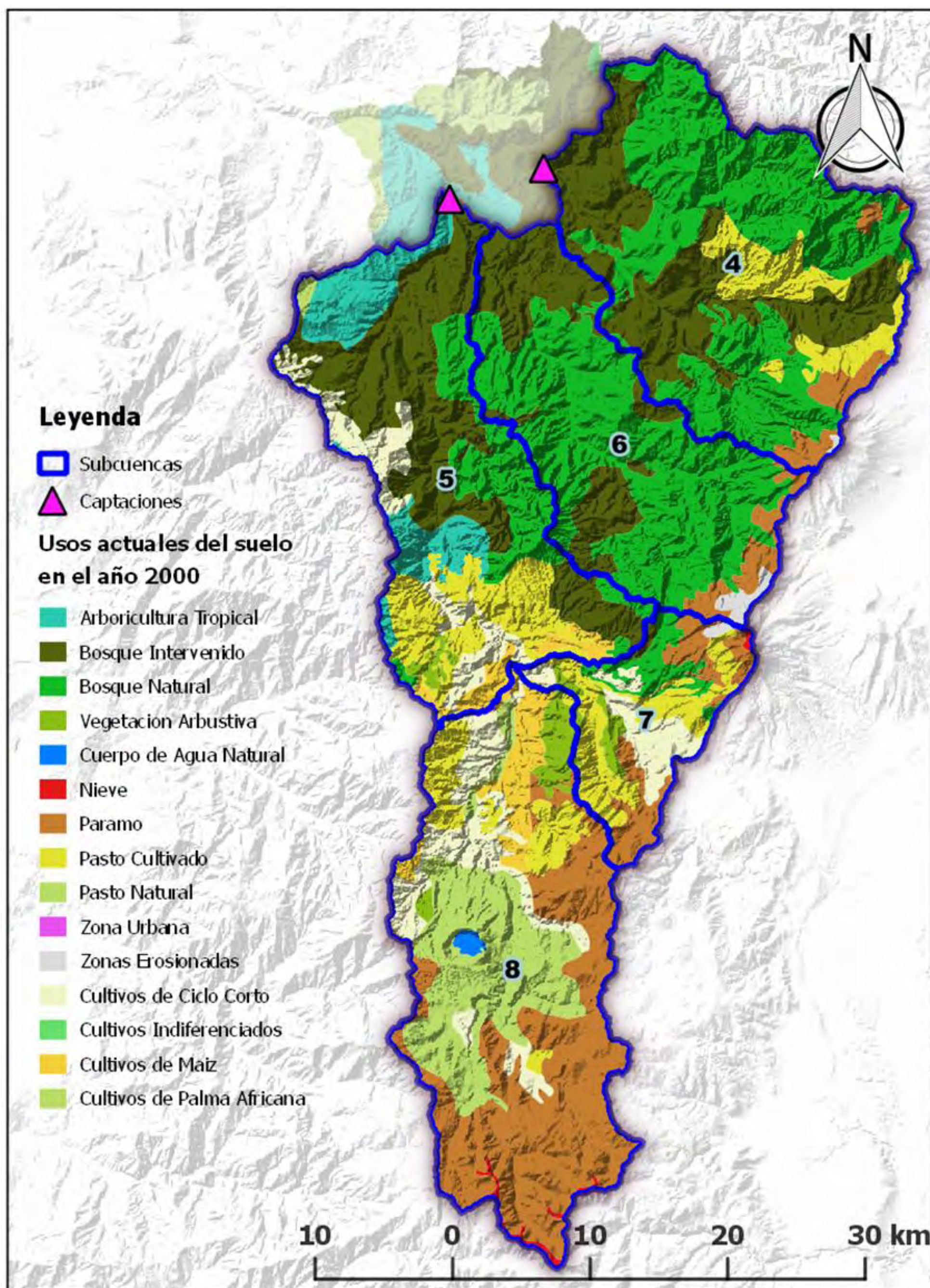
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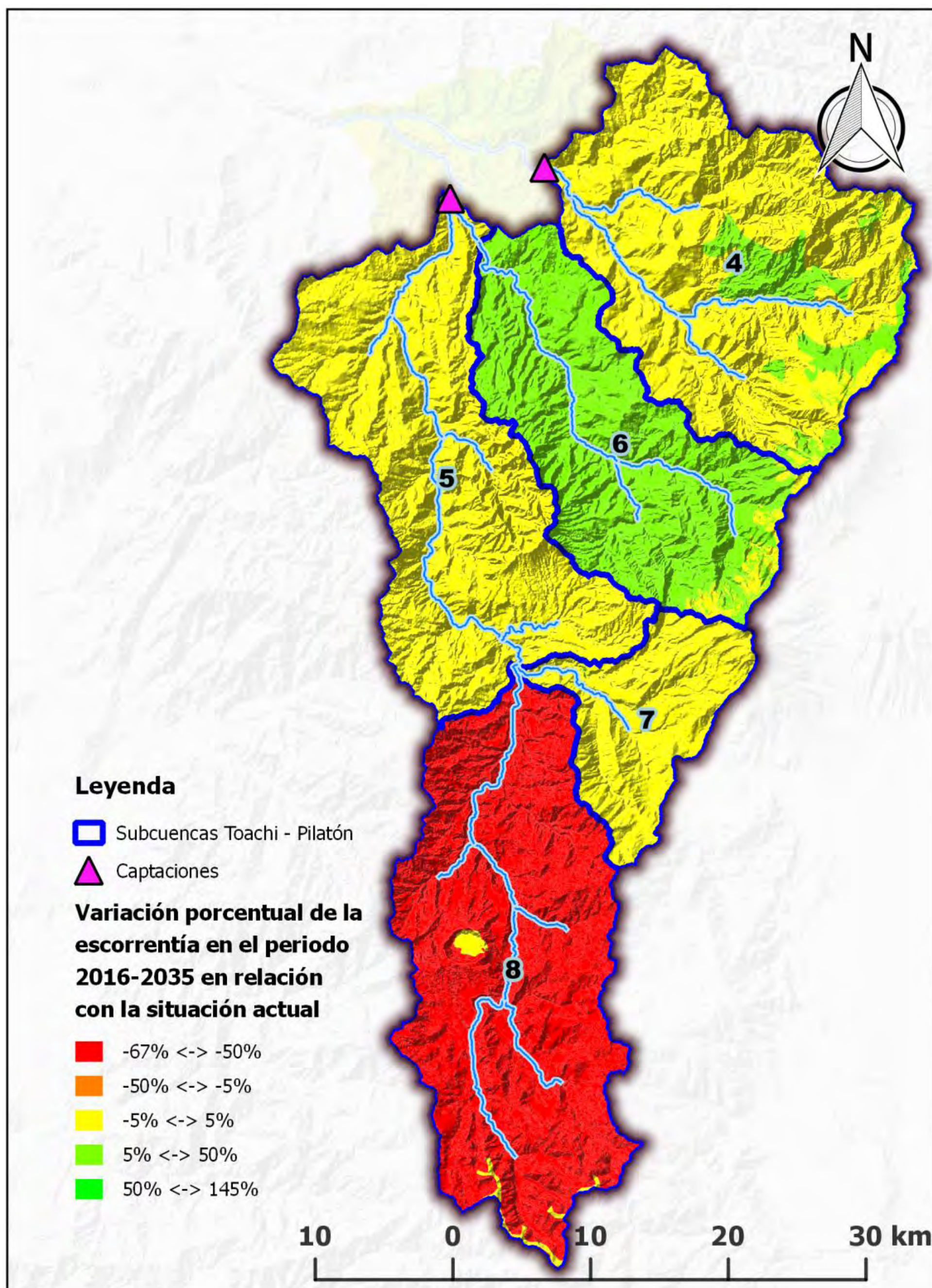
S/S



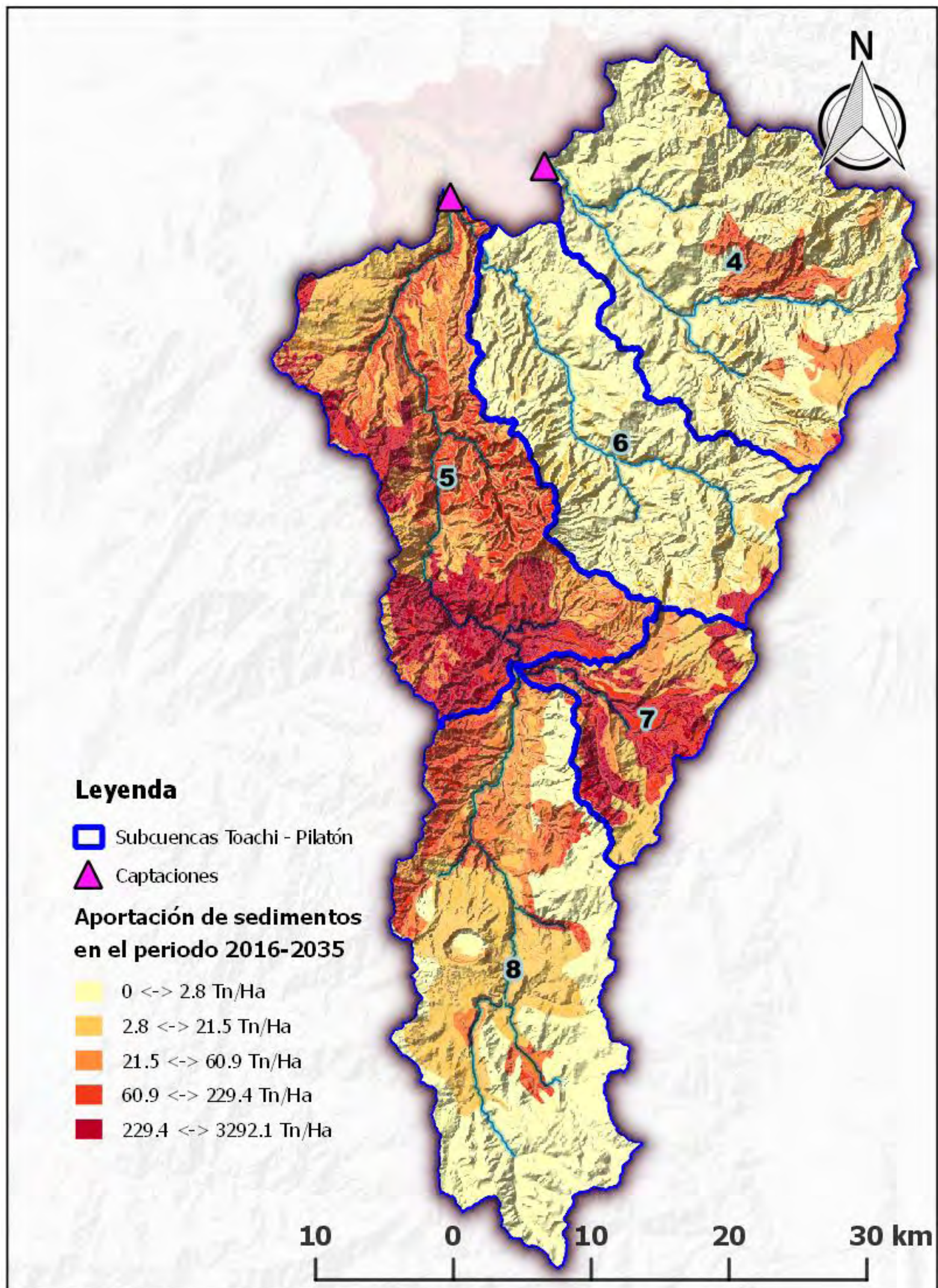
Mapa división político administrativo, con la red vial y con la ubicación de los núcleos urbanos dentro de las subcuencas aportantes de la Central Hidroeléctrica Toachi Pilatón



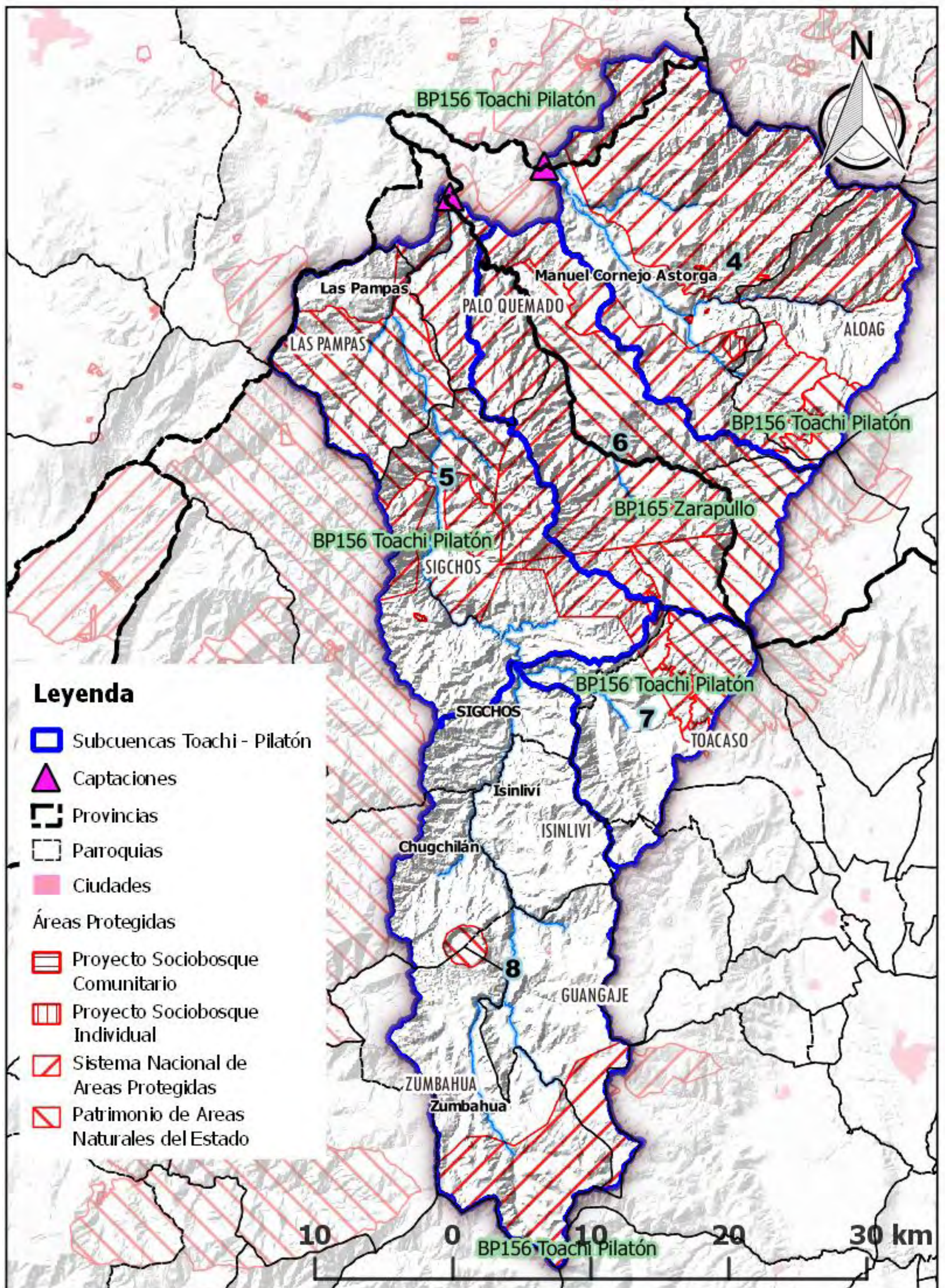
Usos actuales del suelo al año 2000 dentro de las subcuencas de los ríos Toachi y Pilatóns de la CH Toachi Pilatón.



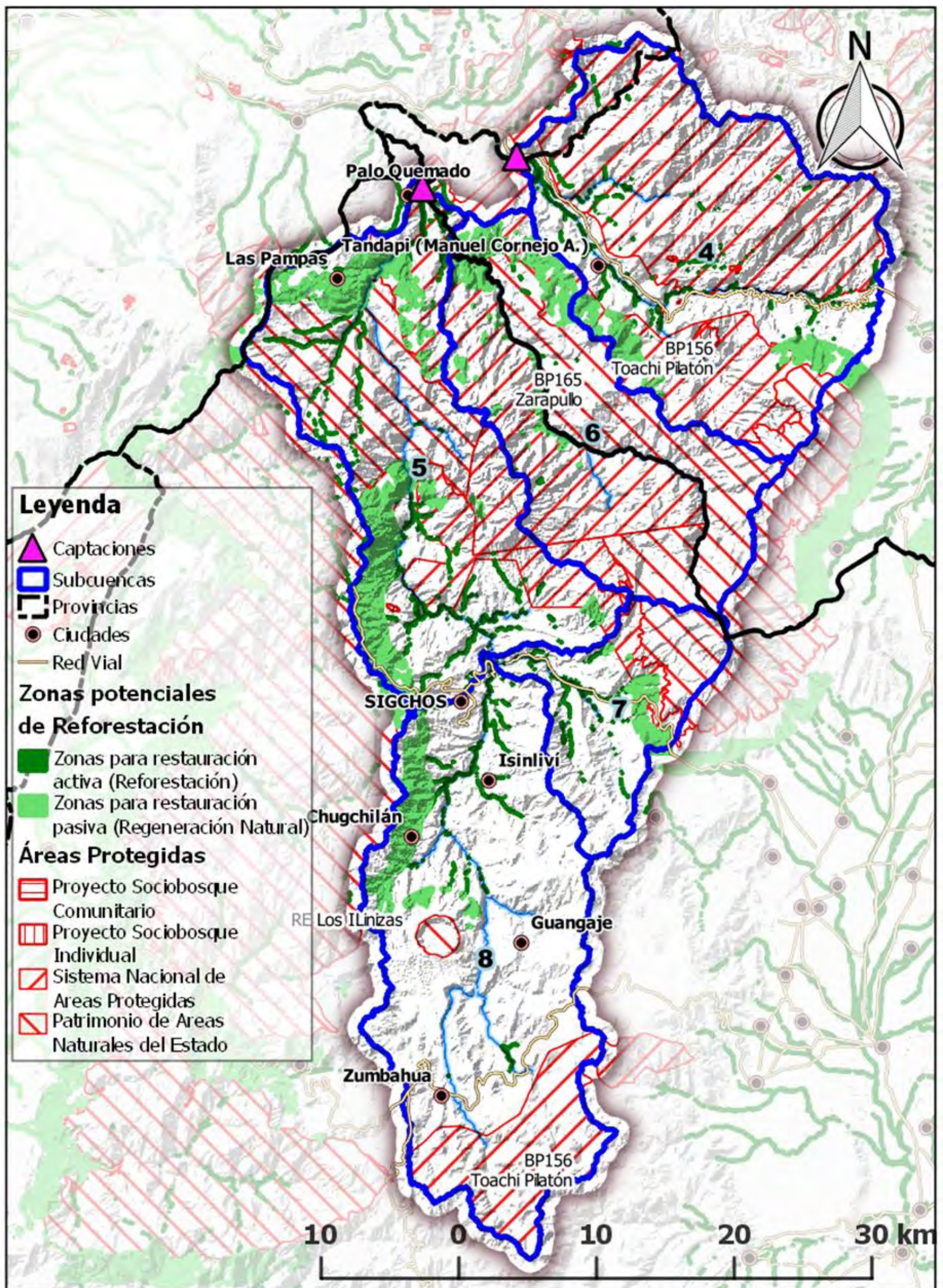
Variación porcentual de la escorrentía en el periodo 2016-2035 en relación con la situación actual, la unidad es en %.



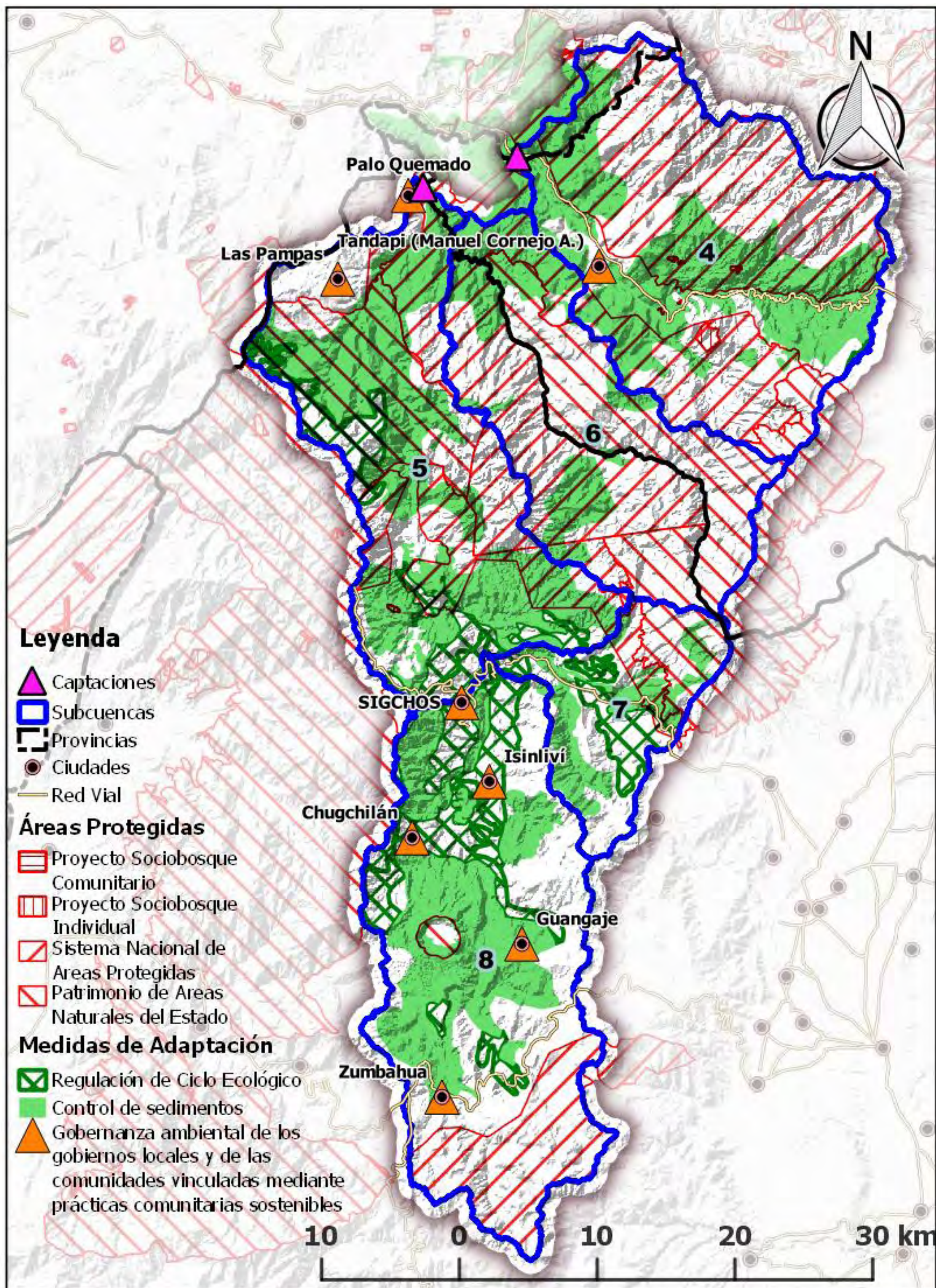
Aportación de sedimentos en el periodo 2016-2035, la unidad es ton/ha



Áreas protegidas, bosques protectores y Socio Bosque incluidos en las subcuencas Toachi y Pilatón



Ubicación de las Zonas de Reforestación Potencial para las subcuencas (río Toachi y río Pilatón), incluye áreas protegidas, centros poblados y subcuencas.



Medidas de Adaptación propuestas para las subcuencas de los ríos Toachi y Pilatón.

Anexo 3. Marco de resultados propuesto.

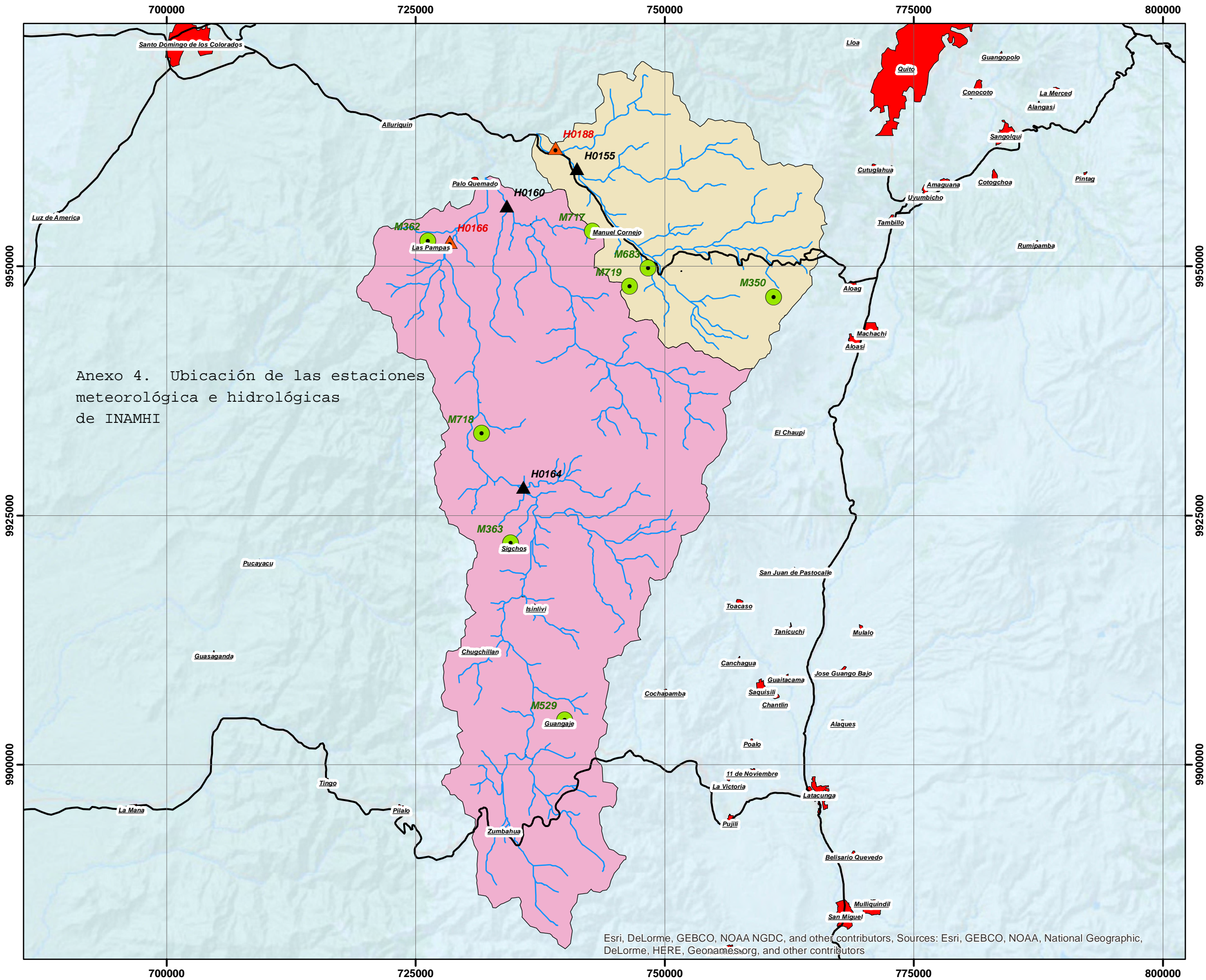
Objetivo Fortalecer la capacidad adaptativa de las poblaciones de la cuenca de los ríos Toachi y Pilatón ante los impactos del cambio climático.

Presupuesto solicitado USD2.400.000 / cuatro años

Componente	Resultados	Productos	Presupuesto referencial (USD)
1. Conservar la cobertura vegetal	1. Se conserva xxx ha de vegetación nativa y se reduce la carga de sedimentos (xxx t/año) para reducir el impacto del cambio climático en el ciclo hidrológico de la cuenca	1. Incorporar 1,000 ha de vegetación nativa bajo esquemas de conservación y manejo forestal sustentable	500,000
		2. Robustecer la gestión de XXX ha de bosques protectores y áreas de conservación existentes	275.000
		3. Construir XXX presas filtrantes para retención de sedimentos.	200.000
2. Adaptar las actividades productivas	2. XX % de la superficie cultivada incorpora prácticas de producción sustentable ajustadas a los posibles impactos del cambio climático	4. 125 ha de cultivos han adoptado prácticas sostenibles para adaptarse al cambio climático	1.000.000
3. Robustecer las capacidades locales y compartir experiencias	3. Población y gobiernos parroquiales con mayor capacidad para implementar medidas de adaptación al cambio climático	5. Ampliar la capacidad de monitoreo hidro-climático (4 estaciones hidrométricas y 3 estaciones meteorológicas) y de entrega de información a la comunidad.	200.000
		6. XXX planes parroquiales incorporan medidas de adaptación al cambio climático con perspectiva de cuenca hidrográfica.	75.000
		7. Plan de sensibilización y educación sobre adaptación al cambio climático implementado (XXX personas / XXX % población).	150.000

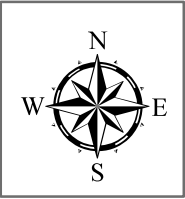
Agenda	Notas
08:30 h Registro de participantes	Dentro de subcuenca del río Blanco
09:00 h Bienvenida	
09:15 h Presentación de participantes	Cantones Santo Domingo (Santo Domingo) Sigchos y Pujilí (Cotopaxi), Mejía (Pichincha)
09:30 h Revisión de la agenda	
09:45 h Introducción al cambio climático	Parroquias Aloag, Manuel Cornejo
10:00 h El Fondo de Adaptación	Astorga (Tandapi) [Pichincha], Alluriquin [Santo Domingo], Las Pampas, Palo quemado Sigchos [Cotopaxi]
10:15 h Cambio climático en la cuenca Toachi – Pilatón	
10:30 h Concepto de proyecto	Acelerada deforestación y cambio de uso de suelo
11:00 h Trabajo en grupo. Análisis de situación	Incremento de sedimentos en los ríos
12:00 h Presentación de los grupos	Pronóstico reducción 25% de pluviosidad
13:00 h Almuerzo	
14:00 h Trabajo en grupo. Acciones del proyecto	
15:00 h Presentación de los grupos	
16:00 h Próximos pasos	
16:30 h Cierre	

MAPA DE LOCALIZACIÓN DE ESTACIONES MATEOROLÓGICAS E HIDROLÓGICAS SUBCUENCA TOACHI - PILATÓN



Anexo 4. Ubicación de las estaciones meteorológica e hidrológicas de INAMHI

- Leyenda**
- ESTACIONES MATEOROLÓGICAS
 - ESTACIONES HIDROLÓGICAS OPERATIVAS 2016
 - ESTACIONES HIDROLÓGICAS NO OPERATIVAS 2016
 - VIAS_MOP_WGS84
 - RIOS
 - RÍOS
 - SUBCUENCA TOACHI
 - SUBCUENCA PILATÓN



Ubicación en el Ecuador

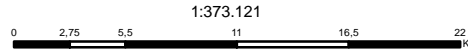


REPÚBLICA DEL ECUADOR
Secretaría Nacional de Gestión de Riesgos
Instituto Nacional de Meteorología e Hidrología

Mapa de localización de estaciones Meteorológicas e Hidrológicas Subcuenca Toachi - Pilatón

Fuente:
Mapa Base: I.G.M, SGR, INAMHI (Escala 1:50.000)

SISTEMA DE COORDENADAS:
UTM. Elipsoide Internacional Datum Horizontal
WGS84 (World Geodetic System) Zona 17S



INAMHI	Formato de impresión:	Mapa:
Dirección de Hidrología	DIN A3	No_1

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors, Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors



Workshops for the project “Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilaton watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management.”

Session Plan

ANNEX 4 - D

July 24 of 2017

Content

Introduction	3
Objective of the consultation sessions	3
Groups to be invited:.....	3
To take into account for the invitation:	3
Sigchos.....	4
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Introduction

This is a proposal of the session plan to apply into the stakeholder consultation meetings related to the project.

Objective of the consultation sessions

To present and receive feedback the components of the project together with the community and local actors, with the purpose of incorporating their contributions and comments.

Groups to be invited:

The entities and groups that participated in the consultation workshops held on July 15, 2016 in the communal house of Union del Toachi and others identified in previous meetings and by local actors.

Organizations / representatives of vulnerable groups (women, the elderly, the disabled, migrants, etc.) who can be co-executors for the project.

To take into account for the invitation:

1. Announce in advance the realization of the event and been aware to avoid coinciding with any other planned event
2. Choose an easily accessible place for communities (or provide the means of transportation to get there)
3. Ensure comfortable and safe spaces for all participants. If necessary, call separately men and women, and even consider the need to have a facilitator for men and a facilitator for women
4. Identify whether women in the community have where to leave their children (or if they can bring them) during the consultation workshop.
5. Establish a schedule that favors participation (which does not intercede with working hours or complicated schedules for people who take care of relatives, this is linked to the previous point)
6. Take into account the language of the communities for the facilitation of the consultation (Spanish may not be the suitable language)
7. If representatives of communities participate, verify that they effectively represent their community (and not just a particular group or sector)

Taking into account that, the interest of the participants focuses directly on the areas of influence of the project, that involve their communities and farms, it is proposed to conduct two separate workshops with the participation of stakeholders in each basin, ie a workshop for the stakeholder group from the Toachi River sub-basin and another stakeholder group from the Toachi River sub-basin.

Sigchos

The event will be held on Monday, July 24, 2017 in the city of Sigchos, starting at 10h00. It is important to coordinate with the Director of the Directorate of Sustainable Development, Mr. Ivan Gomezjurado (0999-666650) of the Municipal GAD, who has contact with the communities of different parishes and knows who their representatives are.

Transportation to facilitate the moving for the meeting of Las Pampas and Palo Quemado participants is provided by consultant.

The event in Sigchos will be attended by representatives of this parish and will also send the invitation to the communities of:

1. Las Pampas Agüilla, y
2. Palo Quemado
 - 2.1. Community of Santa Rosa
 - 2.2. Community of La Florida
 - 2.3. Praderas del Toachi
3. GAD Municipal de Sigchos

Manuel Cornejo Astorga (Tandapi)

1. The next workshop will be held on Tuesday, July 25, 2017 in Tandapi. For this final socialization process, apart from Tandapi representatives, the invitation will be sent to the communities of:Manuel Cornejo Astorga
 - 1.1. Comunidad La Esperie
 - 1.2. Comunidad Pampas Argentinas
 - 1.3. Comunidad La Esperanza
 - 1.4. Comunidad El Mirador
 - 1.5. Comunidad Mirabad
 - 1.6. Comunidad El Paraíso
 - 1.7. Comunidad San Francisco
 - 1.8. Comunidad Los Olivos
 - 1.9. Comunidad Peñas Blancas
 - 1.10. Comunidad Ilusión
 - 1.11. Comunidad Canchacoto
 - 1.12. Comunidad Iliolan
 - 1.13. Comunidad de San Antonio
 - 1.14. Cordilleras del Paríso
2. GAD Municipal Mejia
 - 2.1. Aloag

2.2. GAD Municipal Machachi

In addition, the invitation will be made to officials from public and private institutions that participated in the first workshop in July 2016 and others identified in previous meetings and by local actors.

Prior activities to the consultation meetings

Sigchos y Tandapi

1. The Ministry of Environment (MAE) will send a letter addressed to Dr. Mario Andino Escudero Mayor of the city of Sigchos (with a copy to Dr. Iván Gomezjurado) to kindly request the use of the Municipal Hall.
2. Perform a guest list, considering changes in the functions of public servants or incorporation of new players.
3. Taking into account the recommendations of the Adaptation Fund, concerning gender issues, special emphasis should be made on the invitation to groups of women and vulnerable groups. It is expected to exceed 35% of female attendance reached at the first socialization workshop. Representatives of the elderly or disabled groups should also be considered.
4. Coordinate with the municipal and parish GAD's the delivery of printed invitations to the participants.
5. Make phone calls to the guests to confirm their attendance.

Session plan

Date of the event: Monday 24 July in Sigchos and Tuesday 25 July in Tandapi.

Location: Municipal Hall of Sigchos and meeting room of the Parish of Tandapi.

Objective: Present and get feedback about the components of the project together with the community and local actors, with the purpose of incorporating their contributions and comments.

Key activities:

1. Report on the progress of the project to the Adaptation Fund.
2. Present the draft project
3. Receive comments from local stakeholders.

Expected outcomes:

1. Comments for adjustment of draft project document
2. Agreement on the next steps for submission of the project to the Adaptation Fund

Session Plan and Visits and Workshops Memoir

Considering the time of mobilization of some distant parishes, it is considered appropriate for the meeting to begin at 10:00 a.m. The total time required is 300 minutes (5 hours).

Hour	Activity	Responsible and notes
15min 10h00- 10h15	Registration of participants	At the entrance to the site, a table should be available to attend the participants. A person must be available for registration in an elaborate format. An identification with the name of each participant will also be given to wear on the flap. Debe estar disponible un servicio de bebidas frías y calientes y bocaditos para que los participantes los consuman durante la reunión.
15 min 10h15- 10h30	Wellcome words	Initial welcome by local authorities, MAE. And representative of CAF
10 min 10h30- 10h40	Participants presentation one by one	Participants will be asked to make a brief individual presentation, indicating the name, activity, place of origin and entity they represent.
10 min 10h40- 10h50	Agenda presentation	The purpose of the meeting will be explained. Rules will be established (avoid cell phones, respect the use of the word, listen to opinions of all). The agenda will be explained. Digital projector required.
30 min 10h50- 11h20	Status of the project	PowerPoint presentation (15 minutes). The CAF representative will present (i) an explanation of the Adaptation Fund (1 sheet), (ii) background of the project (1 sheet), (iii) timeline of the process carried out (1 sheet), (iv) Critical themes (1 or 2 sheets). Questions and answers (15 minutes). In the event that there is a power outage, the presentations of the components in paperboard will be made detailing the relevant aspects and verbally explaining each of them.
60 min 11h20- 12h20	Presentation of draft	PowerPoint presentation (20 minutes). The elements of the project will be presented with emphasis on (1) logical framework (products and results), (2) budget and (3) implementation arrangements. Clarifying questions and answers (20 minutes).
60 min 12h20- 13h20	Plenary or working groups	Depending on the number of people involved, a plenary session (<15 persons) or groups (> 15 persons) will be held. It is advisable to identify groups of homogeneous interests and group them (eg, associations, NGOs, etc). In both cases, it will seek to obtain recommendations and suggestions from the participants. Interventions should be recorded to have record for memory. Guiding questions: <ul style="list-style-type: none"> • Did you have any participation during the project design? • What do you consider to be the main achievements to be achieved with this project? • What aspects do you think should be improved? • Sustainable agriculture is economically viable. What do you think? • Can public and private bank financing and COACs be considered as an important tool to promote more sustainable agriculture? • How could the Water Fund interact with the Basin Councils? • What are the most relevant obstacles of the project that should be considered? • How do you think your community could contribute to the achievement of the project? • How could - from its individual or associative role - contribute to the long-term sustainability of the project?

Session Plan and Visits and Workshops Memoir

Hour	Activity	Responsible and notes
		<ul style="list-style-type: none"> • In what measures could vulnerable groups and women benefit from this project? • What sustainable agricultural or livestock practices are being carried out by your community or association? <p>Questions will be given in a printed document. One sheet per group.</p> <p>In addition, an anonymous survey will be conducted among those attending to know their situation of access to credit. Appendix 1</p> <p>Expected results: To know, from the perspective of the residents of the area of influence of the project, their points of view about the relevance of the measures proposed in the components, and the degree of incidence in their living conditions. Also know their empowerment and predisposition for the implementation of the project.</p> <p>Section of the project that reinforces this part:</p> <p>Point 3: Does the project / program provide economic, social and environmental benefits, in particular to vulnerable communities, including gender considerations, avoiding or mitigating negative impacts, in accordance with the Environmental and Social Policy and Gender Policy From the bottom?</p> <p>Point 9: Has a consultative process been carried out involving all key stakeholders, including gender considerations in compliance with the Environmental and Social Policy and the Gender Policy of the Fund?</p>
13h20-14h20		LUCH TIME
40 min 14h20 15h00	Plenary only with women and vulnerable groups	<p>Open forum of opinions and impressions by groups of women and vulnerable groups attending the event. Through open-ended questions, participation will be promoted, so they could present their opinions, doubts or concerns about how the project will affect their daily lives. Their expressions and comments will be recorded by the consulting team.</p> <p>Guiding questions:</p> <p>What are the labor or personal difficulties you face in your day to day life in your community?</p> <p>What is your personal opinion about the project, what concerns you or what leaves you with doubts?</p> <p>How does your economic activity and your family life relate to the scope of the project?</p> <p>To what extent do the public policies in your community affect your role within it?</p> <p>Which components of the project do you consider most relevant to your current situation?</p> <p>What aspects of the project should be improved from the perspective of the group you represent?</p> <p>Which components of the project directly benefit vulnerable groups and women?</p> <p>Expected results: To know more deeply, from the perspective of vulnerable groups and women, their empowerment and degree of affinity with the scope of the project. Also identify aspects to be improved regarding gender assessment within the wording of the Final Proposal</p> <p>Section of the project that reinforces this part:</p> <p>Point 3: Does the project / program provide economic, social and environmental benefits, in particular to vulnerable communities, including</p>

Session Plan and Visits and Workshops Memoir

Hour	Activity	Responsible and notes
		gender considerations, avoiding or mitigating negative impacts, in accordance with the Environmental and Social Policy and Gender Policy From the bottom? Point 9: Has a consultative process been carried out involving all key stakeholders, including gender considerations in compliance with the Environmental and Social Policy and the Gender Policy of the Fund?
10 min 15H00- 15H10	Closure	The CAF representative explains the next steps (it would be useful to have a PowerPoint slide) and thank the participants. Closure by the Ministry of Environment if possible.

Logistics requirements:

1. Room with capacity to accommodate about 30 people sitting, with ease so that they can work in groups, using walls to place their results.
2. A person who takes notes of the interventions for memory.
3. Digital Projector.
4. Digital recorder.
5. Maps printed in A1 format.
6. In the case of group work: flip charts, masking, two-color thick tip markers.

SURVEYS

ACCESS TO FINANCING

SEXO: ☐ F ☐ M

OCUPACION: _____

SECTOR EN EL QUE VIVE: _____

Esta encuesta es de carácter anónimo, la información recabada servirá para conocer la situación de acceso a crédito en las zonas de influencia del proyecto.

1) ¿Tiene cuenta de ahorros? SI ☐ (pase a pregunta 2)

NO ☐ (pase a pregunta 3)

2) ¿En qué institución financiera tiene su cuenta de ahorros?

3) ¿Tiene crédito con alguna institución financiera? SI ☐ (pase a pregunta 4)

NO ☐ (pase a pregunta 6)

4) ¿Con qué institución financiera trabaja?

Banco Privado: ☐ Nombre de la institución: _____

Banco Público: ☐ Nombre de la institución: _____

Cooperativa de Ahorro y Crédito: ☐ Nombre de la institución: _____

5) ¿En qué invierte usualmente su crédito?

Capital de trabajo (mercadería, materia prima) ☐

Activos Fijos (máquinas, implementos) ☐

Consumo (viajes, alimentación, etc.) ☐

Otros: ☐ Especifique: _____

6) ¿Qué aspectos considera que deberían mejorar las instituciones financieras de su localidad? (seleccione máximo 2 respuestas)

Tasa de interés ☐ Plazos más largos ☐

Trámites más sencillos ☐ Flexibilidad de garantías ☐

Agilidad ☐ Acceso a crédito ☐

Session Plan and Visits and Workshops Memoir

7) Comentarios:

Gracias por su atención. ¡Que tenga una buena tarde!

GENDER AND VULNERABLE GROUPS

Datos Generales:

Fecha: _____ Nombre: _____

Edad: _____ Ocupación: _____ Lugar donde vive: _____

Preguntas:

1. Indique por qué son importantes las mujeres y los grupos vulnerables en cada componente del proyecto y que sugerencias tiene para ser considerado:

Componente 1: Conservación de cobertura vegetal

Componente 2: Adaptar las prácticas agrícolas y las nuevas condiciones de cambio climático y permitir su financiamiento sustentable

Componente 3: Fortalecer las capacidades locales y compartir lecciones

2. Escriba los nombres de las asociaciones, organizaciones, grupos que existen en su parroquia en la que participen mujeres y grupos vulnerables. Además llene los datos de la tabla.

Nombre Asociación, Organización o Grupo	Número de mujeres	Número de personas que son parte de los grupos vulnerables	Actividad Económica principal de la Asociación, Organización o Grupo	Tipo de productos que produce la asociación, organización o grupo	¿Es propietario de algún predio? (a nivel de la asociación)

Session Plan and Visits and Workshops Memoir

3. Describa la situación en general de los grupos vulnerables en su parroquia, asociación, organización, comunidad o recinto (Sigchos solamente)

4. Indique los siguientes dato(Tandapi solamente)

Salario mensual (USD) de: mujeres: _____ hombres: _____

Grupos vulnerables: _____

Es dueño de un terreno: Si ___ No___ Qué produce en su terreno: _____

Escriba como ha sido amenazado con el cambio climático:



Project: “Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilaton watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management.”

Report of consultation of stakeholders and workshops

Visited Places

- Sigchos
- Las Palmas
- Palo Quemado
- Tandapi
- Hidrotoapi
- Mejia

ANNEX 4-C

República del Ecuador

July of 2017

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MEMOIR OF VISITS TO GOVERNMENTS AUTONOMOUS DECENTRALIZED (GADs)

INTRODUCTION

During the construction of the Final Proposal for the Adaptation Fund under the project "Enhancing the adaptability of local communities, ecosystems and hydroelectric systems in the Río Blanco upper basin, with emphasis on Adaptation to Ecosystems and Communities and the Integrated Management of Adaptive Basins, "a route of each of the decentralized autonomous governments related to the management of the Río Blanco upper basin.

In the following order were visited the GAD's of: Sigchos, Las pampas, Palo Quemado, Tandapi and Machachi.

The organization of the trip and the visits was made by Nicolás Zambrano, an official of the Ministry of the Environment (MAE) and as a counterpart, the following persons were present during the visits:

- Dayana Vega Officer of the Adaptation to Climate Change Division of the Latin American Development Bank (CAF)
- Mauricio Velásquez, Executive of the Environment of the Latin American Development Bank (CAF)
- Diego Quishpe, Team consultant of Yapu Solutions
- Alvaro Torres, Team consultant of Yapu Solutions
- Miguel Herrera, Team consultant of Yapu Solutions

The schedule for the visits was as follows:

Proyecto "Incremento de la capacidad adaptativa de comunidades locales, ecosistemas y sistemas hidroeléctrico en la cuenca hidrográfica del Toachi-Pilatón con enfoque de Adaptación basada en Ecosistemas y Comunidades y Manejo Integral Adaptativo de Cuenas Hidrográficas"			
SALIDA MIÉRCOLES 12 DE JULIO			
HORA	LUGAR	ACTIVIDAD	PARTICIPANTES
06H00	MAE	SALIDA	MAE, CAF
06H00-07H00	QUITO-ALOAG	RECORRIDO, ENCUENTRO CON CELEC EP	MAE, CAF, CELEC EP
07H00-08H30	ALOAG-SIGCHOS	RECORRIDO	MAE, CAF, CELEC EP
08H30-09H30	SIGCHOS	ENCUENTRO CON MAEDP COTOPAXI / REUNIÓN	MAE, CAF, CELEC EP, MAEDP COTOPAXI - GADM SIGCHOS
09H30-11H30	SIGCHOS-LAS PAMPAS	RECORRIDO	MAE, CAF, CELEC EP, MAEDP COTOPAXI
11H30-12H30	LAS PAMPAS	REUNIÓN	MAE, CAF, CELEC EP, MAEDP COTOPAXI - GADP LAS PAMPAS
12H30-13H30	LAS PAMPAS	ALMUERZO	MAE, CAF, CELEC EP, MAEDP COTOPAXI
13H30-15H30	LAS PAMPAS-PALO QUEMADO	RECORRIDO	MAE, CAF, CELEC EP, MAEDP COTOPAXI
15H30-16H30	PALO QUEMADO	REUNIÓN	MAE, CAF, CELEC EP, MAEDP COTOPAXI - GADP PALO QUEMADO
SALIDA JUEVES 13 DE JULIO			
HORA	LUGAR	ACTIVIDAD	PARTICIPANTES
08H00-10H00	HIDROTOAPI	RECORRIDO HIDROELÉCTRICA	CAF, CELEC EP
10H00-11H00	HIDROTOAPI-TANDAPI	RECORRIDO	CAF, CELEC EP
11H00-12H00	MANUEL CORNEJO ASTORGA (TANDAPI)	REUNIÓN	CAF, CELEC EP, GADP MANUEL CORNEJO ASTORGA (TANDAPI)
12H00-13H00	MANUEL CORNEJO ASTORGA (TANDAPI)	ALMUERZO	CAF, CELEC EP
13H00-14H30	TANDAPI-MACHACHI	RECORRIDO	CAF
14H30-15H30	MACHACHI	REUNIÓN	CAF, GADM MEJIA
15H30-17H00	MACHACHI-QUITO	RECORRIDO	CAF

Objective: The main objective of these on field visits was to inform the various stakeholders about the progress of the adaptation project, the next steps to take, the presentation of the team of consultants and know their concerns. During the visits it was also sought to know the activities planned by the autonomous governments decentralized within their territories and that had close link with the components of the project.

Methodology: Plenary sessions were held with all participants, motivating stakeholders to openly express their views on the project's approach and scope,

detailing the concerns or concerns from its perspective. These interviews were documented by the members of the consulting team. Transcripts of the most relevant aspects are recorder in this document.

VISIT 1

DATE: Wednesday July 12 from 09h30 to 11h00

PLACE: Gobierno Descentralizado Municipal de Sigchos.

ATENDANTS: Dr. Mario Andino Escudero, Alcalde de Sigchos, Dr. Iván Gomezgurado, Director de Sustainable Development, Heidi Niño y Daniel Obando from CELEC EP Nicolás Zambrano, Dayana Vega, Mauricio Velásquez, Diego Quishpe, Alvaro Torres y Miguel Herrera. (Anexo 2).

ABSTRACT: The representatives of the Municipal GAD of Sigchos stated that they were aware of the adaptation project and the importance of its implementation in their territories. They emphasize their total willingness to collaborate in the implementation of this project in the Sigchos canton, since they recognize the importance of their territories for the generation of the water resource that towards the western flank turn into the rivers named Río Blanco.

They explain that the agricultural activities are generating affectations that put at risk the capacity of its ecosystems of paramo and montane cloud forest to be able to regulate the water cycles. They highlight the difficulties and restrictions they have in order to develop projects oriented to the protection of the river basin, which is evident in the limiting composition of staff of the direction of sustainable development because, hardly has a technician and its annual budget allocated is restricted.

However, there have been specific initiatives aimed at strengthening capacities, so the Municipal GAD of Sigchos has the “Punto Verde” award granted by the Ministry of the Environment in 2017. They also work in conjunction with ESPE and Catholic universities to train the farmers of the area in Good Agricultural Practices.

Additionally, they state that at present they have a system of monitoring the quality of water for consumption and with two wastewater treatment plants for the city.

There is also an initiative to produce mortiño wine, which grows wildly. This project has been running for three years, involving about 60 families, whose members are part of the 130 existing partners. It is estimated that this activity also indirectly generates economic benefits to 90 people in the area.

Regarding the synergies to work in the implementation of the project, the Director of the Sustainable Development has proposed the following working areas in his canton

- 1) Water sources conservation,
- 2) Reforestation,

- 3) Soil conservancy, y
- 4) Socio-organizational development.

The GAD of Sigchos has been working with about 40 organizations from the existing 80, with which awareness and reforestation processes have been carried out.

It is stressed that, for the execution of these projects, the following technical aspects must be considered in order to achieve an effective implementation:

- 1) Water sources inventory,
- 2) Status of the vegetation coverage of intervention sites,
- 3) Communities' inventory.

The canton of Sigchos counts on parishes located in zones of paramo and subtropical, the ones that are to the south are those that more environmental affections have. Deforestation is a problem that could not be controlled, even though almost 70% of the canton is within the Los Illinizas Ecological Reserve.

In the city of Sigchos there are credit and saving cooperatives: San Miguel De Sigchos (segment 4), Unión y Progreso (Segment 3) and CACPECO (Segment 1)

Finally, it is agreed with the authorities of Sigchos, that the socialization workshop of the adaptation project, would be held on July 24, for which the respective invitation will be extended, emphasizing the importance of female participation.

VISIT 2

DATE: Wednesday, July 12 from 14h20 to 15h30

PLACE: Gobierno Parroquial de Las Pampas

ATTENDANTS: Mario Porras Presidente del GAD Parroquial Las Pampas, Elizabeth Ati y Leoda Porras from GAD Las Pampas, Clara Villamarín y Judith Pérez from women association Marianita de Jesús, Galo Hernández Livestock Association President of Las Pampas, Nicolás Zambrano, Dayana Vega, Mauricio Velásquez, Heidi Niño y Daniel Obando from CELEC-EP, Diego Quishpe, Alvaro Torres y Miguel Herrera.

ABSTRACT: Attendees of the meeting express that they have perceived that the climate in the area has varied in the last 10 years, in summer the rivers reduce significantly their flows, which generates difficulties for the farmers of the zone, for this reason many crops of naranjilla and sugar cane, getting closer to the banks.

Although they do not have upgraded to irrigation systems, they mention that they once did a drip irrigation project for family farms.

Livestock for fattening is another activity of the area, there are about 1,200 heads of cattle belonging to the 26 members of the association. Of a significant number

of cattle there is no record of their status or location. Livestock is extensive, so an average of 1.5 head of cattle per hectare is estimated.

The manufacture of panela is traditional in the area, many producers have been improving their technology with the help of the Cooperative of Savings and Credit Maquita Cusunchig. The burners they use today in part use bagasse from the same cane as a source of energy through their combustion. This has significantly diminished the use of wood that they remove from the forests. In addition, the panela of the Palmas manufacturers has obtained quality certifications to be able to export the product in the close future.

As main problems in Las Pampas, attendees mention the sewer system, which is already several years old and needs maintenance and expansion. Likewise, there is discomfort with the management of the garbage because at present the waste, without any classification, is deposited in a dump less than 50 meters from the nearest human settlements. This dump does not have any type of cladding, and is located near a ravine.

Illegal deforestation is an issue that seems daily and of which there is a lack of action coming from MAE.

Moreover, the attendees show their concern about the mining activity, which indicate that it is being developed in the contiguous parish, Palo Quemado. They reject mining, and are afraid that their operation will deteriorate the quality of water and soils.

Last but not least, the fact that Las Pampas is one of the few Parish GADs that already has an association of women oriented to promote their economic development is emphasized. At present many of them are active part of the factories of panela, of the cane cultivations and of the cattle ranch.

Apart from the Cooperative Maquita Cusunchig, the financial institutions which operates on the spot are Coop. Union and Progress, and BanEcuador.

VISIT 3

DATE: Wednesday, July 12 from 16h10 to 17h00

PLACE: Gobierno Parroquial de Palo Quemado

ATTENDANTS: Rodrigo Changoluisa President, Wilfrido Pazmiño Responsable from Environment and Marco Changoluisa, in charge of economic promotion, all of them belonging to GAD Parroquial Palo Quemado. In addition, Heidi Niño y Daniel Obando from CELEC-EP, Nicolás Zambrano, Dayana Vega, Mauricio Velásquez, Diego Quishpe, Alvaro Torres and Miguel Herrera.

ABSTRACT: The parochial GAD president mentions that ignorance of the relationships between traditional agricultural activities and vulnerability to climate change is a notorious and remarkable subject, since he mentions having deforested on his lands to encourage agricultural activities without any regret because of lack of knowledge.

Farmers often use wood sticks for fences on their ranches. Five years ago began with a pine planting initiative as an alternative to reduce the use of wood sticks and reduce pressure on forests.

They are aware of the illegal deforestation that occurs in the area, especially in the private protected forest Sarapullo, mention that they have gradually invaded areas of the protected forest, causing deforestation for the development of agricultural activities. In this sense, the GAD of Palo Quemado recognizes its limitations of personnel and budget to carry out activities against illegal logging. The GAD budget reaches USD 150,000 annually, which includes the items to cover administrative expenses and investment.

The sugar cane crops are the main ones and the panela producers are grouped in the “Flor de Caña” and “San Pedro de la Plata” associations. The Savings and Credit Cooperative Maquita Cusunchig has promoted in the producers, its access to a better practices for export of its products. In addition, they mention that the burners used in this activity were modernized 5 years ago, which has made it possible to reduce the use of wood by replacing it with the bagasse of the cane.

They propose that an additional technological leap could help fuel the furnaces to be completely replaced, eliminating the use of wood. There are proposals such as the use of electric ovens, however, would require the use of 220v electric grids. They comment on being open to a detailed and technical analysis, allowing them to identify better available technology (Best Available Technology) to reduce the pressures on the forests.

VISIT 4

DATE: Thursday July 12 from 08h30 to 11h00

PLACE: Premises of CELEC-Hidrotoapi

ATTENDANTS: Heidi Niño from CELEC-EP, Dayana Vega, Mauricio Velásquez, Diego Quishpe y Miguel Herrera.

ABSTRACT: A field visit to the facilities of the Toachi-Pilatón Hydroelectric was carried out. The construction of the civil works has a 95% advance, however, the hydro-mechanical construction is less than 50%, as the Russian company, in charge of this construction phase, did not comply with the contract, which is why the contractual relationship was cancelled. Will be a new process to select the tender for the completion of the mechanical work. However, this gives and realistic idea that the hydro would not come into operation in 2017, there is even talk of starting operations by 2019.

The economic crisis that worsened in 2015, reduced the staff of Environmental Management staff, currently there are 2 environmental engineers, a veterinarian and two community relations officers.

The contributions of the hydroelectric to the community, are given through support in reforestation events, with the delivery of seedlings and transportation for events, have also built infrastructure as sports fields for the community. In

previous years they have provided support with their machinery to repair the second-order roads communicating the neighboring parishes, however, because of malfunctions in the machinery this year have not.

They have left a space of 5 meters away from the water mirror as security in the reservoir. They affirm that this construction has not generated displacements of settlers of the zone. All the lands in the area that will be covered by the reservoir, have been acquired by the hydroelectric plant, cut all the trees in that area (counting on a forest exploitation license issued by the MAE) and delivered the wood to the community

They acknowledge that deforestation exists, especially in the protected forest Sarapullo, the hydroelectric plant has committed to build a non-carriage bridge for the community of Las Praderas. The Ministry of the Environment does not allow the construction of a bridge with capacity for vehicles, since it is intended to avoid illegal deforestation and expansion of the agricultural frontier.

Hidrotoapi has the respective Environmental Impact Study (EIA) approved in 2009 and Annual Environmental Management Plans. They still do not have the results of the 2016 environmental audit.

VISIT 5

DATE: Thursday July 13 from 11h20 to 12h20

PLACE: Gobierno Parroquial de Tandapi

ATTENDANTS: Silena Betancour, Secretary and treasury of GAD Parroquial de Tandapi, Heidi Niño from CELEC-EP, Dayana Vega, Mauricio Velásquez, Diego Quishpe y Miguel Herrera

ABSTRACT: The parochial GAD President of Tandapi was not present at the time of the visit.

To date the most relevant activities in environmental matters have been reforestation events on Pilatón River. For example, recently they would have carried out a reforestation with the participation of students of schools, of about 1000 plants were seed remaining 200 to be planted.

Mirador and Sarapullo are the main areas of deforestation, although there is a forest control of the MAE in Tandapi, it is recognized that there is illegal logging that is transported by roads without any control.

In Manuel Cornejo Astorga "Tandapi", the predominant economic activities are agriculture, livestock, commerce and services, the latter two of which are majority in the center (Tandapi) where the Aloag-Santo Domingo road crosses.

In the place there is a water bottler called "The Quebrada" and a laboratory of Tilapias that are exported to Colombia mainly. Sport fishing is also a relevant economic activity on place.

In the sector, the main supplier of credits is Credifé of Banco del Pichincha, followed by Cooperativ Manantial de Oro.

In terms of gender, there are projects to promote the participation of women, especially through the provision of dance therapy, crafts and beauty trainings, etc. The objective is to promote her entrepreneurship.

VISIT 6

DATE: Thursday July 13 from 14h10 to 15h10

PLACE: Gobierno Municipal de Machachi

ATTENDANTS: Ing. Fernanda Chávez Environment Management Coordinator, Alicia Vizuite Director of Environment and Risk Management Unit from municipal GAD of canton Mejia, Dayana Vega, Mauricio Velásquez, Diego Quishpe, y Miguel Herrera.

EXTRACTO: There is a first comment on the text of the "Concept Note", since it has been difficult to read for municipal GAD officials because it is in English. The request is made to be provided in Spanish.

The degradation of the watersheds of the San Pedro and Pilatón Rivers have been a matter of concern for the municipal GAD, for which they have planned reforestation events and have a vivarium in Romerillos.

There is interest in supporting the implementation of the Adaptation Project. They comment that in parish Manuel Cornejo Astorga there is a pilot project to develop Bocashi using the organic wastes of the harvesting process in Tandapi. It is a project that is expected to incorporate recyclers, among them mainly women, to transport to the transfer station and make the required inputs for Bocashi.

Another concern expressed in this meeting is the chance to use some of the resources of this project to improve actions to be taken in other sites of the canton, so an explanation about the exclusive use of this fund for the protection of Río Blanco upper basin was given.

VISIT 7

DATE: Friday July 22 from 09h10 to 10h10

PLACE: Gobierno Municipal de Aloag

ATTENDANTS: Wilson Rodriguez GAD Aloag's President, Miguel Herrera and Alvaro Torres.

EXTRACTO: It is mentioned that in terms of environmental issues they have carried out reforestation projects with the help of the Banco del Estado with non-reimbursable resources and support from the private company Adelca. While it is true that they are aware that the waters of Río Blanco come from Pilaton river which born in the parish of Aloag, the need to expand crops and pastures for milk and beef cattle have led to deforestation and degradation of the river basin.

Livestock in many cases is carried out at 3,500 meters high, practically where the paramo is born.

Waste management and classification is done in a transfer plant in Romerillos, where recyclable materials are used. They have sewage and potable water, however the sewage is not treated and is discharged directly into the waters of the San Pedro River.

There is great interest and commitment on the part of the parish government to participate in the socialization processes of this project and its subsequent execution.

The opportunity is taken to personally deliver the invitation to the socialization workshop of the adaptation project and stresses the importance of the attendance of representatives of women's groups.

Memoir of the socialization workshops which took place on Monday July 24 in Sigchos and Tuesday July 25 in Tandapi

WORKSHOP IN SIGCHOS

PLACE: Municipal hall of Sigchos

DATE: Monday, July 23 of 2017

ATTENDANTS: 22 men (58%) and 16 women (42%)

Point 1: The local authority, representative of the Ministry of the Environment and the Latin American Development Bank CAF welcomes the attendees and indicates the agenda for the day. They stress the importance of having their views on the overall project proposal.

Point 2: CAF consultants present the background to the adaptation project, briefly addressing the issue of climate change, the importance of adaptive processes for a highly vulnerable country, and entering into a conceptual review for some terms to be generally used during the presentation. A brief review of the general conditions of the Río Blanco upper basin is made mentioning the importance of the paramos and cloud forest ecosystems due to the water recharge they generate and addressing the main causes of degradation.

Subsequently, a brief time line review of the milestones of the project and adaptation from the lifting of the information for the concept note until the present date is made. It is stressed that the final document must be submitted on Monday, August 7 and 2017 as deadline.

Point 3: Presentation and explanation of the project components, the proposed outcomes and outputs. Doubts are clarified concerning the scope of some topics. At the same time, printed documents are delivered with the breakdown of the project's logical framework.

Point 4: A brief presentation by the Department of Sustainable Development of the Municipality of Sigchos is given by the director of the area Dr. Iván Gomezjurado, who shows the vision of the municipality of Sigchos on the subject of climate change and remark proposals that they consider complementary with those addressed by the adaptation project.

Point 5: The presentation of the Environmental Unit of the National Police is given by Captain Fernando Navarrete. This presentation emphasizes the work done by the UMPN in the sector. Forest control points that currently exist and objectives in the short term. Brief interactions with the community are made to clarify doubts and collect suggestions. Annex 2.

Point 6: The attendants are organized in groups of work by component, which means, three working groups each with the task to discuss internally the following points with respect to each component. Some guidelines questions are provided:

- Did you have any participation during the design of the project?
- What do you think will be the main achievements to be achieved with this project?
- What aspects do you think should be improved?
- Sustainable agriculture is economically viable. What do you think?
- Can public and private bank financing and COACs be considered as an important tool to promote more sustainable agriculture?
- How could the Investment Fund interact with the Basin Councils?
- What are the most relevant obstacles of the project that should be addressed?
- How do you think your community could contribute to the achievement of the project?
- How could - from its individual or associative role - contribute to the long-term sustainability of the project?
- In what measures could women's groups and vulnerable groups benefit from this project?
- What sustainable agricultural or livestock practices are your community or association carrying out?

Point 7: The groups work in number of 10 to 15 people with the assistance of the consultants of CAF like moderators. It takes about an hour and a half to discuss the relevant aspects of the component with respect to the guiding questions and their own points of view.

Point 8. Each of the groups makes a short presentation of 15 minutes on the main aspects discussed and contributed in their group. Consultants take notes.

Group 1: They mention activities such as: upgrading techniques and infrastructure for the panela production, conservation of protected areas, zoning and watershed planning, riverine protection plans, ravines and protective forest. Among the means of verification mentioned are: a reduction of 30% in the use of wood, participation of at least 50% of women, number of hectares protected and number of development plans.

Group 2: Propose training in new production technologies and attitudinal changes for the application of more sustainable agriculture and livestock methods. Among the ideas they have about agricultural sustainability is increasing the productivity of land to slow the advance of the agricultural frontier as well as the creation of vivarium that serve to boost reforestation programs. Access to credit is considered very important because BanEcuador is the institution that mostly works in the area and provides access to credit with low interest rates. However better terms and installment conditions according to the production cycles consider it an element to improve.

Group 3: The proposals were aimed at strengthening people's capabilities regarding climate change, understanding the cause-and-effect relationship between ecosystem degradation and the reduction of water flows. Awareness of the population and the strengthening of social network are seen as important elements to act effectively against climate change through adaptation.

Point 9. An individual anonymous survey of access to financing among attendees is given. (Session Plan annex 11).

Point 10. It is requested that only the groups of women, the disabled and the elderly be present at the meeting. These groups work through personal interviews and surveys to better understand their points of view regarding the project and document them.

Point 11. The work session is closed with words of thanks from Dr. Ivan Gomezjurado on behalf of the Mayor of Sigchos and Nicolas Zambrano representing the MAE.

WORKSHOP IN TANDAPI

Place: Parochial GAD of Tandapi's hall

Date: Tuesday, July 24 of 2017

Attendants: 28 men (57%) and 21 women (43%)

Point 1. This meeting had a good attendance of groups of older adults and women. For the efficient wording of this texts and considering that the development of the session the points 1 to 10 was a replication of the one done the previous day in Tandapi. Therefore only the group work has different outcomes, so that part is what is emphasized in this writing. Three groups were created so that each one is dedicated to the discussion of the respective components. It took about 2 hours for this activity including the development of the presentation of the main points. At the same time the survey of access to credit was delivered.

Point 2. Each group appointed its moderator to summarize the main points as follows

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Group 1: The most relevant aspects were the placement of a checkpoint by the environmental police in the Las Pampas sector. Technological transfer mechanisms were also proposed through the institutions involved in the project and the universities participation. For the meteorological monitoring of the areas of influence of the project it is proposed the participation of INAMHI and the respective GADs, this information should be published in bulletins to be available to all stakeholders

Group 2: Farmers claim that they do not know any other way to do their activities, if there is an economically viable alternative and do effectively reduce the pressure on the environment, they would be willing to apply it. The financial institutions that are in place are mainly BanEcuador and Banco del Pichincha, although they offer credit many times the requirements are difficult to meet and the payments do not consider the seasonality of agricultural activities. They consider that the creation of an investment fund can be a good alternative to obtain financing of productive activities in the area, as well as to support protection ecosystem action. As for the selection of demonstrative farms, they mention that it is a good option as long as they keep their educational character and full openness for those who want to know them. The selection of participants for the demonstration farms should regard the backgrounds of serious efforts in training processes. This experience has CELEC through its community relations officers.

Group 3: highlight the importance of strengthening cooperation and knowledge networks, unity, organization and prevention are considered fundamental aspects to face the challenges of climate change. They consider their participation in this event as a way of being taken into account in the decisions which also are their business. Training and support for construction and family orchards that apply good agricultural practices. Learning and strengthening their knowledge of economically viable and environmentally friendly farming practices will help many people to opt for these methods of production, stepping forward and producing organic products. Economic strengthening is important in order to avoid the migration of young people to big cities.

The annexes will compiled pictures about sessions and presentations.

Annex 1: Visits to parochial and municipal GADs



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Annex 2: Workshop in Sigchos.



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Annex 3: Groups presentations

CONSERVACIÓN DE LA COBERTURA VEGETAL		
ACTIVIDAD		MEDIO DE VERIFICACIÓN
1. TECNIFICACIÓN e INFRAESTRUCTURA DE LA PANEJA.	ACUS	REDUCCIÓN 30% DEL USO ACTUAL DE LA MATERIA (CUBIERTA DE BOSQUES SOSTENIBLES).
2. CONSTRUCCIÓN DE ÁREAS PRIENTIRIAS	SADS	CANTIDAD Y CALIDAD DE AGUA Y UN PUESTO FIJO DE CONTROL (ESTACION DE LA VITA Y TONOS DE AGUA).
3. ZONIFICACIÓN Y PLANTACIÓN DE CUENCAS	RESECCION	NÚMERO DE PLANES DE FINCA. AL MENOS 50% DE MUJERES PARTICIPAN.
4. PLAN DE PROTECCIÓN DE RÍVERAS Y GUERRASAS	MAE - SENSIBIL	NÚMERO DE HECTÁREAS PROTEGIDAS. PARTICIPACIÓN INSTITUCIONAL (MUNICIPIO).
5. PLAN DE MANEJO DEL BOSQUE PROTECTOR	MAE Y PROTECTOR	PLAN DE MANEJO ACTUALIZADO. NÚMERO DE HECTÁREAS RESTAURADAS CON FFAP.
6. APLICACIÓN DE INSTRUMENTOS DE PLANTACIÓN	MAE	PGA (PLAN DE GESTIÓN OPERATIVA ANUAL). METT (MATRIZ DE EFECTIVIDAD DE MANEJO).

Participación de grupos

GROUP 1

Trabajar en capacitación en nuevas tecnologías.
Trabajar en los cambios de actitud y formas de trabajos y prácticas tradicionales por medio de capacitación, para incluir prácticas agrícolas sustentables (transmitir tecnología) a los cuidadores las cuencas, buscar alternativas para la producción de paneja.
Organizar con la gente de Sigchos, Isinlivi, Chugchilan.
Ser mas eficiente producción.
Asociación FLOR DE CAÑA.
Asociación MARIANITA DE JESUS.
Asociación San Pablo.
Asociación de GANADEROS LAS PAMPAS.
LA agricultura sostenible económicamente.
* Crédito a largo plazo.
Mano de obra.
terrenos para viveros.
* Cuidar las cuencas.
* Agricultura sustentable y
* Financiamiento

GROUP 2

Grupo # 3

Integrantes: ALVARO

* Martha	* Mario	* Guillermina
* Susana	* Rodrigo	* Joaquín
* Hugo	* José	* Judith
* Leonidas	* Milton	* Rosa
* Isolina	* Nancy	* Ibeth

Conclusiones:

1. La mayoría somos nuevos en el conocimiento del proyecto.
2. Capacitación para mantener las fuentes de agua, y conocimiento de clima, tiempo y lluvia. Alasí, Tandapi, Isinlivi, Chugchilan, Las Pampas y Palo Quemado.
3. Socialización de integración de toda la población, Concientizar que va afectar en el futuro con la mina y el cambio climático.
4. Si puede la agricultura ser rentable ejemplo: Caca de azúcar para la venta. Otros cultivos como subsistencia propia, huertos familiares.

GROUP 3

5: Positivo: Es necesario utilizar créditos para fomentar la agricultura.
Negativo: Reducir la tasa de interés, Presentar menos requisitos.

6: Solo en el centro poblado de las parroquias.

7: El agua y el aire.

8: Compromiso personal, Exigir a las autoridades como Ponentes.

9: Permanecer forestando y las vertientes. mantener.

10: Tercera edad: Un cambio climático, con los conocimientos a adquirirse.
Mujeres: Un ambiente sano.
Diciendo: Las familias podrían sustentar mejor a estas personas por que tendrían más producción.

GROUP 3

Annex 4: Workshop in Tandapi.



Annex 5: Groups presentation

Actividad	Actor	Medio de Verificación	Lugar
1.- BIOCORRECTOR DE CONSERVACIÓN	GADS/SOCIEDAD CIVIL	EXPEDIENTE TÉCNICO (EBA)	BPTP
		ZONIFICACIÓN	BOMBALZ
		PLAN DE MANEJO	OTONGA
		ESTRATEGIA DE SUSTENTABILIDAD FINANCIERA	HESPERIA
		MODELO DE GESTIÓN	RÍO BLANCO
		ACUS	CANCHACOTO
			ZAPAPALLO
			QUEBRADA NEGRA
			CHITOA
2.- ZONIFICACIÓN Y PLANIFICACIÓN DE FINCAS.	BENEFICIARIOS	AL MENOS EL 50% DE MUJERES PARTICIPAN	TODOS LOS INTERESADOS
	UNIDAD DE GESTIÓN DE PROYECTO	# DE PLANES DE FINCA	
	IFIS		

Actividad	Actor	Medio de Verificación	Lugar
3.- CONTROL	MAE/URMA	PUESTO FIJO DE CONTROL	TANDARA
			LAS PAMPAS
			INTERESADOS
4.- PROGRAMA DE TRANSFERENCIA DE TECNOLOGÍA	UNIVERSIDADES	CONVENIO	
	UNIDAD DE PROYECTO		
5.- FORTALECIMIENTO DEL SISTEMA DE MONITOREO HIDROMETEOROLÓGICO	INAMHI	EMISIÓN DE BOLETINES	TODA LA CUENCA
	UGP (Unidad Gestión Proyecto)	PLATAFORMA	
	GADS		

GROUP 1

<p>-2-</p> <p>CRÉDITOS BANCO FOMENTA PARA GANADERÍA, INICIA PASA A PARTIR DE LOS 3 MESES (INTERÉS 11,5% VS 25% OTROS BANCOS)</p> <p>NO HAY CAPACITACIÓN PARA MEJORAR LAS TÉCNICAS EN GANADERÍA, EVITAR DEFORESTACIÓN (SIEMBRA PASTISALES)</p> <p>QUE PROYECTO ES VIABLE Y QUIÉN LO VA HACER</p> <p>CAPACITACIÓN Y ACOMPAÑAMIENTO PERMANENTE (MAGAP)</p>	<p>-1-</p> <p>MEJORAR LAS PRÁCTICAS AGRÍCOLAS, OPTIMIZANDO USO SUELO</p> <p>DIVERSIFICAR PRODUCCIÓN AVICOLA / PORCINA</p> <p>IMPULSAR INVERSIÓN Y ADAPTACIÓN YUCA RAYÓN / QUEBRADA BARRIO PROTEGE LAS RAÍCES Y SUELOS (ASOCIACIÓN AGROPECUARIA PAMPAS AGRARIAS)</p> <p>BIBEROS DE ESTACAS (CULTIVOS SIROPASTORIZES)</p> <p>HUERTOS</p> <p>FINCAS DEMOSTRATIVAS</p> <p>UBICAR UNA ORGANIZACIÓN COMPROMETIDA (APOYO PERMANENTE)</p> <p>USO CON FINES EDUCATIVOS</p>	<p>3-</p> <p>FONDO DE AGUA PARA PROYECTOS COLECTIVOS (APORTAN EMPRESAS QUE SE BENEFICIAN DEL USO HÍDRICO)</p> <p>GAD LOCALES / CELEC</p> <p>A SU VEZ HAY BENEFICIOS PARA TODOS - REQUISITOS DEFINIR Y DELIMITAR EL FONDO VOLVERLO ATRACTIVO PARA EL AGRICULTOR</p> <p>PROPUESTA: GANADO PURO SISTEMA DE EMBRIONES</p> <p>INCENTIVAR DESDE ESCUELAS LAS PRÁCTICAS AGRÍCOLAS GRANJAS → SISTEMAS DE RIESGO (ATRATIVO?)</p>
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GROUP 2

<p>Componente 3</p> <p>Grupo: Tercera Edad</p> <p>Asociación del Adulto Mayor</p> <p>Personería jurídica 2007</p> <p>Proyectos Huertos Hortícolas</p> <p>OBJETIVOS: (huerto, col, lechuga, etc.)</p> <p>1- Mantenerse Unidos</p> <p>2- Ayudarse los unos a los otros</p> <p>Problemas</p> <p>Afectaciones de clima y ecosistemas</p> <p>Hucho calor → riego diario a las plantas</p> <p>Necesidad / Tierra negra y abono</p> <p>* Dirección técnica MAGAP y apoyo de CELEC e P. Hidrotopi</p> <p>* La cosecha utilizan para consumo de la Asociación</p> <p>Capacitación → Mayor Producción (aseor como van a sembrar)</p> <p>Terreno si</p> <p>4300 mts</p> <p>Organización no legalizada</p> <p>Hay presencia</p> <p>Requerimiento</p> <p>Cerramiento mala</p> <p>Necesidades:</p> <p>Donación de terreno</p> <p>2 hectáreas</p> <p>Atracción de la casa</p> <p>techo</p> <p>Que las autoridades les tomen en cuenta y les incluyan en proyectos</p>	<p>Asociación Adulto Mayor</p> <p>Otras Actividades</p> <p>Bailo terapia</p> <p>Manualidades (tejidos, cerámicas)</p> <p>Incluir al grupo/Asociación dentro PAOT</p> <p>Cambios Climáticos</p> <p>Hace 10 años era abrigado</p> <p>Clima variado</p> <p>En temas de ganadería han delegado a sus hijos</p> <p>Transmiten sus experiencias</p> <p>Han migrado a la ciudad los hijos y familiares</p> <p>Instituciones que pueden aportar en las Capacidades</p> <p>CELEC e P. Hidrotopi, Fundación Tanager, La Hesperia</p> <p>Grupos: Adulto Mayor, otros grupos vulnerables: jóvenes, niñas, mujeres, GAD Parroquiales</p> <p>Capacitación y hacer consciencia del Cambio Climático</p> <p>Capacitación interactiva (videos)</p>
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GROUP 3

Annex 6: Registration of attendants.



Taller de Presentación y retroalimentación los componentes del proyecto en conjunto con la comunidad y actores locales, con la finalidad de incorporar sus aportes y comentarios.

Sigchos, 24 de julio de 2017

POR FAVOR ESCRIBA CON LETRA IMPRENTA



	NOMBRE	ENTIDAD	CARGO	CIUDAD	TELÉFONO	CORREO ELECTRÓNICO
30 -H	Marcelino Quinacho	morador	morador	Las Pampas.		
31 -H	Leonido Viteri	flor de caña	Socio	Palo Quemado	0986862646	Leonido V.
32 -H	Yosé Inias Viteri Antor	flor de caña	Socio	Las Pampas	0961132688	Yosé Viteri
33 -M	Margoth Robayo	Asociación Marianita de Jesús	Local Socio	Las Pampas	0998869110	Margoth Robayo
34 -M	Judith Pérez Sti	Asociación Marianita de Jesús	Presidenta	Las Pampas	0998343551	Judith Pérez
35 -H	Gonzalo Hincapié Palencia	Morador	Morador	Palo Quemado		Gonzalo Hincapié
36 -H	Iridero Guarochico	morador	morador	Palo Quemado	0995010089	Iridero Guarochico
37 -H	Ibeth Tipanguiza	Aso. San Pablo	Secretaria Cunicultura	Palo Quemado	0997199162	Amoresdani@gmail.com
38 -M	Nancy Oña	Aso. San Pablo	R. Socio	Palo Quemado	0999049299	

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NOMBRE	ENTIDAD	CARGO	CIUDAD	TELÉFONO	CORREO ELECTRÓNICO
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Jorge Balboa	Asociación ^{Santero}	Socio	San Pampa	65	
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Hugo Herrera	morador	morador	Los Pampas	0959601034	
Olga Maria Guasti	morador	morador	Los Pampas		
Julio Pérez	morador	morador	Los Pampas		

Asociación Pastura

UNOCS 12 años

Asociación Santero

Vocal



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Sigchos, 24 de julio de 2017

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BANCO DE DESARROLLO DE AMÉRICA LATINA

NOMBRE	ENTIDAD	CARGO	CIUDAD	TELÉFONO	CORREO ELECTRÓNICO
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Jordith Hincapié	Usuario	Usuario	Palo Quemado	099872040	
Gonzalo Campione	Galapagos		Palo Quemado	099225756	
Maria Rosa	Galapagos		Palo Quemado	099062900	
Maria Elly Manrique	Galapagos		Palo Quemado		
Maria Ramirez	Galapagos		Palo Quemado		
Segundo Tapia	Poblador		Pampas	0999301236	
Humberto Jaquín	Poblador		Pampas		
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Cptn. Alfonso Navarrete

UPMA-209

Jef. UPMA-209.




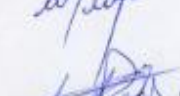



Quito

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21-07-2017	Gustavo Viteri			0994971320	@hot-mail-Com. asociacion Flor de Cana@yahoo.com.es
21-07-2017	Leonido Viteri			0968682646	
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Taller de Presentación y retroalimentación los componentes del proyecto en conjunto con la comunidad y actores locales, con la finalidad de incorporar sus aportes y comentarios.

Sigchos, 24 de julio de 2017

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NOMBRE	ENTIDAD	CARGO	CIUDAD	TELÉFONO	CORREO ELECTRÓNICO
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Gustavo Tapia			San Rosa	0987393701	
Rosa Romero			Las Praderas del Zaachi	0986385662	
Gonzalo Hincapié			Palo Quemado		
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Taller de Presentación y retroalimentación los componentes del proyecto en conjunto con la comunidad y actores locales, con la finalidad de incorporar sus aportes y comentarios.

Tandapi, 25 de julio de 2017

POR FAVOR ESCRIBA CON LETRA IMPRENTA



NOMBRE	INSTITUCIÓN	CARGO	CIUDAD	TELÉFONO	CORREO ELECTRÓNICO
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Luciano Torero				093934882	
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Session Plan and Visits and Workshops Memoir



Taller de Presentación y retroalimentación los componentes del proyecto en conjunto con la comunidad y actores locales, con la finalidad de incorporar sus aportes y comentarios.

Tandapi, 25 de julio de 2017

POR FAVOR ESCRIBA CON LETRA IMPRENTA



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DE AMÉRICA LATINA

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Taller de Presentación y retroalimentación los componentes del proyecto en conjunto con la comunidad y actores locales, con la finalidad de incorporar sus aportes y comentarios.

Tandapi²⁵ Sigchos, 25 de julio de 2017

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STAKEHOLDERS, INTERESTS AND SOCIOECONOMIC SITUATION IN THE TOACHI-PILATÓN WATERSHEDS

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STAKEHOLDERS, INTERESTS AND SOCIOECONOMIC SITUATION IN THE TOACHI-PILATÓN WATERSHEDS

Byron Real¹

Introduction

A watershed is an “area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel” (USGS 2016). Besides of being such natural framework watersheds are also areas of intense socioeconomic exchange where people and organizations of diverse type and range (state, natural resources extractors, traders, farmers and so on) exert their agency in order to get and influence management of the existent resources in the area.

Because of the diversity of existing geographic areas, the often difficult access to them, and the social competition for its natural resources, watershed s are of complex management and then prone to be ecologically neglected and significantly altered by socioeconomic activities. Since whatever natural and human-induced issues happening in upper areas can affect the rest of the basin until the river-outflow point, watersheds are extremely vulnerable to socioeconomic activities. For that it is important to apply integrated water management strategies where all stakeholders can coordinate and exchange experiences, and be regulated and controlled in a comprehensive plan intended to protect the hydric resources.

The ecological vulnerability of the watershed supposes also a socioeconomic vulnerability of the societies living in these areas especially those already vulnerable like women, children and indigenous people. By historical and socioeconomic issues these groups are the most vulnerable in any society and particularly in those of frontier where social life depends of direct natural resource extraction. In this understanding the climate change phenomenon and the expected impacts on nature and society will particularly affect watersheds and women and indigenous people as the most vulnerable in natural and social environments. Therefore in the efforts to promote adaptation measures to address the problem of climate change especial attention must be devoted to watersheds, its societies, and the women, children and indigenous peoples existing in these environments.

Considering the issues of social and natural vulnerability and the expected effects of climate change, this document presents a quick ecological and socioeconomic overview of the Toachi and Pilaton watersheds pointing the situation of the three rural jurisdictions in which lie the critical part of this area and identifying stakeholders and their perceptions regarding weather and climate change issues. As part of this analysis this document also points the situation of women and issues of gender inequality in this area.

The Toachi and Pilaton watersheds located in the North-Central area of Ecuador, in the so-called Cordillera Occidental de los Andes, in the provinces of Cotopaxi, Pichincha

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and Santo Domingo de los Tsachilas. Starting both watersheds in different volcano systems at more than 14,000 feet over the sea level in the Cotopaxi province; they joint at 2,000 feet altitude in the Santo Domingo de los Tsachilas province and then under the name of Blanco River run northbound to then be part of the Esmeraldas basin, which finally drains its waters in the Pacific Ocean. Besides, because of the elevated altitude and topographic steepness of ridges and hills of the cordillera where the basin starts, the Toachi and Pilaton rivers are the outflow point of several smaller watersheds which increase the ecological complexity of this area.

The analysis and conclusions of this document intend to put in perspective the ecological and social complexity of the Toachi-Pilaton watershed and the imperative to address both in the efforts to promote adaptation measures to deal with the expected issues related with climate change events.

NATURAL SCENE OF THE AREA

The Toachi river starts in the foothills of the Chugchilán mountains, a branch of the Western Cordillera, in territories of the Chugchilán and Isinliví parishes, in the county of Sigchos, province of Cotopaxi. The river begins at an altitude of 4500 m and descends to 1000 m altitude to join the Pilaton River. The Toachi basin is flanked to the east by the Corazon hill (4,788 m s.n.m) and the volcanoes Illiniza Sur (5 248 m s.n.m.) and Illiniza Norte (5,126 m s.m.). To the South by the Era Urco hill (4,473 ms s.n.m.). These elevations contain several smaller water courses that end in the river Toachi. The basin of this river has a length of 104 km, and a contribution area of 1,478 km². The average slope is of 34.7%.

The Pilatón river is formed by the thawing of the volcanoes glaciers of the Corazón (4,790 msnm) and Atacazo (4,455 feet altitude) creating a watershed that has an east - west direction and is formed on the western slopes of the Cordillera Occidental, El Corazón and Atacazo hills, has an contribution area of 514 km², the main channel length is 42.5 Km, the average slope represents 42.7%. This river join with the Toachi and then form the Blanco river which in turn join the Quinindé river and then flow into the Esmeraldas hydrographic system which drains in the Pacific Ocean.

As shown in Table 1 the hydrologic complex that conform the area of interest of this document lies in a territorial mosaic of three provinces, three counties and three rural parishes. There more than 10,000 people live in more than 35 communities.

Table 1.- Territorial jurisdictions of the Toachi-Pilaton watershed

PROVINCE	COUNTY	PARISH	MAIN COMMUNITIES
Pichincha	Mejía	Manuel Cornejo Astorga	La Esperie
			La Palma
			Mirabad
			Pampas Argentinas
Cotopaxi	Sigchos	Palo Quemado	Praderas Del Toachi
			Palo Quemado
			Santa Rosa
Santo Domingo de los Tsachilas	Santo Domingo	Alluriquin	Unión Del Toachi
			Alluriquín

Because of the altitudinal variability this territory is biologically rich. It contains from the paramo ecosystem at more than 9,000 feet altitude to tropical and cloud forest at about 1,000 feet altitude. This natural configuration of the area explains the existence of several ecosystems and watershed, and then of a rich biological diversity. The most important watersheds of this hydro-geologic system are those of the Toachi and Pilatón rivers. Smaller watersheds in this ecological reserve are of the Zarapullo river, which drains to the Toachi and the Corazon and Santa Ana rivers which drains to the Pilaton.

In the Toachi river basin, the largest area corresponds to natural forest (22.8%), followed by páramo (18%) and forest intervened plus cultivated grass 70-30 with 15.4%, the remaining area (43.8%) corresponds to others Types of land use mainly

crops In the Pilatón river basin; The largest occupation corresponds to natural forest (52.8%) and forest intervened plus cultivated grass 70-30 (31%), the remaining 16.2% is destined for other uses.

The natural richness of this natural compound has guided the human interventions in the area, which is still basically a frontier. Practically all the socioeconomic activities in the region rely in the extraction of primary natural resources. One of the major problems in the upper part of both basins is the transformation of the natural ecosystems of paramo and forest due to agricultural activities. This change in vegetation cover affects the surface runoff.

This ecological complex is important for hydric resources and because of its biodiversity, for the reproduction of both the flora and fauna of the region and then, important for ensuring water and food security of the local communities. Then the importance of the Toachi-Pilaton watershed must be understood under the complex natural mechanisms of biodiversity and hydric natural resource availability in which the local communities have built their culture and food and water security.

Areas under conservation status

Because of its natural landscape and biological importance the area of study have several public and private protected areas. The public areas under conservation statuses are Sarapullo and Toachi Pilaton Protected Forests and the Ilinizas Ecologic Reserve. The private protected areas have been created under the category of “protected forests” that was the first category for conservation of natural areas allowed in private lands before 2008 when the national constitution established the creation of private and public decentralized² ecological reserves. The protected forest is an administrative figure for conserving soil and hydric resources and in function of these primary goals is considered that forests and natural or introduced vegetation must be maintained undisturbed in critical areas of the watersheds. By creating protected forests the state promoted the protection of the steepest areas of the watersheds and then avoiding landslides, land erosion and drainage alterations.

Ilinizas Ecologic Reserve and Sarapullo Protected Forest

The Ilinizas Ecological Reserve is a public protected area consisting of 149,900 has of paramo and Andean Humid and Subtropical Forests. It is located in the provinces of Cotopaxi and Pichincha. This area encompasses the twin peaks of the Ilinizas as well as the extinct volcano Quilotoa best known by its crater lake. The reserve lie in the Cordillera Occidental de los Andes its territory contains also several hillas and ranges like the Lelia Cordillera, the El Corazón, Jaligua Alto and Tene fuerte hills. This mountain system barrier the evaporations from the costal forcing its condensation in the west side of the Cordillera Occidental and therefore increasing the hydric resources of the watersheds or even favoring the creation of micro-watersheds in the entire area.

² Before the National Constitution of 2008, protected areas of any kind were created only under the central government control, With the new legal framework of 2008 municipalities and rural parishes can create their own protected areas and rural communities, indigenous people and private owners can also legally create areas for conservation in the lands under their control. See: article xxx of the National Constitution.

The Sarapullo Protected Forest was created in 1986 before the Ilinizas Ecological Reserve which creation was in **XXX and with less territory**. Then when the Ilinizas was declared as a reserve the entire territory of the Sarapullo forest was incorporated in such new protected area. So now in practice all the policies and management measures regarding this area are made considering the main area that is the Ilinizas Ecological Reserve.

Toachi – Pilatón Protected Forest

This protected forest was created in 1987 as a means to maintain unchanged the forest other vegetation of the Toachi and Pilatón river basins. This forest has an area of 212,000 has and is under the control of the state forest districts of Cotopaxi and Pichincha. Although the status of protected forest is lesser than the national parks and ecological reserves it is still prohibited logging and the use of the area for any socioeconomic activity. Activities in this type of areas must be compatible with conservation purposes only. The main goals of this area are the protection of soil, water resources and biodiversity. About 20% of the Palo Quemado territory lies in this protected forest and the Las Pampas parish is also next to this area. Most of the problems of the Toachi Pilaton protected forest become from the socioeconomic activities of the mentioned parishes.

The international environmental organizations *Birdlife Internacional* and *Conservación Internacional* have stated that the lower area of the Toachi Pilaton protected forest is a place of high importance for protecting birds because about 420 bird species has been found here. However insufficient control has promoted illegal logging and even the invasion of parts of the area for cattle ranching are damaging the habitats of these and other species existent here. Moreover, several land tenure issues have not yet solved in this ecological area.

Private protected forest

Protected forests and reserve have been created in private lands in the Toachi-Pilaton watershed. These areas combine conservations goals with scientific research, environmental education, organic agriculture, and eco-tourism activities so that are source of income generation for their owners. The creation of protected areas in private lands in this zone is a very important form to show the neighbors that other socioeconomic uses can be applied to the lands. As a frontier area, the Toachi Pilaton watershed system has been traditionally seen as a wilder or an area to mine any existent natural resource. Such mentality is still present and private owner who devote their lands to conservation purposes are helping to change such extractive view.

Typically private conservation areas are composed by temperate, cloudy and subtropical forests. Significant parts of these areas are secondary and highly degraded forest for which programs of ecological recovery has been established. Reforestation activities in areas previously used for agriculture are also in process. In addition by creating this type of conservation areas many steep zones of the hills and ridges are being protected otherwise they would be subject of forest fires, illegal logging and unsustainable agriculture.

The private areas that have been legally declared as reserves or protected forests are the following:

1. Reserva Biológica La Esperanza
2. Hesperia Biological station and reserve
3. Otongachi biological reserve
4. Río Guajalito Scientific Station
5. Tanti protected forest
6. Rio Lelia watershed protected forest
7. La Favorita Scientific Station

In practical terms these private areas for conservation provide patches of ecological security for birds, mammals and other migratory species that need of scattered habitats to survive. They are also creating biological corridors and then allowing genetic variability in areas that otherwise would be isolated and prone to genetic erosion.

Notwithstanding the importance of private protected areas it is worth to mention that a significant flaw of them is the lack of sufficient resources for ensuring adequate control and the application of technically standardized management practices. This observation is also valid for the public protected forests for which the state has not established a particular administrative mechanism for control and management. However, new legal frameworks and technical regulations for this type of areas are under preparation by the Ministerio del Ambiente.

The Socio Bosque and the conservation initiatives in the area

In addition to the public and private system for protecting the natural areas of the watershed the Ministerio del Ambiente has established the nationwide Socio Bosque program which main goal is to help private owners and parishes to protect the existent natural forests presents in their lands or to carry out reforestation plans. The Manuel Cornejo Astorga, Palo Quemado and Alluriquin rural parishes are beneficiaries of the Socio Bosque program and about 692 hectares of public and private forests areas are under this scheme of protection, distributed in 22 plots and 15 private owners.

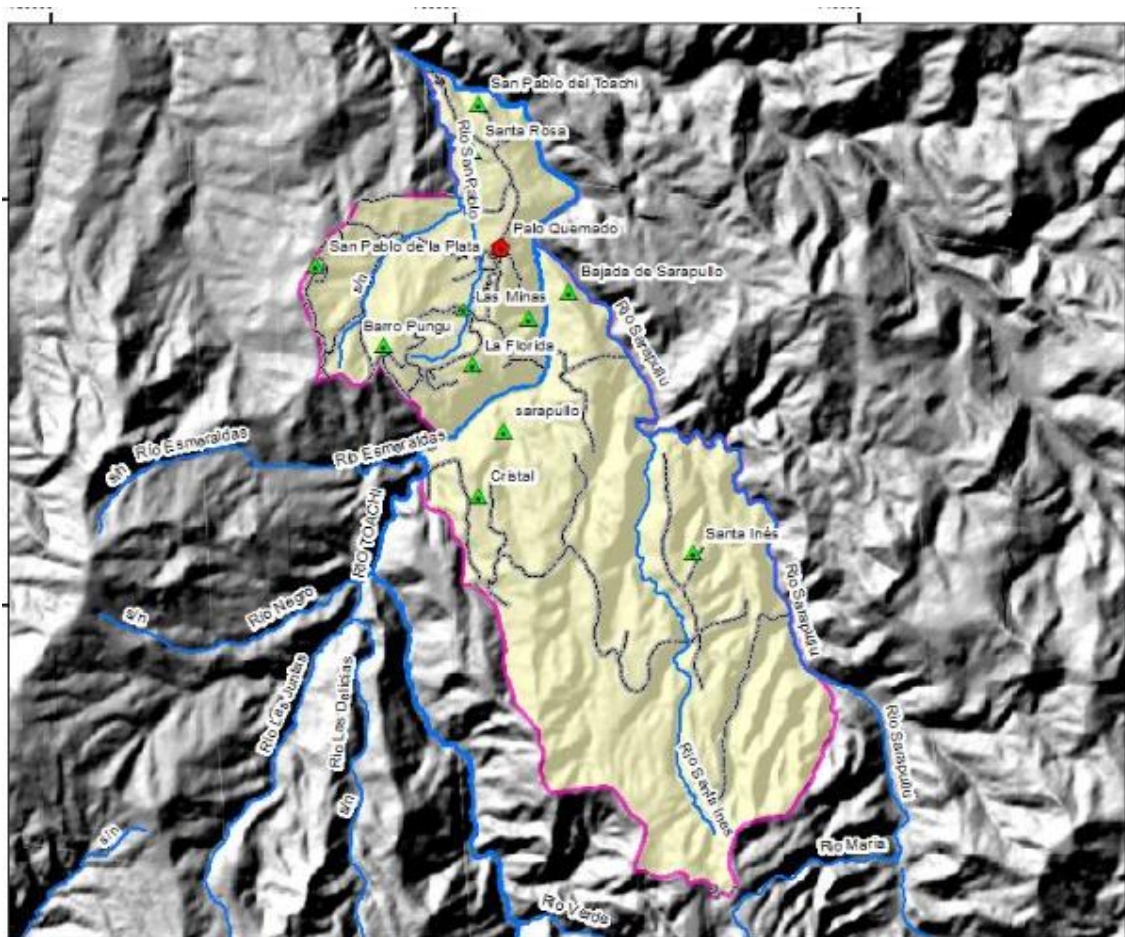
LOCAL JURISDICTIONS IN THE TOACHI PILATON WATERSHED

The Toachi Pilaton watershed lies in the territories of three provinces, three counties and six rural parishes. However, only three rural parishes are directly involved in the socioeconomic issues evolving and affecting this area. For that in this section will be presented a general socioeconomic overview of the Palo Quemado, Manuel Cornejo Astorga and Alluriquin rural parishes.

Palo Quemado Rural Parish:

Palo Quemado is a rural parish depending of the Sigchos county and Cotopaxi province. It is located at 4,500 feet altitude right next to the flanks of the Toachi river watershed (Map 1). In terms of road connectivity, this jurisdiction is served by a second order road, which connects Sigchos and the rural town of La Union.

Map 1.- Palo Quemado Rural Parish

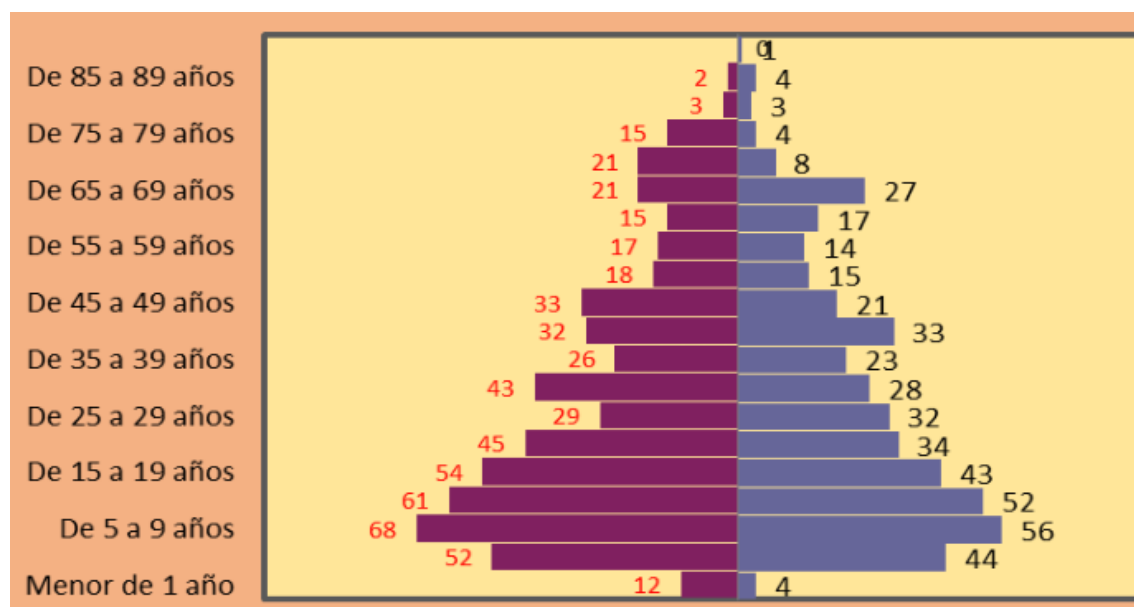


Source: GAD-PQ 2015.

According the last census (INEC 2010) the total population of this parish is of 1,030 inhabitants (55% men and 45% women) who live in eight townships or communities as follows: Palo Quemado Centro, San Pablo de la Plata, Las Praderas, Santa Rosa de Lima, Las Minas de la Plata, El Cristal, Zarapullo, and La Florida.

According to the national census (INEC 2010) the women-men correlation in Palo Quemado is 55-45%. The 57% of the population is under 30 years old and 30% are in the age range of 15-30 years old. (Figure 1)

Figure 1.- Age distribution in the Palo Quemado Rural Parish



Source GAD-PQ 2015

Ethnic self-representation in this parish is basically the “mestizo” accounting the 80% of the population. “Montubios” with 11% of the people is the second form of ethnic identity, and white 5%. There are no other forms of ethnic self-identification. (GAD-PQ 2015)

The subsistence of this population comes from small scale agriculture and cattle ranching. Sugar cane and raw milk are the most important products providing about the 75% of the work opportunities in this jurisdiction. While the cane is processed in the locality the milk is sold in the cities of Latacunga and Santo Domingo. The workforce of Palo Quemado is composed of 504 people.

According to the national last census (INEC 2010), 234 people of this parish work in agriculture and cattle ranching activities and 141 in manufacture activities, which is basically the production of panela, the most important product of this locality. Other relevant activities are related with services: local trade, transportation and education.

Palo Quemado is an important regional producer of “panela”³ which is the main source of local income. The panela made in this parish is sold practically in all the central Andean area. In the last few years the sugar cane producers have started producing granulated brown sugar, which is being well accepted in urban regional markets as a healthy alternative to the centrifuged white sugar.

³ Panela is basically the unrefined whole cane sugar. It is the result of boiling and evaporating raw sugarcane juice and then poured into molds to obtain hard round blocks for easy transportation. Each block has a standard weight of 32 pounds.

Other local socioeconomic activities in Palo Quemado are around local transportation (regular shifts to La Union, Alluriquin and Santo Domingo), local trade of rural utensils, staples, agrichemicals and other products and artifacts required for living in the rural environment of the parish. Modest production of fruits and tuberos like naranjilla, limón, naranja, banana, tree tomato, camote, yuca, papa china, among other is mostly used for family consumption and local exchange.

The most important local organizations are the associations Flor de Caña formed by the sugar cane producers and the Asociación Agroartesanal San Pablo de la Plata created by agriculture and cattle ranching producers. Most of the economically active people in the parish are member of either one of these organizations.

Finally it is important to note that the territory of Palo Quemado has some mine resources, especially gold and copper. Concessions of about 2,347 hectares⁴ of the parish territory have been established for mining purposes. At the moment three mine sites are in the area (Table 2), however this activity is still not relevant for the local economy and the companies working there have not significant relation neither with local authorities nor with the socioeconomic life of the parish.

Table 2.- Mining places in the Palo Quemado Parish

PLACE	MINE COMPANY	TYPE	AREA
La Florida	Sultana del Còndor Minera Sulcomi SA	Metallic	642
Loma del Tigre	Sultana del Còndor Minera Sulcomi SA	Metallic	1658
Toachi	GADs Sigchos and Pichincha	No-Metallic ⁵	47
TOTAL			2347

The mines operated by the Sigchos Municipality and the Consejo Provincial de Pichincha are natural deposits for temporal extraction of sand, crushed stone and aggregate for construction needed for road construction and maintenance and other public works. According the mining legislation, the nonmetallic mining is under the control of the municipalities while the metallic one is controlled by the central government so that the local governments, Junta Parroquial has nothing to do with this activity and then it has a no relevant role in the local economy.

Based in the national census 2010, Table 3 shows a comprehensive overview of the parish.

Table 3.- Socioeconomic Overview of the Palo Quemado Parish

Sector / Indicator	Measure	Palo Quemado
Illiteracy	% (15 years old or more)	9.54
Functional illiteracy	% (15 years old or more)	15.91

⁴ Typically the mine concession areas are higher than the actual place of mine activity. So although a concession can be of hundred or thousand hectares, the place where the mine resource is extracted is significantly smaller.

⁵ Nonmetallic mining is for extracting sand, gravel; rock stone and other related mine products.

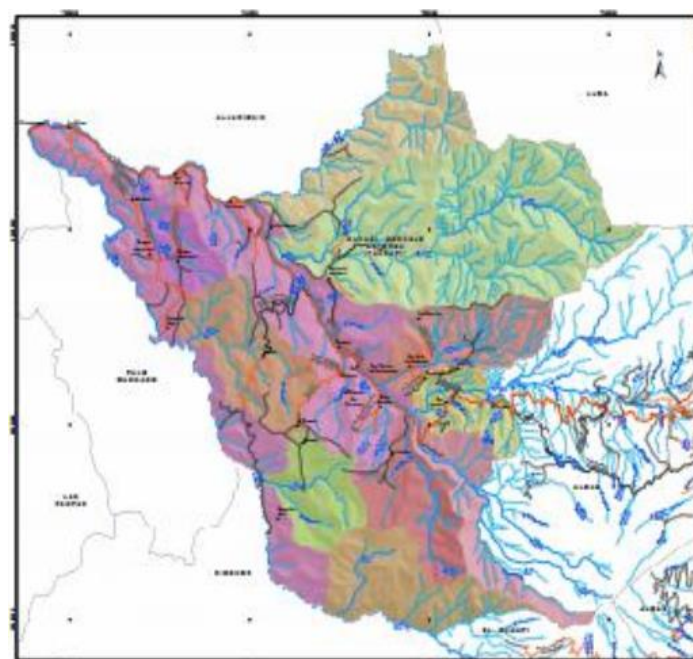
Education	Años de estudio	6.84
Universitary education	% (24 years old or more)	4.77
Complete Elementary School	% (12 years old or more)	81.11
Complete High School	% (18 years old or more)	18.86
Working children 15 - 17 years old	% (children 5-17 years old)	46.15
Working children 5 - 14 years old	% (children 5-14 years old)	6.75
Peoble economically active	Number	504.00
People in working age	Number	794.00
Afroecuadorian population	Number	16.00
White population	Number	47.00
Total population	Number	1,030.00
Men population	Number	567.00
Indigenous people	Number	8.00
Mestizo population	Number	846.00
Women population	Number	463.00
Women proportion	% (total population)	44.95
Extreme poverty for non-satisfied basic needs	% (total population)	33.60
Poverty for non-satisfied basic needs	% (total population)	95.60
Human Development Bonus	Number	314.00
Water service inside home	% (houses)	11.37
Sewage network	% (houses)	9.41
Electric service	% (houses)	85.49
Telephone land line	% (houses)	11.40
Gas use for cooking	% (homes)	83.65
Firewood / charcoal use for cooking	% (homes)	15.20
Own home	% (homes)	79.46

The data shows that this rural parish presents some signs of acute social vulnerability. For example, education, water and sewage services are insufficient,

Manuel Cornejo Astorga (Tandapi) Rural Parish

Although the official name of this rural parish is Manuel Cornejo Astorga, the name of the main town in the territory is known as Tandapi, a traditional name since this side road town was created. It is located in the Pilaton watershed and next to the Aloag-Santo Domingo road, the most important artery to communicate Quito and Guayaquil, the main Ecuadorian cities (Map 2). The area of this parish is of 495,89 km², with an altitudinal range between the 3,800 feet and 8,000 feet. According the national census of 2010 the population is of 3,661 people of which 60% (2,197) is considered economically active.

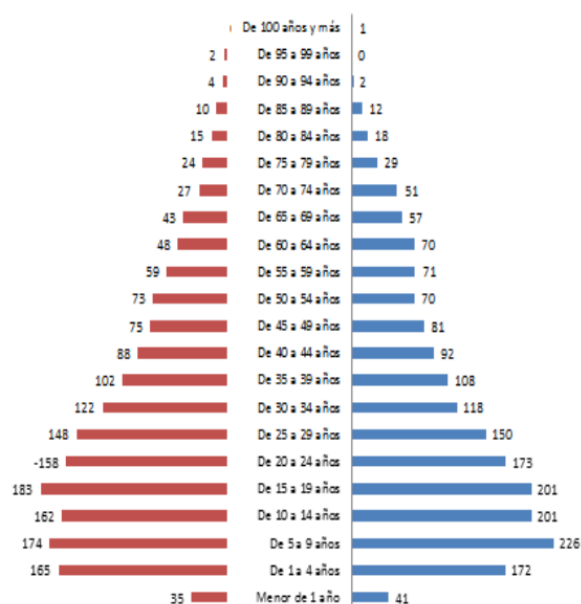
Map 2.- The Manuel Cornejo Astorga – Tandapi Rural Prish



According to the national census (INEC 2010) the women-men correlation is 53-47%. The 68% of the population is under 40 years old and 30% are in the age range of 15-30 years old. (Figure 2)

The most extended ethnic self-representation in this parish is basically that of “mestizo” representing almost the 90% of the local population. Other ethnic self-representation are white (4.5), indigenous (4%), and Afroecuadorian (2.2%).

Figure 2.- Age distribution in the Manuel Cornejo Astorga – Tandapi Rural Parish



Source: GAD-MCA 2012

The main economic activities in this rural parish are related to agriculture, livestock, milk and meat production, flower, tourism, and transportation. Agriculture and livestock are the main sources of income and subsistence for the local population representing the 46% of the entire economic activities in the parish. Trade and small business represent the 11.5% of the economic activities. Food and accommodation represent 7.78 % (Table 4). The most important products are maize, cocoa, cassava, banana, oil palm, potatoes, cereals, maize, beans, quinoa, vegetables,⁶ pork and chicken meat, milk, fish.

Table 4.- Economic activities in the Manuel Cornejo Astorga – Tandapi Rural Parish

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	806	46,78
Industrias manufactureras	57	3,31
Suministro de electricidad, gas, vapor y aire acondicionado	9	0,52
Distribución de agua, alcantarillado y gestión de desechos	7	0,41
Construcción	71	4,12
Comercio al por mayor y menor	199	11,55
Transporte y almacenamiento	78	4,53
Actividades de alojamiento y servicio de comidas	134	7,78
Información y comunicación	5	0,29
Actividades financieras y de seguros	1	0,06
Actividades profesionales, científicas y técnicas	7	0,41
Actividades de servicios administrativos y de apoyo	42	2,44
Administración pública y defensa	14	0,81
Enseñanza	40	2,32
Actividades de la atención de la salud humana	6	0,35
Artes, entretenimiento y recreación	3	0,17
Otras actividades de servicios	12	0,70
Actividades de los hogares como empleadores	56	3,25
No declarado	155	9,00
Trabajador nuevo	21	1,22
	1723	100

Source: GAD-MCA 2012.

Nonmetallic mine is also an important economic activity in the area. According the local authorities 31 mine deposits are in the parish territory, which represent more than the 20% of the national offer of nonmetallic products. Important amounts of rock stone

⁶ These are products for warm and cold weather, favored by the location of the parish between the Coast and Sierra regions.

and gravel are extracted from the Pilatón river banks mostly for being used at the Hidrotoapi hydroelectric project the most important public work in this region.

Based in the national census 2010, Table 5 shows a comprehensive overview of the parish.

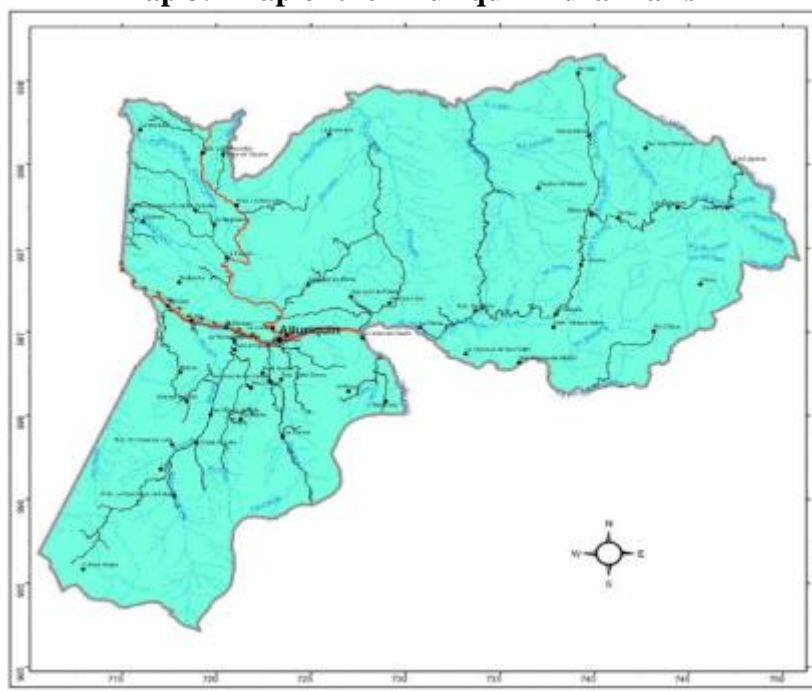
Table 5.- Socioeconomic Overview of the Manuel Cornejo Astorga – Tandapi Parish

Sector / Indicator	Measure	MCA (Tandapi)
Illiteracy	% (15 years old or more)	10.22
Functional illiteracy	% (15 years old or more)	22.95
Education	Años de estudio	6.73
Universitary education	% (24 years old or more)	5.51
Complete Elementary School	% (12 years old or more)	79.52
Complete High School	% (18 years old or more)	19.10
Working children 15 - 17 years old	% (children 5-17 years old)	38.52
Working children 5 - 14 years old	% (children 5-14 years old)	9.96
Peoble economically active	Number	1,708.00
People in working age	Number	2,848.00
Afroecuadorian population	Number	87.00
White population	Number	168.00
Total population	Number	3,661.00
Men population	Number	1,944.00
Indigenous people	Number	149.00
Mestizo population	Number	3,154.00
Women population	Number	1,717.00
Women proportion	% (total population)	46.89
Extreme poverty for non-satisfied basic needs	% (total population)	27.70
Poverty for non-satisfied basic needs	% (total population)	83.50
Human Development Bonus	Number	670.00
Water service inside home	% (houses)	26.05
Sewage network	% (houses)	34.70
Electric service	% (houses)	83.93
Telephone land line	% (houses)	16.03
Gas use for cooking	% (homes)	83.86
Firewood / charcoal use for cooking	% (homes)	14.28
Own home	% (homes)	56.83

Alluriquin Rural Parish

Alluriquin is a rural parish that belongs to the county of the Santo Domingo de los Tsachilas and its homonymous province. It has 9,725 inhabitants (INEC 2010) and an area of 664,8 Km². (Map 3)

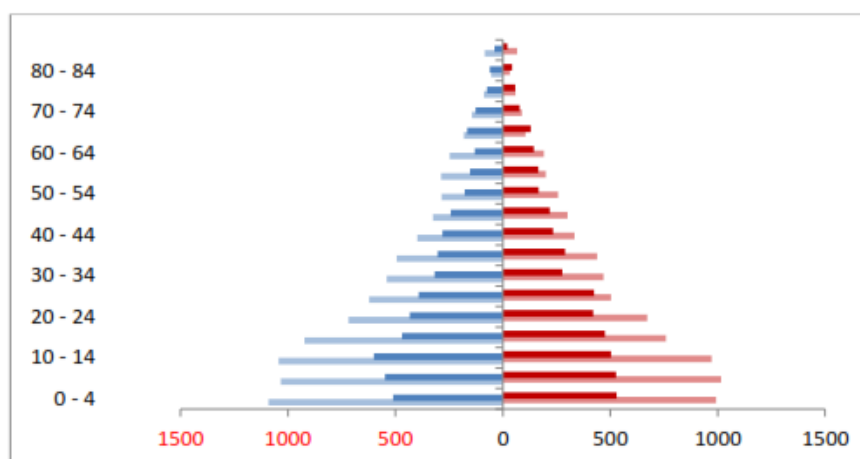
Map 3.- Map of the Alluriquin Rural Parish



Source: GAD-A 2015

According to the national census (INEC 2010) the women-men correlation is 52-48%. The 67% of the population is under 40 years old and 31% are in the age range of 15-30 years old. (Figure 3Figure 2). Like in other parishes of the region, most of the population of Alluriquin is ethnically self-identified with mestizo (90%), being the remaining people identified as white (5%) Afroecuadorian (2%), indigenous (1%), and the rest as “mulato”, “negro”, and “montubio” ethnicities.

Figure 3.- Age distribution in the Alluriquin rural Parish



Source: GAD-A 2015

The population in working-age (PWE) is defined as all those over 10 years old who are considered to be able to work. The PWE in Alluriquín corresponds to 78.24% of its total population. However, the Economically Active Population (EAP) is another indicator that best describes labor supply. The EAP is any population in age to work who is capable and willing to do so at a given moment. It includes both people who work or have jobs (occupied EAP) and those who do not have work but are willing to do so (unemployed EAP). In Alluriquín the EAP is of 3,792 people, which constitutes 49.84% of PWE and is made up of 73.10% of men and 26.90% of women.

On the other hand, Alluriquín is the third parish in the province with the highest poverty rate with an 89.6% of unsatisfied basic needs. According to INEC (2010) only the 55% of the dwellings in the village receive water from the public network, 44% take this resource from the rivers or springs and wells. Sewage service is also insufficient here. Only the 20% of the homes are connected to the public network, 29% to a septic tank, 19% have direct discharge to rivers and streams, 17% of the homes are connected to a blind well, 12% has no sewage service at all and 3% have latrine.

Land coverage is composed by 32.5 % of natural forests, 61% of introduced grass and the remaining 6.5% is composed of permanent and semi-permanent crops, planted forests and riparian vegetation (SDT 2010; MAGAP-SENPLADES, 2014). These numbers speak of the importance of livestock for local people. Livestock, agriculture, forestry and fishing cover more than the half of the whole economic activities in the parish. Far below, other relevant activities in this territory are manufacturing industries, construction, transportation and storage, accommodation, and catering services among others (Table 6).

Table 6.- Economic activities in the Alluriquín Rural Parish

Activity	%	Records
Agriculture, livestock, forestry and fishing	57.57%	2,183
Wholesale and retail trade	10.36%	393
Manufacturing industries	7.20%	273
Transportation and storage	4.03%	153

Accommodation and catering services	2.37%	90
Construction	2.22%	84
Government and public administration	1,19 %	45

The topography in Alluriquín characterized by steep slopes provides to this territory abundant water and biological resources, which have determined the main economic activities of the local society based in agriculture and livestock and the extraction of natural resources (Table 6).

Hills, ridges, and micro watersheds have created conditions for biodiversity and scenic views, but these conditions also turn this area vulnerable to landslides, deluges and spates. In fact, Alluriquín undergo a catastrophic spate in April 2016 when record precipitations occurred in a single night. Four people died in that event, which also caused important material damages like the destruction of houses and buildings included the seat of the local government and part of the road Aloag-Santo Domingo cutting then for few days one of the most important routes that connect the Sierra and Costa regions (EC 2016). According to local authorities, more than 75% of the territory has high and medium-high susceptibility to landslides, spate, deluges and flooding. (GAD-A 2015).

Although these issues of territorial vulnerability the parish must also deal with economic activities that would increase the risks to adverse events. According to the Agencia de Regulación y Control Minero, the governmental mining agency, in the Alluriquín territory there are the following concessions: i) M-10 granted to Teegra Ecuador S.A.; ii) La Florida 1 granted to Caselogic, and iii) Loma del Tigre, granted to Sultana del Cóndor Minera (Sulcomi S.A)⁷. The mine resources existing in the territory are basically gold, silver and cooper. Nonmetallic mine activities also exist in the banks of the Toachi, Pilatón, Mulaute and El Tránsito rivers where sand, crushed stone and other similar materials are extracted. As known, the mine industry needs to remove large amounts of rocks, sand and mud in the mine siting process opening pits and quarries. This cause soil instability and then promotes erosion and landslides. Other activities that cause negative impacts in the soil are logging and unsustainable agriculture and cattle ranching, which remove the natural vegetation facilitating the water infiltration in the soil making this less able to maintain its stability during intense rainfall.

Based in the national census 2010, Table 6 shows a comprehensive overview of the parish.

Table 7.- Socioeconomic overview of the Alluriquín Rural Parish

Sector / Indicator	Measure	Alluriquín
Illiteracy	% (15 years old or more)	9.34

⁷ This mining company also works in the territory of the Palo Quemado parish. The “Loma del Tigre” hill lie between the territory of the Alluriquín and Palo Quemado parishes.

Functional illiteracy	% (15 years old or more)	20.72
Education	Años de estudio	7.11
University education	% (24 years old or more)	6.11
Complete Elementary School	% (12 years old or more)	84.12
Complete High School	% (18 years old or more)	21.28
Working children 15 - 17 years old	% (children 5-17 years old)	26.62
Working children 5 - 14 years old	% (children 5-14 years old)	4.54
People economically active	Number	3,792.00
People in working age	Number	7,609.00
Afroecuadorian population	Number	319.00
White population	Number	450.00
Total population	Number	9,725.00
Men population	Number	5,023.00
Indigenous people	Number	111.00
Mestizo population	Number	8,715.00
Women population	Number	4,702.00
Women proportion	% (total population)	48.34
Extreme poverty for non-satisfied basic needs	% (total population)	32.50
Poverty for non-satisfied basic needs	% (total population)	93.90
Human Development Bonus	Number	3,651.00
Water service inside home	% (houses)	12.05
Sewage network	% (houses)	19.80
Electric service	% (houses)	87.50
Telephone land line	% (houses)	13.17
Gas use for cooking	% (homes)	87.18
Firewood / charcoal use for cooking	% (homes)	11.55
Own home	% (homes)	53.95

STAKEHOLDERS AND PERCEPTIONS ON CLIMATIC ISSUES

As described above the Toachi-Pilaton watershed is a natural framework of intense socioeconomic exchange where people and organizations of diverse type and range exert their interests in order to get and influence management of the existent natural resources. This approach is helpful for understanding that any measure for promoting sustainable development, water management or adaptation strategies for climate change and vulnerabilities should be the result of the dialogue among the different stakeholders of the area.

This part of the report is based on fieldwork carried out in the three rural counties in June 2016. During the field work was used semistructured questionnaires to interview representatives of the Cotopaxi, Sigchos, Mejia, Alluriquin, Palo Quemado, and Manuel Cornejo Astorga GADs, representatives of the Environmental and Communitarian sections of the Hidrotoachi project, members of productive organizations, and local residents. People interviewed were asked how they perceived climate issues and how they think they affect the daily life of the people.

Questions during the interviews looked for understanding five basic issues:

- What kind of weather issues are occurring in the area of study,
- How they are affecting the local people and socioeconomic activities,
- What are the explanations of local people to these events,
- What is the understanding of climate change phenomenon; and,
- How concerned are local authorities in watershed management and climate issues in the Toachi-Pilatón watershed.

These questions were helpful to know the perception and the level of preparedness for climatic events and issues of vulnerability in the area.

Stakeholders in the area

Stakeholders or Interest Groups are people and entities with a declared or conceivable interest or stake in the management of a given area. Stakeholders are not necessary organized they can be of any form, size and capacity like individuals, organizations, or even unorganized groups. In the Toachi Pilaton watershed stakeholders fall into the following categories:

State actors:

- Administrative agencies: MAE, INAMHI, CELEC
- Regional GADS: Pichincha, Cotopaxi and Santo Domingo de los Tsachilas provinces,
- Suregional GADs: Mejía (Pichincha), Sigchos (Cotopaxi), and Santo Domingo (Santo Domingo de los Tsachilas)
- Local GADS Manuel Cornejo Astorga, Palo Quemado and Alluriquin;
- Junta de Agua de Santa Rosa (Palo Quemado)

Private sector:

- Ranchers and farmers
- Companies and projects:
 - HidroToapi hydroelectrical project
 - Sultana del Còndor Minera Sulcomi SA (Palo Quemado)
 - Toachi GADs Sigchos and Pichincha mining processing sites (Palo Quemado)
 - Teegra Ecuador S.A. (Alluriquin)
 - Caselogic (Alluriquin)
 - Sultana del Còndor Minera (Sulcomi S.A), Loma del Tigre concession (Alluriquin).

Civil society and foundations

- Fundación Tangaré (Tandapi)
- Reserva Biológica La Esperanza
- Hesperia Biological station and reserve
- Otongachi biológico reserve
- Río Guajalito Scientific Station
- Tanti protected forest
- Rio Lelia watershed protected forest
- La Favorita Scientific Station

Productive organizations

- ORCOPROSAN - Organización comunitaria productiva Santa Rosa Lima. (Palo Quemado)
- Asociación Flor de Caña (Palo Quemado)
- Asociación de Ganaderos de las Pampas (Pampas Agüilla)
- Asociación Agroartesanal San Pablo de la Plata (Pampas Agüilla)
- Pre-Asociación de Cafetaleros (Tandapi)
- Pre-Asociación de Cafetaleros (La Esperie)
- Asociación de Productores Agropecuarios “Pampas Argentinas” (Tandapi)
- Asociación Agropecuaria Mirabad (Tandapi)

Coomunities and local Interest groups

- Unión del Toachi (Alluriquin)
- La Esperanza community (Tandapi)
- El Mirador community (Tandapi)
- Mirabad community (Tandapi)
- El Paraíso community (Tandapi)
- San Francisco community (Tandapi)
- Los Olivos community (Tandapi)
- Peñas Blancas community (Tandapi)
- Ilusión community (Tandapi)

- Canchacoto community (Tandapi)
- Iliolan community (Tandapi)
- Cordilleras del Paraíso community (Tandapi)
- San Antonio community (Tandapi)
- La Esperie community (Tandapi)
- La Palma community (Tandapi)
- Pampas Argentinas community (Tandapi)
- Praderas del Toachi community (Palo Quemado)
- Palo Quemado Centro community (Palo Quemado)
- San Pablo de la Plata community (Palo Quemado)
- Las Praderas community (Palo Quemado)
- Santa Rosa de Lima community (Palo Quemado)
- Las Minas de la Plata community (Palo Quemado)
- El Cristal community (Palo Quemado)
- Zarapullo community (Palo Quemado)
- La Florida community (Palo Quemado)
- Unidad Educativa Juan Salinas (Palo Quemado)

First of all it is important to consider that there is not any encompassing process that calls the attention of all the listed stakeholders in the context of the context of watershed management. This does not mean that they do not have interest and/or exert influence in the watershed issues but that there is not coordination or dialogues in terms of management initiatives. This is largely due to the fact that according the national Constitution the regional decentralized governments are invested with the exclusive competence for watershed planning and for creating watershed council to carry out its management.⁸ Besides the conservation, recuperation and integrated management of water resources are also under the state responsibility through the regional governments⁹ This competence bestow these governments to regulate all activities that can affect the water quality and quantity and the ecosystemic equilibrium especially y water recharge areas¹⁰.

Although the importance of the legal framework regarding watersheds, the regional governments have not been created yet, so their competences are not fully executed by any public organization. As a result there are not administrative councils for watershed managements and no control agency that can assure an overview of all the watershed of the country. Some control activities regarding these areas are carried out by the Ministerio del Ambiente and Ministerio de Agricultura Ganadería, Acuacultura y Pesca. MAGAP but in any case an integrated policy of management and control can be applied by several and dispersed organizations.

Provincial governments have the competence for promoting public works in watershed of all type in their territories and to carry out the environmental management. However these competences can be conflictive since the promoting of public works means the construction of roads, irrigation channels, bridges and other infrastructure that can impact watershed if environmental issues are not considered. In addition, not all

⁸ See articles 262 and 263 of national Constitution.

⁹ See article 411 of national Constitution.

¹⁰ Idem.

provincial governments have still authorization for environmental management¹¹ so in practice no competences over watershed can be applied.

Another issue regarding one of the productive stakeholders in the watershed is the mining activity. As known mining is among the most nature transformation activities and typically they are executed in very difficult to access areas where rural governments are more efficient to reach. However according the national law, metallic mining activities are under the control of the central government and non-metallic mining under the municipal governments. In the area of study there are six metallic mining concessions and a number of non-metallic extracting places. Since rock, sand, stone and other non-metallic mine resources are abundant in the area it is virtually impossible for the local municipalities to control all of them. Companies granted with metallic mine concessions report to ARCOM (Agencia de Regulaciòn and Control Minero) and not to local rural parishes in whose territories the environmental impacts occur. As a result, mining companies work in the area but have not relationship with local organizations.

The effect of the above explained situation is that there is not any organization in the Toachi-Pilaton watershed that can carry out a comprehensive management of the existing hydric resources and to coordinate activities of the local public organizations in order to establish management activities for the control and conservation of the area.

Two institutions only are carrying some type of activities in coordination with local authorities, and other stakeholders. They are the MAE in the framework of Plan Bosque, in which coordination at different levels is performed with rural parishes, communitarian organizations and forest private owners. The other organization is the Hidrotoapi Hydroelectric Project, a large infrastructure construction executed by a private company under the order of the central government. As a part of the environmental requirements Hidrotoapi must execute communitarian consultation in the area of direct and indirect impact of such project. In order to fulfill such need this project has organized a comprehensive plan to inform local communities about potential environmental and socioeconomic impacts that can affect local livelihoods.

In the above mentioned scenario, the local stakeholders has few opportunities for communication, coordination and exchange strategies for organizing their activities in a sustainable way or at least to make them more efficient. On the other hand, the absence of a management straggles leave the stakeholders to perform their activities at large with a minimum of considerations for the security and sustainable use of the watershed.

Climate issues in the Toachi Pilaton watershed

Four climatic issues were mentioned consistently during the interviews: drought, rainfalls, temperature increase and strong winds. The local people are now aware of the weather events and negative impacts since it is fresh in the memory the catastrophic spate in the Alluriquin parish occurred a couple months before the field work for this report and caused by record precipitations. Most of the communities of the parishes involved in this study have also experienced landslides in their lands in the last two years due to sudden and excessive rains. So for most of the interviewed people it is evident that changes in weather patterns have occurred over the last years and they are

¹¹ According the MAE legal framework only provincial and municipal governments that fulfil some requirements are bestowed for environmental management in their jurisdictions.

interconnected. Then awareness regarding climatic issues in the area has been triggered by the experience with such disasters which have affected practically all the region.¹²

Drought was considered an important issue especially in the Toachi watershed area. Communities of the upper basin like Palo Quemado and even of Sigchos referred that most of the year 2015 the entire area has suffered an extreme dry season. For communities of the lower basin it was not an issue because of the alternatives to offset the problem through the use of the river water, but for those of the higher and middle watershed it was more problematic because the river is far from the communities. However after several months of dryness there was a sudden rainy season including deluges that caused spate, mass movements and flooding in different communities of the lower and middle areas in the watershed.

Strong winds have also been reported during the interviews. These events occurred especially in Palo Quemado where the winds were so intense that several trees were uprooted. This weather condition is also pointed as part of the climate pattern change that is experiencing this region.

Effects of the weather issues on local socioeconomic activities,

Local people have been concerned of threats to the communities caused by changes in the climate patterns especially in terms of human and economic security (i.e. landslides, flooding and crops quality). Ongoing changes in weather patterns are seen acutely since the Lamas river spate occurred in April 2016 and the string of landslides and avalanches occurred in the last months of 2015 and first trimester of 2016 in different areas of the three involved counties.

The related weather events have affected negatively the local people in several ways. First, long periods of dryness and short but intense periods of rains are pointed as the cause of the decreasing of sugar cane quantity and quality. Sugar producers said that the panela production has significantly decreased in the last year because of the lack of the cane quality. Now they need more canes to produce the same amount of panela that is the standard for commercialization.¹³ Other sectors like the cattle ranchers and agriculture producers have also experienced problems derived from extreme weather events. Low productivity, fungus and pest¹⁴ increase, and plant destruction by intense rains are the most common problems the farmers attribute to weather problems. For that they need to use more agrichemicals and devote more time for caring the crops.

On the other hand extreme rains soften the soils of deforested areas or steep hills and produce landslides or mass movements and flooding. During the last months of 2015 and the early 2016 several landslides occurred in the entire region and in most of the cases closing paths and roads and then causing transportation problems sometimes for

¹² The spate occurred in the Damas River in Alluriquin have had an economic impact beyond the micro-region of the lower Toachi-Pilatón watershed. Since the Aloag Santo Domingo road was closed during few days it affected the transportation between Quito, Santo Domingo and Guayaquil. Some landslide occurred in the same period near to Tandapi also forced to close the Aloag Santo Domingo road.

¹³ Each piece of panela or “banco” for commercialization weight 32 pounds.

¹⁴ Pests can appear during dry or wet season, but now with the intense weather conditions have appeared others previously unknown. For example in the naranjilla crops were common the “lancha negra” and “lancha blanca” pest, but now have appeared two more the “ojo de pollo” and “muerte lenta”, to control which farmers must apply more and stronger agrichemicals. This make costly some crops.

several days. In the Manuel Cornejo Astorga rural parish more than 200 small and medium scale landslides occurred in the last year. Practically all the 26 communities of the parish have had landslides in their territory. The worst landslide occurred in May 2016 at the point in the kilometer 32 of the Aloag - Santo Domingo road forcing to close it for a couple days.

As already explained the spate in the Damas River that caused avalanche and flooding in Alluriquin was the most extreme effect of the concentrated rains occurred in April 2016. Besides the actual damage that can cause a landslide if it occur over towns, houses or roads, it affect the transportation of products to the markets and some of them like milk and other perishable can be ruined at all causing significant economic damage to the producers.

Strong winds have less impact in the farmers however some crops can be affected and accidents can occur when trees are uprooted. However any of the interviewed has reported accidents due to this type of event. On the other hand, the combination of winds, drought and high temperature sparked some wildfires in the area, especially in Sigchos.

Finally considering the sharp contrasts of the dry and wet periods local people realize that during the drought there was also a significant increment of temperature. However it may be a subjective observation. In any case cases of skin irritation especially in children have been experienced in the communities of Palo Quemado and Pampas de Agüilla in the middle and upper part of the Toachi watershed.

Perceptions of local people regarding weather events

Experience has provided rural communities a knowledge about the local environment and climatic issues. Based in such knowledge these communities have designed a yearlong calendar determining periods for planting, cropping, applying agrichemicals for caring the crops, and even for festivities and other celebrations. However, when sudden changes in local conditions occur, the people tend to fall in fabrications and attributions in order to make an understanding of the new or extreme events.

Pyhälä et al (2016) has studied how people can easily astray when issues go beyond of what is considered normal in terms of their experiential knowledge. He calls it memory illusions in which facts from previous knowledge and new imaginations can be mixed to get sense of new realities. However this may affect the experiential knowledge of the communities acquired through daily observation of their environment. Precisely this has happened in the Toachi – Pilaton areas.

Common explanation of why the creeks of the lower basin area have become dry during 2015 is that the waters were sank through the cracks opened in the soil because of the dynamite explosions carried out to build the Hidrotoapi hydroelectric project. In the upper part of the basin there are also communitarian explanations based in the imagination. For example the drought that has affected most of the year during 2015 and 2016 becoming an overwhelming problem and even a political issue. Since this weather condition affected five counties of the Cotopaxi province included Sigchos in the upper part of the Toachi River, there was a public petition for creating “veedurias” or commissions in charge to investigate the cause of such abnormal drought (GAD-C

2016). In the communities sparked the idea that a program of “cloud seeding”¹⁵ was being carried out by flower cultivators in order to produce rain in specific areas to favor their agribusiness (GAD-C 2016). The popular explanations to new or unknown events may have been caused by influential or fantastic memories of extreme events mixed with new situations observed in the area.

However people also retain some indicators of recurrent local problems and provide more scientific explanation for new events. For example the drought problem and the landslides occurred in the upper basin, has been explained by the productive associations as a direct result of the constant deforestation in the area. The association of panela producers, Flor de Caña has explained that farmers use now more trees every week to produce panela, so the nearest forest in Palo Quemado are being significantly degraded. This means also that logs for firing the cauldrons should be brought from more distant places which make more expensive the production.¹⁶

The above explanations show how stakeholders are eager to determine whether situations and to establish them in terms of what is their interest. Beyond of what true or false can be the explanations, this situation also show that local are prone to know about climate issues and that information, capacitation and measures implementation on climate change adaptation are needed.

Understanding on climate change and awareness of local authorities

There is not a clear understanding regarding climate change in the communities in the three counties. Climate change is still a far reality and then there is not a conception on how to take actions to response it. However the adverse events of rainfall, spate and landslides have suddenly forced the people to take a position regarding the recurrent and catastrophic events that occurred in the area.

The Alluriquin disaster made people aware that climate has changed and some collective actions should be adopted. It is obvious that local communities are now more favorable to protect forest especially in the steep areas of the river bank and hills. In addition private reserves are more popular and seen as something positive for the community.

Notwithstanding the increase in public awareness it is not easily translated to local authorities in terms to move them devise plans for bettering the watershed management or coordinating among the different institutions to take common measures. This situation is due to normative and practical issues. From the point of view of the national legislation, the responsibility for watershed management corresponds to the regional GADs which as has already said are still inexistent. These institutions are bestowed by the National Constitution and COOTAD¹⁷ to carry out the management of the hydrographic systems. This means that parish GADs cannot take initiative in promoting

¹⁵ This process consists in “seeding the heavy clouds with tiny particles of silver iodide whose electrical charge would pull together the cloud's water droplets. Once enough droplets had gathered together, their weight would make them fall from the sky as rain.” See: <http://www.dailymail.co.uk/sciencetech/article-1351437/Can-scientists-REALLY-make-rain-useless-shower.html#ixzz4V92o0FR7>

¹⁶ To address this problem, the Association Flor de Caña of Palo Quemado is working with Maquita Cushunchic, a fair trade organization based in Quito, to introduce more efficient technologies and improve the production.

¹⁷ Código Orgánico de Ordenación Territorial y Administración Descentralizada.

watershed management activities. So in this case while local authorities (the parish GADs) may understand the climate change issues and the potential impacts that can produce in their territories, they do not feel that can take actions or decisions in response to such global event.

Another issue that conspire against the adoption of local measures for watershed management is that some activities that cause severe impacts in the hydrographic basin are not under the control of local governments (the parish GADs). For example metallic and nonmetallic mine activities are under the control of the central government and of the municipal GADs. As a result these activities are not reported to the local parish authorities –the most idoneous to locally verify any situation- and then the control of the problems caused by mine companies not always are known by the control agencies.

The related issues and perceptions in the Toachi-Pilaton watershed show that capacity-building and community-based education are important activities for raising awareness on climate change impacts and promoting adaptation measures. These approaches are important to promote sustainable livelihoods, food security and finally sustainable development.

Gender issues and vulnerable people

As in most of rural areas in Ecuador, gender is a complex issue. It is difficult to evaluate women issues not only because there is an evident level of “machismo” but also because women have types of agency that do not necessarily have been analyzed by feminist studies and then may not fit in what gender inequality stands for.

The first aspect of gender inequality in the area is the invisibilization of the female work. Despite the current interest of the government for promoting women visibilization, most of the productive female activity is still not socially recognized, and in that sense it is not statistically reflected either. The division between labor for the market and domestic work is often diffused and part of the productive work ends up being counted as unrecognized domestic labor. In other words, female work counts only when it is sold in the market economy (as waged worker or as independent entrepreneur) but not when women work at home. Two factors contribute to this statistical invisibility: on the one hand the fact that all of the female home work has a high use value but it is of null exchange value. For example, cooking for the family, caring children, making the room and so on are activities that cannot be sold in the free market and then it is not worth or practical accounting them. On the other hand, the home female activities are seen as part of the gender work division so it is the task that women must contribute for family and social reproduction.

Beyond the above theoretical considerations since many men in the Toachi Pilaton area are increasingly incorporated in waged work activities, rural women have taken on bigger roles in agricultural production and community labour. The resulting effect of this fact is that the women must assume the place that men have left vacant and then must work an average of 14-16 hours daily. The personal impact of this social phenomenon can be devastating in terms of women health and of physical abuse from

husbands.¹⁸ Here also is affected the right of women to have time for leisure, which in turn men enjoy in any case working in family subsistence activities or in waged work outside the town.

Notwithstanding evident gender inequality issues in the area of study it is also important to consider the women agency for creating income opportunities for their families. In practically all the areas women control most of the formal and informal food business. This provides them great economic independence counterbalancing home male-women asymmetries. In this case women are visibilized through a work inserted in the market economy.

Regarding other vulnerable people beyond women and children, there are no other particular groups that can be identified as vulnerable. Since the area of study of the Toachi Pilaton watershed is a frontier territory, there are no indigenous people nor Afroecuadorians.

¹⁸ In rural areas women have reported health problems like of the spine, of respiratory and reproductive organs, hernias, bruises, and wounds (MacMillan 1995) and gender violence (Camacho 2014).

BIBLIOGRAPHY

Camarero Rioja, Luis Alfonso

- 2006 El trabajo desvelado. Trayectorias ocupacionales de las mujeres rurales en España. Instituto de la Mujer, Ministerio de Trabajo y Asuntos Sociales. Madrid.

EC (ElComercio.com)

- 2016 Cuatro personas fallecidas por el desbordamiento del río Damas en Santo Domingo de los Tsáchilas. El Comercio Newspaper, April 26, 2016. Available at: <http://www.elcomercio.com/actualidad/aloag-santodomingo-cierre-deslizamiento-desbordamiento.html>

GAD-A

- 2015 Plan de Desarrollo y Ordenamiento Territorial de la parroquia Alluriquín 2015-2019. Gobierno Autónomo Descentralizado de la parroquia Alluriquín.

GAD-C

- 2016 Comunidades exigen solución y ayuda ante la aguda sequía en la provincia. Consejo Provincial de Cotopaxi. Noviembre 18, 2016 <http://www.cotopaxi.gob.ec/index.php/noticias/item/1759-comunidades-exigen-solucion-y-ayuda-ante-la-aguda-sequia-en-la-provincia>

GAD-MCA

- 2012 Plan de Desarrollo y Ordenamiento Territorial de la parroquia Manuel Cornejo Astorga - Tandapi 2012-2025. Gobierno Autónomo Descentralizado de la parroquia Manuel Cornejo Astorga.

GAD-PQ

- 2015 Plan de Desarrollo y Ordenamiento Territorial de la parroquia Palo Quemado 2025. Gobierno Autónomo Descentralizado de la parroquia Palo Quemado.

MacMillan, Neale

- 1995 Ecuador: Health and the Working Woman. IDCR Reports Vol. 23, No. 2. July 1995. Available at <https://idl-bnc.idrc.ca/dspace/bitstream/10625/22843/2/112201.pdf>

Pyhälä, A., Á. Fernández-Llamazares, H. Lehvävirta, A. Byg, I. Ruiz-Mallén, M. Salpeteur, and T. F. Thornton.

- 2016 Global environmental change: local perceptions, understandings, and explanations. Ecology and Society 21(3):25. <http://dx.doi.org/10.5751/>

USGS

- 2016 What is a watershed?. The USGS Water Science School. Available at: <https://water.usgs.gov/edu/watershed.html>



Annex 5. Stakeholders, interests and socioeconomic situation in the project: "Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management"

ANNEX 5 - B

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

August of 2017

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GLOSSARY OF TERMS

ARCOM	Agencia de Regulación and Control Minero
CELEC	Corporación Eléctrica del Ecuador
ESPE	Escuela Politécnica del Ejército
ELEPCO	Empresa Eléctrica Cotopaxi
GAD	Gobierno Autónomo Descentralizado
INEC	Instituto Nacional de Estadísticas y Censos
MAE	Ministerio del Ambiente
MAGAP	Ministerio de Agricultura Ganadería, Acuacultura y Pesca
MEER	Ministerio de Electricidad y Energía Renovable
MINTUR	Ministerio de Turismo
SENAGUA	Secretaría Nacional del Agua
SEPS	Superintendencia de Economía Popular y Solidaria

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INTRODUCTION

The hydrographic watershed of the Toachi Pilatón hydroelectric power plant is formed by the Toachi and Pilatón rivers, and receives contributions from the Verde, Siguí, Pashillin, Zumbahua, Santa Ana and Zarapullo rivers, on the western slope of the Andes. (TECNALIA) Toachi river originates in the badlands of the Ecological Reserve of the Ilinizas around Quilotoa lagoon, between Ilinizas volcanoes north and south in the province of Cotopaxi. Pilatón River born from badlands of the slopes of volcanoes Atacazo and Guagua Pichincha and the hill Corazón. (TECNALIA)

A watershed is an “area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel” (USGS 2016). Besides of being such natural framework watersheds are also areas of intense socioeconomic exchange where people and organizations of diverse type and range (state, natural resources extractors, traders, farmers and so on) exert their agency in order to get and influence management of the existent resources in the area.

Because of the diversity of existing geographic areas, the often difficult access to them, and the social competition for its natural resources, watersheds are of complex management and then prone to be ecologically neglected and significantly altered by socioeconomic activities. Since whatever natural and human-induced issues happening in upper areas can affect the rest of the basin until the river-outflow point, watersheds are extremely vulnerable to socioeconomic activities. For that it is important to apply integrated water management strategies where all stakeholders can coordinate and exchange experiences, and be regulated and controlled in a comprehensive plan intended to protect the hydric resources.

The ecological vulnerability of the watershed supposes also a socioeconomic vulnerability of the societies living in these areas especially those already vulnerable like women, children and indigenous people. By historical and socioeconomic issues these groups are the most vulnerable in any society and particularly in those of frontier where social life depends of direct natural resource extraction. In this understanding the climate change phenomenon and the expected impacts on nature and society will particularly affect watersheds and women and indigenous people as the most vulnerable in natural and social environments. Therefore in the efforts to promote adaptation measures to address the problem of climate change especial attention must be devoted to watersheds, its societies, and the women, children and indigenous peoples existing in these environments.

Considering the issues of social and natural vulnerability and the expected effects of climate change, this document presents an ecological and socioeconomic overview of the Toachi and Pilatón watersheds pointing the situation of the three rural jurisdictions in which lie the critical part of this area and identifying stakeholders and their perceptions regarding weather and climate change issues. As part of this analysis this document also points the situation of women and issues of gender inequality in this area.

The Toachi and Pilatón watersheds located in the North-Central area of Ecuador, in the so-called Cordillera Occidental de los Andes, in the provinces of Cotopaxi, Pichincha and Santo Domingo de los Tsachilas. Starting both watersheds in different volcano systems at more than 14,000 feet over the sea level in the Cotopaxi province; they joint at 2,000 feet altitude in the Santo Domingo de los Tsachilas province and then under the name of Blanco River run northbound to then be part of the Esmeraldas basin, which finally drains its waters in the Pacific Ocean. Besides, because of the elevated altitude and topographic steepness of ridges

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and hills of the cordillera where the basin starts, the Toachi and Pilaton rivers are the outflow point of several smaller watersheds which increase the ecological complexity of this area.

Analysis and conclusions of this document are intended to put in perspective the ecological and social complexity of the Toachi-Pilaton watershed, to address both in the efforts to promote adaptation measures to deal with the expected issues related with climate change events. In addition, introduce to Adaptation Fund a final document with a map of stakeholders in Toachi-Pilaton watershed.

NATURAL SCENE OF THE AREA

The Toachi river starts in the foothills of the Chugchilán mountains, a branch of the Western Cordillera, in territories of the Chugchilán and Isinlivi parishes, in the county of Sigchos, province of Cotopaxi. The river begins at an altitude of 4500 m and descends to 1000 m altitude to join the Pilatón River. The Toachi basin is flanked to the east by the Corazon hill (4,788 m s.n.m) and the volcanoes Illiniza Sur (5 248 m s.n.m.) and Illiniza Norte (5,126 m s.m.). To the South by the Era Urco hill (4,473 ms s.n.m.). These elevations contain several smaller water courses that end in the river Toachi. The basin of this river has a length of 104 km, and a contribution area of 1,478 km². The average slope is of 34.7%.

The Pilatón river is formed by the thawing of the volcanoes glaciers of the Corazón (4,790 msnm) and Atacazo (4,455 feet altitude) creating a watershed that has an east - west direction and is formed on the western slopes of the Cordillera Occidental, El Corazón and Atacazo hills, has an contribution area of 514 km², the main channel length is 42.5 Km, the average slope represents 42.7%. This river join with the Toachi and then form the Blanco river which in turn join the Quinindé river and then flow into the Esmeraldas hydrographic system which drains in the Pacific Ocean.

As shown in Table 1 the hydrologic complex that conform the area of interest of this document lies in a territorial mosaic of three provinces, three counties and three rural parishes. There more than 10,000 people live in more than 35 communities.

Drainage unit	Province	Canton	Parrish	Total population in the Parrish	Population within the drainage unit
Toachi	Cotopaxi	Latacunga	Toacaso	7,685	7,685
		Pujili	Guangaje	8,026	8,026
			Zumbahua	12,643	12,643
		Sigchos	Chugchilan	7,811	7,811
			Isinlivi	3,227	3,227
			Las Pampas	1,943	1,943
			Palo Quemado	1,030	1,030
			Sigchos	7,933	7,933
	Pichincha	Mejía	El Chaupi	1,456	NA
Pilatón	Pichincha	Mejia	Aloag	9,237	NA
			Manuel Cornejo Astorga (Tandapi)	3,661	3,661
	Santo Domingo de los Tsachilas	Santo Domingo	Alluriquin	9,725	9,725
Total population in 2010				74.377	53.959
NA = Not available, but it is known to be very small					

Table 1 Population in the Toachi – Pilatón system

Because of the altitudinal variability this territory is biologically rich. It contains from the paramo ecosystem at more than 9,000 feet altitude to tropical and cloud forest at about 1,000 feet altitude. This natural configuration of the area explains the existence of several ecosystems

and watershed, and then of a rich biological diversity. The most important watersheds of this hydro-geologic system are those of the Toachi and Pilatón rivers. Smaller watersheds in this ecological reserve are of the Zarapullo river, which drains to the Toachi and the Corazon and Santa Ana rivers which drains to the Pilatón.

In the Toachi river basin, the largest area corresponds to natural forest (22.8%), followed by páramo (18%) and forest intervened plus cultivated grass 70-30 with 15.4%, the remaining area (43.8%) corresponds to others. Types of land use mainly crops. In the Pilatón river basin; The largest occupation corresponds to natural forest (52.8%) and forest intervened plus cultivated grass 70-30 (31%), the remaining 16.2% is destined for other uses. The natural richness of this natural compound has guided the human interventions in the area, which is still basically a frontier. Practically all the socioeconomic activities in the region rely in the extraction of primary natural resources. One of the major problems in the upper part of both basins is the transformation of the natural ecosystems of paramo and forest due to agricultural activities. This change in vegetation cover affects the surface runoff.

This ecological complex is important for hydric resources and because of its biodiversity, for the reproduction of both the flora and fauna of the region and then, important for ensuring water and food security of the local communities. Then the importance of the Toachi-Pilatón watershed must be understood under the complex natural mechanisms of biodiversity and hydric natural resource availability in which the local communities have built their culture and food and water security.

Areas under conservation status

Because of its natural landscape and biological importance the area of study have several public and private protected areas. The public areas under conservation statuses are Sarapullo and Toachi Pilatón Protected Forests and the Ilinizas Ecologic Reserve. The private protected areas have been created under the category of “protected forests” that was the first category for conservation of natural areas allowed in private lands before 2008 when the national constitution established the creation of private and public decentralized¹ ecological reserves. The protected forest is an administrative figure for conserving soil and hydric resources and in function of these primary goals is considered that forests and natural or introduced vegetation must be maintained undisturbed in critical areas of the watersheds. By creating protected forests the state promoted the protection of the steepest areas of the watersheds and then avoiding landslides, land erosion and drainage alterations.

Ilinizas Ecologic Reserve and Sarapullo Protected Forest

The Ilinizas Ecological Reserve is a public protected area consisting of 149,900 has of paramo and Andean Humid and Subtropical Forests. It is located in the provinces of Cotopaxi and Pichincha. This area encompasses the twin peaks of the Ilinizas as well as the extinct volcano Quilotoa best known by its crater lake. The reserve lie in the Cordillera Occidental de los Andes its territory contains also several hills and ranges like the Lelia Cordillera, the El Corazón, Jaligua Alto and Tenufuerte hills. This mountain system barrier the evaporations from the costal forcing its condensation in the west side of the Cordillera Occidental and

¹ Before the National Constitution of 2008, protected areas of any kind were created only under the central government control, with the new legal framework of 2008 municipalities and rural parishes can create their own protected areas and rural communities, indigenous people and private owners can also legally create areas for conservation in the lands under their control.

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therefore increasing the hydric resources of the watersheds or even favoring the creation of micro-watersheds in the entire area.

The Sarapullo Protected Forest was created in 1986 before the Ilinizas Ecological Reserve. Then when the Ilinizas was declared as a reserve the entire territory of the Sarapullo forest was incorporated in such new protected area. So now in practice all the policies and management measures regarding this area are made considering the main area that is the Ilinizas Ecological Reserve.

Toachi – Pilatón Protected Forest

This protected forest was created in 1987 as a means to maintain unchanged the forest other vegetation of the Toachi and Pilatón river basins. This forest has an area of 212,000 has and is under the control of the state forest districts of Cotopaxi and Pichincha. Although the status of protected forest is lesser than the national parks and ecological reserves it is still prohibited logging and the use of the area for any socioeconomic activity. Activities in this type of areas must be compatible with conservation purposes only. The main goals of this area are the protection of soil, water resources and biodiversity. About 20% of the Palo Quemado territory lies in this protected forest and the Las Pampas parish is also next to this area. Most of the problems of the Toachi Pilaton protected forest become from the socioeconomic activities of the mentioned parishes.

The international environmental organizations Birdlife Internacional and Conservación Internacional have stated that the lower area of the Toachi Pilaton protected forest is a place of high importance for protecting birds because about 420 bird species has been found here. However insufficient control has promoted illegal logging and even the invasion of parts of the area for cattle ranching are damaging the habitats of these and other species existent here. Moreover, several land tenure issues have not yet solved in this ecological area.

Private protected forest

Protected forests and reserve have been created in private lands in the Toachi-Pilatón watershed. These areas combine conservations goals with scientific research, environmental education, organic agriculture, and eco-tourism activities so that are source of income generation for their owners. The creation of protected areas in private lands in this zone is a very important form to show the neighbors that other socioeconomic uses can be applied to the lands. As a frontier area, the Toachi Pilaton watershed system has been traditionally seen as a wilder or an area to mine any existent natural resource. Such mentality is still present and private owner who devote their lands to conservation purposes are helping to change such extractive view.

Typically private conservation areas are composed by temperate, cloudy and subtropical forests. Significant parts of these areas are secondary and highly degraded forest for which programs of ecological recovery has been established. Reforestation activities in areas previously used for agriculture are also in process. In addition by creating this type of conservation areas many steep zones of the hills and ridges are being protected otherwise they would be subject of forest fires, illegal logging and unsustainable agriculture.

The private areas that have been legally declared as reserves or protected forests are the following:

1. Reserva Biológica La Esperanza
2. Hesperia Biological station and reserve
3. Otongachi biológico reserve

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4. Río Guajalito Scientific Station
5. Tanti protected forest
6. Río Lelia watershed protected forest
7. La Favorita Scientific Station

In practical terms these private areas for conservation provide patches of ecological security for birds, mammals and other migratory species that need of scattered habitats to survive. They are also creating biological corridors and then allowing genetic variability in areas that otherwise would be isolated and prone to genetic erosion.

Notwithstanding the importance of private protected areas it is worth to mention that a significant flaw of them is the lack of sufficient resources for ensuring adequate control and the application of technically standardized management practices. This observation is also valid for the public protected forests for which the state has not established a particular administrative mechanism for control and management. However, new legal frameworks and technical regulations for this type of areas are under preparation by the Ministerio del Ambiente.

The Socio Bosque and the conservation initiatives in the area

In addition to the public and private system for protecting the natural areas of the watershed the Ministerio del Ambiente has established the nationwide Socio Bosque program which main goal is to help private owners and parishes to protect the existent natural forests presents in their lands or to carry out reforestation plans. The Manuel Cornejo Astorga, Palo Quemado and Alluriquin rural parishes are beneficiaries of the Socio Bosque program and about 692 hectares of public and private forests areas are under this scheme of protection, distributed in 22 plots and 15 private owners.

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LOCAL JURISDICTIONS IN THE TOACHI PILATON WATERSHED

The Toachi Pilaton watershed intersect in the territories of three provinces, three counties and six rural parishes. Three of them are in the influence area of the project. Below you will find a description of each parish:

Sigchos:

Sigchos is located in the province of Cotopaxi, northwest of Latacunga city. It was created on July 21, 1992. Sigchos is situated on the sub-watershed of the Toachi River and has an area of 1,266.6 km². The population is composed of approximately 23,236 inhabitants. (GAD Cotopaxi, 2014)

Sigchos has an urban parish, it's also called Sigchos, and four rural parishes, that two are located in the Toachi River watershed into the project area. These rural parishes are: Las Pampas and Palo Quemado. Map below shows where Sigchos is located and its parishes: (GAD Cotopaxi, 2014)



Map 1 Parishes located in Sigchos

In Sigchos, annual average temperature is 13 ° C and annual precipitation reach values between 500 to 1000mm. (GAD Cotopaxi, 2014). Table below shows the temperature chart with maximum, minimum values:

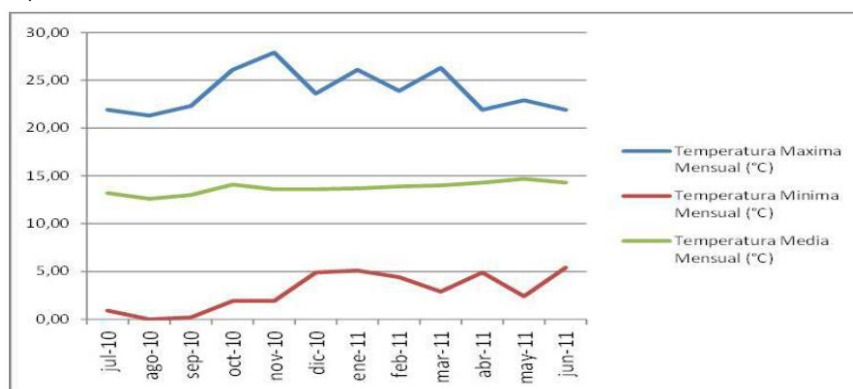


Figure 1 Sigchos Annual Average Temperature

According to PDOT document, Sigchos has been experimented changes of temperature, which produce prolonged droughts between July and December, with very strong winds, and very strong and prolonged rainfall, between January and June. (GAD Sigchos, 2012)

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As a consequence of changes in temperature, crops have been destroyed, human and animal health has been affected, and also roads network has been damaged, and of course economic losses are produced in the project area.

Most of settlements are located in areas of slopes, which means a high risk due to landslides, and it makes difficult communication between villages.

In the Sigchos parish, the population is engaged in the following economic activities: (GAD Sigchos, 2012)

Economic Activities	Percentage (%)	Description
Agriculture	20	Local consumption or familiar economic subsistence. Main products: panela, beans, maize, zambo, squash, mackerel, mora, mortiño.
Cattle range	70	Cattle for meat production
Tourism	5	Community tourism
Others	5	Dairy production

Table 2 Sigchos Economic Activities Source

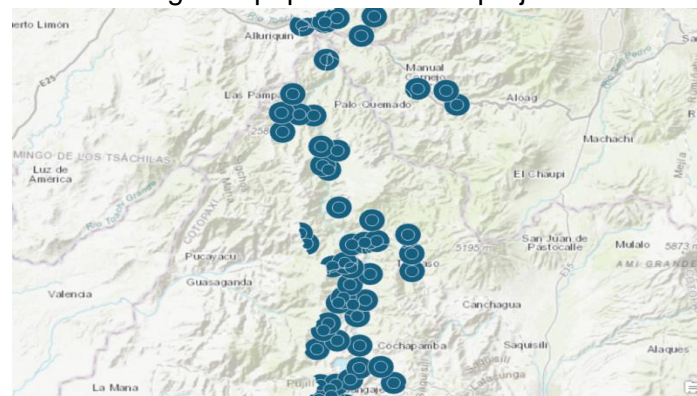
According to census of population and housing carried out in 2010, population economically active is composed as follows: (GAD Sigchos, 2012)

	Population economically active (PEA)	Population economically inactive (PEI)	Total Economic Population (PET)
Men	2.077	992	3.069
Women	1.295	1.759	3.054
Total	3.372	2.751	6.123

Table 3 Sigchos Population Economically Active

Likewise, census of population and housing carried out 2010, shows that all Sigchos urban and rural parishes, represent economically active population (EAP) with a value of 42.50%, that its equals a total number of 9,327 habitants, while a percentage 57.49% represent elderly, children and adolescents population, which is equivalent to 12,617 people.(GAD Sigchos, 2012)

Map below shows location of Sigchos population in the project area:



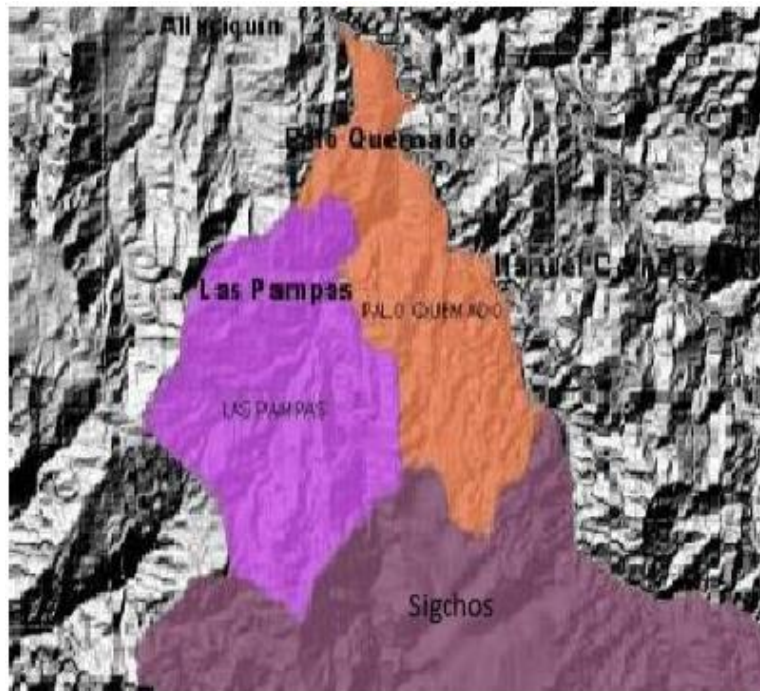
Map 2 Sigchos population located in the project area Source

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Las Pampas:

Parish Las Pampas is located at northern end of Sigchos canton, which it's belong to Cotopaxi province. Las Pampas is located 53.6 km from cantonal head. This parish has 2 extremes of territorial height levels, one as lowest part from 1,200 msnm, and other as highest part of 2,481 msnm.(GAD Las Pampas, 2015)

This parish has an area of 13,178.27 m2, and it's located in the upper and middle part of the hole of the Toachi River. Below is the map showing the area delimitation for Las Pampas parish:(GAD Las Pampas, 2015)



Map 3 Territorial map Las Pampas

According to the field study carried out in 2015, for development of the Territorial Planning document (PDOT), Las Pampas parish consists of 15 precincts and they reach a population of 2,405 habitants.

According to INEC, data related to Las Pampas parish population in 2010, it's ranged between 14 and 44 years as shown in chart below:

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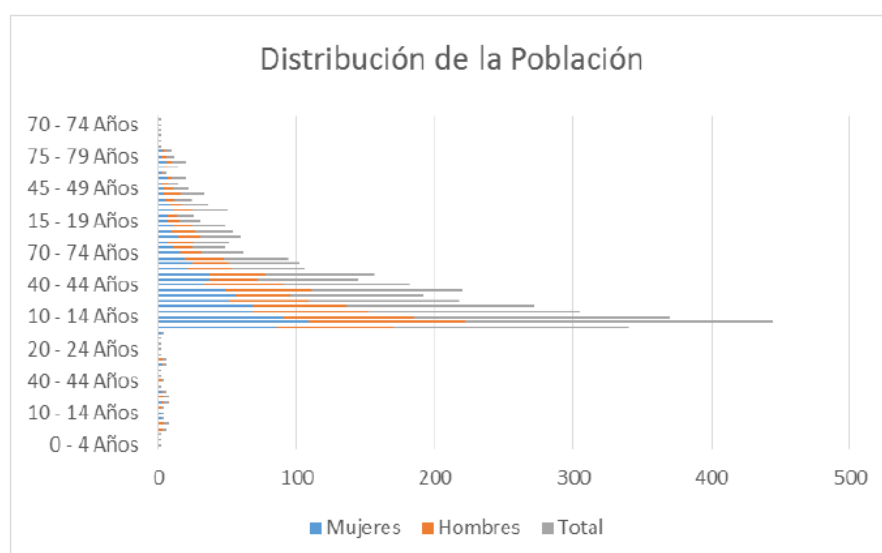


Figure 2 Las Pampas population in 2010 Source

In the year 2015, a field study was carried out to determine more accurately the distribution of population in the Las Pampas parish. A summary of results are shown below: (GAD Las Pampas, 2015)

LAS PAMPAS POBLACIÓN

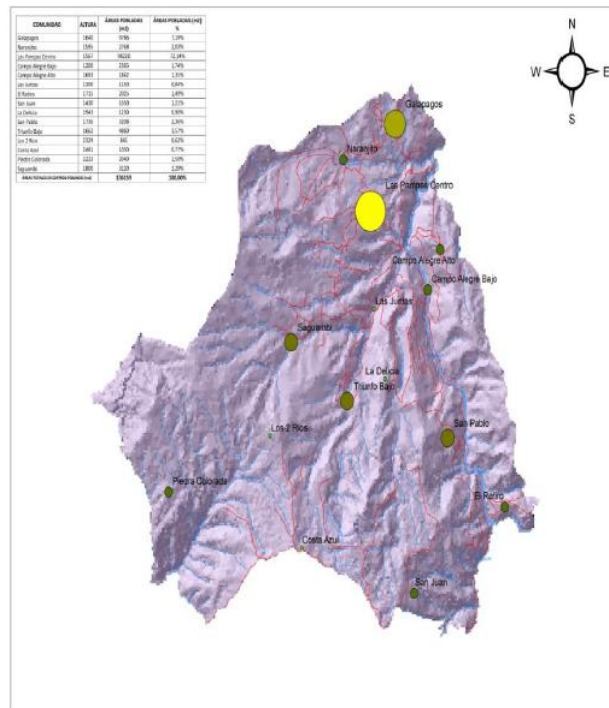
COMUNIDAD	X	Y	ALTURA	POBLACION	Poblacion %
Galapagos	727460	9954701	1640	250	9,69%
Naranjito	725297	9953582	1595	100	3,88%
Las Pampas Centro	726437	9951953	1567	780	30,23%
Campo Alegre Bajo	728825	9949479	1200	160	6,20%
Campo Alegre Alto	729339	9950738	1693	70	2,71%
Las Juntas	726584	9948873	1300	60	2,33%
La Delicia	727041	9946674	1943	45	1,74%
San Pablo	729645	9944814	1736	280	10,85%
Triunfo Bajo	725461	9945979	1662	150	5,81%
Los 2 Ríos	722254	9944881	2329	35	1,36%
Ana María	723573	9941357	2481	40	1,55%
Piedra Colorada	718021	9943112	2223	185	7,17%
Saguambi	723121	9947826	1800	250	9,69%
				2405	100,00%

Table 4 Las Pampas Population distribution by community in 2015

The most population in Las Pampas parish is mestizo, around 97%, while remaining 3% is divided into indigenous population and other ethnic groups. (GAD Las Pampas, 2015)

Below a map shows populated areas of the parish of Las Pampas: (GAD Las Pampas, 2015)

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Map 4 Las Pampas populated areas in the map

In the parish Las Pampas the population is dedicated to the following economic activities:
(GAD Sigchos, 2012)

Economic Activities	Percentage (%)	Description
Agriculture	15	Panela
Cattle range	80	Cattle for meat production
Tourism	0	
Others	5	Various activities

Table 5 Las Pampas Economic Activities

In Las Pampas unemployment rate reach 0.5%. Table below shows employment rates in the parish and sources of employment:

Percentage	Sources of Employment
75%	Own work in their lands
25%	Trade and service provision

Table 6 Las Pampas Employment Rates

The population of Las Pampas has 90% coverage of electric power, which is obtained from the national electric interconnection network and service is delivered by the Cotopaxi Electric Company (ELEPCO). However, several communities in the parish do not have these service due to dispersal. (GAD Las Pampas, 2015)

Access for Las Pampas has deteriorated road conditions but there are 3 access roads. The main access is from Alluriquín (Santo Domingo) and the others from Sigchos cantonal road network; Union Toachi (Santo Domingo) / Palo Quemado.

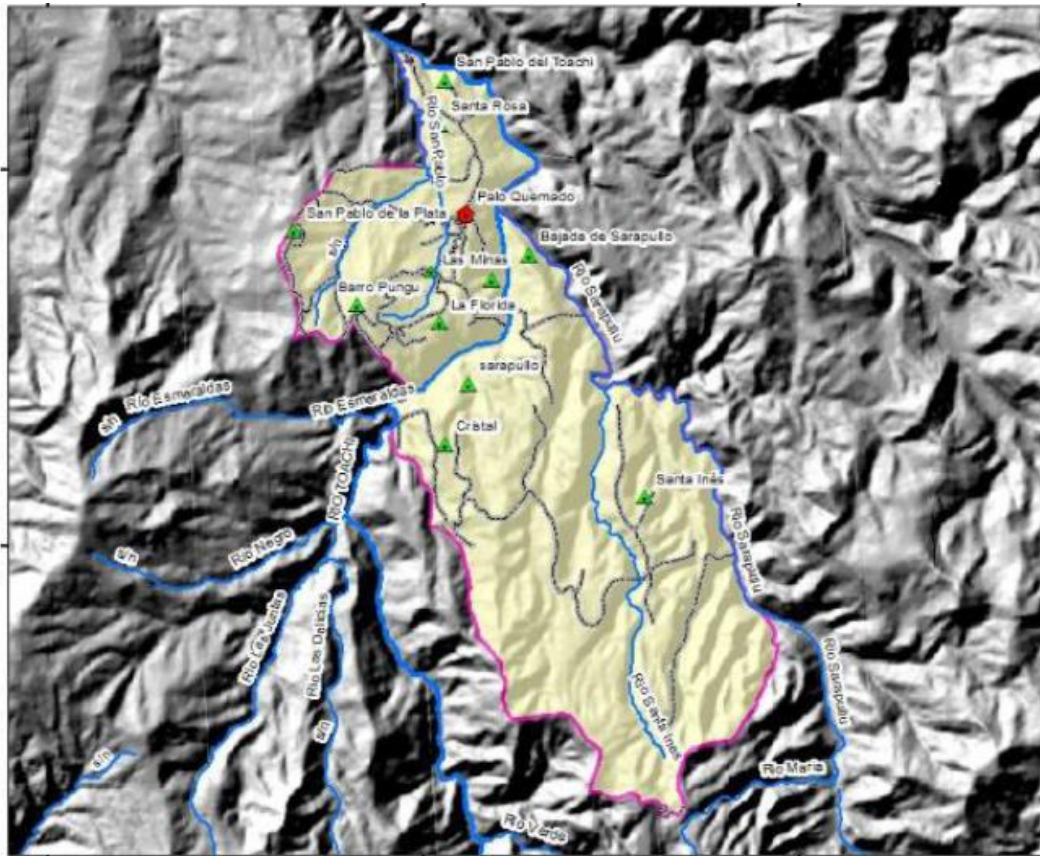
Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

In Las Pampas, it is also observed that contamination rate by solid wastes (garbage) is a high value, due to the inefficiency in the service of garbage collection, and in some cases by the non-existent culture of recycling. So, it is necessary to build garbage dumps.

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Palo Quemado:

Palo Quemado is a rural parish depending of the Sigchos county and Cotopaxi province. It is located at 4,500 feet altitude right next to the flanks of the Toachi river watershed (Map 1). In terms of road connectivity, this jurisdiction is served by a second order road, which connects Sigchos and the rural town of La Union.



Map 5 Palo Quemado populated areas

According the last census (INEC 2010) the total population of this parish is of 1,030 inhabitants (55% men and 45% women) who live in eight townships or communities as follows: Palo Quemado Centro, San Pablo de la Plata, Las Praderas, Santa Rosa de Lima, Las Minas de la Plata, El Cristal, Zarapullo, and La Florida.

According to the national census (INEC 2010) the women-men correlation in Palo Quemado is 55-45%. The 57% of the population is under 30 years old and 30% are in the age range of 15-30 years old.

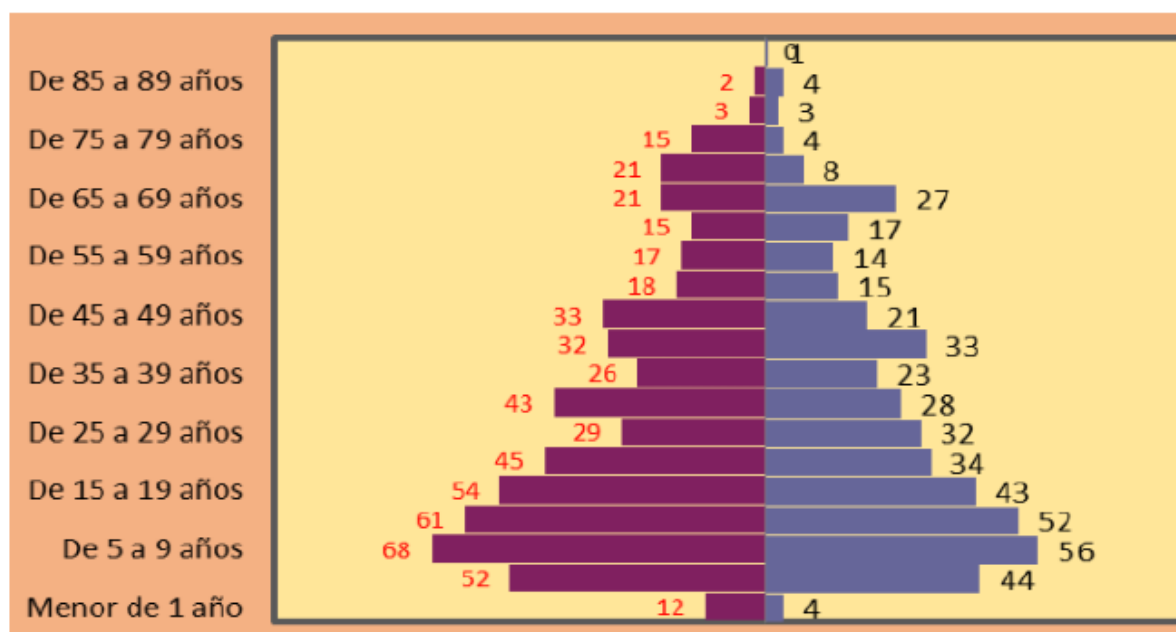


Figure 3 Palo Quemado population

Ethnic self-representation in this parish is basically the “mestizo” accounting the 80% of the population. “Montubios” with 11% of the people is the second form of ethnic identity, and white 5%. There are no other forms of ethnic self-identification. (GAD-PQ 2015) The subsistence of this population comes from small scale agriculture and cattle ranching. Sugar cane and raw milk are the most important products providing about the 75% of the work opportunities in this jurisdiction. While the cane is processed in the locality the milk is sold in the cities of Latacunga and Santo Domingo. The workforce of Palo Quemado is composed of 504 people. According to the national last census (INEC 2010), 234 people of this parish work in agriculture and cattle ranching activities and 141 in manufacture activities, which is basically the production of panela, the most important product of this locality. Other relevant activities are related with services: local trade, transportation and education.

Palo Quemado is an important regional producer of “panela”² which is the main source of local income. The panela made in this parish is sold practically in all the central Andean area. In the last few years the sugar cane producers have started producing granulated brown sugar, which is being well accepted in urban regional markets as a healthy alternative to the centrifuged white sugar.

Other local socioeconomic activities in Palo Quemado are around local transportation (regular shifts to La Unión, Alluriquin and Santo Domingo), local trade of rural utensils, staples, agrichemicals and other products and artifacts required for living in the rural environment of the parish. Modest production of fruits and tuberos like naranjilla, limón, naranja, banana, tree tomato, camote, yuca, papa china, among other is mostly used for family consumption and local exchange.

The most important local organizations are the associations Flor de Caña formed by the sugar cane producers and the Asociación Agroartesanal San Pablo de la Plata created by agriculture

² Panela is basically the unrefined whole cane sugar. It is the result of boiling and evaporating raw sugarcane juice and then poured into molds to obtain hard round blocks for easy transportation. Each block has a standard weight of 32 pounds.

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

and cattle ranching producers. Most of the economically active people in the parish are member of either one of these organizations. Finally it is important to note that the territory of Palo Quemado has some mine resources, especially gold and copper. Concessions of about 2,347 hectares³ of the parish territory have been established for mining purposes. At the moment three mine sites are in the area (Table 7), however this activity is still not relevant for the local economy and the companies working there have not significant relation neither with local authorities nor with the socioeconomic life of the parish.

PLACE	MINE COMPANY	TYPE	AREA
La Florida	Sultana del Cóndor Minera Sulcomi SA	Metallic	642
Loma del Tigre	Sultana del Cóndor Minera Sulcomi SA	Metallic	1658
Toachi	GADs Sigchos and Pichincha	No-Metallic ⁵	47
TOTAL			2347

Table 7 Mining places in Palo Quemado parish⁴

The mines operated by the Sigchos Municipality and the Consejo Provincial de Pichincha are natural deposits for temporal extraction of sand, crushed stone and aggregate for construction needed for road construction and maintenance and other public works. According the mining legislation, the nonmetallic mining is under the control of the municipalities while the metallic one is controlled by the central government so that the local governments, Junta Parroquial has nothing to do with this activity and then it has a no relevant role in the local economy.

Based in the national census 2010, Table 8 shows a comprehensive overview of the parish.

Sector / Indicator	Measure	Palo Quemado
Illiteracy	% (15 years old or more)	9.54
Functional illiteracy	% (15 years old or more)	15.91

³ Typically the mine concession areas are higher than the actual place of mine activity. So although a concession can be of hundred or thousand hectares, the place where the mine resource is extracted is significantly smaller.

⁴ Nonmetallic mining is for extracting sand, gravel; rock stone and other related mine products.

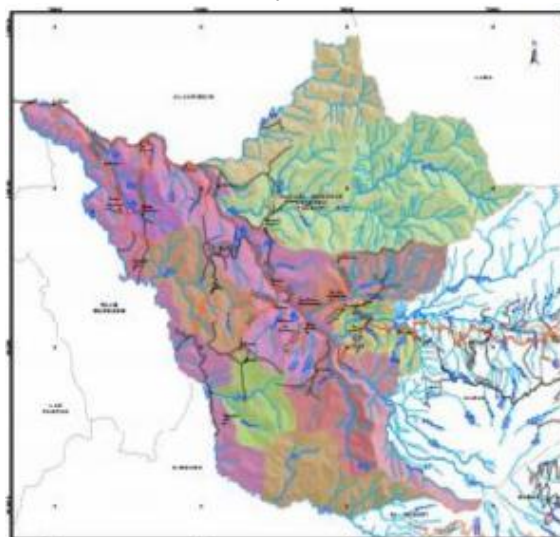
Education	Años de estudio	6.84
Universitary education	% (24 years old or more)	4.77
Complete Elementary School	% (12 years old or more)	81.11
Complete High School	% (18 years old or more)	18.86
Working children 15 - 17 years old	% (children 5-17 years old)	46.15
Working children 5 - 14 years old	% (children 5-14 years old)	6.75
People economically active	Number	504.00
People in working age	Number	794.00
Afroecuadorian population	Number	16.00
White population	Number	47.00
Total population	Number	1,030.00
Men population	Number	567.00
Indigenous people	Number	8.00
Mestizo population	Number	846.00
Women population	Number	463.00
Women proportion	% (total population)	44.95
Extreme poverty for non-satisfied basic needs	% (total population)	33.60
Poverty for non-satisfied basic needs	% (total population)	95.60
Human Development Bonus	Number	314.00
Water service inside home	% (houses)	11.37
Sewage network	% (houses)	9.41
Electric service	% (houses)	85.49
Telephone land line	% (houses)	11.40
Gas use for cooking	% (homes)	83.65
Firewood / charcoal use for cooking	% (homes)	15.20
Own home	% (homes)	79.46

Table 8 Socioeconomic Overview of the Palo Quemado Parish

The data shows that this rural parish presents some signs of acute social vulnerability. For example, education, water and sewage services are insufficient,

Manuel Cornejo Astorga (Tandapi)

Although the official name of this rural parish is Manuel Cornejo Astorga, the name of the main town in the territory is known as Tandapi, a traditional name since this side road town was created. It is located in the Pilaton watershed and next to the Aloag-Santo Domingo road, the most important artery to communicate Quito and Guayaquil, the main Ecuadorian cities (Map 2). The area of this parish is of 495,89 km², with an altitudinal range between the 3,800 feet and 8,000 feet. According the national census of 2010 the population is of 3,661 people of which 60% (2,197) is considered economically active.



Map 6 The Manuel Cornejo Astorga – Tandapi Rural Prish

According to the national census (INEC 2010) the women-men correlation is 53-47%. The 68% of the population is under 40 years old and 30% are in the age range of 15-30 years old. (Figure 9) The most extended ethnic self-representation in this parish is basically that of “mestizo” representing almost the 90% of the local population. Other ethnic self-representation are white (4.5), indigenous (4%), and Afroecuadorian (2.2%).

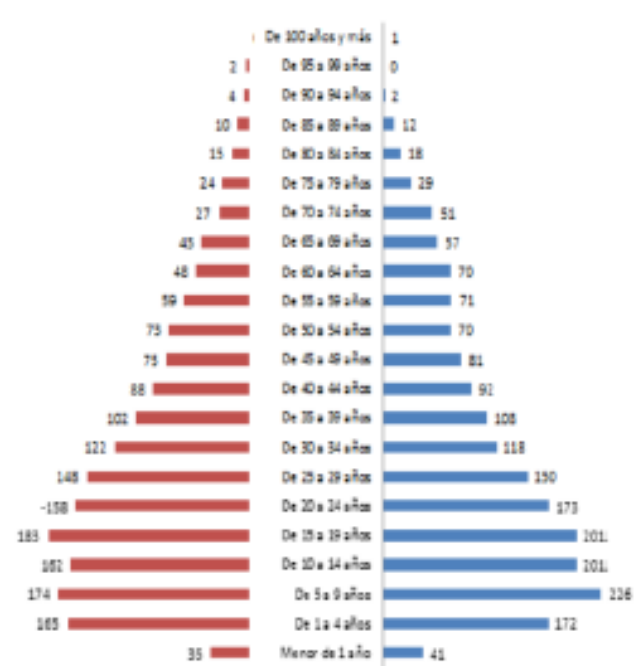


Figure 4 Age distribution in the Manuel Cornejo Astorga – Tandapi Rural Parish

The main economic activities in this rural parish are related to agriculture, livestock, milk and meat production, flower, tourism, and transportation. Agriculture and livestock are the main sources of income and subsistence for the local population representing the 46% of the entire economic activities in the parish. Trade and small business represent the 11.5% of the economic activities. Food and accommodation represent 7.78 % (Table 9). The most important products are maize, cocoa, cassava, banana, oil palm, potatoes, cereals, maize, beans, quinoa, vegetables⁵, pork and chicken meat, milk, fish.

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	806	46,78
Industrias manufactureras	57	3,31
Suministro de electricidad, gas, vapor y aire acondicionado	9	0,52
Distribución de agua, alcantarillado y gestión de desechos	7	0,41
Construcción	71	4,12
Comercio al por mayor y menor	199	11,55
Transporte y almacenamiento	78	4,53
Actividades de alojamiento y servicio de comidas	134	7,78
Información y comunicación	5	0,29
Actividades financieras y de seguros	1	0,06
Actividades profesionales, científicas y técnicas	7	0,41
Actividades de servicios administrativos y de apoyo	42	2,44
Administración pública y defensa	14	0,81
Enseñanza	40	2,32
Actividades de la atención de la salud humana	6	0,35
Artes, entretenimiento y recreación	3	0,17
Otras actividades de servicios	12	0,70
Actividades de los hogares como empleadores	56	3,25
No declarado	155	9,00
Trabajador nuevo	21	1,22
	1723	100

Table 9 Economic activities in the Manuel Cornejo Astorga – Tandapi Rural Parish

⁵ These are products for warm and cold weather, favored by the location of the parish between the Coast and Sierra regions.

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Alóag

Alóag is a rural parish of Mejía canton, which is near road highway, and its located in the connection between the north and south mountains and country's coast region, this is 33 kilometers from Quito, near the El Corazón volcano, which its 4,786 meters of height. Alóag has an area of 255.56 square kilometers and its altitude reaches 3040 meters above sea level. In 2014, population reaches 10,602 habitants, which is estimated in 3% of population density of habitants per kilometer considering total of the canton.(GAD Mejía, 2014)



Map 7 Aloag location

In 2010, the population of Alóag was estimated in 9237 habitants, which value is calculating a population density of 36.14 habitants per square kilometer. The population density estimates for the year 2020 in 37.99 habitants per square kilometer and for 2025 in 38.95 habitants per square kilometer. According to PDOT, in this parish the total amount of houses reaches 2353. Below is a chart with a projection of population for canton Mejía by parishes:

TABLA CAH 62			Población de las parroquias, Cantón Mejía					
Parroquias	Población total		Tasa de crecimiento	Proyección de la población				
	1990	2001	Año 2001	2005	2010	2015	2020	2025
Machachi	18402	22492	2,02	24309	26581	28853	31124	33396
Cutuglagua	3593	9987	16,17	16447	24521	32596	40670	48745
Aloag	6301	8850	3,67	10149	11773	13397	15021	21019
Aloasi	5175	6855	2,95	7664	8675	9686	10697	11708
Tambillo	5960	6571	0,93	68,13	7115	7417	7720	8022
Uyumbicho	3217	3679	1,3	3870	4109	4349	4588	4827
Manuel Comejo Astorga	2776	3132	1,16	3279	3462	3645	3828	4011
El Chaupi	1263	1322	0,42	1345	1373	1402	1430	1458

Fuente: INEC; PD y OT 2002-2012; POT PICHINCHA; P.D.L. UCE 2008; Cálculo proyección Población. Consultoría se tomó los datos del INEC-2001
Año: 2001 Proyección al 2025
Elaboración: EQUIPO PDOT GAD, MEJÍA 2014

Table 10 Population project for Mejía parishes

Regarding basic services for Alóag population, it is estimated in the following table:

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

TABLA CAH 69 Servicios básicos por parroquia						
Parroquia	Vivienda con agua potable	Vivienda con servicio de alcantarillado	Vivienda con servicio de recolección de basura	Vivienda con servicio de electricidad	Vivienda con servicio higiénico exclusivo	Vivienda con características adecuadas de piso
Machachi	46,15	56,14	61,41	92,75	47,93	90
Alóag	33,67	45,03	46,15	79,75	39,41	85,24
Aloasi	34,19	37,11	32,9	90,36	44,48	89,17
Cutuglagua	8,81	22,02	27,13	71,05	30,24	84,62
El Chaupi	13,88	8,47	19,18	77,55	18,95	86,94
Manuel Comejo Astorga	17,64	16,9	19,75	43,03	20,03	96,12
Tambillo	38,83	56,93	54,78	94,48	50,13	89,31
Uyumbicho	61,95	62,93	56,37	95,71	59,66	87,98

Fuente: GPP-DPLA
Elaboración: SISE

Table 11 Basic Services for Mejía parishes

In 2014, the urban and rural population of Mejía canton was distributed according to the table below:

TABLA CSC 1 Población Urbana y Rural del Cantón Mejía			
Población	Hombres	Mujeres	Total
Rural	7301	3187	43,65
Urbana	2331	952	40,84
Total	2525	876	34,69
TOTAL	21127	9059	42,88

Fuente INEC: 2010
Elaborado: EQUIPO PDOT GAD MEJÍA 2014

Table 12 Urban and Rural population for Mejía Canton

In Aloag, the weather is considered as equatorial meso thermal semi-humid, with the following temperatures: minimum of 3.6 ° C, maximum of 12.4 ° C, average 12.4 ° C.

Mainly, canton Mejía is characterized by the richness of volcanic soils and presence of water resources. It has highly agricultural areas, small and medium owners. In the last two decades extensive export agriculture was carried out, principally of flowers and vegetables. Livestock activity is developed and large farms and dairy companies.(GAD Mejía, 2014) Chart below shows land use in canton Mejía:

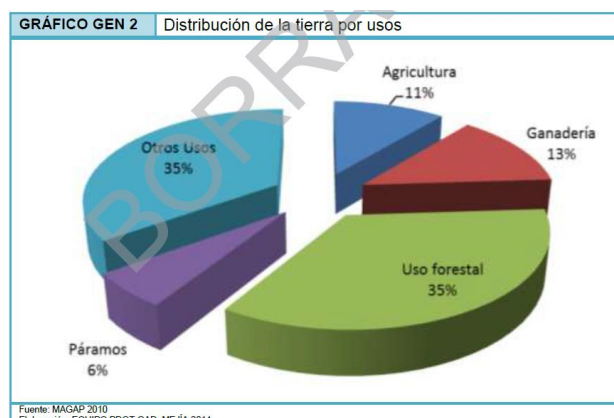


Figure 5 Land use for Mejía canton

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

In 2010, according to data from MAGAP, in Mejía canton, was estimated that 59,962 hectares were destined to cattle range for milk production, while 5,420 hectares for traditional agriculture and 1,408 hectares to export crops. The high moors cover the ecological reserve and 28,017 hectares are part of water sources generation.

Agricultural production of small producers is based on the following main crops: maize, vegetables, beans and potatoes, with a production of 2,300 hectares per year. In Alóag are located industries, which 52% are dedicated to the processing and elaboration of food products and 48% diversified activities.

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

El Chaupi:

The Chaupi Parish is located to the southwest of Mejía, near the Ilinizas Ecological Reserve, and it is located at altitude of 2900 meters above sea level. The area of this parish reaches 136, 91 square kilometers.

The weather for this parish is humid, sub-tempered, with an average temperature of 9.11° C. El Chaupi parish uses 30% of tropical humid forest. El Chaupi GAD has been carried out several reforestation projects for the massive planting of native trees, such as: quishuar, puma maqui, arrayan.

In 2010, a population of 1,373 was estimated. In 2014, studies were carried out to estimate a density population per parish, those results are shown in chart below:

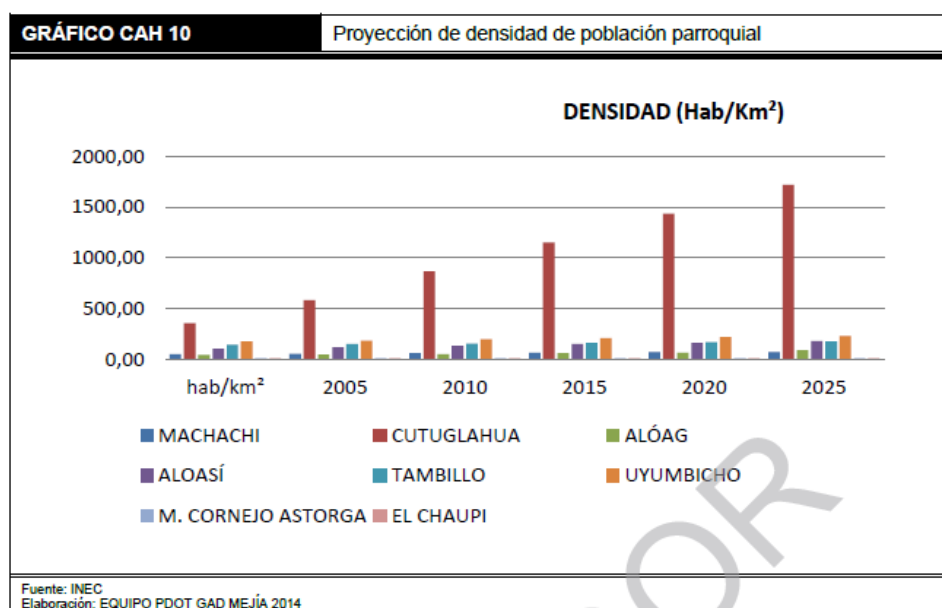


Figure 6 Projection of density of parish population

El Chaupi is characterized by being a productive parish, and it has several access roads, which allows villagers to mobilize between farms to transport their products.

Tables below show historical milestones of El Chaupi parish, in the following aspects: Economic, Social and Environmental:

• **ECONÓMICO**

AÑO	HITO	IMPACTO POSITIVO	IMPACTO NEGATIVO	OBSERVACIONES
1930 1940	Producción de los campos	Aumento de las fuentes de ingreso	Contaminación ambiental	
1908	El pase del tren	Mejora la economía, Movilidad y conectividad		
2009	Asentamiento de la empresa agroquímica Quimiroburg S.A.			Requerir estudio de impacto ambiental para el correcto funcionamiento de la empresa.
2008	Florícolas Ilinizas Big Roses CIA. LTDA.	Positivo (Mano de obra local)	Utilización de Químicos. Personal afectado en su salud y desatención de la empresa.	Requerir estudio de impacto ambiental para el correcto funcionamiento de la florícola

Table 13 Economic Historical Milestones for El Chaupi

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

• SOCIAL

AÑO	HITO	IMPACTO POSITIVO	IMPACTO NEGATIVO	OBSERVACIONES
1930-1940	Fraccionamiento De los terrenos		Aumento de necesidades de infraestructura Destrucción de bosque Daño al suelo	Propiedad de la Sra. Doña Manuela Carcelén (Marquesa de Solanda)
1949	Se presenta la propuesta ante el Concejo para la parroquialización de El Chaupi	Organización Social		
1996	Creación del salón de usos múltiples y sede del Gobierno Parroquial.	Espacios físicos para desarrollo de actividades sociales		
	Estadio parroquial El Chaupi	Disfrute de actividades deportivas de la población		
2009	Grupo Club Adulto Mayor	Atención a personas de tercera edad		
2009	Biblioteca Municipal	Servicio a la comunidad como fuente de consulta		
2000	Destacamento Policial - UPC	Seguridad a la ciudadanía		Organización ciudadana.
1912	Primer ascenso de los hermanos Martínez y Rafael Villavicencio a los Illinizas. Inicio de actividades turísticas hacia los Illinizas y demás atractivos naturales.	Asentamiento De Hosterías Y Hospedajes Para Turistas		Débil promoción turística y capacitación a dueños de hosterías de la parroquia sobre promoción turística y atención a clientes.

Table 14 Social Historical Milestones for El Chaulpi

• AMBIENTAL

AÑO	HITO	IMPACTO POSITIVO	IMPACTO NEGATIVO	OBSERVACIONES
1996	Se establece la Resolución 066 publicada en el Registro Oficial No. 92 Como Reserva ecológica los Illinizas	Promueve la conservación del medio ambiente y el turismo		Ejercer cumplimiento de la Ley sobre las reservas ecológicas.
1886	Erupción del Cotopaxi		Contaminación del aire , agua, suelo	Afecto a todo el país.
2011	Incendio Forestal		Contaminación de las aguas del Río Nieves toma El Corazón. Destrucción forestal en la reserva ecológica Illinizas.	Descuido de autoridades competentes.
	Empresa Novopan		Daños a la esponja natural de gua (páramo)	Daño permanente al medio ambiente.
2007	Empresa ACOSA		Siembra de árboles de Pino causando daño y erosión al suelo	Cultivos y talas permanentes
1995	Helada natural que terminó con la especie Batracio (Jambato)		Desaparición de la especie.	
	Contaminación de quebradas y ríos de la parroquia por descargas de aguas servidas.		Contaminación de ríos y daño de animales y cultivos.	

Table 15 Environment Historical Milestones for El Chaulpi

In the El Chaulpi parish, one of the most important environmental problems is the inappropriate handling of solid waste, which is a threat for human and animal health located close this parish, especially in areas without garbage collection.

The El Chaulpi parish has suffered from the exploitation and deterioration of the forests in El Chaulpi hill, which has caused losses in biodiversity, and it's generating a decrease in water sources and pollution. The main threats of the area are: deforestation, forest fires, grazing and clearing activities.

This parish has experienced economic and population growth, because there is soil fertility in to carry out productive activities, such as floriculture and livestock. So, there has been considerable pollution and environmental degradation which has resulted in a decline in natural resources.

Deforestation, is the main cause for the destruction of the habitat of the species and its disappearance. However, presence of forests and ecological reserves, promote the tourist activity in the parish. Table below shows information about reforestation projects in El Chaulpi parish:

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Ubicación/ Sector	PROYECTOS		
	Acciones o Estrategias	Avance	Actores Involucrados
Barrio Pucará	Reforestación	10%	Junta Parroquial, Consejo Provincial de Pichincha, Ministerio de Ambiente y Comunidad
Vertientes de San Marcos	Reforestación	10 %	Junta Parroquial, Consejo Provincial de Pichincha

Table 16 Reforestation Projects in El Chaulpi

Agriculture and livestock are main sources of income and subsistence for population, these activities are complemented with other family incomes. Table below shows results of studies carried out about economically active population and data obtained are sorted by activity, group and occupation category.

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	369	59,23
Explotación de minas y canteras	2	0,32
Industrias manufactureras	44	7,06
Suministro de electricidad, gas, vapor y aire acondicionado	5	0,80
Distribución de agua, alcantarillado y gestión de desechos	1	0,16
Construcción	25	4,01
Comercio al por mayor y menor	41	6,58
Transporte y almacenamiento	23	3,69
Actividades de alojamiento y servicio de comidas	8	1,28
Actividades financieras y de seguros	3	0,48
Actividades profesionales, científicas y técnicas	5	0,80
Actividades de servicios administrativos y de apoyo	10	1,61
Administración pública y defensa	7	1,12
Enseñanza	10	1,61
Actividades de la atención de la salud humana	7	1,12
Artes, entretenimiento y recreación	3	0,48
Actividades de los hogares como empleadores	12	1,93
No declarado	28	4,49
Trabajador nuevo	20	3,21
Total	623	100,00

CUADRO 17

RAMA DE ACTIVIDAD
Fuente: Censo INEC, 2010
Elaboración: ETP-GADPP

GRUPO DE OCUPACIÓN	CASOS	%
Directores y gerentes	18	2,89
Profesionales científicos e intelectuales	6	0,96
Técnicos y profesionales del nivel medio	7	1,12
Personal de apoyo administrativo	18	2,89
Trabajadores de los servicios y vendedores	58	9,31
Agricultores y trabajadores calificados	201	32,26
Oficiales, operarios y artesanos	47	7,54
Operadores de instalaciones y maquinaria	58	9,31
Ocupaciones elementales	161	25,84
Ocupaciones militares	1	0,16
no declarado	28	4,49
Trabajador nuevo	20	3,21
Total	623	100,00

CUADRO 18

GRUPO DE OCUPACIÓN
Fuente: GPP - DIPLA
Elaboración: ETP-GADPP

CATEGORÍA DE OCUPACIÓN	CASOS	%
Empleado/a u obrero/a del Estado, Gobierno, Municipio, Consejo Provincial, Juntas Parroquiales	33	5,47
Empleado/a u obrero/a privado	170	28,19
Jornalero/a o peón	153	25,37
Patrono/a	12	1,99
Socio/a	2	0,33
Cuenta propia	193	32,01
Trabajador/a no remunerado	9	1,49
Empleado/a doméstico/a	17	2,82
Se ignora	14	2,32
Total	603	100,00

CUADRO 19

CATEGORÍA DE OCUPACIÓN
Fuente: Censo INEC, 2010
Elaboración: ETP-GADPP

Table 17 Economically Active Population in El Chaulpi

Table below shows a summary of productive activities in El Chaulpi parish:

ACTIVIDADES PRODUCTIVAS	TIPO DE PRODUCCIÓN O CULTIVOS	PRINCIPALES MERCADOS DE COMERCIALIZACIÓN
Agrícola	Papas, Haba, Melloco, Hortalizas	Quito, Guayaquil, Latacunga, Saquisilí
Ganadería	Leche Y Derivados	
Florícola	Rosas	

Table 18 Productive Activities in El Chaulpi

Regarding to gender projects, those have been executed in this parish; one in La Llovizna farm, which employs 20 women to dehydrate fruits and produce tea. Other projects developed were focus on involving women to work in agriculture activities in small family gardens for planting and harvesting organic vegetables.

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

In 2010, a study of vulnerable groups was carried out, which results are show in the table below:

TIPO DE VULNERABILIDAD	POBLACIÓN APROXIMADA
En qué sector de vulnerabilidad se ubica	Número aproximado de personas que sufren esta vulnerabilidad
Adultos/as mayores	40
Discapacitados	35

Table 19 Vulnerable Groups in El Chaulpi 2010

STAKEHOLDERS AND PERCEPTIONS ON CLIMATIC ISSUES

As described above the Toachi-Pilaton watershed is a natural framework of intense socioeconomic exchange where people and organizations of diverse type and range exert their interests in order to get and influence management of the existent natural resources.

This approach is helpful for understanding that any measure for promoting sustainable development, water management or adaptation strategies for climate change and vulnerabilities should be the result of the dialogue among the different stakeholders of the area. This part of the report is based on fieldwork carried out in the three rural counties in June 2016. During the field work was used semistructured questionnaires to interview representatives of the Cotopaxi, Sigchos, Las Pampas, Alóag, Palo Quemado, and Manuel Cornejo Astorga GADs, representatives of the Environmental and Communitarian sections of the Hidrotoachi project, members of productive organizations, and local residents. People interviewed were asked how they perceived climate issues and how they think they affect the daily life of the people.

Questions during the interviews looked for understanding five basic issues:

- ☐ What kind of weather issues are occurring in the area of study,
- ☐ How they are affecting the local people and socioeconomic activities,
- ☐ What are the explanations of local people to these events,
- ☐ What is the understanding of climate change phenomenon; and,
- ☐ How concerned are local authorities in watershed management and climate issues in the Toachi-Pilatón watershed.

These questions were helpful to know the perception and the level of preparedness for climatic events and issues of vulnerability in the area.

Stakeholders in the area

Stakeholders or Interest Groups are people and entities with a declared or conceivable interest or stake in the management of a given area. Stakeholders are not necessary organized they can be of any form, size and capacity like individuals, organizations, or even unorganized groups.

To carry out a detailed analysis of stakeholders or interest groups in the area, a categorization was required as follow:



Figure 7 Stakeholders by category

Below a description of each category:

Government Sector: Organizations that are part of the state apparatus and have their functions determined according to national legislation.

Private Sector: Heterogeneous organizations that know the problem in the Toachi-Pilatón watershed including financial institutions.

Productive Organizations: Organizations that carry out their productive economic activities within the project area.

Civil Society and foundations: Individuals or foundations part of civil society in the project area.

Communities and Local Interest Groups: Communities and local groups that live in the Project area.

Academy: Organizations that have technical knowledge and collaborate in projects with the GAD.

For development of the final proposal, working meetings and consultations were held with Toachi Pilatón watershed stakeholders. As a result a list of stakeholders is shown in the following table:

Category	Represented Organizations	Roles
Government Organizations	MAE	Administrative agency for providing climate change and environmental guidelines
	INAMHI	Implementing meteorological stations
	CELEC-HIDROTAPI	Administrative agency for implementing the project
	MEER	Administrative agency for providing energy technical knowledge
	MAGAP	Administrative agency for providing agriculture technical knowledge
	MINTUR	Promoting tourism in the project area
	Regional GAD: Pichincha	Administrative agency - province
	Regional GAD: Cotopaxi	Administrative agency – province
	Regional GAD: Santo Domingo de los Tsachilas	Administrative agency - province

	Subregional GAD: Mejía	Administrative agency - municipality
	Subregional GAD: Sigchos	Administrative agency - municipality
	Subregional GAD: Santo Domingo	Administrative agency - municipality
	Local GAD: Manuel Cornejo Astorja	Administrative agency - local
	Local GAD: Palo Quemado	Administrative agency - local
	Local GAD: Alluriquin	Administrative agency - local
	Local GAD: Las Pampas	Administrative agency - local
	SENAGUA	Reporting and monitoring water quality
	Water Board Santa Rosa (Palo Quemado)	Water providing and administration
	BanEcuador	Providing financial services
Private Sector	Ranchers and farmers	
	Sultana del Cóndor Minera Sulcomi SA (Palo Quemado)	Mining
	Toachi GADs Sigchos and Pichincha mining processing sites (Palo Quemado)	Mining
	Teegra Ecuador S.A. (Alluriquin)	
	Caselogic (Alluriquin)	
	Sultana del Cóndor Minera (Sulcomi S.A), Loma del Tigre concession (Alluriquin)	Mining
	Coop "San Miguel de Sigchos" (Segment 4)	Providing financial services
	Coop "Unión y Progreso" (Segment 3)	Providing financial services
	Coop "CACPECO" (Segment 1)	Providing financial services
	Majinta Cusunchi	Providing financial services
	Credi Fé Banco Pichincha	Providing financial services
	Manantial de Oro	Providing financial services
	Mining Company "Mina de la Plata	Mining production
Civil Society and foundations	Fundación Tangaré (Tandapi)	
	Reserva Biológica La Esperanza	
	Hesperia Biological station and reserve	
	Otongachi biológico reserve	
	Río Guajalito Scientific Station	
	Tanti protected forest	
	Rio Lelia watershed protected forest	
	La Favorita Scientific Station	
	ORCOPROSAN	Productive community organization Santa Rosa Lima. (Paloquemado)
	Association of agricultural producers and dealers "Quinticusig"	Production of mulberry wine
	Association women's "Marianita de Jesús" Las Pampas	Working in cattle and agriculture
	Association of Cattle Rancher "Las Pampas"	Working in cattle raising
	Association "Flor de Caña"	Production of panela

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Productive Organizations	Agroartesanal Association “San Pablo de la Plata”	Working in agriculture and cattle ranching
	Pre-Asociación de Cafetaleros (Tandapi)	
	Pre-Asociación de Cafetaleros (La Esperie)	
	Asociación de Productores Agropecuarios “Pampas Argentinas” (Tandapi)	
	Asociación Agropecuaria Mirabad (Tandapi)	
	Asociación de Trabajadores El Progreso	
Local interest groups	Juan Játiva	
	Unión del Toachi (Alluriquin)	Community
	La Esperanza community (Tandapi)	Community
	El Mirador community (Tandapi)	Community
	Mirabad community (Tandapi)	Community
	El Paraíso community (Tandapi)	Community
	San Francisco community (Tandapi)	Community
	Los Olivos community (Tandapi)	Community
	Peñas Blancas community (Tandapi)	Community
	Ilusión community (Tandapi)	Community
	Canchacoto community (Tandapi)	Community
	Iliolan community (Tandapi)	Community
	Cordilleras del Paraíso community (Tandapi)	Community
	San Antonio community (Tandapi)	Community
	La Esperie community (Tandapi)	Community
	La Palma community (Tandapi)	Community
	Pampas Argentinas community (Tandapi)	Community
	Praderas del Toachi community (Palo Quemado)	Community
	Palo Quemado Centro community (Palo Quemado)	Community
	San Pablo de la Plata community (Palo Quemado)	Community
	Las Praderas community (Palo Quemado)	Community
	Santa Rosa de Lima community (Palo Quemado)	Community
	Las Minas de la Plata community (Palo Quemado)	Community
	El Cristal community (Palo Quemado)	Community
	Zarapullo community (Palo Quemado)	Community
	La Florida community (Palo Quemado)	Community
	Unidad Educativa Juan Salinas (Palo Quemado)	Community

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Academy	ESPE University	Providing technical knowledge and training
	Católica University	Providing technical knowledge and training

Table 20 Stakeholders in the project area

During consultations, all stakeholders agreed on relevant importance of climate change adaptation project in the Toachi Pilatón watershed because they have evidenced a remarkable change in the climate over at least 5 years. This change is affecting the community's way life and their subsistence.

Using meetings each stakeholder presented their opinions and recommendations for the project and also they share information of projects in connection with adaptation climate change project. Parallel, according to National Constitution the regional decentralized governments are invested with the exclusive competence for watershed planning and for creating watershed council to carry out its management.⁶ Besides the conservation, recuperation and integrated management of water resources are also under the state responsibility through the regional governments.⁷ This competence bestow these governments to regulate all activities that can affect the water quality and quantity and the ecosystemic equilibrium especially and water recharge areas.⁸

As a summary stakeholders did focus in the following main aspects:



Table 21 Stakeholders aspects

Although the importance of the legal framework regarding watersheds, the regional governments have not been created yet, so their competences are not fully executed by any public organization. As a result there are not administrative councils for watershed managements and no control agency that can assure an overview of all the watershed of the country. Some control activities regarding these areas are carried out by the Ministry of Environment (MAE) and Ministry of Agriculture, livestock, aquaculture and fisheries. (MAGAP) but in any case an integrated policy of management and control can be applied by several and dispersed organizations.

⁶ See articles 262 and 263 of National Constitution

⁷ See article 411 of National Constitution

⁸ Idem

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Provincial governments have the competence for promoting public works in watershed of all type in their territories and to carry out the environmental management. However these competences can be conflictive since the promoting of public works means the construction of roads, irrigation channels, bridges and other infrastructure that can impact watershed if environmental issues are not considered. In addition, not all provincial governments have still authorization for environmental management⁹ so in practice no competences over watershed can be applied.

Another issue regarding one of the productive stakeholders in the watershed is the mining activity. As known mining is among the most nature transformation activities and typically they are executed in very difficult to access areas where rural governments are more efficient to reach. However according the national law, metallic mining activities are under the control of the central government and non-metallic mining under the municipal governments. In the area of study there are six metallic mining concessions and a number of non-metallic extracting places. Since rock, sand, stone and other non-metallic mine resources are abundant in the area it is virtually impossible for the local municipalities to control all of them. Companies granted with metallic mine concessions report to ARCOM (Agencia de Regulaciòn and Control Minero) and not to local rural parishes in whose territories the environmental impacts occur. As a result, mining companies work in the area but have not relationship with local organizations.

The effect of the above explained situation is that there is not any organization in the Toachi-Pilaton watershed that can carry out a comprehensive management of the existing hydric resources and to coordinate activities of the local public organizations in order to establish management activities for the control and conservation of the area.

Two institutions only are carrying some type of activities in coordination with local authorities, and other stakeholders. They are the MAE in the framework of Plan Bosque, in which coordination at different levels is performed with rural parishes, communitarian organizations and forest private owners. The other organization is the Hidrotoapi Hydroelectric Project, a large infrastructure construction executed by a private company under the order of the central government. As a part of the environmental requirements Hidrotoapi must execute communitarian consultation in the area of direct and indirect impact of such project. In order to fulfill such need this project has organized a comprehensive plan to inform local communities about potential environmental and socioeconomic impacts that can affect local livelihoods.

In the above mentioned scenario, the local stakeholders has few opportunities for communication, coordination and exchange strategies for organizing their activities in a sustainable way or at least to make them more efficient. On the other hand, the absence of a management straggles leave the stakeholders to perform their activities at large with a minimum of considerations for the security and sustainable use of the watershed.

Climate issues in the Toachi Pilaton watershed

Four climatic issues were mentioned consistently during the interviews: drought, rainfalls, temperature increase and strong winds. The local people are now aware of the weather events and negative impacts since it is fresh in the memory the catastrophic spate in the Alluriquin

⁹ According the MAE legal framework only provincial and municipal governments that fulfil some requirements are bestowed for environmental management in their jurisdictions.

parish occurred a couple months before the field work for this report and caused by record precipitations. Most of the communities of the parishes involved in this study have also experienced landslides in their lands in the last two years due to sudden and excessive rains.

So for most of the interviewed people it is evident that changes in weather patterns have occurred over the last years and they are interconnected. Then awareness regarding climatic issues in the area has been triggered by the experience with such disasters which have affected practically all the region.¹⁰

Drought was considered an important issue especially in the Toachi watershed area. Communities of the upper basin like Palo Quemado and even of Sigchos referred that most of the year 2015 the entire area has suffered an extreme dry season. For communities of the lower basin it was not an issue because of the alternatives to offset the problem through the use of the river water, but for those of the higher and middle watershed it was more problematic because the river is far from the communities. However after several months of dryness there was a sudden rainy season including deluges that caused spate, mass movements and flooding in different communities of the lower and middle areas in the watershed.

Strong winds have also been reported during the interviews. These events occurred especially in Palo Quemado where the winds were so intense that several trees were uprooted. This weather condition is also pointed as part of the climate pattern change that is experiencing this region.

Effects of the weather issues on local socioeconomic activities

Local people have been concerned of threats to the communities caused by changes in the climate patterns especially in terms of human and economic security (i.e. landslides, flooding and crops quality). Ongoing changes in weather patterns are seen acutely since the Lamas river spate occurred in April 2016 and the string of landslides and avalanches occurred in the last months of 2015 and first trimester of 2016 in different areas of the three involved counties.

The related weather events have affected negatively the local people in several ways. First, long periods of dryness and short but intense periods of rains are pointed as the cause of the decreasing of sugar cane quantity and quality. Sugar producers said that the panela production has significantly decreased in the last year because of the lack of the cane quality.

Now they need more canes to produce the same amount of panela that is the standard for commercialization.¹¹ Other sectors like the cattle ranchers and agriculture producers have also experienced problems derived from extreme weather events. Low productivity, fungus and pest¹² increase, and plant destruction by intense rains are the most common problems the

¹⁰ The spate occurred in the Damas River in Alluriquin have had an economic impact beyond the micro-region of the lower Toachi-Pilatón watershed. Since the Aloag Santo Domingo road was closed during few days it affected the transportation between Quito, Santo Domingo and Guayaquil. Some landslide occurred in the same period near to Tandapi also forced to close the Aloag Santo Domingo road.

¹¹ Each piece of panela or “banco” for commercialization weight 32 pounds.

¹² Pests can appear during dry or wet season, but now with the intense weather conditions have appeared others previously unknown. For example in the naranjilla crops were common the “lancha negra” and “lancha blanca” pest, but now have appeared two more the “ojo de pollo” and “muerte lenta”, to control which farmers must apply more and stronger agrichemicals. This make costly some crops.

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farmers attribute to weather problems. For that they need to use more agrichemicals and devote more time for caring the crops.

On the other hand extreme rains soften the soils of deforested areas or steep hills and produce landslides or mass movements and flooding. During the last months of 2015 and the early 2016 several landslides occurred in the entire region and in most of the cases closing paths and roads and then causing transportation problems sometimes for several days. In the Manuel Cornejo Astorga rural parish more than 200 small and medium scale landslides occurred in the last year. Practically all the 26 communities of the parish have had landslides in their territory. The worst landslide occurred in May 2016 at the point in the kilometer 32 of the Aloag - Santo Domingo road forcing to close it for a couple days.

As already explained the spate in the Damas River that caused avalanche and flooding in Alluriquin was the most extreme effect of the concentrated rains occurred in April 2016. Besides the actual damage that can cause a landslide if it occur over towns, houses or roads, it affect the transportation of products to the markets and some of them like milk and other perishable can be ruined at all causing significant economic damage to the producers.

Strong winds have less impact in the farmers however some crops can be affected and accidents can occur when trees are uprooted. However any of the interviewed has reported accidents due to this type of event. On the other hand, the combination of winds, drought and high temperature sparked some wildfires in the area, especially in Sigchos.

Finally considering the sharp contrasts of the dry and wet periods local people realize that during the drought there was also a significant increment of temperature. However it may be a subjective observation. In any case cases of skin irritation especially in children have been experienced in the communities of Palo Quemado and Pampas de Agüilla in the middle and upper part of the Toachi watershed.

Perceptions of local people regarding weather events

Experience has provided rural communities a knowledge about the local environment and climatic issues. Based in such knowledge these communities have designed a yearlong calendar determining periods for planting, cropping, applying agrichemicals for caring the crops, and even for festivities and other celebrations. However, when sudden changes in local conditions occur, the people tend to fall in fabrications and attributions in order to make an understanding of the new or extreme events.

Pyhälä et al (2016) has studied how people can easily astray when issues go beyond of what is considered normal in terms of their experimental knowledge. He calls it memory illusions in which facts from previous knowledge and new imaginations can be mixed to get sense of new realities. However this may affect the experiential knowledge of the communities acquired through daily observation of their environment. Precisely this has happened in the Toachi – Pilaton areas.

Common explanation of why the creeks of the lower basin area have become dry during 2015 is that the waters were sank through the cracks opened in the soil because of the dynamite explosions carried out to build the Hidrotoapi hydroelectric project. In the upper part of the basin there are also communitarian explanations based in the imagination. For example the drought that has affected most of the year during 2015 and 2016 becoming an overwhelming problem and even a political issue. Since this weather condition affected five counties of the

Cotopaxi province included Sigchos in the upper part of the Toachi River, there was a public petition for creating “veedurias” or commissions in charge to investigate the cause of such abnormal drought (GAD-C 2016). In the communities sparked the idea that a program of “cloud seeding”¹³ was being carried out by flower cultivators in order to produce rain in specific areas to favor their agribusiness (GAD-C 2016). The popular explanations to new or unknown events may have been caused by influential or fantastic memories of extreme events mixed with new situations observed in the area.

However people also retain some indicators of recurrent local problems and provide more scientific explanation for new events. For example the drought problem and the landslides occurred in the upper basin, has been explained by the productive associations as a direct result of the constant deforestation in the area. The association of panela producers, Flor de Caña has explained that farmers use now more trees every week to produce panela, so the nearest forest in Palo Quemado are being significantly degraded. This means also that logs for firing the cauldrons should be brought from more distant places which make more expensive the production.¹⁴

The above explanations show how stakeholders are eager to determine whether situations and to establish them in terms of what is their interest. Beyond of what true or false can be the explanations, this situation also show that local are prone to know about climate issues and that information, capacitation and measures implementation on climate change adaptation are needed.

Understanding on climate change and awareness of local authorities

There is not a clear understanding regarding climate change in the communities in the three counties. Climate change is still a far reality and then there is not a conception on how to take actions to response it. However the adverse events of rainfall, spate and landslides have suddenly forced the people to take a position regarding the recurrent and catastrophic events that occurred in the area.

The Alluriquin disaster made people aware that climate has changed and some collective actions should be adopted. It is obvious that local communities are now more favorable to protect forest especially in the steep areas of the river bank and hills. In addition private reserves are more popular and seen as something positive for the community.

Notwithstanding the increase in public awareness it is not easily translated to local authorities in terms to move them devise plans for bettering the watershed management or coordinating among the different institutions to take common measures. This situation is due to normative and practical issues. From the point of view of the national legislation, the responsibility for watershed management corresponds to the regional GADs which as has already said are still inexistent. These institutions are bestowed by the National Constitution and COOTAD¹⁵ to

¹³ This process consists in “seeding the heavy clouds with tiny particles of silver iodide whose electrical charge would pull together the cloud's water droplets. Once enough droplets had gathered together, their weight would make them fall from the sky as rain.” See: <http://www.dailymail.co.uk/sciencetech/article-1351437/Can-scientists-REALLY-make-rain-useless-shower.html#ixzz4V92o0FR7>

¹⁴ To address this problem, the Association Flor de Caña of Palo Quemado is working with Maquita Cushunchic, a fair trade organization based in Quito, to introduce more efficient technologies and improve the production.

¹⁵ Código Orgánico de Ordenación Territorial y Administración Descentralizada.

carry out the management of the hydrographic systems. This means that parish GADs cannot take initiative in promoting watershed management activities. So in this case while local authorities (the parish GADs) may understand the climate change issues and the potential impacts that can produce in their territories, they do not feel that can take actions or decisions in response to such global event.

Another issue that conspire against the adoption of local measures for watershed management is that some activities that cause severe impacts in the hydrographic basin are not under the control of local governments (the parish GADs). For example metallic and nonmetallic mine activities are under the control of the central government and of the municipal GADs. As a result these activities are not reported to the local parish authorities –the most idoneous to locally verify any situation- and then the control of the problems caused by mine companies not always are known by the control agencies.

The related issues and perceptions in the Toachi-Pilaton watershed show that capacity-building and community-based education are important activities for raising awareness on climate change impacts and promoting adaptation measures. These approaches are important to promote sustainable livelihoods, food security and finally sustainable development.

Gender Issues and Vulnerable groups:

As in most of rural areas in Ecuador, gender is a complex issue. It is difficult to evaluate women issues not only because there is an evident level of “machismo” but also because women have types of agency that do not necessarily have been analyzed by feminist studies and then may not fit in what gender inequality stands for.

The first aspect of gender inequality in the area is the invisibilization of the female work. Despite the current interest of the government for promoting women visibilization, most of the productive female activity is still not socially recognized, and in that sense it is not statistically reflected either. The division between labor for the market and domestic work is often diffused and part of the productive work ends up being counted as unrecognized domestic labor. In other words, female work counts only when it is sold in the market economy (as waged worker or as independent entrepreneur) but not when women work at home. Two factors contribute to this statistical invisibility: on the one hand the fact that all of the female home work has a high use value but it is of null exchange value. For example, cooking for the family, caring children, making the room and so on are activities that cannot be sold in the free market and then it is not worth or practical accounting them. On the other hand, the home female activities are seen as part of the gender work division so it is the task that women must contribute for family and social reproduction.

Beyond the above theoretical considerations since many men in the Toachi Pilaton area are increasingly incorporated in waged work activities, rural women have taken on bigger roles in agricultural production and community labour. The resulting effect of this fact is that the women must assume the place that men have left vacant and then must work an average of 14-16 hours daily. The personal impact of this social phenomenon can be devastating in terms of women health and of physical abuse from husbands.¹⁶ Here also is affected the right of women

¹⁶ In rural areas women have reported health problems like of the spine, of respiratory and reproductive organs, hernias, bruises, and wounds (MacMillan 1995) and gender violence (Camacho 2014).

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to have time for leisure, which in turn men enjoy in any case working in family subsistence activities or in waged work outside the town.

Notwithstanding evident gender inequality issues in the area of study it is also important to consider the women agency for creating income opportunities for their families. In practically all the areas women control most of the formal and informal food business. This provides them great economic independence counterbalancing home male-women asymmetries. In this case women are visibilized through a work inserted in the market economy.

Regarding other vulnerable people beyond women and children, there are no other particular groups that can be identified as vulnerable. Since the area of study of the Toachi Pilaton watershed is a frontier territory, there are no indigenous people nor Afroecuatorians.

En el cantón Sigchos, para el trabajo de las parcelas se utiliza la mano de obra familiar de las mujeres y sus hijos, los cuales también se encargan de la crianza de aves de corral. (GAD Sigchos, 2012)

During 2008, in the parish of “Las Pampas” was created the women’s association “Marianita de Jesus”, which is supervised by the Superintendence of Popular and Solidarity Economy (SEPS). At present, the association made up of 18 women and they are owns a land for economic activities. Those activities are agriculture and cattle raising. For this association the main objective is generate income for their families.

In Las Pampas parish, there is an important role of women in the economic activities. According to data from INEC in 2010, population distribution in the productive sector is as show table below:

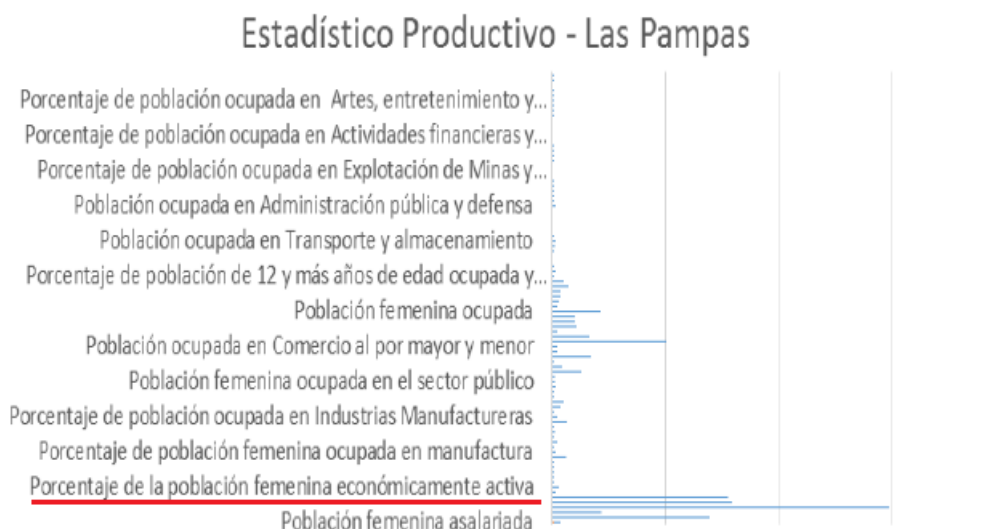


Figure 8 Las Pampas productive sectors

For 2018, according to PDOT, in the main precincts of Las Pampas parish, the goal is to build at least 13 centers of support for community social organization including women's groups, local social groups, among others.

In the parish of “Tandapi”, the municipality promotes entrepreneurship projects where women from the community participate in different activities such as: dance therapy, crafts, beauty, etc.

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Finally, another important project is one from Palo Quemado parish, where population is interested in implementing agriculture associations for single mothers and support them to granting land.

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BIBLIOGRAPHY

- GAD Cotopaxi. (2014). *Sigchos*. Obtenido de Cotopaxi Gobierno Autónomo Descentralizado Provincial: <http://www.cotopaxi.gob.ec/index.php/2015-09-20-00-13-36/2015-09-20-00-15-41/sigchos>
- GAD Las Pampas. (2015). *Plan de Desarrollo y Ordenamiento Territorial*. Las Pampas - Sigchos.
- GAD Mejía. (2014). *Actualización del Plan de Desarrollo y Ordenamiento Territorial Cantón Mejía*.
- GAD Sigchos. (2012). *Plan de Desarrollo y Ordenamiento Territorial (PDOT)*. Sigchos.
- TECNALIA. (s.f.). *Análisis de la vulnerabilidad de las centrales hidroeléctricas priorizadas ante los efectos del cambio climático*.
- Camarero Rioja, Luis Alfonso
2006 El trabajo desvelado. Trayectorias ocupacionales de las mujeres rurales en España. Instituto de la Mujer, Ministerio de Trabajo y Asuntos Sociales. Madrid.
- EC (ElComercio.com)
2016 Cuatro personas fallecidas por el desbordamiento del río Damas en Santo Domingo de los Tsáchilas. El Comercio Newspaper, April 26, 2016. Available at: <http://www.elcomercio.com/actualidad/aloag-santodomingo-cierre-deslizamiento-desbordamiento.html>
- GAD-A
2015 Plan de Desarrollo y Ordenamiento Territorial de la parroquia Alluriquín 2015-2019. Gobierno Autónomo Descentralizado de la parroquia Alluriquín.
- GAD-C
2016 Comunidades exigen solución y ayuda ante la aguda sequía en la provincia. Consejo Provincial de Cotopaxi. Noviembre 18, 2016 <http://www.cotopaxi.gob.ec/index.php/noticias/item/1759-comunidades-exigen-solucion-y-ayuda-ante-la-aguda-sequia-en-la-provincia>
- GAD-MCA
2012 Plan de Desarrollo y Ordenamiento Territorial de la parroquia Manuel Cornejo Astorga - Tandapi 2012-2025. Gobierno Autónomo Descentralizado de la parroquia Manuel Cornejo Astorga.
- GAD-PQ
2015 Plan de Desarrollo y Ordenamiento Territorial de la parroquia Palo Quemado 2025. Gobierno Autónomo Descentralizado de la parroquia Palo Quemado.
- MacMillan, Neale
1995 Ecuador: Health and the Working Woman. IDCR Reports Vol. 23, No. 2. July 1995. Available at <https://idl-bnc.idrc.ca/dspace/bitstream/10625/22843/2/112201.pdf>

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Pyhälä, A., Á. Fernández-Llamazares, H. Lehvävirta, A. Byg, I. Ruiz-Mallén, M. Salpeteur, and T. F. Thornton.

2016 Global environmental change: local perceptions, understandings, and explanations. *Ecology and Society* 21(3):25. <http://dx.doi.org/10.5751/>

USGS

2016 What is a watershed?. The USGS Water Science School. Available at: <https://water.usgs.gov/edu/watershed.html>



“Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management.”

Annex 7: Compliance with the AF Environmental and Social Policy

República del Ecuador

February of 2018

Annex 7. Compliance with the AF Environmental and Social Policy

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1. Compliance with the Environmental and Social Policy

It is developed based on the Manual of Basic Environmental and social where environmental and social risks are identified, impacts are assessed and prevention and mitigation used as required, are identified and are required and based on the 15 principles of the adaptation.

This Annex, consolidate the information demonstrating compliance with the ESP in a single document. The document is divided in five sections, related with: 1. Summary description of the project, 2. risk identification and categorization, 3. Environmental and social management plan. 4. Monitoring and evaluation arrangements and 5. Grievance mechanism.

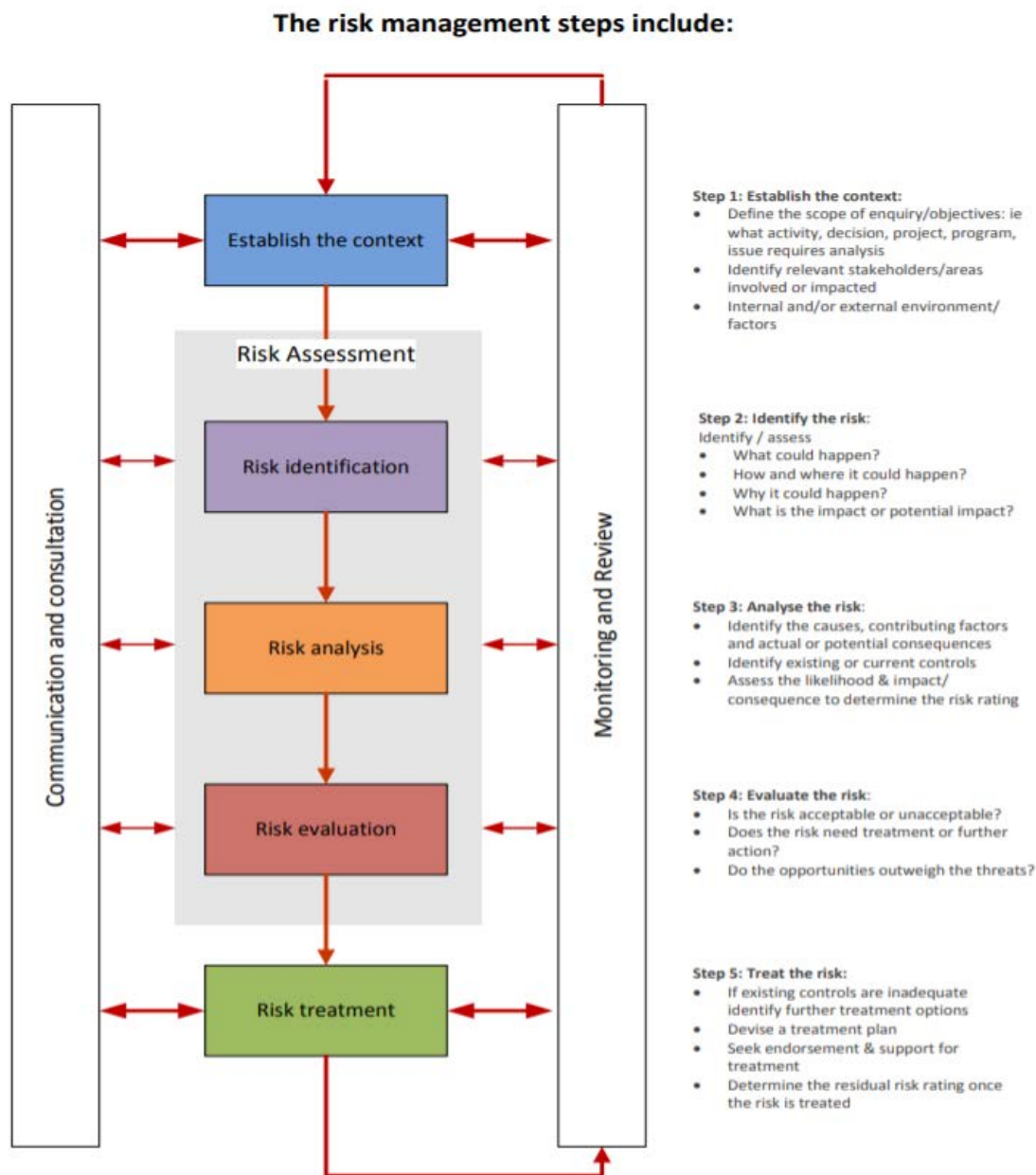


Figure 1: Methodology establish the risk

1.1. Summary description of the project

The main objective of the project is to strengthen the adaptive capacity of vulnerable populations in the Río Blanco upper watershed and develop a model of adaptation to climate change that can be replicated in similar context in the country and in the region. The project focuses on key drivers that will create adverse impacts from climate change or generate opportunities that concern the most vulnerable populations. The expected mid-term impacts are improved enabling conditions to sustain forest cover and sustainable small-scale farming in the area, with a gender perspective. In the long-term, it is expected that the project's activities will result in improved adaptive capacity of the target farmers, ecosystems and hydroelectric systems. The farmers, as well as their communities, are understood as co-executors of the project and its key target.

The critical aspects in this area, which affect the ecosystems and populations of the parishes of the Municipalities of Sigchos and Mejía, which will have limitations regarding access to water quantity and quality are:

- a) Poor monitoring capacity in watersheds. The Toachi watershed has the worst monitoring system (few meteorological stations, minimum gauging stations and no sediment stations). Therefore, it is not possible to track the flow and sediment accurately, much less make a prediction that allows events to be anticipated with certainty.
- b) Unsustainable agricultural and livestock practices in the watershed increase deforestation, erosion and degradation of water quality. An example is the extensive use of firewood for panela [raw sugar cake] production. Most farmers have small areas of no more than 20 ha where they apply inappropriate farming practices and obtain very poor yields.
- c) Difficulty obtaining credit for sustainable productive activities. Farmers have little access to financing to improve their living conditions and thus carry out unsustainable activities that affect ecosystems and the quantity and quality of water in the watershed, reducing the resilience to climate change.
- d) Lack of awareness by the local population of climate-related impacts. Interviews with local stakeholders revealed that there is no clear understanding of the likely impacts of climate change, so communities do not insist that local authorities take adaptation measures as priority issues.
- e) Local development plans do not include measures for adapting to climate change. Local development plans (i.e. parishes and municipalities) mention climate change as a matter of concern, but do not have specific actions for mitigating or reducing the agents of deforestation, erosion, invasion of riverbanks, land use changes, and others. Generally, these plans do not have a gender perspective, and leave women more exposed to climate change.

The Project will contribute to breaking down the barriers that limit adaptation capacity in the lower basin of the Toachi and Pilatón rivers by strengthening local communities through the following actions:

- a) Conservation of the forest surface to maintain the hydrological cycle and to prevent a reduction of rainfall and avoid erosion on the slopes of the mountains;
- b) Introduction of sustainable practices to increase production per hectare, concentrate production in smaller spaces and thus reduce the expansion of the agricultural frontier, soil erosion and deforestation;

Mainstreaming of adaptation to climate change in territorial development plans and involvement of the population by increasing their knowledge of the impacts of climate change.

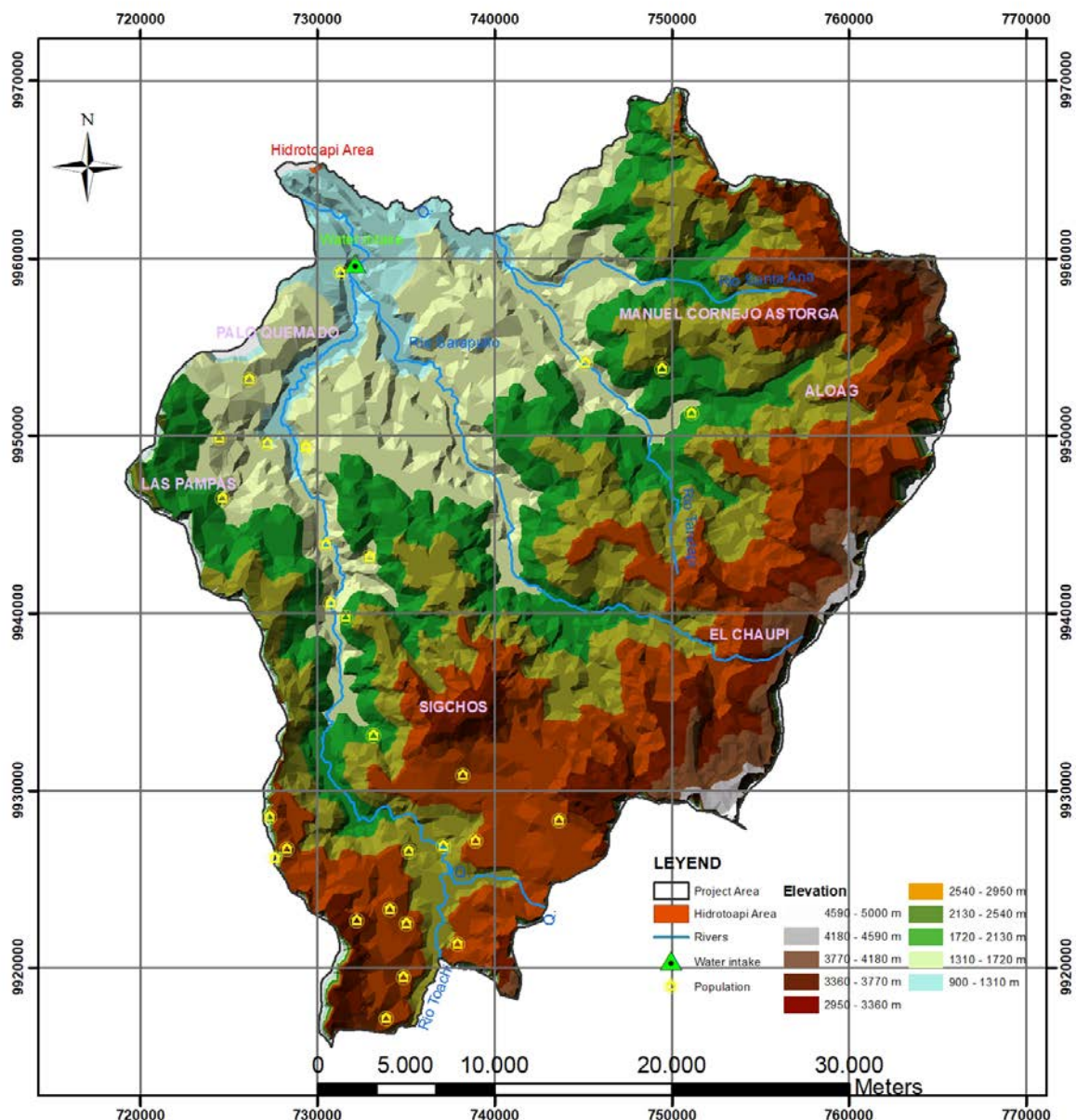


Figure 2: Localisation Adaptation Project

2. Risk identification and categorization

Using the Manual of Basic Environmental and Social Management System procedures and functions at National Implementing Entities – Readiness Programme for Climate Finance, the Social and Environmental Risks Screening Checklist and the Identification and preliminary Management of Social and Environmental Risks were developed.

The process of risk screening for the current project activities developed followed the 15 principles of the ESP. Including Principles 1 (Compliance with the law), 4 (Human rights) and 6 (Basic labour rights) which always apply, the other 12 principles were screened in relation

to the project outcomes, outputs and activities were screened. Establishing relevance between these principles and project elements was one of the outcomes of the risk identification process.

2.1. ESP Risks Identification

Based on the checklist of the AF ESMS procedures Manual of basic Environmental and Social Management System procedures and functions at National Implementing Entities (AF Readiness Programme Climate Finance 2016)

Considering the differentiated risks identified above, the Components 1 and 2 go through the following risk identification with all of its planned outputs and activities, the component 3 has relations with the strengthening of local capacities for these reason no includes the first screening.

In the case of having Unidentified Sub-projects during the implementation phase but always before their explicit implementation will have to be screened under the risk identification matrix again.

Component 1:	Outputs ¹
Conserve vegetation cover	1.1. Functional conservation areas as part of the Toachi Pilaton (Río Blanco upper basin) basin bio-corridor have been established 1.2. Increase in # of Decentralized Autonomous Governments (GAD) with planning, regulatory and normative instruments for ACUS 1.3. Increase sustainable livelihoods alternatives that reduce pressure on forests. 1.4 Increase in # of families in communities adjoining conservation areas in target ACUS, participating in productive activities demonstrated to reduce pressures on forest with at least 50% of women participate 1.5 Strengthening of the hydro-meteorological system of the Río Blanco upper basin. 1.6 Reduction in the use of forest wood for productive activities in the Upper and Middle Basin of the Toachi River (Landscape Las Pampas and Palo Quemado), through promoting technology change and improvement of the production process of the panela production. 1.7 Priority conservation areas maintenance through the creation of the Toachi Pilaton Bio-corridor. 1.8 Increase in the process of planning and zoning of farms in which at least 50% of women participate 1.9 Increases in ratings of Management Effectiveness Tracking Tool and PGOA 1.10 Increases in control capacities in wildlife and forest traffic
Component 2:	Outputs ²
Adapt farming practices to new climate change conditions and enable their	2.1 250 ha of pasture and 250 ha of crops apply sustainable farming practices 2.2 At least 2 institutions have introduced specific solutions and credit assessments to support the disbursement of credits for adaptation, integrating environmental and climate risks in their operations

¹ Table 14, Project Document, keys activities component 1

² Table 15, Project Document, keys activities component 2

sustainable climate smart financing	2.3 One investment fund to promote sustainable development is set up and operational
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The following checklist shows the compliance with the economic and social principles in force in this project. Each principle compliance is evaluated by answering with YES or NO the questions identified for each principals. The questions answered with NO indicate a potential risk for the compliance of project principals, which translates into associated risks of the project. Therefore, principals whose questions have been answered with YES, don't present associated risks, on the other hand, principals whose questions have been answered mainly with NO, activate the associated risk indicated in the checklist.

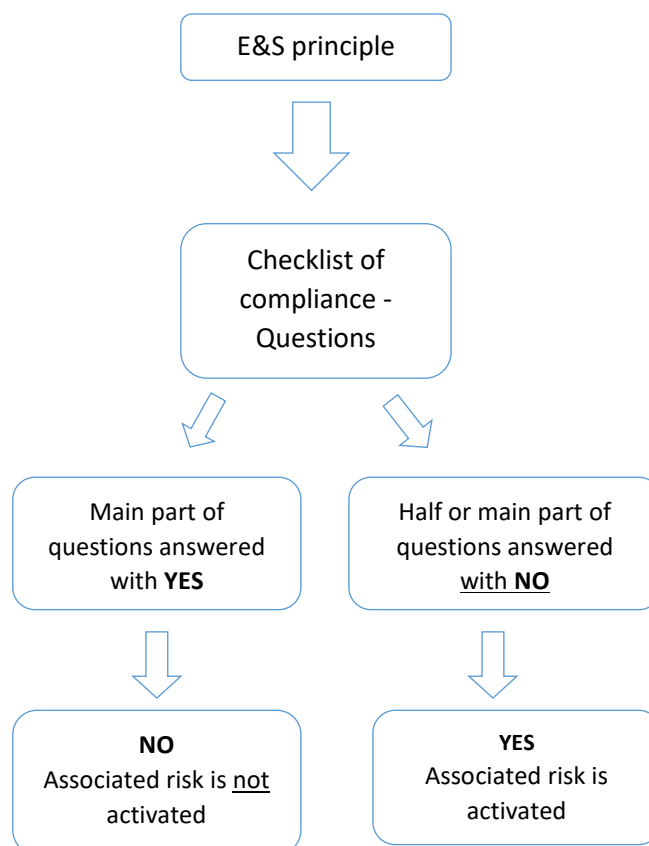


Table 1. Project Risk identification

Component 1: Conserve vegetation cover Component 2: Adapt farming practices to new climate change conditions and enable their sustainable climate smart financing					
Checklist of E&S Principles	Questions	Yes / No	Risks Associated	Yes / No	Observations
<i>1. Compliance with the law</i>	1.1. Does the Project demonstrate compliance with any applicable international law? Has the project identified all the specific, applicable domestic and international laws, regulations, standards, procedures and permits that apply to any of its activities?	YES	The project could not comply with applicable domestic and international law	NO	
	1.2. Has the project identified activities that may require prior permissions (such as planning permission, environmental permits, construction permits, permits for water extraction, emissions, and use or production or storage of harmful substances), which have been identified for the implementation of project activities	YES			Which permissions are needed??
	1.3. Does the project take into consideration environmental and social safeguarding requirements, other than those of the AF (e.g. national or of co-financing entities) using the appropriate screening tools, including any threshold lists and sectorial requirements	YES			
	1.4. Has the project identified technical or industry standards that apply to any of its activities?	YES			Which technical or industrial standards have been identified??

2. <i>Access and Equity</i>	2.1. Has the project identified benefits and its geographical area of effect?	YES	The beneficiary might have unfair and/or unequitable access to project benefits created.	NO	
	2.2. Has the project identified any marginalized or vulnerable groups among potential project beneficiaries? (stakeholder mapping in order to identify the potential beneficiaries, rivals, disputants, marginalized or vulnerable people)	YES			
	2.3. Are the project activities addressing existing inequities with respect to these marginalized or vulnerable groups?	YES			
	2.4. Has the project identified the existing access to the essential services and rights indicated in the principle?	YES	The project might impede an access to basic health services, clean water and sanitation, energy, education, housing, safe and decent working conditions, and land rights. Projects or programs exacerbate existing inequities, particularly with respect to marginalized or vulnerable groups		
	2.5. Has the project described the mechanism of allocating and distributing project benefits, and how this process ensures fair and impartial access to benefits?	YES			
	2.6. Has the project developed stakeholder and local authorities' consultations?	YES			
3. <i>Marginalized and</i>	3.1. In the influence area of the project has there been identified the presence of marginalized or vulnerable groups, including but not limited to	NO	The project may impose any disproportionate	YES	The project provides a detail report on children women and girls as well

<i>Vulnerable Groups</i>	children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities and people living with HIV/AIDS?		adverse impacts on marginalized and vulnerable groups (including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS).		as elderly people, but does not take into consideration refugees, disabled people or people living with HIV and AIDS.
	3.2. Has the project quantified all the groups identified using accepted methods based, where possible, on disaggregated data?	YES			
	3.3. Has the project described the characteristics of any marginalized or vulnerable groups, identifying their particular vulnerabilities that would or could make them disproportionately vulnerable to negative environmental or social impacts caused by the implementation of the activities of the project?	NO			This description is going to be made throughout implementation phase, once identified all vulnerable groups.
4. <i>Human Rights</i>	4.1. Has the project evidenced if the host country is cited in any Human Rights Council Special Procedures, be they thematic or country mandates?	YES	The project might not promote and disrespect international human rights.	NO	Although there is no associated risk, human rights is a transversal principle throughout all project activities.
	4.2. Has the project provided an overview of the relevant human rights issues that are identified in the Special Procedures?	YES			
	4.3. Has the project include human rights issues in stakeholder consultations during project identification and/or formulation?	YES			Yes, during consultations stakeholders were asked about the compliance of their human rights.
	4.4. Has the project included the findings of the consultations on human rights issues in the project document?	YES			No human rights issue has been found during consultations.

5. <i>Gender Equity and Women's Empowerment</i>	5.1. Do project activities guarantee the non-existing of local activities that are known to exclude or hamper gender group based on legal, regulatory or customary grounds?	NO	Risk that either women or men has disproportionate opportunities to participate.	YES	In Ecuador, although the country has a constitutions that takes into considerations gender equality, on customary grounds many populations don't practice gender equality (e.g: women representation in local governments). The project promotes activities which include gender equality. It is important to mention, although
	5.2. Has the project conduct or consult a gender analysis of the supported sector / area, describing the current situation of the allocation of roles and responsibilities in sector or area?	YES			
	5.3. Do project activities exclude all elements that maintain or exacerbate gender inequality or the consequences of gender inequality?	NO	Risk that that both women and men receive incomparable social and economic benefits	YES	In Ecuador, although the country has a constitution that takes into considerations gender equality, on customary grounds many populations don't practice gender equality (e.g: women representation in local governments). Project activities are not designed to directly
	5.4. Has the project identified particular vulnerabilities of men and women that would or could make them disproportionately vulnerable to negative environmental or social impacts caused by the outputs / activities of the project?	NO	Risk that either women or men suffers disproportionate adverse effects during the	YES	

			development process		change customs or habits, but to implement a gender equality approach during activities, which may lead to changes in customs.
6. <i>Core Labour Rights</i>	6.1. Has the project determined if the host country has ratified the eight ILO core conventions	YES	Risk of not meeting the core labour standards as identified by the International Labour Organization (ILO).	NO	
	6.2. Has the project reviewed the latest ILO assessments of application of the standards in the country?	YES			
	6.3. Has the project identified any past/present/planned ILO assistance to meet the standards through social dialogue and technical assistance?	YES			
	6.4. Has the project identified information on any ILO Special procedures relevant to the Member nation including details on the triggering representation or complaints	YES			
	6.5. Has the project identified how the ILO core labour standards are incorporated in the design and the implementation of the outputs / activities' project?	YES			
	6.6. Has the project described the common labour arrangements in the sector(s) in which the project will operate, with particular attention to all forms of child labour and forced labour?	NO			The project will not promote or accept child labor or forced labor. All activities will be based on national law, which does not permit child labor and forced labor.
7. <i>Indigenous Peoples</i>	7.1. Has the project identified if indigenous peoples are present in the area of influence?	YES	Risk of inconsistency of the project with the	NO	There are no indigenous groups present in the project area, therefore
	7.2. Has the project quantify the groups identified of indigenous peoples?	YES			

	7.3. Has the project determined if there are provisions for a realistic and effective Free, Prior, Informed Consent process, giving a community the right to give or withhold its consent to proposed projects that may affect the lands they customarily own, occupy or otherwise use?	YES	rights and responsibilities set forth in the UN Declaration on the Rights of Indigenous Peoples and other applicable international instruments relating to indigenous peoples.		there is no risk of inconsistency of the project with the rights and responsibilities set forth in the UN Declaration on the Rights of Indigenous Peoples and other applicable international instruments relating to indigenous peoples.
	7.4. Has the project provided a summary of any reports, specific cases, or complaints that have been made with respect to the rights of indigenous peoples by the Special Rapporteur on the rights of indigenous peoples and that are relevant to the project?	NO			As there are no indigenous groups present in the area, the project has not seen necessary realize this summary.
8. <i>Involuntary Resettlement</i>	8.1. Has the project identified if physical or economic displacement is required or will occur as a consequence of its implementation?	YES	Risk of not minimizing or avoiding the need for involuntary resettlement.	NO	The project activities will not require a physical displacement as a consequence of its activities, however the project may promote economic resettlement in order to generate a balance between the population, the productions and conservation using a landscape advancing approach.
	8.2. Has the project determined if it is voluntary or involuntary resettlement?	YES			
	8.3. Has the project identified stakeholders whose livelihoods may be affected, directly or indirectly, and if this may lead to resettlement?	NO	Risk of not producing well-	YES	During the implementation there will

	8.4. Has the project identified stakeholders whose assets or access to assets may be affected, directly or indirectly, and if this may lead to resettlement and its consequences including indemnification, compensation, etc.?	NO	informed rights, consultation, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.		be realized a social mapping, in order to identify stakeholders whose livelihoods may be affected, directly or indirectly by the project and will need economical resettlement, and stakeholders whose assets or access to assets may be affected, directly or indirectly because of economical resettlement activities.
9. <i>Protection of Natural Habitats</i>	9.1. Has the project identified all the critical natural habitats in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. noise) and an appreciation of its propagating ability. The habitats to be considered include all those recognized as critical in any way, be it legally (through protection), scientifically or socially.	YES	Risk of involving unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or	YES	The Ministry of Environment has realized a vulnerability study for hydroelectric power plants, which includes an analysis of natural habits.
	9.2. Has the project identified for each critical natural habitat, the mechanism by which it is particularly vulnerable?	NO			
	9.3. Has the project considered all the activities to identify actual risks for each of the natural habitats identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each habitat identified.	NO			

			indigenous local communities.		
10. <i>Conservation of Biological Diversity.</i>	10.1. Has the project identified all the elements of biodiversity interest in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent and an appreciation of its propagating ability. It is important in the identification of the elements of biodiversity interests not to limit this to the species level but to include all elements of biodiversity interest, including landscapes, ecosystem processes, habitats, and hydrological cycles, processes of erosion and sedimentation and interactions between taxa. Include all elements enjoying local or international protection	NO	Risk of not avoiding any significant or unjustified reduction or loss of biological diversity or the introduction of unknown invasive species	YES	The project has one of his main focuses on this principle, as one of his main activities is the implementation of biological corridors.
	10.2. For each identified biodiversity element, has the project identified the mechanism by which it is particularly vulnerable? (Changes in flow regime or water quality for a seasonal wetland or disruption of migration routes).	NO			
	10.3. Has the project identified actual risks for each of the biodiversity elements identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each biodiversity element identified?	NO			
	10.4. Has the project identified the potential of introducing – intentionally or accidentally – known invasive species?	NO			
	10.5. Has the project identified the use of living modified organisms resulting from modern biotechnology?	NO			

11. <i>Climate Change</i>	11.1. Has the project determined if it belongs to a sector mentioned in the Guidance document for which a greenhouse gasses emission calculation is required? <ul style="list-style-type: none"> Energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management. 	YES	The risk of resulting in significant or unjustified increase in greenhouse gas emissions or other drivers of climate change.	NO	
	11.2. Has the project carry out a qualitative risk identification for each of the following drivers of climate change: <ul style="list-style-type: none"> Emission of carbon dioxide gas from the use of fossil fuel and from changes in land use methane and nitrous oxide emissions from agriculture emission of hydrofluorocarbons perfluorocarbons sulphur hexafluoride Other halocarbons, aerosols, and ozone. 	NO			The country counts with an inventory of greenhouse gases, however this does not include perfluorocarbons, sulphur hexafluoride and other halocarbons, aerosols, and ozone.
	11.3. Has the project carry out a qualitative risk identification of any impact on carbon capture and sequestration capacity.	YES			The project is part of the Socio Bosque Program, which has realized a study in carbon capture and sequestration capacity of forests and reforestation.
12. <i>Pollution Prevention and Resource Efficiency</i>	12.1. Has the project identified activities with preventable waste or pollution production?	NO	Risk of project designed and implemented in a way that does not meet applicable international	NO	
	12.2. Has the project determined the nature and quantity of the waste, as well as those of possible pollutants that may be produced?	NO			
	12.3. Has the project determined if the concept of minimization of waste and pollution production has	YES			

	been applied in the design phase and if this will be effective during implementation?		standards for maximizing energy efficiency and minimizing material resource use, the production of wastes, and the release of pollutants		
	12.4. Has the project determined if applicable local, national and international regulations regarding any waste and pollution generation have been applied and will be complied with?	YES			
	12.5. Has the project determined if the concept of minimization of resource use has been applied in the design phase and if this will be effective during implementation?	YES			
	12.6. Has the project determined where international standards for maximizing energy efficiency and minimizing material resource use may apply?	YES			
13. <i>Public Health</i>	13.1 Has the project analyzed the need of using an appropriate health impact-screening tool, in order to identify the generation of negative impacts on public health caused by project activities?	YES	Risk of a project designed and implemented in a way that produces potentially significant negative impacts on public health.	NO	The project does not need a health impact screening tool, as it is not implementing activities related to public health including any chemicals (industry or agriculture) or other toxic substances, but activities for conservation and organic agriculture.
14. <i>Physical and Cultural Heritage</i>	14.1. Has the project determined if the host country has ratified the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage?	YES	The project might not avoid or promote the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites	YES	The project activities will promote the conservation of natural and cultural heritage.
	14.2. Has the project identified the national and local legal and regulatory framework for recognition and protection of physical and cultural heritage?	YES			
	14.3. Has the project described in the influence zone all the elements of the cultural heritage, their location and their vulnerabilities?	NO			

	The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. vibrations, landscape elements) and an appreciation of its propagating ability. Include all elements enjoying local or international protection.		with unique natural values recognized as such at the community, national or international level. Projects or programs should also not permanently interfere with existing access and use of such physical and cultural resources.		
	14.4. Has the project determined if the cultural heritage is being accessed by communities?	NO			
	14.5. Has the project determined if any of the heritage elements included in the List of World Heritage in Danger is in the influence zone?	NO			
	14.6. Has the project considered all the activities to identify actual risks for each of the heritage elements identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each heritage element identified?	YES			
15. <i>Lands and Soil Conservation</i>	15.1. Has the project identified the presence of fragile soils within the influence area?	YES	The project might not promote soil conservation and avoid degradation or conversion of productive lands / land that provides valuable ecosystem services.	NO	Ecuador counts with maps of soil degradation and identification of soils.
	15.2. Has the project identified activities that could result in the loss of otherwise non-fragile soil, due to non-sustainable activities carried out by the population in the influence zone?	YES			
	15.3. Has the project identified productive lands and/or lands that provide valuable ecosystem services within the influence area?	YES			
	15.4. Has the project identified activities that may lead to land degradation?	YES			

The common elements of the unidentified sub-projects (USP) are screened using the risk identification matrix as part of the compliance with the AF's USP. Also, a USP general mechanism to be followed by the EE during the execution phase and monitoring arrangements are part of this Annex, for a full compliance with the ESP for all the activities of the project.

2.2. Categorization

The following table will define which category corresponds to each component of the Adaptation Project.

Questions	Component Answer YES / NO		
	1	2	3
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are diverse?	NO	NO	NO
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are widespread?	NO	NO	NO
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are irreversible?	NO	NO	NO
Does the Project Outputs / Activities have few adverse environmental or social impacts?	YES	YES	NO
Does the Project Outputs / Activities have in small scale / low widespread adverse environmental or social impacts?	YES	YES	NO
Does the Project Outputs / Activities have reversible or easily mitigated adverse environmental or social impacts?	YES	YES	NO
Does the Project Outputs / Activities have no adverse environmental or social impacts?	NO	NO	YES
Categorization	B	B	C

Table 2. Categorization definition

The results of the screening showed that the Component 3 are categorized as low risk (Category C) because of their nature of capacity building (risk-based adaptation, communication and education strategies, narrators' initiatives, electronic platform to facilitate communication, lessons and best practices dissemination) which is not expected to generate any significant environmental and social

The project presents a categorization B in component 1 and 2 that requires according to the EIAS risks - projects with potential adverse impacts but less in number, scale or that are easily mitigated. Low risk general, which presents only moderate risks and a potential social and environmental risk with great importance. For the risks identified, a plan of measures for environmental safeguards is presented while all the activities proposed in the Adaptation Project are aligned to comply with the 15 principles, taking into consideration the protection of human rights and environmental sustainability. The implementation of energy-efficient furnaces for the production of panela reduces: the CO2 pollution caused by the deforestation of the wood, the loss of natural habitat and the pressure on the remaining primary forests, also allow to guarantee the participation of women during the activities of capacity building, with the objective of reaching a participation of at least 50% of women during all activities. On the other hand, all activities proposed within the framework of the project take into consideration the protection of human rights and environmental sustainability. The implementation of energy efficient furnaces for panela production reduces: the CO2 pollution caused by the deforestation of the wood, the loss of natural habitat and the pressure on the remaining

primary forests. In conclusion, many of the activities proposed under the project are additional benefits for risk managers with low social and environmental risks currently.

2.3. Risk Evaluation

After having the risk identification, it is important to assess the significance of the risk to valuate if it is necessary an ESIA or not. The combination of impact and probability is then used to determine the overall significance of the risk (Low, Moderate or High).

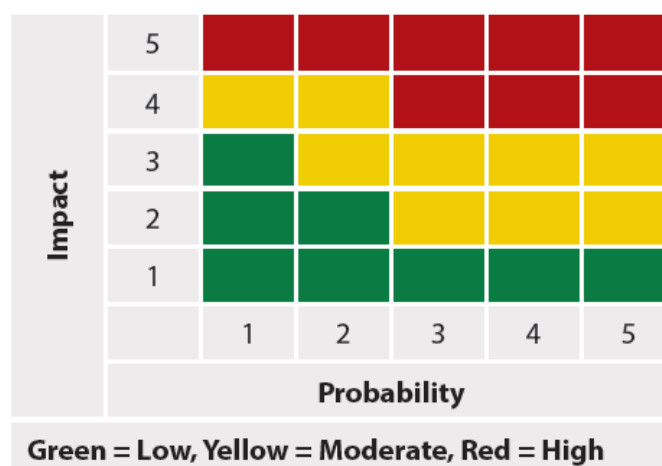


Figure 3: Significance of the risk

Table 3. Significance of the risk

<i>Risk Description</i>	<i>Impact (1-5)</i>	<i>Probability (1-5)</i>	<i>Significance (Low, Moderate, High)</i>
Principle 3: Marginalized and Vulnerable Groups			
The project may impose any disproportionate adverse impacts on marginalized and vulnerable groups (including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS).	3	3	Yellow
Principle 5: Gender Equity and Women's Empowerment			
Risk that either women or men has disproportionate opportunities to participate.	3	3	Yellow
Risk that that both women and men receive incomparable social and economic benefits	2	4	Yellow

Risk that either women or men suffers disproportionate adverse effects during the development process	3	2	
Principle 8: Involuntary Resettlement			
Risk of not producing well-informed rights, consultation, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.	1	4	
Principle 9: Protection of Natural Habitats			
Risk of involving unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.	2	2	
Principle 10: Conservation of Biological Diversity.			
Risk of not avoiding any significant or unjustified reduction or loss of biological diversity or the introduction of unknown invasive species	3	3	
Principle 14: Physical and Cultural Heritage			
The project might not avoid or promote the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects or programmes should also not permanently interfere with existing access and use of such physical and cultural resources.	1	3	

The results of the significance of the risks is that the Component 1 has a Moderate significance and for that it is not needed an Environmental and Social Impact Assessment. Therefore, in the next section, the ESMP is presented, as the AF's ESP requires.

3. Environmental and social management plan (ESMP)

The PMAS describes the risk mitigation measures that will be taken to ensure consistency with the ESGP principles including the laws and regulations of Ecuador, if the risk has been identified and assessed as moderate mitigation is implemented. PMAS will consist of a specific management plan (s) and related activities that have been identified as necessary during the impact evaluation.

3.1. Environmental and social mitigation program

In general terms, for the entire project, there must be elaborated and approved the Environmental and Social Management Plan, that includes specific measures to prevent correct and/or mitigate adverse environmental and social impacts and risks outlined in Table 3.

Table 4. Mitigation measures for management of environmental and social impacts and risks.

Identified risks/impacts	Environmental and Social principles	Planned mitigation measure	Responsible
The project may impose any disproportionate adverse impacts on marginalized and vulnerable groups (including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS).	<i>Principle 3: Marginalized and Vulnerable Groups</i>	<ol style="list-style-type: none"> 1. Encourage the creation of community-based committees. 2. Update the identification and quantification report of marginalized and vulnerable groups and a description of their risk of disproportionate adverse impacts with the help of community-based committees. The steps of the process: <ol style="list-style-type: none"> a. In the project area, identify the presence of marginalized or vulnerable groups. b. Quantify all groups identified using accepted methods on a base, when possible, in the disaggregated data. c. Describe the characteristics of marginalized or vulnerable groups, the identification of particular vulnerabilities that could make or excessively vulnerable to environmental impacts or negative negatives caused by the project. 3. Update the vulnerability report of the population that is in the project area 	<p>This update of the reports must be done by the 3 Project technicians: Territory Technical (Gads), Specialist Adaptation, Specialist Management, Monitoring And Evaluation</p> <p>The review will be carried out by Technical Assistant. The approval will be made: Project Manager</p>
<p>Either women or men have disproportionate opportunities to participate.</p> <p>Both women and men receive incomparable social and economic benefits</p> <p>Either women or men suffers disproportionate adverse effects during the development process</p>	<i>Principle 5: Gender Equity and Women's Empowerment</i>	<ol style="list-style-type: none"> 1. Update the report on the Identification of creation risks or the maintenance of gender inequalities and a description of the risk of disproportionate adverse impacts based on gender. The steps of the process: <ol style="list-style-type: none"> a. Identify activities or other elements in the project that are known to exclude or hinder a gender group based on legal, regulatory or customary characteristics. 	<p>This update of the reports must be done by the 3 Project technicians: Territory Technical (Gads), Specialist Adaptation, Specialist Management, Monitoring And Evaluation</p> <p>The review will be carried out by Technical Assistant.</p>

Identified risks/impacts	Environmental and Social principles	Planned mitigation measure	Responsible
		<ul style="list-style-type: none"> b. Conduct or consult a gender analysis of the project sector, which describes the actual situation of the assignment of functions and responsibilities in the project area. c. Identify the project elements that persist or exacerbate gender inequality or the consequences of gender inequality. <ol style="list-style-type: none"> 2. Create a report to implement each activity where gender equality is recorded, without ruling out whether you belong to the vulnerable group. 3. Training on gender equality issues where issues such as: equality, breaking barriers, opportunities for all, sexist culture, stereotypes, decision-making will be addressed. 	The approval will be made: Project Manager
The project is not producing well-informed rights, consultation, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.	<i>Principle 8: Involuntary Resettlement</i>	<ol style="list-style-type: none"> 1. To minimize the need for involuntary resettlement, it is proposed to update the identification and quantification of the persons or communities potentially affected and to carry out the corresponding analysis of the economic benefits that they will have by adhering to the activities proposed by the Adaptation Project. 2. Talks to those involved in the change of economic activity so that they know the benefits and opportunities of the project. 	This update of the reports must be done by the 3 Project technicians: Territory Technical (Gads), Specialist Adaptation, Specialist Management, Monitoring And Evaluation The review will be carried out by Technical Assistant. The approval will be made: Project Manager Mitigation measure 2, responsible territory Technical.
Project activities cause unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative	<i>Principle 9: Protection of Natural Habitats</i>	<p>The concepts of untouchable conservation that corresponds to literal c), in the Adaptation Project there is a paradigm shift that conserves traditional conservation where the population is involved.</p> <ol style="list-style-type: none"> 1. Study of alternative activities that can be developed in the proposal of the creation of the Biocorridor with the interaction of the communities. 	1. Specialist Adaptation

Identified risks/impacts	Environmental and Social principles	Planned mitigation measure	Responsible
sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.		<ol style="list-style-type: none"> 2. Talks with the beneficiaries of the Biocorridor to disseminate knowledge of the destination of the activities and the benefits of adapting to climate change. 3. Meeting with the beneficiaries that are within the area of Biocorredor, determination of agreements and commitment actions of the conservation of the Biocorredor with sustainable and sustainable activities. 	<ol style="list-style-type: none"> 2. Territory Technical and Specialist Adaptation 3. Territory Technical
The project is avoiding significant or unjustified reduction or loss of biological diversity or the introduction of unknown invasive species	<i>Principle 10: Conservation of Biological Diversity.</i>	<ol style="list-style-type: none"> 1. Forest technical study of the study area to implement the reforestation activity. (It should include analysis of ecosystems, analysis of native species, identification of nurseries in the area that give plants that are native and that adapt to the microclimate) 2. Technical study of adaptation measures to be implemented by farms to strengthen organic farming. 3. Training for the beneficiaries of the steps to follow for the areas that are reforested. 4. Training of farmers on farms for the installation of good agricultural practices. 	<ol style="list-style-type: none"> 1. Specialist Adaptation 2. Specialist Adaptation 3. Territory Technical and Specialist Adaptation 4. Territory Technical and Specialist Adaptation <p>The review will be carried out by Technical Assistant. The approval will be made: Project Manager</p>
The project might not avoid or promote the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects or programs should also not permanently interfere with existing access and use of such physical and cultural resources.	<i>Principle 14: Physical and Cultural Heritage</i>	<ol style="list-style-type: none"> 1. Training for the population of the Project area of the benefits and strengths of the proposed activities for the adaptation of climate change. 2. Create a historical knowledge of the population of agricultural practices, livestock, forestry, knowledge exchange, among other things considered necessary for a historical review. 	<ol style="list-style-type: none"> 1. Specialist Adaptation 2. Territory Technical

3.1. Mechanism for Identification Environmental and Social Risk of an unidentified activity

An unidentified activity or subproject is one that at the time of submission of the proposal cannot identify ESG risks. This may be due to the time elapsed from the evaluation in the field until the Project was approved and started to develop, and other characteristics that determine the ESG risks have not yet been established and have occurred in the implementation through a participatory approach. In any case, these activities or subprojects require a PMAS that includes a framework for identification and risk management strategies.

At the beginning of the project, analyze the possible implementation of new findings in the ESIA and recognize recognizing the possibility of reformulating a PMAS.

The Process developed is:

Step 1. Design of Activities.

Step 2. Risk screening using a risk identification form

Step 3. Evidence to identify compliance (Impact assessment if required)

Step 4. Mitigation Measures

Step 6. Verification for Approval

Step 7. Monitoring of Compliance

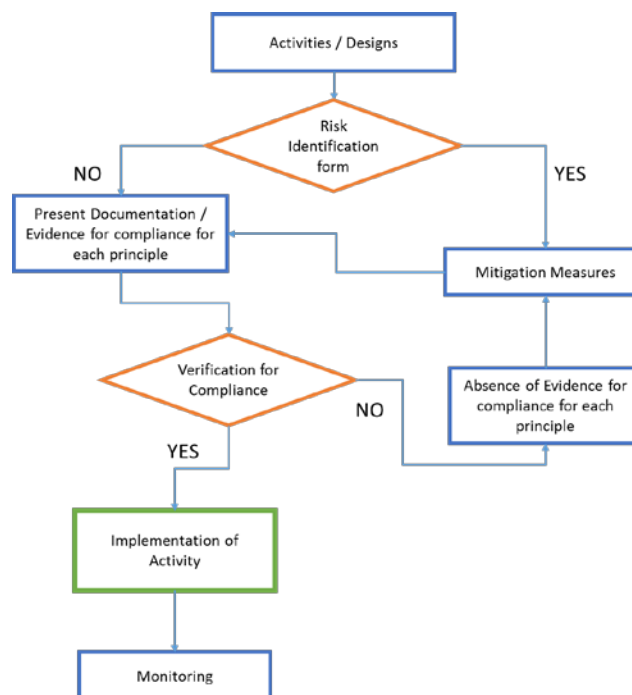


Figure 4. Risk identification – Mitigation Measures – Activity Implementation

Templates

This templates are for risk identification for each adaptation activity technically designed under Component 1 y 2 of the project. After the risk identification and mitigation measures templates are completed and verified by the Project Unit after to socialize the results with the community.

Executive Resume				
NAME OF THE ACTIVITY:				
Area on intervention:	Responsible of fulfilling the template - Local Technical Coordinator Check:	Management Coordinator Check:	Project Check:	Unit Date:
Technical General Description of the Activity :				
Fulfillment of the Risk Identification				
Consultation with the community				
Documentation – Evidence Base of Risk Identification				
General Relevant Mitigation Measures /				

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	Questions	YES / NO
1. <i>Compliance with the law</i>	1.1. Does the Project demonstrate any incompliance with any applicable international law? Has the project identified all the specific, applicable domestic and international laws, regulations, standards, procedures and permits that apply to any of its activities?	
	1.2. Has the project identified activities that may require prior permission (such as planning permission, environmental permits, construction permits, permits for water extraction, emissions, and use or production or storage of harmful substances)	
	1.3. Has the project identified environmental and social safeguarding requirements, other than those of the AF (e.g. national or of co-financing entities). Use the appropriate screening tools, including any threshold lists and sectorial requirements?	
	1.4. Has the project identified technical or industry standards that apply to any of its activities?	
2. <i>Access and Equity</i>	2.1. Has the project identified benefits and its geographical area of effect?	
	2.2. Has the project identified any marginalized or vulnerable groups among potential project beneficiaries? (stakeholder mapping in order to identify the potential beneficiaries, rivals, disputants, marginalized or vulnerable people)	
	2.3. Has the project identified any existing inequities with respect to these marginalized or vulnerable groups?	
	2.4. Has the project identified the existing access to the essential services and rights indicated in the principle?	
	2.5. Has the project described the mechanism of allocating and distributing project benefits, and how this process ensures fair and impartial access to benefits?	
	2.6. Has the project developed stakeholder and local authorities' consultations?	
3. <i>Marginalized and</i>	3.1. In the influence area of the project has there been identified the presence of marginalized or vulnerable groups, including but not limited to children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities and people living with HIV/AIDS?	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	Questions	YES / NO
<i>Vulnerable Groups</i>	3.2. Has the project quantified all the groups identified using accepted methods based, where possible, on disaggregated data?	
	3.3. Has the project described the characteristics of any marginalized or vulnerable groups, identifying their particular vulnerabilities that would or could make them disproportionately vulnerable to negative environmental or social impacts caused by the implementation of the activities of the project?	
4. <i>Human Rights</i>	4.1. Has the project evidenced if the host country is cited in any Human Rights Council Special Procedures, be they thematic or country mandates?	
	4.2. Has the project provided an overview of the relevant human rights issues that are identified in the Special Procedures?	
	4.3. Has the project include human rights issues in stakeholder consultations during project identification and/or formulation?	
	4.4. Has the project included the findings of the consultations on human rights issues in the project document?	
5. <i>Gender Equity and Women's Empowerment</i>	5.1. Has the project identified activities that are known to exclude or hamper a gender group based on legal, regulatory or customary grounds?	
	5.2. Has the project conduct or consult a gender analysis of the supported sector / area, describing the current situation of the allocation of roles and responsibilities in sector or area?	
	5.3. Has the project identified elements that maintain or exacerbate gender inequality or the consequences of gender inequality?	
	5.4. Has the project identified particular vulnerabilities of men and women that would or could make them disproportionately vulnerable to negative environmental or social impacts caused by the outputs / activities of the project?	
6. <i>Core Labour Rights</i>	6.1. Has the project determined if the host country has ratified the eight ILO core conventions	
	6.2. Has the project reviewed the latest ILO assessments of application of the standards in the country?	
	6.3. Has the project identified any past/present/planned ILO assistance to meet the standards through social dialogue and technical assistance?	
	6.4. Has the project identified information on any ILO Special procedures relevant to the Member nation including details on the triggering representation or complaints	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	Questions	YES / NO
	6.5. Has the project identified how the ILO core labour standards are incorporated in the design and the implementation of the outputs / activities' project?	
	6.6. Has the project describe the common labour arrangements in the sector(s) in which the project will operate, with particular attention to all forms of child labour and forced labour.	
7. <i>Indigenous Peoples</i>	7.1. Has the project identified if indigenous peoples are present in the area of influence?	
	7.2. Has the project quantify the groups identified of indigenous peoples?	
	7.3. Has the project determined if there are provisions for a realistic and effective Free, Prior, Informed Consent process, giving a community the right to give or withhold its consent to proposed projects that may affect the lands they customarily own, occupy or otherwise use?	
	7.4. Has the project provided a summary of any reports, specific cases, or complaints that have been made with respect to the rights of indigenous peoples by the Special Rapporteur on the rights of indigenous peoples and that are relevant to the project?	
8. <i>Involuntary Resettlement</i>	8.1. Has the project identified if physical or economic displacement is required or will occur as a consequence of its implementation?	
	8.2. Has the project determined if it is voluntary or involuntary resettlement?	
	8.3. Has the project identified stakeholders whose livelihoods may be affected, directly or indirectly, and if this may lead to resettlement?	
	8.4. Has the project identified stakeholders whose assets or access to assets may be affected, directly or indirectly, and if this may lead to resettlement and its consequences including indemnification, compensation, etc.	
9. <i>Protection of Natural Habitats</i>	9.1. Has the project identified all the critical natural habitats in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. noise) and an appreciation of its propagating ability. The habitats to be considered include all those recognized as critical in any way, be it legally (through protection), scientifically or socially.	
	9.2. Has the project identified for each critical natural habitat, the mechanism by which it is particularly vulnerable?	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	Questions	YES / NO
	9.3. Has the project considered all the activities to identify actual risks for each of the natural habitats identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each habitat identified.	
10. <i>Conservation of Biological Diversity.</i>	10.1. Has the project identified all the elements of biodiversity interest in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent and an appreciation of its propagating ability. It is important in the identification of the elements of biodiversity interests not to limit this to the species level but to include all elements of biodiversity interest, including landscapes, ecosystem processes, habitats, and hydrological cycles, processes of erosion and sedimentation and interactions between taxa. Include all elements enjoying local or international protection	
	10.2. For each identified biodiversity element, has the project identified the mechanism by which it is particularly vulnerable? (Changes in flow regime or water quality for a seasonal wetland or disruption of migration routes).	
	10.3. Has the project identified actual risks for each of the biodiversity elements identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each biodiversity element identified?	
	10.4. Has the project identified the potential of introducing – intentionally or accidentally – known invasive species?	
	10.5. Has the project identified the use of living modified organisms resulting from modern biotechnology?	
11. <i>Climate Change</i>	11.1. Has the project determined if it belongs to a sector mentioned in the Guidance document for which a greenhouse gasses emission calculation is required? <ul style="list-style-type: none"> Energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management. 	
	11.2. Has the project carry out a qualitative risk identification for each of the following drivers of climate change: <ul style="list-style-type: none"> Emission of carbon dioxide gas from the use of fossil fuel and from changes in land use methane and nitrous oxide emissions from agriculture 	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	Questions	YES / NO
	<ul style="list-style-type: none"> • emission of hydrofluorocarbons • perfluorocarbons • sulphur hexafluoride • other halocarbons, aerosols, and ozone. 	
	11.3. Has the project carry out a qualitative risk identification of any impact on carbon capture and sequestration capacity.	
12. <i>Pollution Prevention and Resource Efficiency</i>	12.1. Has the project identified activities with preventable waste or pollution production?	
	12.2. Has the project determined the nature and quantity of the waste, as well as those of possible pollutants that may be produced?	
	12.3. Has the project determined if the concept of minimization of waste and pollution production has been applied in the design phase and if this will be effective during implementation?	
	12.4. Has the project determined if applicable local, national and international regulations regarding any waste and pollution generation have been applied and will be complied with?	
	12.5. Has the project determined if the concept of minimization of resource use has been applied in the design phase and if this will be effective during implementation?	
	12.6. Has the project determined where international standards for maximizing energy efficiency and minimizing material resource use may apply?	
13. <i>Public Health</i>	13.1. Has the project identified using an appropriate health impact screening tool (check list) potentially significant negative impacts on public health generated?	
14. <i>Physical and Cultural Heritage</i>	14.1. Has the project determined if the host country has ratified the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage?	
	14.2. Has the project identified the national and local legal and regulatory framework for recognition and protection of physical and cultural heritage?	
	14.3. Has the project described in the influence zone all the elements of the cultural heritage, their location and their vulnerabilities? The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. vibrations, landscape elements) and an appreciation of its propagating ability. Include all elements enjoying local or international protection.	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	Questions	YES / NO
	14.4. Has the project determined if the cultural heritage is being accessed by communities?	
	14.5. Has the project determined if any of the heritage elements included in the List of World Heritage in Danger is in the influence zone?	
	14.6. Has the project considered all the activities to identify actual risks for each of the heritage elements identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each heritage element identified?	
15. <i>Lands and Soil Conservation</i>	15.1. Has the project identified the presence of fragile soils within the influence area?	
	15.2. Has the project identified activities that could result in the loss of otherwise non-fragile soil?	
	15.3. Has the project identified productive lands and/or lands that provide valuable ecosystem services within the influence area?	
	15.4. Has the project identified activities that may lead to land degradation?	

Categorization of the Activity	
Activity	
Questions	YES / NO
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are diverse?	
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are widespread?	
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are irreversible?	
Does the Project Outputs / Activities have few adverse environmental or social impacts?	
Does the Project Outputs / Activities have in small scale / low widespread adverse environmental or social impacts?	
Does the Project Outputs / Activities have reversible or easily mitigated adverse environmental or social impacts?	
Does the Project Outputs / Activities have no adverse environmental or social impacts?	
Categorization of the Activity	

Mitigation Measures					
Activity:					
Area on intervention:	Responsible of fulfilling the template - Local Technical Coordinator Check:		Management Coordinator Check:	Project Check:	Unit Date:
Environmental or social Principle	Environmental or social risk	Mitigation measure		Responsible	Verification
Principle 1. Compliance with the Law	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3.			

Mitigation Measures					
Activity:					
Area on intervention:	Responsible of fulfilling the template - Local Technical Coordinator Check:		Management Check:	Coordinator	Project Check: Unit Date:
Environmental or social Principle	Environmental or social risk	Mitigation measure		Responsible	Verification
		Mitigation measure 4.			
Principle 2. Access and Equity	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.			
Principle 3. Marginalized and Vulnerable Groups	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.			
Principle 4. Human Rights	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.			
Principle 5. Gender Equality and Women's Empowerment	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.			
Principle 6. Gender Equality and Women's Empowerment	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.			
Principle 7. Indigenous Peoples	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.			

Mitigation Measures						
Activity:						
Area on intervention:	Responsible of fulfilling the template - Local Technical Coordinator Check:		Management Check:	Coordinator	Project Check:	Unit Date:
Environmental or social Principle	Environmental or social risk	Mitigation measure			Responsible	Verification
Principle 8. Involuntary Resettlement.	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.				
Principle 9. Protection of Natural Habitats	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.				
Principle 10. Conservation of Biological Diversity	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.				
Principle 11. Climate Change	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.				
Principle 12. Pollution Prevention and Resource Efficiency	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.				
Principle 13. Public Health	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.				
Principle 14. Physical and Cultural Heritage	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2.				

Mitigation Measures					
Activity:					
Area on intervention:	Responsible of fulfilling the template - Local Technical Coordinator Check:		Management Check:	Coordinator	Project Check: Unit Date:
Environmental or social Principle	Environmental or social risk	Mitigation measure		Responsible	Verification
		Mitigation measure 3. Mitigation measure 4.			
Principle 15. Lands and Soil Conservation	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.			

4. Monitoring, evaluation and oversight program³

A surveillance program in accordance with the actions identified in the PMAS will report the results in the reports that can be: intermediate, annual and performance terminals. Supervision will ensure that actions are taken in a timely manner and for the determination of whether the measures are mitigating the risks and impacts or whether it is necessary to modify the expected results.

The annual project execution reports should include a section on the state of execution of the ESG risks, as well as the corrective measures considered necessary.

Interim and final reports also included an evaluation of project performance related to ESG.

Environmental monitoring plan

The relevant environmental variables must contain, when appropriate, for each phase of the project or activity the component of the environment that will be subject to measurement and control; the associated environmental impact; the location of the control points; the parameters that will be used to characterize the state and evolution of said component.

The quantitative levels or limits allowed or committed; the duration and frequency of the monitoring plan for each parameter. The method or procedure of measuring each parameter; the deadline and frequency of delivery of monitoring plan reports to the competent agencies; the indication of the competent body that will receive such documentation, and any other relevant aspect.

Inspection

It will correspond to the State organisms that, in use of their legal faculties, participate in the control

Modification of the Action Plan if necessary, depending on the criteria of the auditor

³ Before the implementation of the project, a "Manual of Social and Environmental Safeguards Implementation" will be developed to have protocols with specific indicators, means of verification and responsible for the implementation of the mitigation measures these protocols will be validated with the main partners involved in the project's implementation. Additionally, a training workshop aimed at the members of the project unit and project partners will be carried out for the implementation of this manual. CAF will give technical support for the manual elaboration and the operation of training workshop.

IMPLEMENTATION STAGE

During the implementation, there are several aspects that must be supervised and evaluated, including:

- Application of environmental and social measures
- Preparation of compliance reports at the farm or producer group level
- Preparation of environmental and social monitoring reports for the executive community.

Post-Closing Stage

- Generation of information at the project level on environmental and social compliance
- Evaluation of lessons learned
- Consideration of positive environmental impacts such as carbon sequestration and the benefits of biodiversity
- Calculation of the economic and financial impact of the subprojects

Midterm and final evaluation of the Project

- Prepare an assessment of compliance with environmental and social measures.
- Evaluation of the environmental and social impact (including the economic and financial impact) of the investments, as a whole.

Table 5. Plan de Monitoreo y Evaluación

Identified risks/impacts	Planned mitigation measure	Means of support	Indicator	Moment of execution	Responsible of monitoring
<p><i>Principle 3: Marginalized and Vulnerable Groups</i></p> <p>The project may impose any disproportionate adverse impacts on marginalized and vulnerable groups (including children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities, and people living with HIV/AIDS).</p>	<ol style="list-style-type: none"> 1. Encourage the creation of community-based committees. 2. Update the identification and quantification report of marginalized and vulnerable groups and a description of their risk of disproportionate adverse impacts with the help of community-based committees. The steps of the process: <ol style="list-style-type: none"> a. In the project area, identify the presence of marginalized or vulnerable groups. b. Quantify all groups identified using accepted methods on a base, when possible, in the disaggregated data. c. Describe the characteristics of marginalized or vulnerable groups, the identification of particular vulnerabilities that could make or excessively vulnerable to environmental impacts or negative negatives caused by the project. 3. Update the vulnerability report of the population that is in the project area 	<p>Agreements</p> <p>Report</p> <p>Report</p>	<p># committees / # parishes * 100</p> <p># of the steps analyzed / # total steps * 100</p> <p># analyzed parishes (vulnerability) / # total parishes</p>	First semester	Specialist Management, Monitoring And Evaluation
<p><i>Principle 5: Gender Equity and Women's Empowerment</i> Either women or men have disproportionate opportunities to participate.</p> <p>Both women and men receive incomparable</p>	<ol style="list-style-type: none"> 1. Update the report on the Identification of creation risks or the maintenance of gender inequalities and a description of the risk of disproportionate adverse impacts based on gender. The steps of the process: <ol style="list-style-type: none"> a. Identify activities or other elements in the project that are known to exclude or hinder a gender group based on 	Report	# of the steps analyzed / # total steps * 100	First semester	Specialist Management, Monitoring And Evaluation

Identified risks/impacts	Planned mitigation measure	Means of support	Indicator	Moment of execution	Responsible of monitoring
social and economic benefits	legal, regulatory or customary characteristics.				
Either women or men suffers disproportionate adverse effects during the development process	b. Conduct or consult a gender analysis of the project sector, which describes the actual situation of the assignment of functions and responsibilities in the project area. c. Identify the project elements that persist or exacerbate gender inequality or the consequences of gender inequality. 2. Create a report to implement each activity where gender equality is recorded, without ruling out whether you belong to the vulnerable group. 3. Training on gender equality issues where issues such as: equality, breaking barriers, opportunities for all, sexist culture, stereotypes, decision-making will be addressed.	Report Attendance	# of reports where gender equity is involved / # of Project activities # attendees / # of guests * 100		
<i>Principle 8: Involuntary Resettlement</i> The project is not producing well-informed rights, consultation, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.	1. To minimize the need for involuntary resettlement, it is proposed to update the identification and quantification of the persons or communities potentially affected and to carry out the corresponding analysis of the economic benefits that they will have by adhering to the activities proposed by the Adaptation Project. 2. Talks to those involved in the change of economic activity so that they know the benefits and opportunities of the project. 3. Reach agreements with the beneficiaries and sign commitment minutes.	Report Engagement letters	# of the steps analyzed / # total steps * 100 # attendees / # of guests * 100 # of signed commitment minutes / # total minutes	First semester	Specialist Management, Monitoring And Evaluation Territory Technical Project Manager

Identified risks/impacts	Planned mitigation measure	Means of support	Indicator	Moment of execution	Responsible of monitoring
<i>Principle 9: Protection of Natural Habitats</i> Project activities cause unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.	<p>The concepts of untouchable conservation that corresponds to literal c), in the Adaptation Project there is a paradigm shift that conserves traditional conservation where the population is involved.</p> <ol style="list-style-type: none"> 1. Study of alternative activities that can be developed in the proposal of the creation of the Biocorridor with the interaction of the communities. 2. Talks with the beneficiaries of the Biocorridor to disseminate knowledge of the destination of the activities and the benefits of adapting to climate change. 3. Meeting with the beneficiaries that are within the area of Biocorredor, determination of agreements and commitment actions of the conservation of the Biocorredor with sustainable and sustainable activities. 	<p>Report</p> <p>Attendance</p> <p>Engagem ent letters</p>	<p># viable alternatives / # total alternatives * 100</p> <p># attendees / # of guests * 100</p> <p># of signed commitment minutes / # total minutes</p>	First year	<p>Specialist Management, Monitoring And Evaluation</p> <p>Territory Technical</p> <p>Project Manager</p>
<i>Principle 10: Conservation of Biological Diversity.</i> The project is avoiding significant or unjustified reduction or loss of biological diversity or the introduction of unknown invasive species	<ol style="list-style-type: none"> 1. Forest technical study of the study area to implement the reforestation activity. 2. Technical study of adaptation measures to be implemented by farms to strengthen organic farming. 3. Training for the beneficiaries of the steps to follow for the areas that are reforested. 4. Training of farmers on farms for the installation of good agricultural practices. 	<p>Report</p> <p>Report</p> <p>Attendance</p> <p>Attendance</p>	<p># local nurseries / # total nursery of the parishes</p> <p># native species adaptive to the microclimate / # native species</p> <p># of farms that have adapted adaptability measures to climate change / # total farms * 100</p> <p># attendees / # of guests * 100</p>	<p>First year</p> <p>Monitoring annually</p>	Specialist Management, Monitoring And Evaluation

Identified risks/impacts	Planned mitigation measure	Means of support	Indicator	Moment of execution	Responsible of monitoring
<p><i>Principle 14: Physical and Cultural Heritage</i></p> <p>The project might not avoid or promote the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects or programs should also not permanently interfere with existing access and use of such physical and cultural resources.</p>	<ol style="list-style-type: none"> 1. Training for the population of the Project area of the benefits and strengths of the proposed activities for the adaptation of climate change. 2. Create a historical knowledge of the population of agricultural practices, livestock, forestry, knowledge exchange, among other things considered necessary for a historical review. 	<p>Attendance</p> <p>Report</p>	<p># attendees / # of guests * 100</p> <p># data contributed their knowledge / # stories of beneficiaries * 100</p>	First year	Specialist Management, Monitoring And Evaluation

5. Grievance mechanism

The Complaints and Dispute Resolution Mechanism will be adapted to the existing regulations, the options for presenting complaints are: complains and discrepancy, which are enabled to people who are considered to be affected by possible environmental or social impacts resulting from the implementation of measures and actions of the project.

The Ministry of the Environment MAE does not have the functions of solving problems; indeed they do the follow up on the competent institutions to solve the problem efficiently and effectively. The primary objective of the dispute management mechanism is to protect the rights and obligations among all the actors involved in the implementation of the Project, making sure that the means are clear and effective measures are implemented in case of problems. The processes of claims, disputes and conflicts, will be resolved with local support, has been identified the Mediation Centers as key entity, formality created by the Ecuadorian law (2008) that allow to avoid judicial process-cost.

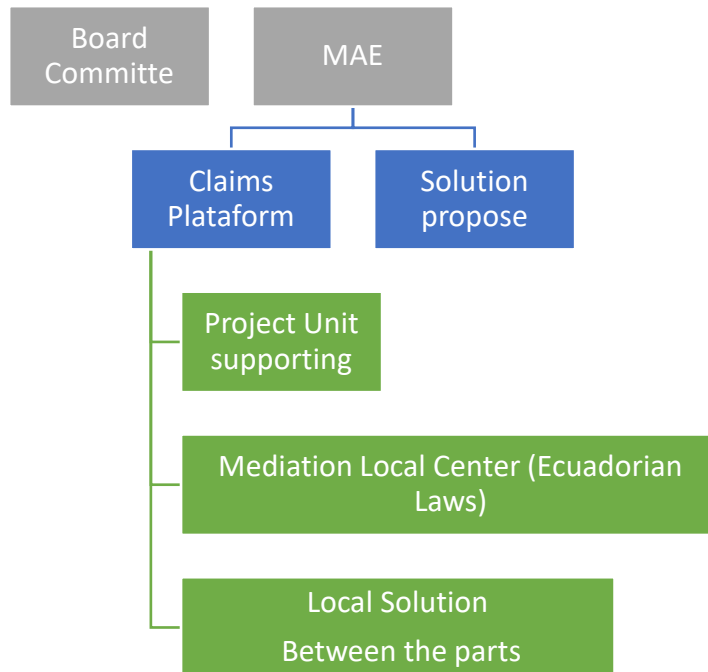
Response to petitions, complaints and claims: To respond adequately and effectively to petitions, complaints or claims that may arise at any stage of the project cycle, a mechanism must be designed that allows an effective and rapid response to the needs. The entire population should be informed of this mechanism regarding how to file a petition, claim or complaint, and about the time and manner in which they will receive a response. The planned mechanism must be presented and communicated among the local population with transparency and privacy, if necessary.

Periodically, the results of the treated cases must be disseminated, and this information will also be used as a commentary to improve the practice of the project.

Main complaints agents: Beneficiaries, organizations affected by project activities can file a complaint. Claimants do not need to be directly affected by the decision, project action and are not required to identify the applicable rule, regulation or policy that may have been violated.

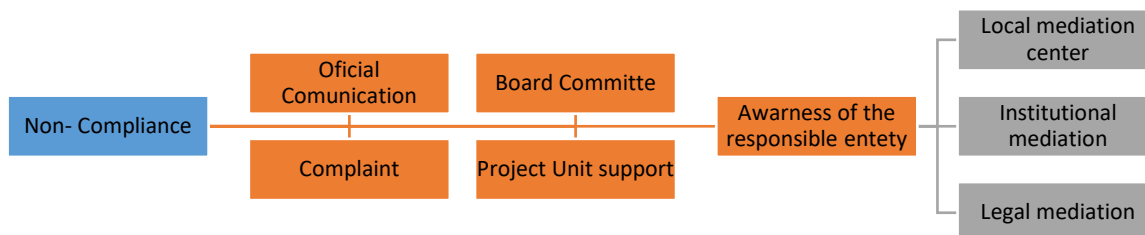
5.1 Procedure for dispute settlement

At the beginning of the project, commitment letters will be signed by the Project's stakeholders. During the project execution, if there is any disagreement or controversy on any issue, the Unit Project will promote a friendly solution, if necessary, the support of the mediation centers will be solicited. Finally, the intervention of the mediation centers.



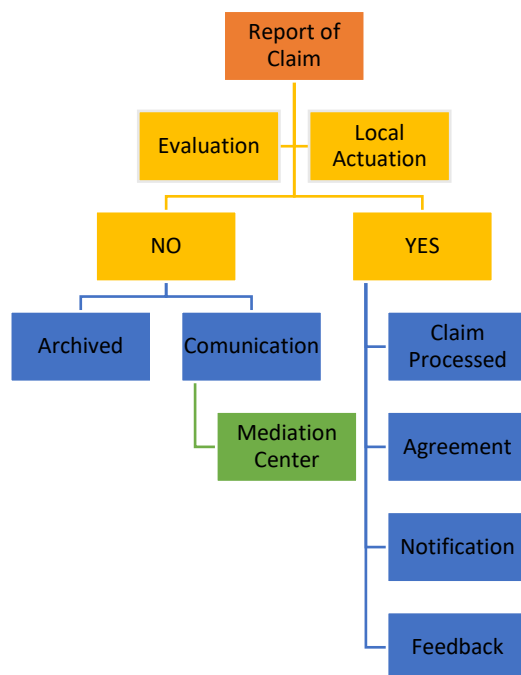
5.2 Procedures for cases of non-compliance

They serve to fulfill the requirements, prevent and address community concerns in order to reduce the risk of social participation and participation of all beneficiaries involved in decision-making. Also, it provides a guarantee of faithful compliance that is a legal backing mechanism intended to protect, compensate or ensure compliance with the obligations assumed by the State.



5.3 Procedure for complaints

A complaints mechanism provides a predictable and clear process and provides results that are considered durable and effective. The objective is to identify the complaint, facilitate corrective actions and a preventive engagement.



The contact information of the Adaptation Fund will also be publicized (i.e. project website, Facebook and mailbox) for the public to directly address concerns regarding the project:

Adaptation Fund Board secretariat
Mail stop: MSN P-4-400
1818 H Street NW
Washington DC
20433 USA
Tel: 001-202-478-7347
afbsec@adaptation-fund.org

5.4 Use of the stakeholders response mechanism

There must be a commitment from the stakeholders throughout the duration of the Project to promote mutually beneficial, transparent, responsible and positive working relationships.

The commitment of the stakeholders the construction of knowledge and the exchange of information

5.5 Involvement of relevant stakeholders and the disclosure of information

By means of its 3 components the Project has to implement the citizen participation mechanisms established by Law (i.e. public consultations), although the development of these consultations was verified in this evaluation phase; once the Adaptation Fund approves the proposal, CAF will verify during the execution that the levels of citizen participation are respected and that the results are incorporated into the process; in Component 3 and in a cross-cutting manner, the implementers shall inform CAF in a timely manner about the communication strategy used with the community and the results obtained, such that there is full compliance with the obligations stipulated in the Regulations for the Application of Social Participation Mechanisms specified in the Environmental Management Law, promulgated in Executive Decree 1040 of April 22, 2008, and the Instructions for the Regulations for the Application of social participation mechanisms established in Executive Decree 1040.

The citizen participation component should be managed as a system that permits community involvement in the phases of information and incorporation of criteria, precisely in order to dilute potential expressions of discontent or complaints from the inhabitants of the areas of influence of the program who might feel adversely affected by the Projects.

The Strategic Environmental Assessment process of the Project will also serve to improve public participation in assessing the environmental consequences of the project's initiatives, in order to ensure that they are fully included and correctly communicated during the early decision-making stages, and placed at the level of social and economic considerations.

6. Annex

6.1. Applicable Domestic and International Laws That Apply

Laws	Ecuador
2030 Agenda for Sustainable Development	YES
Article 2 of the UN Framework Convention on Climate Change (UNFCCC)	YES
Cartagena protocol on Biosafety	YES
Convention on Biological Diversity (CBD)	YES
Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)	YES
Guidelines for National Greenhouse Gas Inventories (2006)	YES
Human Rights Council Special Procedures thematic mandates	YES
Human Rights Council Special Procedures country mandates	YES
ILO Declaration of Fundamental Principles and Rights at Work	YES
Intergovernmental Panel on Climate Change (IPCC)	YES
IUCN Red List of Threatened Species	YES
List of World Heritage in Danger	YES
Millennium Development Goals (MDGs)	YES
Ramsar sites inventory	YES
Report of the Special Rapporteur on the rights of indigenous peoples, James Anaya (The situation of indigenous peoples in Chile and Ecuador)	YES
Special Rapporteur on the Rights of Indigenous Peoples (UN)	YES
Status of Ratification Interactive Dashboard (See Ecuador and Chile listing)	YES
Sustainable Development Goals (SDGs)	YES
UN Framework Convention on Climate Change (UNFCCC) (Article 2)	YES
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 – article 1 and 2. See also: http://whc.unesco.org/en/statesparties/na - Namibia accepted the Convention in 2000. See also: List of World Heritage in Danger – article 11(4) of the Convention	YES
UNESCO Convention on Biological Diversity	YES
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage – article 1 and 2	YES
UNESCO Man and the Biosphere Programme reserves list (Ecuador - Chile)	YES
Universal Declaration of Human Rights (UDHR)	YES
UN Declaration on the Rights of Indigenous Peoples (UNDRIP 2007)	YES
WHO Determinants of Health	YES
Sendai Framework for Disaster Risk Reduction 2015 – 2030. Hyogo Framework for Action 2005-2015	YES
Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts and article 8 of the Paris Agreement under the United Nations Framework Convention on Climate Change.	YES

National Laws and Regulations

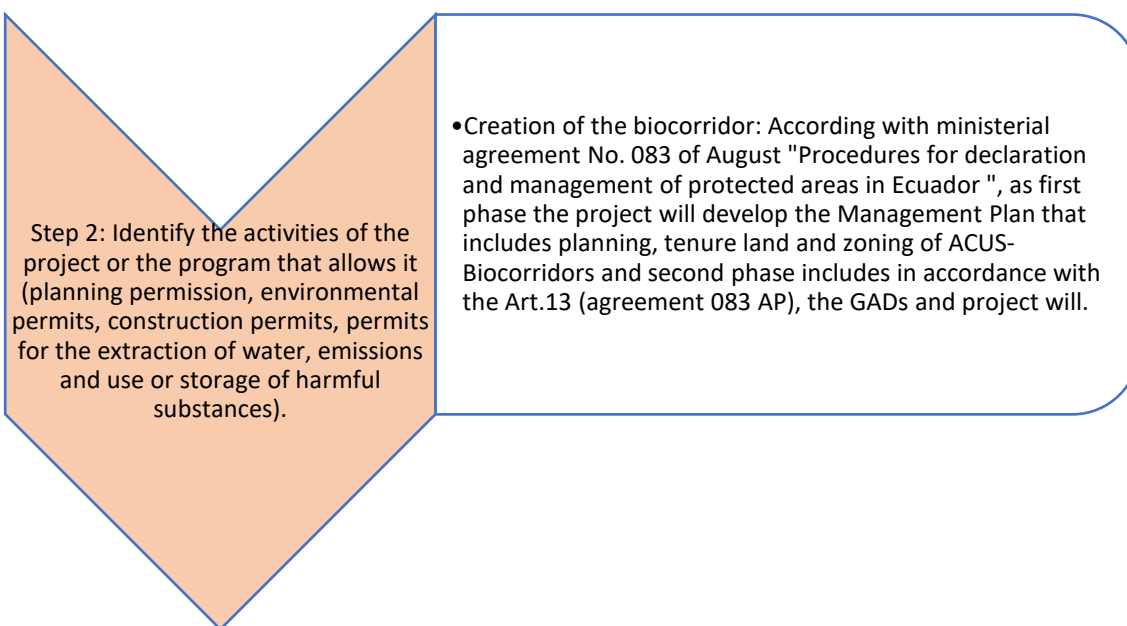
Principle 1 that corresponds to the Compliance with the law. The identified process is:

Step 1: Identify specific laws, norms, standards, procedures and national and international permits that apply to the project or program, or to any of its activities.

Basel Convention, Stockholm Convention, Rotterdam Convention, Kyoto Protocol on Climate Change, Basel Convention

Constitution of the Republic of Ecuador (Published in the Official Gazette 449 of October 20, 2008)

Law on Environmental Management (Published in the Official Gazette 245 of July 30, 1999), Codification of the Environmental Management Law Codification 19 Official Registry Supplement 418 of September 10, 2004 Status: Effective, Law of Prevention and Control of Environmental Pollution (Published in the Register Official 418 of September 10, 2004), Law of Water Resources, Uses and Use of Water (Published in the Official Gazette 305 of August 6, 2014), Organic Health Law (Published in the Supplement to the Official Register 423 of December 22, 2006), COA Organic Environmental Code that will enter into force after twelve months have elapsed, counted from its publication in the Official Register. Given by Sole Final Provision No. 0, published in Official Register Supplement 983 of April 12, 2017; Forestry, Conservation of Natural Areas and Wildlife Law Standard: Codification # 17 (Published in the Official Gazette Supplement # 418 of September 10, 2004, Forestry Law, Conservation of Natural Areas and Wildlife - Standard: Codification # 17 (Published in the Official Gazette Supplement # 418 of September 10, 2004, Executive Decree No. 1040, (Published in Official Gazette No. 332 of May 8, 2008), Agreement No. 061 of the Unified Text, published in the RO No. 316 of May 4, 2015, Ministerial Agreement No. 097-A of Wednesday, November 4, 2015 - Special Edition No. 387 - Official Registry, Organic Code of Comprehensive Criminal Registry Official, in the supplement No.180 dated Monday 10 February 2014, Labor Code (Published in the Official Gazette 167 of December 16, 2005), Codification of the Fire Defense Law Published in Official Gazette No. 815 of April 19, 1979



Step 3: Identify environmental and social safeguard requirements, other than AFs (for example, national or co-financing entities). Use the appropriate evaluation tools, including threshold lists and sectoral requirements.

- Agreement Ministerial Agreement 018 - Ministry of the Environment:
<http://www.ambiente.gob.ec/wp-content/uploads/downloads/2016/02/Acuerdo-Ministerial-N%C2%B0-018.pdf>
- Forest and conservation law for natural areas and wildlife:
<http://www.ambiente.gob.ec/wp-content/uploads/downloads/2012/09/ley-forestal.pdf>
- Regulations for land zoning: <http://ecuadorforestal.org/wp-content/uploads/2010/05/Normativa-para-la-zonificaci%C3%B3n-de-tierras-para-forestaci%C3%B3n-y-reforestaci%C3%B3n.pdf>
- Agreement No. 502 Minister of Agriculture:
<http://servicios.agricultura.gob.ec/forestacion/wp-content/uploads/downloads/2013/01/SPF-acuerdo-502-con-reformas-incorporadas.pdf>
- Acuerdo 211. Restauración Agreement 211. Forest Restoration:
<http://sociobosque.ambiente.gob.ec/files/images/articulos/archivos/amr211.pdf>

Step 4: Identify the technical or industrial standards that apply to any of the project or program activities.

- Rules link: <http://ecuadorforestal.org/legislacion-forestal/>
- Norms for the Sustainable Forest
- Management of the Humid Forests (Ministerial Agreement N ° 125)
- Procedures for Authorizing the Harvesting and Cutting of Wood (Ministerial Agreement No. 139)
- Rules for the Management of Andean Forests (Ministerial Agreement No. 128)
- Standards for Sustainable Forest Management of Dry Forest (Ministerial Agreement No. 244)
- Standard for the Procedure for the Awarding of Lands of the State Forest Patrimony and Forest and Vegetation Protectors
- Annex PFE Adjudication Standard Regulations of the Forest Regency System (Ministerial Agreement No. 038)
- Right of Use of Standing Wood (Ministerial Agreement N ° 041)
- Forest Seed Standard (Ministerial Agreement No. 003)
- Instructive application tax credit payments afforestation program (Ministerial Agreement No. 75)
- Operational Manual for the Incentive for Sustainable Forest Management (Partner Management) (Ministerial Agreement No. 187)
- Instructions for granting the economic incentive for reforestation and afforestation with commercial purposes (Ministerial Agreement N ° 035)
- Regulations for the zoning of lands for afforestation and reforestation (Interministerial Agreement No. 002)
- NORMS INEN ECUADOR
 - NTE INEN 221:1997 FERTILIZERS OR FERTILIZERS. REQUIREMENTS LABELED <http://www.agrocalidad.gob.ec/wp-content/uploads/2013/11/inen-0221-1997.pdf>
 - NTE INEN 330:98 Fertilizers, fertilizers, classification <http://www.agrocalidad.gob.ec/wp-content/uploads/2013/11/INEN-330-clasificacion-de-fertilizantes-11-04-2017.pdf>
 - NTE INEN - ISO 25119-2 TRACTORES Y MAQUINARIA PARA LA AGRICULTURA Y LA SILVICULTURA – PARTES DE LOS SISTEMAS DE CONTROL RELACIONADAS CON LA SEGURIDAD http://www.normalizacion.gob.ec/wp-content/uploads/downloads/2015/07/nte_inen-iso_25119-2.pdf
 - NTE INEN 2331 SOLID PANEL. REQUIREMENTS http://www.normalizacion.gob.ec/wp-content/uploads/downloads/2015/07/nte_inen_2331-1r.pdf
 - NTE INEN 1761:2012 FRESH VEGETABLES. CHOCLO-MAIZ TIERNO. REQUIREMENTS http://www.normalizacion.gob.ec/wp-content/uploads/downloads/2013/11/nte_inen_1761.pdf

Applicable legal and institutional frameworks

The **Constitution of the Republic of Ecuador** (20th October 2008) contains a number of important provisions of relevance to this project:

- Right of the population to live in a healthy environment Art. 14, 66.
- Recognition of water as a Human Right: All citizens have the right to have safe water in sufficient quantity and quality. Articles 3, 12, 15, 32, 318, 396 and 413.
- Considers water as a strategic resource: It is the support of food sovereignty and sustainable development of the country. Articles 12, 14, 71, 72, 73, 74, 397, and 411.
- Considers water as the Right of Nature and Source of life. Articles 281 and 282.
- Finally, it recognizes water as a heritage resource: Water cannot be privatized since it is part of the national heritage considered strategic for the development of the country and for public use. Articles 85, 95, 318, 319 and 419.
- The Constitution of the Republic of Ecuador, which establishes in Article 414 that "The State shall adopt appropriate and transversal measures for the mitigation of climate change, by limiting emissions of greenhouse gases, deforestation and air pollution ; will take measures for the conservation of forests and vegetation, and will protect the population at risk ".
- In addition, the 2008 constitution is an institutional umbrella under which safeguards are addressed and respected. It provides a context for the implementation of a rights-based approach associated with REDD + UNFCCC safeguards and incorporates environmental variables into production activities, ecosystem management, citizen participation in environmental discussions and climate change adaptation (Policies 2, 3 and 5).

The **National Development Plan**, (named during the present period of the Government “**the National Plan Lifetime 2017-2021**”) establishes policies and strategic guidelines related to climate change, such as:

- Objective 3: Guarantee the rights of nature for current and future generations. Policy 3.3: Promote good environmental practices that contribute to the reduction of pollution, to conservation, to mitigation and adaptation to the effects of climate change, and promote them at the global level.
- Proposed Goals for indicator homologation and construction of information: Reduce the Vulnerability Index from high to means, population, livelihoods and ecosystems, in the face of climate change and natural disasters.
- Objective 5: Promoting Productivity and Competitiveness for Sustainable Economic Growth in a Redistributive and Solidarity way indicates that the rural population must strengthen the capacities of social interaction that strengthens cooperation and networks collaborative as well as the resistance capacities, which respond to adverse scenarios caused by natural effects and climate change.
- Territorial guidelines for territorial cohesion with environmental sustainability and risk management. Second. Habitat management for sustainability environmental and integral management risks in b.2. Promote integral and co-responsible management of water heritage to protect its quality, availability and proper use, with recovery actions, conservation and protection of water sources, recharge zones, aquifers and groundwater, considering the equitable access of water for consumption, irrigation and production

The Ministry of the Environment of Ecuador also considers a specific policy for the management of climate change in its "Policy 3: Management of adaptation and mitigation to Climate Change to reduce social, economic and environmental vulnerability".

The Organic Environmental Code (COA) is an advanced law, articulated to our Constitution, which recognizes nature as subject of rights, responds to current needs. He is optimistic, that is, he looks with pleasure on the use of natural rights in an intelligent rational and responsible way. Not the environmentalist look of the 70s or 80s where there was talk of preserving what it was not to touch. Today we say to the communities that live in the paramos, mangroves, fragile ecosystems, that we want them there to be our partners, conserving those beautiful ecosystems that serve all Ecuadorians. The COA deals with the ownership and possession of community lands within the National System of Protected Areas; of the conservation, use and sustainable management of biodiversity and natural resources; of the protection, maintenance and development of collective knowledge associated with biodiversity; and of the practical knowledge, ancestral and cultural traditions contemplated in the 282 articles of the COA.

The National Law on water resources, uses and exploitation 2014 (Water Law), aims to develop the human right to water, as well as regulating the authorization, management, preservation, conservation, use and use of water, included within the national territory in its different phases, forms and physical states, in order to guarantee Sumak Kawsay or good living. In this sense, the management through hydrographic basins is regulated:

- Articles 2, 7 and 17, recognizes the strategic nature of water, the participatory and community nature of its management, as well as the consideration of ecological flows in all forms of use and exploitation to achieve sustainable development.
- Articles 12 and 65, the protection and conservation of sources is the responsibility of the State, the Single Water Authority, the decentralized autonomous governments, users, communes, communities, peoples, nationalities, peasants and property owners where water sources are located, they will be responsible for sustainable and Integrated management, as well as for the protection and conservation of said sources, considering the integrated management approach of resources as cross-cutting.
- Article 64, proposes strategies for the conservation of resources in their sources, catchment areas, regulation, recharge, outcrop and natural water channels, in particular, snow-capped mountains, glaciers, paramos, wetlands and mangroves.
- Article 83, promotes the adoption and promotion of measures regarding adaptation and mitigation to climate change to protect the population at risk, the development of mechanisms to encourage and encourage the efficient use and exploitation of water through the application of appropriate technologies in irrigation systems

The national development plan (SENPLADES, 2013) states in its general objective 7 that climate change is a multi-sector problem of national scope that should be approached with programmatic

actions which generate results in the short and medium term. Specific objective 7.10 focus on implementing measures to mitigate and adapt to climate change to reduce the economic and environmental vulnerability with emphasis on priority groups.

In addition, specific objective 7.6 focus on managing water resources in a sustainable and participatory manner, with a focus on watersheds and ecological flows to ensure the human right to water. The project is in line with the National Climate Change Strategy (MAE, 2012), in particular with specific objectives 2 and 4. The first, focus on initiate action so that the performance levels of productive and strategic sectors and the country's infrastructure are not affected by the effects of change climate. Also 5, 6, and 8 the national strategy covers the period 2012 – 2025. It defines eight priority sectors for climate change adaptation. The present project is in line with the specific objectives of the adaptation line of work:

- Specific objective 2. The performance levels of the productive and strategic sectors and the country's infrastructure are not affected by the effects of climate change:

Action 1. Strengthen and consolidate the development of projects in the productive, strategic and infrastructure sectors with criteria of adaptation to climate change.

Action 2. Consolidate the actions that increase the resilience of the infrastructure in the face of extreme climate events attributed to climate change.

- Specific objective 4. To manage the water heritage with a comprehensive and integrated approach by the Hydrographic Unit, to guarantee the availability, sustainable use and quality of the water resource for different human and natural uses, in the face of the impacts of climate change:

Action 1. Consolidate the integral management of the water heritage, ensuring its availability, sustainable use and quality for the various human and natural uses in the face of the impacts of climate change.

- Specific objective 5. Conserve and sustainably manage the natural heritage and its terrestrial and marine ecosystems in order to contribute with its capacity to respond to the impacts of climate change:

Action 1. Consolidate and strengthen the implementation of measures that increase the capacity of species and ecosystems to respond to the impacts of climate change.

Action 2. Ensure that the Heritage of Natural Areas of Ecuador contributes to the response capacity of species and ecosystems in the face of the impacts of climate change

- Specific objective 6. Take measures to ensure access of priority attention groups and priority attention to the resources of the response to the impacts of climate change:

Action 1. Promote timely access to health, nutrition and infrastructure resources for the population, especially for groups defined as vulnerable and priority attention, which contribute to the response capacity of these groups in the face of the impacts on the population attributed to the change climate.

- Specific objective 8. Implement measures to increase the response capacity of human settlements to deal with the impacts of climate change. Within this objective, the project will contribute to three key actions:

Action 2. Promote public participation and social organization to facilitate the implementation of response measures to deal with extreme climate events related to climate change.

Action 3. Promote the generation of specific information and its access to the GAD on possible impacts of extreme weather events under possible climate change scenarios.



**Feasibility study for the creation and operation of an
Investment Fund within the scope of the project
"Increasing adaptive capacity of local communities,
ecosystems and hydroelectric systems in the Río Blanco
upper watershed (Toachi-Pilatón watershed) with a
focus on Ecosystem and Community Based Adaptation
and Integrated Adaptive Watershed Management"**

ANNEX 8

Feasibility of investment fund

July of 2017

Contend

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FEASIBILITY STUDY OF THE INVESTMENT FUND TO PROMOTE THE SUSTAINABLE DEVELOPMENT OF THE RÍO BLANCO UPPER BASIN

1. ABSTRACT: The investment funds have been set up in the country some years ago to provide financial resources for the implementation of projects that would otherwise not be possible, water funds are the most common figure used to this end.

The recovery of vegetation cover, the preservation of water basins, transfer of knowledge to communities, etc., are actions that, even in the absence of economic yields, generate important environmental and social benefits that are difficult to quantify. Therefore, the Sustainable Development Investment Fund (FONDESA, name suggested) seeks to pool economic resources to ensure its own sustainability and to have resources that boost projects that improve the livelihoods and productive activities of the people.

The degradation conditions of the Toachi and Pilatón rivers basins require coordinated actions between control authorities, surrounding populations, producers associations and direct beneficiaries of the water resource like hydropower plants. The Investment Fund has a well-defined and proven governance structure in the funds fully operating in the country. Strategies of success models will have to be adapted according to the local characteristics (political, social and economic) to the management of this watershed

The contribution of seed capital for the constitution of the fund may trigger the interest of sectional governments, which have among their various concerns, environmental protection within their territories. The addition of local constituent adherents to the Investment Fund will give them a sense of belonging and ownership of the management of this financial instrument. The correct selection of the technical staff - who will support the work of the fund from the very beginning- and the promotion of various projects in favor of the basin will be important reasons to attract and maintain the contributions of the constituents and achieve the adhesion of others.

The creation of suitable means to gather economic resources from the autonomous governments (GADs) through new bills or taxes is within their competence, as is the case in the city of Quito and in the municipalities of Loja with FORAGUA, without a doubt, this strategy merits political will that can be achieved with a correct and wide dissemination of the Investment Fund performance throughout the basin.

The transparent management of resources and the periodic accountability will be decisive elements to show the benefits generated by the operation of the fund in the area. Adequate management of resources, under criteria of prudence, security and profitability, will allow the equity of this fund to be progressively expanded, even after the Adaptation Fund Project has been completed. Sustainability, understood as the permanence in time of financial resources for the benefit of the basin, will be fully achieved, constituting an illustrative and demonstrative case to promote the emerging of similar initiatives in the country.

2. BACKGROUNDS: As a most remarkable model of functioning is the water fund scheme, as it was mentioned, are financial instruments that can guarantee the sustainability in time of activities related to the protection of the water resources of a defined area and to give support for more ecofriendly productive practices. In Ecuador, there are fully operational water funds with increasing equity. For example, the Water Protection Fund of Quito (FONAG) was constituted in 2000 with an initial contribution of USD 20,000 currently has a net equity of USD 12 million, and is an exemplary model of performance for others Funds. Nevertheless, the rules for the management of public funds have limited the bunch of investments of trust funds can do when obtain public resources in an amount greater than 50% of the contributors, even so these funds continue to strengthen their equity by seeking new investment niches, and at the same time, actively promote the integral management of water basins under their scope.

Another similar example but with different target is CORPEI CAPITAL, this is an investment fund that started operating from 2009, with one million dollars of equity, their main objective is to give support to micro, medium and a small enterprises (MSME) to boost their business models through: joint venture scheme, equity investments, factoring and sometimes conventional lending. Today CORPEI CAPITAL is no longer receiving resources from its constituents because have the capacity to sustain itself with their investment returns. But it's worth remark that CORPEI is able to invest in private sector getting higher interest rates among 10%-12%-15% which is interesting with an equity of around USD 7 million dollars.

Below is a summary of the main features of existing funds.

WATER FUND	CONSTITUTION YEAR	MAIN CONSTITUENTS	INITIAL EQUITY	CURRENT EQUITY
Fondo para Protección del Agua (FONAG)	2000	Empresa Municipal de Agua Potable de Quito (EMAP-Q)	USD 20.000	USD 12.000.000
Fondo Regional del Agua (FORAGUA)	2009	Gobierno Autónomo Descentralizado Municipal de Loja	USD 51.961	USD 2.444.141
Fondo Ambiental para la Protección del Agua (FONAPA)	2008	Empresa de agua potable de Cuenca ETAPA y de Azogues EMAPAL	USD 532.000	USD 1.396.000
Fondo de Manejo de Páramos y Lucha	2008	Gobierno Autónomo Descentralizado	USD 460.000	USD 3.300.000

contra la Pobreza (FMPLPT)		Provincial de Tungurahua		
CORPEI CAPITAL	2009	Private investors	USD 1.000.000	USD 7.000.000

3. OBJECTIVE: The current analysis seeks to determine the conditions under which the Sustainable Development Investment Fund (FONDESA) for the protection of the Río Blanco upper basin through the support of innovative production models can become an alternative of sustainability that provides financial support to activities needed to increase the protection of the rivers basin among other environmental benefits. For this end, we are taking into account the successful experiences of water funds and private funds at a national level, in various regions and mechanisms according to the reality of each locality, common and appropriate elements will be assimilated for the formation of the Toachi-Pilatón Sustainable Development Investment Fund, using the resources of the Adaptation Fund as efficiently as possible.

The trust agreement, as with other funds, will be valid for 80 years, after the expiration date, it will be possible to decide on their liquidation or continuation of their operations.

The construction of this fund will be with the contribution of mainly public constituents that are maintained in the time and generate the necessary resources to support the local initiatives oriented to protect the rivers basin Toachi-Pilatón. The organizational structure of the fund will include democratic decision-making criteria, in a representative manner, aligned with the legislation stated at Organic Environmental Code. Water Law, and Stock Market Law, etc.; and whose decision-making process and the establishment of governing bodies include criteria of gender equity and attention to vulnerable groups.

4. MARKET STUDY: The different investment funds that operate in the provinces of Loja, Guayas, Tungurahua, Azuay and the Metropolitan District of Quito (IMQ), have been growing through the returns of their investments and the contributions from constituents, both are the main traditional mechanisms to strength the capital each year. Although there are several models for the management of the resources of the mercantile trust, they generally split by 60% to strengthen the capital and the remaining 40% for operating expenses and investment in watershed protection activities. There is also the possibility of allocating 100% of the initial contribution to the strengthening of the capital, without directing any resources to the investments in projects. However, the absence of visibility of the benefits generated by the existence of the fund can, discourage the incorporation of adherents.

Investments in the last year have been affected by the decrease in the passive interest rate, due to the accumulation of liquidity in the financial system at the end of the last year. To this, must be added the difficulty of finding better financial options, because of the restrictions that oblige funds, which are fed mostly (>

50%) of government resources, to invest in institutions that belong to the same public sector, this fact limits the alternatives of placing resources in financial instruments with better rates, as CORPEI does. In some public financial institutions such as the Pacific Bank, the interest rate has fallen to 2.15% in the last year, while BanEcuador's deposit certificates have kept the interest rate at 5%. Also there is options to buy government bonds with rates that exceed 8%. The search for profitable investment options has led to funds like FONAG to acquire retirement bonds with attractive discount rates that improve the return on these investments to 10%. Handling the alternatives to get a relevant weighted interest rate, is responsibility of the investment manager

5. ADMINISTRATIVE MATTERS: The Investments Funds have a well-defined organizational structure, the constituents are part of the Board of Directors with voice and vote, generating a sense of equality and appropriation of the fund. The manager is in charge of the political, administrative and implementation issues of the annual planning and make decision of investments.

The majority of Investment funds in the country that receives public resources, work with CFN fiduciary businesses, for that reason, we consider its charges as reference for the estimation of the costs of the constitution of the trust.

The hiring of an administrative assistant will complement the start-up staff structure. Likewise, the premises, office equipment and mobilization will be the initial investments that will enable the Investment Fund to function in the first year. Regarding personnel management, it's important to remark that initially, the recruitment figure of the Investment Manager and the administrative assistant, will be under the figure of professional fees.

Estimation of administrative costs:

ITEM	EXPENCE	MONTHS	TOTAL YEAR
Trust administration expenses	USD 1.500	12	USD 18.000
Payment to the technical secretary	USD 1.800	12	USD 21.600
Payment to the administrative assistant	USD 800	12	USD 9.600
Payment of rent and utilities	USD 300	12	USD 3.600
Petty cash.	USD 300	12	USD 3.600
TOTAL			USD 56.400

Cost estimation for creation of the trust:

ITEM	EXPENCE	TOTAL
Expenses for constitution of the trust	USD 3.000	USD 3.000

Fix assets investment:

ASSETS	AMOUNT
IT Equipment	USD 5.000
Vehicle (four wheel drive)	USD 28.000
TOTAL	USD 33.000

The fiduciary costs correspond to the payment for the creation of the trust contract, the management of the resources of the fund and the inclusion of adherents. Due to national regulation, the Trust that is most likely to assume the management of this fund, is the Trust Business of the Corporación Financiera Nacional (CFN) or the Pacific Bank.

During the first year of operations, the Investment Manager will have the exclusive responsibility of seeking potential actors to become adherents to the Investment Fund and allocate the equity in profitable investments, for that purpose, the professional profile of the Investment Manager will have to include, among others: Professional knowledge in the areas of Sustainable Development, Environmental Economy, management of financial resources or related; Have at least 3 years of experience in the field of fiduciary business preferably of investments funds either private or public, good public relations skills and being desirable to have business administration knowledge.

The role of the Investment Manager is mainly political-technical, with the ability to interact with relevant political actors and obtain long-term commitments for the allocation of resources on a regular and secured basis.

6. INVESTMENTS: The resources that get in as contribution to the capital will be of USD 327.600 that corresponds to the net amount of investment once extracted the operative expenses of the first year. This contribution will be invested in diversified financial instruments, as far as possible, according to the alternatives available in the market, such as: fixed-term deposits that generate a better interest rate, certificates of deposit, purchases of bonds from public institutions, government bonds or retirement bonds will be, among others, the alternatives to invest. The amount of the investments, the maturity, interest rates agreed, the frequency of interest and the capitalization periods must be clearly agreed as part of the duties of the Investment Manager, who will finally give the Board of Directors the full information for the respective investment decision.

7. CONTRIBUTIONS OF THE CONSTITUENTS: The main actors identified to participate in the constitution of the trust are:

ACTOR	RELATION WITH THE BASIN	POSSIBILITY OF CONTRIBUTION
Gobierno Provincial de Pichincha	Canton Mejía and its parishes Aloag, El Chaupi and Manuel Cornejo Astorga are directly related to the Pilatón river basin.	High
Gobierno Provincial de Cotopaxi	The Sigchos canton and its rural parishes are quite important to provision water into de basin, mainly in the highlands	Medium
Gobierno Municipal de Sigchos	70% of its territory is within the ecological reserve Illinizas. It has "Punto Verde" recognition for good environmental practices.	High
Gobierno Municipal de Mejia	It has an Environmental Management and Risk Management Unit. It has initiated reforestation initiatives in the basins.	High
Gobierno Municipal de Santo Domingo	The populations like Alluriquin, Union del Toachi among others are beneficiaries of the water resource	Medium
CELEC-Unidad de Negocios Hidrotoapi	The hydroelectric is the main beneficiary of the Toachi and Pilatón flows, however, at the beginning of operations is expected for 2009	Medium (at least in the short term)
Gobierno Parroquial de Las Pampas	Beneficiaries of the Toachi water resource for crops and livestock mainly	High
Gobierno Parroquial de Palo Quemado	Beneficiaries of the Toachi water resource, mainly for crops and livestock	High
Gobierno Parroquial de Manuel Cornejo Astorga	Beneficiaries of the water resource of Pilatón for crops mainly	High
Gobierno Parroquial de Aloag	Beneficiaries of the water resource of Pilatón for crops mainly	High
Gobierno Parroquial El Chaupi	Some water sources that become the Pilaton River are born in its territory.	Medium

The adhesion to the investment fund, is a political decision mainly, the source of economic contributions can be generated by means of the creation of municipal ordinances that include an item in the water bill. In the case of the IMQ there is the municipal ordinance 213 issued in 2009, in which an economic contribution is created in the water bill which reaches 2% of the total billed, these funds go to FONAG. In the case of Loja the collection comes by means of 10% of the environmental tax applied to the municipalities that are the constituents of FORAGUA.

In the case of decentralized autonomous governments (GADs), adherence may take time, considering that approval must be guaranteed by provincial, municipal or parish councils. Which can generate the support or the rejection according to the political affinity of the councils. The change of authorities by means of popular elections, must be taken into account for the continuity in the process of adhesion the fund. The mentioned processes of formal adherence by the GADs and the approval of the Ministry of Finance for the automatic debit of the contributions must be considered and monitored to solve delays or obstacles to the process of creation and operation of the fund.

8. PROJECTION OF CASH FLOWS: With estimations of acquisition of the public contributors (could be private too), who are more likely to be part of the investment fund, and estimations of operating expenses in the first year, the projection is made of the movement of cash flows including the following assumptions:

- 1) 60% of the resources are addressed to the strengthening of the capital and the remaining 40% for expenses of operation and investments in conservation projects.
- 2) The contributions of the constituent adherents will be made effective from the following year to the implementation of this project, considering all the administrative and legal procedures that must be solved for approval and adhesion.
- 3) Investment Manager and his/her assistant will have as sole responsibility, to ensure the incorporation of adherents to the fund in the first year and the wide diffusion of the Sustainable Development Investment Fund.
- 4) The items for investment projects will be available from the year following the launching of the fund.

Ordinary annual contributions: These figures are composed by the estimation of the economic contributions that will be made by the adherents, taking as a reference the amount that public and private companies have given in other funds which they participate.

CONSTITUENTS/YEAR	SEED CAPITAL	2018	2019	2020	2021	TOTAL CONTRIBUTION
GAD Provincial Pichincha		\$ 20.000,00	\$ 20.000,00	\$ 20.000,00	\$ 20.000,00	\$ 80.000,00
GAD Municipal de Sigchos	\$ 200.000,00	\$ 15.000,00	\$ 15.000,00	\$ 15.000,00	\$ 15.000,00	\$ 60.000,00
GAD Municipal de Mejia	\$ 127.600,00	\$ 15.000,00	\$ 15.000,00	\$ 15.000,00	\$ 15.000,00	\$ 60.000,00
GAD Parroquial Las Pampas		\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 12.000,00
GAD Parroquial Palo Quemado		\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 12.000,00
GAD Parroquial Tandapi		\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 12.000,00
GAD Parroquial Aloag		\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 3.000,00	\$ 12.000,00
TOTAL	\$ 327.600,00	\$ 62.000,00	\$ 62.000,00	\$ 62.000,00	\$ 62.000,00	\$ 248.000,00

Total contributions

The contributions of CELEC-Hidrotoapi are not considered for two reasons: First, the hydropower plant is expected to start functioning on 2019, so no current incomes at all to Hidrotoapi for the moment, the second reason is the new raw-

water tariff, which began to apply since this year, Hidrotoapi is billed for the use of the Toachi river flow (32,000 liters / second) a payment of USD 86,852.67 and USD 62,425.36 for the use of the Pilatón river flow (23.000 liters / second) , these values meat an increase of 46% compared to 2016

The rest of actors are considered to contribute in a conservative way, in comparison with the current contribution that similar organizations do in other operating investment funds.

Contributions to the growing capital: The contributions that are obtained from the adherents, 60% will be channeled for the strengthening of the capital through the investment in financial instruments.

CONSTITUENTS/YEAR	2019	2020	2021	TOTAL CONTRIBUTION
GAD Provincial Pichincha	\$ 12.000,00	\$ 12.000,00	\$ 12.000,00	\$ 36.000,00
GAD Municipal de Sigchos	\$ 9.000,00	\$ 9.000,00	\$ 9.000,00	\$ 27.000,00
GAD Municipal de Mejia	\$ 9.000,00	\$ 9.000,00	\$ 9.000,00	\$ 27.000,00
GAD Parroquial Las Pampas	\$ 1.800,00	\$ 1.800,00	\$ 1.800,00	\$ 5.400,00
GAD Parroquial Palo Quemado	\$ 1.800,00	\$ 1.800,00	\$ 1.800,00	\$ 5.400,00
GAD Parroquial Tandapi	\$ 1.800,00	\$ 1.800,00	\$ 1.800,00	\$ 5.400,00
GAD Parroquial Aloag	\$ 1.800,00	\$ 1.800,00	\$ 1.800,00	\$ 5.400,00
TOTAL	\$ 37.200,00	\$ 37.200,00	\$ 37.200,00	\$ 111.600,00

Amount allocated to investments

Since the resources of the constitution of a Trust go to the accounts of the Central Bank and do not generate interest, it is essential that the Investment Manager define the suitable investments to be made from the first year

Contributions to the extinguishing capital: 40% of the contributions of the constituents will be used for the payment of operating expenses and for the financing of priority projects for conservation protects to conserve the ecosystems of the Toachi-Pilatón River basin.

Note: USD 80.000 to pay lending incentives will be keep as liquid asset, not invested.

CONSTITUENTS/YEAR	2019	2020	2021	TOTAL CONTRIBUTION
GAD Provincial Pichincha	\$ 8.000,00	\$ 8.000,00	\$ 8.000,00	\$ 24.000,00
GAD Municipal de Sigchos	\$ 6.000,00	\$ 6.000,00	\$ 6.000,00	\$ 18.000,00
GAD Municipal de Mejia	\$ 6.000,00	\$ 6.000,00	\$ 6.000,00	\$ 18.000,00
GAD Parroquial Las Pampas	\$ 1.200,00	\$ 1.200,00	\$ 1.200,00	\$ 3.600,00
GAD Parroquial Palo Quemado	\$ 1.200,00	\$ 1.200,00	\$ 1.200,00	\$ 3.600,00
GAD Parroquial Tandapi	\$ 1.200,00	\$ 1.200,00	\$ 1.200,00	\$ 3.600,00
GAD Parroquial Aloag	\$ 1.200,00	\$ 1.200,00	\$ 1.200,00	\$ 3.600,00
TOTAL	\$ 24.800,00	\$ 24.800,00	\$ 24.800,00	\$ 74.400,00

Amount to be used for operation and projects investments

9. EXPECTED RETURNS The amount allocated as seed capital for the formation of the Investment Fund is USD 420,000; of which USD 83,000 will be used to cover operating costs (salaries, leasing, etc.) for the full operation of the Fund. The remaining USD 327,600 will be used exclusively for investment in long-term financial instruments that will provide interest rates between 5% and 8%.

For the estimation of income has been considered the yields of financial tools that are currently used by some existing water resources.

Investments year 1

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	\$ 327.600,00	0,0776	\$ 21.312,49
	\$ 327.600,00		\$ 21.312,49

The seed capital given by Adaptation Fund will go to investments in State Bonds with a conservative rate of 7.76% per year. Currently, these bonds are paying rates of 8.45% per annum.

The interest generated by this investment is calculated only for the 10 months regarding only the time that have elapsed since the actual investment until the close of the fiscal year. The following years will calculate the interest rate applied for a full year (365 days).

Investment year 2

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	\$ 348.912,49	0,0776	\$ 27.075,61
Goberment bonds to 20 years	\$ 37.200,00	0,0776	\$ 2.886,72
	\$ 348.912,49		\$ 29.962,33

The interest earned in the first year, is added to the capital and constitutes the new amount on which the return is calculated for the following year with the same interest rate. Additionally, USD 37.200 is included as an additional investment of the contributions, provided by the constituents corresponding to 60% under the figure of growing capital.

Investment year 3:

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	\$ 378.874,82	0,0776	\$ 29.400,69
Goberment bonds to 20 years	\$ 37.200,00	0,0776	\$ 2.886,72
	\$ 378.874,82		\$ 32.287,41

Just as the year before the invested capital sum the corresponding interest of the year, this amount becomes the new capital. Like the previous year, USD 37.200

is also invested, corresponding to 60% of the contributions for increasing capital delivered by the constituents that year.

Investments year 4

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	\$ 411.162,22	0,0776	\$ 31.906,19
Goberment bonds to 20 years	\$ 37.200,00	0,0776	\$ 2.886,72
	\$ 411.162,22		\$ 34.792,91

The capitalization of interest and equity increases for new contributions will maintain this dynamic year after year. This short analysis is done within the scope of the Adaptation Fund project duration, however the same process is foreseen year by year. Interest is capitalized and the new capital and investment are formed and USD 37.200 of contributions for growing equity are added.

10. CASH FLOWS: Once we have projected information expected from the contributions of the founding constituents splitting them towards capital for strengthen the equity and extinguishable capital, and making a projection of operating expenses, we can build the projected flow of cash or the Investment Fund

The basic scenario for the construction of cash flow are modeled like this:

- Scenario 1 (the ideal one): it is assumed that all the constituents contribute amounts considered based on the experiences of water funds existing in other regions of the country. In addition, this model includes a lower interest rate than has been obtained in the market in current times with the same instruments.

In this scenario the equity growth is kept, the adjustment variable to get a better performance of the flows is through the amount of investment for conservation projects, so in this scenario the investment amount available from the second year and on, can reach over USD 30,000 per year or this amount can be take it for new investments, under the premise that, the more increase the equity, the higher returns will be obtained.

The resources coming to be used for lending incentives will be channeled through the Investment Fund, however the dynamic of that activity must be well known prior to decide which part of this resources (USD 75.000 for incentives and USD 5.000 for reporting) will be invested, and which part will remain liquid for incentives payments. For the cash flow exercise we assume that all this resources will be kept out of investments.

Feasibility of investment fund

Projected cash flow from the Investment Fund 2017-2021

PROYECTION	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	YEAR 1	YEAR 2	YEAR 3	YEAR 4
+INCOMES											\$ 519.225,18	\$ 88.881,76	\$ 93.367,49	\$ 98.167,21
Seed capital	\$ 420.000,00										\$ 420.000,00	\$ -	\$ -	\$ -
Contributions to equity											\$ -	\$ 37.200,00	\$ 37.200,00	\$ 37.200,00
Extinguishing capital contributions											\$ -	\$ 24.800,00	\$ 24.800,00	\$ 24.800,00
Funds to be used for lending incentives	\$ 80.000,00										\$ 80.000,00			
Returns											\$ 19.225,18	\$ 26.881,76	\$ 31.367,49	\$ 36.167,21
Others											\$ -	\$ -	\$ -	
-EXPENSES	\$ 7.400,00										\$ 110.000,00	\$ 82.400,00	\$ 84.092,00	\$ 60.834,76
Constitution expenses		\$ 3.000,00									\$ 3.000,00	\$ -	\$ -	\$ -
Trust administration expenses	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 1.500,00	\$ 15.000,00	\$ 18.000,00	\$ 18.540,00	\$ 19.096,20
salaries expenses	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 2.600,00	\$ 26.000,00	\$ 31.200,00	\$ 32.136,00	\$ 33.100,08
Leasing and basic services	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 3.000,00	\$ 3.600,00	\$ 3.708,00	\$ 3.819,24
Fix assets aquisition		\$ 33.000,00									\$ 33.000,00	\$ -	\$ -	\$ -
Projects investments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Incentives in lending and reporting	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 2.700,00	\$ 27.000,00	\$ 26.000,00	\$ 26.000,00	\$ 1.000,00
Others	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 300,00	\$ 3.000,00	\$ 3.600,00	\$ 3.708,00	\$ 3.819,24
BALANCE											\$ 409.225,18	\$ 6.481,76	\$ 9.275,49	\$ 37.332,45
+ INITIAL BALANCE	\$ -										\$ -	\$ 409.225,18	\$ 415.706,95	\$ 424.982,43
FINAL BALANCE	\$ -										\$ 409.225,18	\$ 415.706,95	\$ 424.982,43	\$ 462.314,88
											Increase	2%	2%	9%
											Total increase	13%		

Some considerations that were applied in this projection are:

- The amount received to incentives in lending (Scheme 1) will not be invested because it will needed in the short term, even though the portion that will be used in the next years indeed can be invested at least in short term, but the amount must be assessed once the dynamic of credits is already well known. **In the present analysis is assumed not be invested**
- The management of the adherents and their contributions are effective as of the following year of the constitution of the trust
- It is considered an inflation component of 3% per year in the estimation of expenses
- Interest is capitalized annually

11. REGULATIONS: The Investments funds are complementary with the Basin Councils, not opposed to them. However, the Basin Councils are collegiate consultative bodies of water areas known as Local Hydrographic Planning Units (acronym in Spanish UHPL), which are basin extensions that include several sub-basins and basins. Therefore, the geographical demarcation of the Basin Council will most probably not coincide with the demarcation of the basin on which the fund will work.

The Investment Fund will be used to leverage activities related to the area inside the boundaries of Toachi-Pilatón basin exclusively, which is one part of the jurisdiction of the basin council for the UPHL Esmeraldas.

In order to have a more complete idea of the legal considerations that the constitution of the Investment Fund should have, it would be worthwhile to make a brief review of the pertinent rules:

According to the Organic Law of Water Resources, Uses and Use of Water, Regulation and Instruction, specifies:

Art. 26: Functions of the Basin Council: The Basin Council has the following functions:

- 1) To choose among its members or representatives to the Intercultural and Plurinational Council of Water, in accordance with the regulation of this law;
- 2) Participate in the formulation of guidelines and guidelines as well as the monitoring of the management plan by river basin, in the Marc of the National Plan of Water Resources;
- 3) Generate proposals for sectorial public policies related to water resources, which will be presented to the Intercultural and Plurinational Water Council, through their representatives;
- 4) To speak to the sole authority of water, in all matters that are of interest or request;
- 5) Participate in the consultation processes carried out by the single water authority and propose priority issues for the management of the basin or the water units that comprise it;
- 6) Resolve the matters that concern and that could influence the operation of the council;
- 7) Monitor that the decisions of the policies and plans of integral management of the watershed are materialized in budgetary items of the different levels of government that take part in the watershed;
- 8) The others that are established in the regulation of this law.

In the framework of the Nuevo Código Orgánico del Ambiente, the following rules are identify regarding creation of water funds:

Article 86.- Financing of environmental services. In order to finance the mechanisms for remuneration for conservation activities, sustainable management and recovery of ecosystems and their subsequent flow of environmental services, public and private contributions will be promoted, as

well as funds from donations, loans or international contributions , Taxes or fees and any other source that is identified for these purposes.

Article 20.- Of the funds for environmental management. The National Environmental Authority shall issue standards and guidelines for the operation of public, private or mixed funds, based on the National Development Plan, national environmental policy and other priorities defined by said authority. The funds will be regulated in accordance with the law and will be subject to the control activities of the competent entities. The Decentralized Autonomous Governments may create environmental funds that contribute to the environmental management of their competencies, under the guidelines of the National Environmental Authority and the provisions of this Code. Private funds will contribute to the financing of environmental management on the basis of the principles of internalization of costs and environmental responsibility, without prejudice to other actions that may be undertaken in the framework of social responsibility, as well as other contributions free of charge.

In the Código Orgánico Organización Territorial Autonomía Descentralización (COOTAD), is stated:

Article 135: ... It is the responsibility of the autonomous decentralized provincial governments to govern, direct, order, arrange, or organize environmental management, environmental and nature advocacy, within their territory; These actions will be carried out within the framework of the decentralized national environmental management system and in accordance with the policies issued by the national environmental authority. For the granting of environmental licenses must be compulsorily accredited as an environmental authority with responsible application in its circumscription.

12.LESSONS LEARNED: The experience of fully operational investment fund (mainly of water funds) in the country can be considered as a positive example of the capacity of these structures to mature and be strengthened over time. As this happens the benefits for its constituents and for the ecosystems and, communities inside its jurisdiction will also increase. However, it is worth to recognize that there was also an unsuccessful case of FOOPAD, this water fund constitution was attempted to be implemented in Riobamba but currently is running out of business. The lessons of success and failure, leave us with the following lessons to take into account for the construction of the Investment Fund of the Toachi-Pilatón basin:

- 1) Sponsor or godfather: There must be a person or company dedicated to promoting the construction of the water, agglutinate intentions and monitor progress. This first interested in the achievement of this project must be the initial actor involved in the project. In this case the Mayors of municipal GAD of Sigchos and Mejia are pretended to assume this roll.

- 2) The Investment Manager must be hired from the very beginning and inform the promoter / sponsor of the progress made, especially in the identification of potential adherents and their commercial and political progress. The Investment Manager must have a safe and agreed remuneration since the beginning because the lack of payments can discourage him/her and spread doubt about the investment fund
- 3) It is important that initial "seed" resources start investing with profitability criteria, since stagnation in the trust accounts will cause a periodic reduction of the fund's resources.
- 4) The return on investments as a function of the interest rate must be higher between the smaller the funds are, and can be gradually decreasing as the capital grows. For example: FONAG that has a capital of USF 12 million has an average return of 5% a year, while the FMPLPT with a capital of USD 3.3 million requires to invest in financial tools with a rate of 7% or 8%.
- 5) Only those actors who have a regular contribution to the mechanism will have a vote in the structure of decisions and decisions.
- 6) Having the political leadership in the creation of a fund is a determining factor when initiating this initiative. If there is no political will to create a mechanism to conserve water resources in the long term, it will be difficult to carry out this process¹.
- 7) Ensure that the mechanism is inclusive of different actors and users that can be part of the fund and of the decision making process ².

13.ORGANIZATIONAL STRUCTURE: The organizational structure of the Investment Funds is homogeneous and has proven to be useful for the proper functioning of the fund.

From the experiences observed we have the following:

Board of Directors: Conformed by a representative of the constituents, this is responsible for approving the planning and investment proposals submitted by the technical secretariat. It is desirable to have, among their representatives, different actors or users of water to have a broad vision.

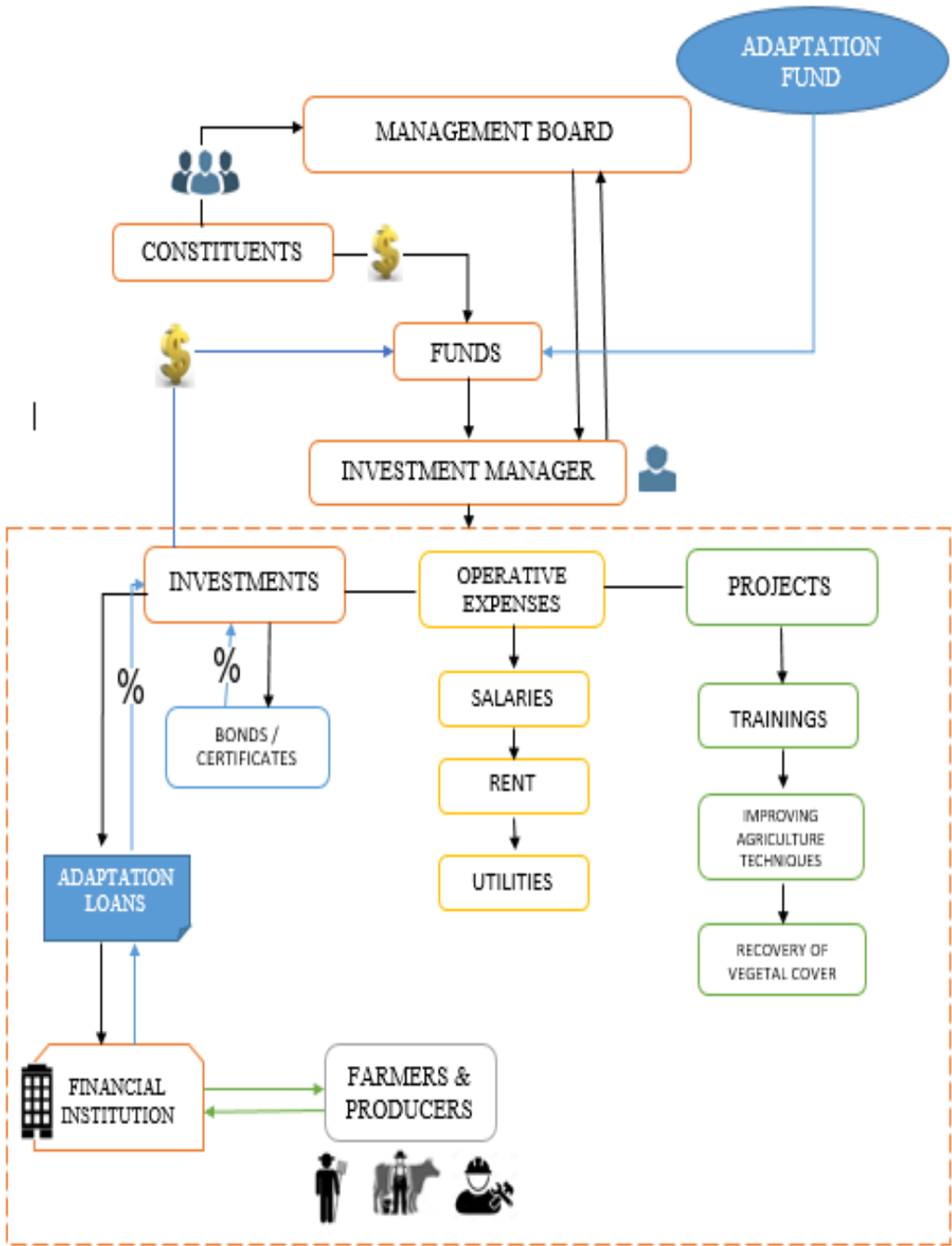
Investment Manager: who under the waters fund structure is named Technical Secretary in the case of water funds and Investment Manager in the case of investment funds, he/she is in charge of the execution of the planning, of the investments to be made, of the dissemination of the

¹ Mecanismos financieros: Elementos para la creación y consolidación de un fondo de agua. Cooperación alemana, p 67.

² Ibid

programs and projects that are carried out and of attracting new adherents. The Investment Manager is the person responsible for its management and representation. He/she must report to the Board of Directors

14. **DIAGRAM:** Illustration of the functioning of Investment Fund





Annex 9 Gender and vulnerability groups analysis for the project “Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Toachi-Pilatón watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management.”

ANNEX 9

Concept note: Stakeholders, interests and socioeconomic situation in the Toachi - Pilaton watersheds, February 2017

Full size project preparation: Gender and vulnerability groups analysis, August 2017 – January 2018

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Glossary of terms:

FAO	Food and Agriculture Organization of the United Nations
INEC	National Institute of Statistics and Censuses
PDOT	Development and Territorial Planning

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Introduction

In Article 11 of the Constitution of the Republic of Ecuador recognizes the principle of equality and non-discrimination, which states: "All persons are equal and shall enjoy the same rights and opportunities." The Ecuadorian state is working on incorporating and translating this gender approach into public policies. In Ecuador, the Commission on Gender Statistics was created to promote and produce statistics and indicators based on the information obtained in the Population and Economic Census 2010.

Ecuador presents a high Gender Gap Index¹, however, gender inequalities still persist, particularly in political participation and access to decision-making processes. Given that illiteracy rates (also functional and digital) in Ecuador are higher for women, communication and education strategies will need to be gender-sensitive and convey appropriate and understandable messages for both sexes. This disadvantage should also be taken into account when designing project outputs such as capacity building, training and creation of new financial products, so women are enabled to effectively participate in these activities. Women are more vulnerable to climate change and disasters than men, because of gender roles and responsibilities, project design takes into consideration gender differences and finds ways to promote women's participation.

The World Conference on Women held in Beijing in 1995 marked an important milestone in the development of gender statistics. They propose to collect, compile, analyze and periodically present data disaggregated by age, sex, socio-economic and other relevant indicators, including the number of dependents, for use in the planning and implementation of policies and programs. Promote further development of statistical methods to improve data related to women in economic, social, cultural and political development. (Mujeres y Hombres del Ecuador en cifras III)

The Brasilia consensus held in July 2010 recommends states to "Strengthen the production of necessary statistical information disaggregated to make feasible the problems of gender inequality in the area of physical and economic autonomy and decision-making", in agreement with the observatory of equal gender.

Climate change is a global phenomenon that will affect natural and managed ecosystems and systems, such as water resources, agriculture, food production systems, forest ecosystems, coastal-marine areas, and society in general (Género y Adaptación al Cambio Climático, 2014)

In particular, women and men in rural areas have different roles, tasks, responsibilities, and rights assigned in relation to natural resources. According to the FAO, "women make key contributions in the rural economy of all regions of developing countries as farmers, laborers and entrepreneurs." Women in rural areas play an important role in food production. Women are the ones who guarantee feeding of their families, through subsistence farming and cattle breeding, in their orchards. For their part, men tend to work in producing organizations in different places of their home. Women, in their role of providing food, rely heavily on natural resources and a healthy environment, which is why they are the first to be affected by the impacts of climate change. (Stock, 2012)

Vulnerability to climate change is linked to people's current capabilities to deal with or adapt to the environmental changes induced by global warming. The effects of climate change

¹ WEO, Global Gender Gap Index

have potential to aggravate gender inequalities. In this sense, existing gender inequality shows that some women are less likely to access and control production such as: use of land, finance, training or information, and therefore will be more vulnerable to the effects of climate change than men. This means that they will lose their livelihoods more easily and it will be less easy for women to find alternative means to meet their needs and that of their families. (Género y Adaptación al Cambio Climático, 2014)

Another task for women is motherhood, childcare and housekeeping. This includes provision of health services and hygiene measures, using energy and water supplies. In several societies women and girls are the ones that provide water for domestic use.²

Women and men face problems of climate change, such as: heat waves, floods, storms and drought, which can lead to increased morbidity and mortality.³

In 2007, according to the United Nations Development Program Human Development Report, climate change is likely to increase the disadvantages currently affecting women.⁴

In 2010, at the sixteenth Conference of the Parties in Cancun, it was identified for first time, the needs of designing climate change adaptation actions that took gender dimensions into account.

If gender is not mainstreamed into climate change adaptation programs, women will continue to be more vulnerable because their role depends more on access to natural resources and land, compares to men, for their livelihoods and for their families. In rural areas, women have a broad knowledge of the environment. This knowledge about how to manage and protect households is extremely valuable when seeking solutions for adaptation to climate change.

² Dankelman, I., Gender and Climate Change, 2010, p. 28.

³ UN WomenWatch, Fact Sheet: Women, Gender Equality and Climate Change ver en http://www.un.org/womenwatch/feature/climate_change/

⁴ PNUD, Human Development Report 2007/2008, p. 24.

Conceptual Framework

Climate change is not a neutral issue for gender dimensions. The impacts of climate change affect women and men differently, so it is necessary to address these differences in the design of responses to these challenges. From this context, micro and small producers are generally most disadvantaged in the face of climate change, because their livelihoods depend directly on the climate. Therefore, climate change adaptation measures have the potential to promote the role of women in the socio-economic activities of the parishes located in the Toachi-Pilaton watershed and address following basic elements:

- Access to land and resources
- Access to financial services
- Access to education and professionalization
- Access to information
- Access to public participation
- Access to justice

From a gender perspective, the word gender does not refer to men or women, but masculine and feminine, that is, to the qualities or characteristics that society attributes to each sex. Gender is a central factor in the organization of societies and can affect the processes of production, consumption and distribution.

The influence of gender on the rural population is important and it determines that "with any indicator of human development, women's power and resources are lower in rural areas of the developing world. Rural women's are part of majority of the world's poor. Despite recent improvements in their status, they have the lowest levels of schooling in the world and the highest illiteracy rates. In all developing regions, female-headed households are among the poorest." (FAO, 2009)

One way to reduce gender inequalities is to achieve gender equity, which means justice and fairness in the treatment of women and men in terms of rights, benefits, obligations and opportunities. By establishing social relations in which neither sex suffers discrimination, gender equity aims to improve gender relations and functions and achieve gender equality. The essence of equity does not lie in equal treatment (treatment can be the same or different), but should always be considered equivalent in terms of rights, benefits, obligations and opportunities

The index or relation of femininity reflects composition by sex of the population and is the result of the demographic dynamics of a population. After birth, the ratio between number of women and men varies due to different patterns of mortality and migration of the sexes.

Definition of Femininity Index. - Relationship between number of women and number of men that make up a population. It is expressed as the number of women of all ages in a given year relative to every 100 men of all ages in that year.

The following table shows the femininity index obtained in the 2010 population census.

Etnia	Mujeres		Hombres		Índice de feminidad
	Número	%	Número	%	
Indígena	517.797	7,1%	500.379	7,0%	103,5
Afroecuatoriano/a	513.112	7,0%	528.447	7,4%	97,1
Montubio/a	500.115	6,8%	570.613	7,9%	87,6
Mestizo/a	5.301.654	72,6%	5.115.645	71,3%	103,6
Blanco/a	448.740	6,1%	433.643	6,0%	103,5
Otro/a	24.398	0,3%	28.956	0,4%	84,3
Total	7.305.816	100,0%	7.177.683	100,0%	101,8

Table 1 The feminity index calculated in 2010 for Ecuador

With results of the population census carried out in 2010, it was concluded that the income of the economically active population is lower in rural areas, especially for women. This information is a basis for estimating women's income in parishes located in the project area. The following table summarizes the information on the average income of the employed population.

Área	Ingreso promedio en USD		Nacional	Desigualdad
	Mujeres	Hombres		
Urbana	\$ 421	\$ 524	\$ 483	80,3%
Rural	\$ 219	\$ 293	\$ 273	74,8%
Nacional	\$ 374	\$ 445	\$ 419	84,0%

Fuente: INEC - Encuesta Nacional de Empleo, Desempleo y Subempleo - ENEMDU - Diciembre 2012
Población de 10 años y más

Table 2 Income of economically active population

The population composition in the Project area is as follows:

Área	Men	Women	Total
Watershed	21188	22012	43200
Intervention Area	5567	4975	10542

Table 3 Population in the Project Area

The most of population is located near main populations in the watershed and near the main roads.

Área	0-14 años	15-64 años	64 o más	Total
Watershed	17504	22296	3400	43200
Intervention Area	3498	5996	1048	10542

Table 4 Disaggregated data of Population in the Project Area

Gender Analysis: Description of Social, Economic and cultural characteristics

In 2010, Ecuador had 14.306.876 inhabitants (INEC, 2011), 62,8% of those lived in urban areas, while 50% lived in the coast. The country has a high Global Gender Gap Index⁵ (0.738), there is almost complete equality in educational attainment and health and survival, and a high level in economic participation and opportunities, but a major gap in political empowerment (WEF, 2015). Also, the country has a low OECD's Social Institutions and Gender Index (i.e., 0.0422), which indicates low level of gender discrimination in social institutions.

a. Health

Prenatal control increased from 80% in 1999 to 96,1% in 2012⁶, also 96,3% of births were attended by skilled health personnel in 2014⁷. This has led to a reduction in neonatal mortality rates, from 16,1 deaths per 1.000 live births in 2002 to 10,8 deaths per 1.000 live births in 2015⁸.

However, maternal mortality rate⁹ presents a different trend: between 1990 and 2006 it decreased to its lowest level, with 48,46 deaths per 100.000 live births; from 2007 onwards this rate picked up and increased up until 2012, when registered 87,15 deaths per 100.000 live births. Public Health Ministry identified these factors among the reasons that could have led to this increase: medical centers infrastructure; medical equipment; health care services model; poverty; gender violence; other. According to the World Health Organization, in 2015 this rate was 64 deaths per 100.000 live births.

Adolescent pregnancy rates¹⁰ descended in rural areas, between 2003 and 2013, however, they have increased slightly in urban:

	Girls aged 12 to 19		Girls aged 15 to 19	
	2003	2013	2003	2013
Urban	4,9%	5,0%	8,7%	8,2%
Rural	6,5%	5,3%	11,2%	8,8%

b. Education

According to the Women and Gender Equality National Agenda 2014 – 2017 (WGENA), and based upon data from INEC (2013), women present higher illiteracy rates than men, especially in rural areas:

	Illiteracy rates		Functional illiteracy rates		Digital illiteracy rates	
	Urban	Rural	Urban	Rural	Urban	Rural
Men	3,2%	4,6%	7,0%	20,2%	18,6%	34,4%
Women	10,7%	15,2%	8,9%	25,6%	24,7%	43,2%

⁵ World Economic Forum

⁶ Data from Public Health Ministry, found in Logros de la revolución ciudadana en clave de género, Consejo Nacional para la Igualdad de Género.

⁷ World Health Organization.

⁸ World Health Organization

⁹ Public Health Ministry.

¹⁰ Women and Gender Equality National Agenda 2014 – 2017.

Digital illiteracy refers to access and use of information and telecommunication technologies, while functional illiterates refers to people with 3 years or less of education¹¹.

In 2015, primary and secondary education enrolment rates and attainment rates¹² were close to parity, however, women tend to outnumber men in tertiary studies:

	Enrolment			Attainment		
	Female	Male	F/M ratio	Female	Male	F/M ratio
Primary	96%	94%	1,02	80%	82%	0,97
Secondary	84%	81%	1,04	38%	39%	0,96
Tertiary	45%	35%	1,31	11%	10%	1,06

Also, there is horizontal segregation in tertiary¹³ studies, with 7% of female graduates against 26% of male graduates in STEM¹⁴. Women have reduced access to credit and scholarships, receiving 28% of grants awarded by the Science, Technology and Innovation Superior Education National Secretary's Office in 2011. According to WGENA, reasons behind this gap may refer to the lower participation of female students in STEM fields.

Finally, 73% of professors in tertiary education were male. This gap further increases in dean's and rector's offices¹⁵.

c. Income

In 2014, 28,7% of 3,8 million homes are led by women¹⁶, 70% of those are located in urban areas, and also 70% of those are single-parent households, with 2 to 4 family members. Within afro Ecuadorian community, the rate of female-led households increases, up to 32,2%, while the montubio community has the lowest proportion: 21,4%.

In Ecuador poverty affects more women than men¹⁷. More than one out of every woman (35,% from age 15 and above) do not have any sort of income of their own (and are not studying), more than tripling the amount of men in the same situation (9,1% of men in 2014). This lack of personal income correlates with the femininity index in poor households in 2013, of 117,6, which proves that more women than men, from the age of 20 to 59 years, lived in poor households.

d. Labour markets

In March 2017, according to the latest Employment, Unemployment and Underemployment National Survey¹⁸, 69% of total working-age population constitute labor force: 81% men, 57% women. Out of the 8 million people, 3,1 million people are fully employed (38,5%), 7,1

¹¹ Sistemas de indicadores sociales del Ecuador.

¹² World Economic Forum, Gender Gap Index, Ecuador 2016.

¹³ Bachelor's or equivalent level, Master's or equivalent level, Doctoral or equivalent level, according to the International Standard Classification of Education (ISCED) by UNESCO 2011.

¹⁴ Science, Technology, Engineering and Mathematics.

¹⁵ WGENA

¹⁶ Agenda Nacional para las Mujeres y la Igualdad de Género, 2014 – 2017

¹⁷ CEPALSTAT, Gender Indicators

¹⁸ Instituto Nacional de Estadísticas y Censos (INEC), Ecuador

million people are underemployed (21,4%), 0,9 million people have a non-remunerated employment (10,9%), and 1,9 million people have a non-full-time job (24,7%). Public servants constitute 18,7% of all wage-earning people and informal sector accounts for 45,6% of total employment.

Only 31% of females have an adequate job¹⁹, while 47% of working men do. This category includes people who either: (i) earn, at least, the minimum salary; (ii) work, at least, 40h a week; (iii) earn, at least, the minimum salary, work less than 40h, but they do not wish to work more than those hours.

Also, women tend to concentrate in low-productivity jobs, more than men do²⁰:

Productivity level	Low	Medium	High
Women	81,1%	13,1%	4,1%
Men	57,5%	34,2%	6,7%

However, underemployment²¹ is greater for men 24% vs 21% women. This is consistent with (1) gender differences in average number of working hours: women work 32h/week, while men do around 40h/week; and (2) gender roles: more women than men are employed in non-remunerated jobs²² : 19% of women vs 6% of men.

Unemployment rate is higher for women (5,5%) than for men (3,6%), even though women earn less: average monthly earnings are 277,08 US\$, 78% of male average monthly earnings (US\$ 354,69).

Regarding balance between professional life and personal life²³, women spend more hours in domestic chores and care-taking activities than men. In 2012, women dedicated more than 31 hours per week to non-remunerated work, compared to 9h spent by men doing same tasks. Gender gap in rural areas is even larger, reaching a 25h difference in disfavor of women. However, hours dedicated to remunerated jobs show little gender differences in rural areas: men work 50h per week, on average, while women work 47h. Subsequently, female's average total workload per week is greater than male's, with 82h and 59h, respectively.

e. Political participation

In general terms, women held about 23% of public elected offices in 2009²⁴. In 2013, 38,7% of legislative seats were occupied by women, ratio that had been increasing since 1990 from a 6,9% and after having passed a quota law in 1998. At the local level, female participation in city councils was 28,61% in 2009, while only 6,3% of elected mayors and 8,7% of prefects were women.

¹⁹ CAF Calculations based on tabulations from Encuesta Nacional de Empleo, Desempleo y Subempleo, 2017.

²⁰ CEPALSTAT, Gender Indicators.

²¹ Underemployment considers two situations: (i) working less than 40 hours a week but wanting to work more; and (ii) earning less than the minimum salary.

²² This category includes: (i) people who work at their own homes and receive no salary; (ii) people who work at somebody else's own home and receive no salary; and (iii) non-remunerated assistants and/or temporary workers.

²³ Encuesta de uso del tiempo, INEC 2012.

²⁴ Women and Gender Equality National Agenda 2014 – 2017, based upon data from INEC, CONAMU and Electoral National Council

f. Gender-based violence

According to data²⁵ from Gender violence and family relationships survey (2011), 61% of women has suffered, at least, an episode of any type of gender violence perpetrated by any person in their life's. When discriminating by type of aggression, psychological violence appears to be the most common (54%), followed by physical aggression (38%), sexual violence (26%) and economic violence (17%). Regardless of violence typology, in most of the cases perpetrator is victim's (former) partner. This is true for 87% of physical aggression cases, on one end of the scope, and 54% of sexual aggression cases, at the other end. Prevalence of intimate partner violence is 25%, understood as the percentage of women who have suffered more than one episode of violence ("many times" or "sometimes") in the last 12 months.

The study²⁶ analyses some socio-economic factors that may be linked to gender violence, revealing:

- (a) Income: gender violence levels are similar for the first four income quintiles, but descend on the fifth, specially psychological and physical aggressions (differences between 1st and 5th quintile are 10 percentage points and 9 percentage points, respectively);
- (b) Ethnicity: prevalence of intimate-partner gender violence varies with ethnicity: indigenous women (59,3%), afro Ecuadorian women (55,3%), montubian women (48,0%), mestizo women (47,5%), and white women (43,2%);
- (c) Education: women with no education (57,4%) or basic education (54,5%) suffer more from psychological and physical violence than women with tertiary studies (36,3%);
- (d) Disabilities: women with some type of permanent²⁷ disability²⁸ suffer more gender violence than women without disabilities, especially sexual aggressions (more than 7 percentage points), followed by physical aggressions (with 6 percentages points of difference).

According to CEPAL, Ecuador's femicides rate in 2014 was 1,2 deaths per 100.000 women.

Gender issues and vulnerable people

As in most of rural areas in Ecuador, gender is a complex issue. It is difficult to evaluate women issues not only because there is an evident level of "machismo" but also because women have types of agency that do not necessarily have been analyzed by feminist studies and then may not fit in what gender inequality stands for.

²⁵ La violencia de género contra las mujeres en el Ecuador: Análisis de los resultados de la encuesta nacional sobre relaciones familiares y de violencia de género contra las mujeres, 2014.

²⁶ La violencia de género contra las mujeres en el Ecuador: Análisis de los resultados de la encuesta nacional sobre relaciones familiares y de violencia de género contra las mujeres, 2014.

²⁷ Permanent disability refers to disabilities suffered for at least a year, or longer.

²⁸ It includes the following types: cognitive, developmental, physical, mental, and deafness.

The first aspect of gender inequality in the area is the invisibilization of the female work. Despite the current interest of the government for promoting women visibilization, most of the productive female activity is still not socially recognized, and in that sense it is not statistically reflected either. The division between labor for the market and domestic work is often diffused and part of the productive work ends up being counted as unrecognized domestic labor. In other words, female work counts only when it is sold in the market economy (as waged worker or as independent entrepreneur) but not when women work at home. Two factors contribute to this statistical invisibility: on the one hand the fact that all of the female home work has a high use value but it is of null exchange value. For example, cooking for the family, caring children, making the room and so on are activities that cannot be sold in the free market and then it is not worth or practical accounting them. On the other hand, the home female activities are seen as part of the gender work division so it is the task that women must contribute for family and social reproduction.

Beyond the above theoretical considerations since many men in the Toachi Pilaton area are increasingly incorporated in waged work activities, rural women have taken on bigger roles in agricultural production and community labour. The resulting effect of this fact is that the women must assume the place that men have left vacant and then must work an average of 14-16 hours daily. The personal impact of this social phenomenon can be devastating in terms of women health and of physical abuse from

Project issues

The proposed project aims at strengthening the adaptive capacity of vulnerable populations in the Río Blanco upper watershed and develop a model of adaptation to climate change that can be replicated in similar context in the country and in the region, The project is organized into three components and four outcomes. 9 concrete outputs will be produced. The multiyear work plan will be developed during project preparation:

Table 5. Project components and key gender indicator

Project/Programme Components	Expected Outcomes	Expected Concrete Outputs	Key gender ²⁹ indicator in the project
1. Conserve vegetation cover	1. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management	1. 1,000 ha of native vegetation is conserved by sustainable management and forest conservation mechanisms.	1.1.4 # of families in communities adjoining areas de conservation in target ACUS, participating in livelihood/productive activities demonstrated to reduce pressures on forest which at least 50% of women participate. Disaggregated beneficiaries information: specifying number of men and women.

²⁹ The component and indicator are describe y the part III, section E in the Project Document full design

Vulnerability groups and gender analysis

		2. Improved management of existing protected forests and private conservation areas (ca. 230,000 ha)	2.1.3 # of families with adaptation plans in their farms and % of women participation. Disaggregated beneficiaries information: specifying number of men and women
2. Adapt farming practices to new climate change conditions and enable their sustainable climate smart financing	2. Sustainable farming practices and livestock adjusted to local realities are being introduced and implemented with assistance of financing mechanisms for adaptation measures	3. 250 ha of pasture and 250 ha of crops apply sustainable farming practices	% of women included in vulnerable groups
		4. At least 2 institutions have introduced specific solutions and credit assessments to support the disbursement of credits for adaptation, integrating environmental and climate risks in their operations.	2.1.4. # of institutions have introduced specific solutions and risk assessment methodology to support the disbursement of credits for adaptation, integrate sustainable and climate smart criteria in their whole operations
	3. At least 1 long term financing mechanisms has been piloted or introduced	5. One investment fund to promote sustainable development is set up and operational	2.2.1 # of investment funds to promote sustainable development set up and fully operational
3. Strengthen local capacities and share lessons	4. Local population and parish governments with increased capacity to implement climate change adaptation measures.	6. At least 6 parishes being built capacities and prepared to manage and use meteorological information.	3.1.2 # of farmers, women and vulnerable groups trained in climate information
		7. Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.	3.2.1. # of development plans (PDOT) incorporate measures for ecosystem-based adaptation to climate change (document and promote the participation of women in decision-making processes)
		8. Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms and markets. Plus training on adaptation finance to financial institutions.	3.1.5. # of established information system established in the project # of documented practices where the role of women and vulnerable groups is highlighted.
		9. Systematization of information gathered during the whole project design and implementation using existing informatics platforms	3.1.5. # of established information system established in the project

Gender Action Plan

Climate Change Gender Action Plans (ccGAPs) build on a country's national climate change policy, plan or strategy, delving into gender-specific issues by priority sector and creating innovative action plans to enhance mitigation, adaptation and resilience-building efforts for women and men in every community. In the project context, the National Climate Change Strategy (MAE, 2012) establish the gender and vulnerable groups as a priority sector.

As a result of this Gender Analysis, gender entry points for project Log Frame have been identified (table 5). To monitor project implementation, some gender-sensitive indicators and criteria has been suggested to be incorporated in the matrix. The following actions (figure 1) and the activities are described in the following paragraphs.



Figure 1. Gender action plan for the project

-Initial Gender Assessment: to be presented before first disbursement. It should contain the following: (i) gender analysis of farming and agricultural value chains, including an assessment of gender division of labor in local farming and agricultural practices (land preparation, ploughing, manuring, seed purchase, sowing, weeding, harvesting, processing, grain storage, folder collection, water collection, feeding, cleaning/bathing, milking cows, milk processing, dung collection, marketing). Include assessment in terms of use, access and control of natural resources differentiated by gender; (ii) gender assessment of existing differentiated needs and demands of farmers and local producers to benefit from project, this part should also mention how existing risks and problems affect differently to men, women and vulnerable groups. To establish the needs and demands the day-to-day activities of men and women should be clearly stated. Include the dynamic and use of time from children or

other vulnerable groups, which will be useful to assess time availability of women for future planned training; (iii) identification of existence of gender-specific crops and products.

- Sex-disaggregated project baseline: containing, at least: heads of households; land owners; farm owners; farm workers.
- Gender-responsive participatory processes, as part of the project communications plan with communities, should recognize women as primary users of forest resources in project design, implementation and evaluation. These mechanisms should effectively engage both men and women in decision making processes, additional training targeted to women may be needed in order to ensure their full and effective contribution. Also, gender-responsive processes may include the use of women-only interviews and gender-specific focus groups and group consultations (UNREDD 2013).
- Training and capacity building activities to be implemented under project components, with either local farmers, general population, parishes and other public officers, should promote women's participation and be gender-sensitive, taking into consideration specific demands (location, adequate schedules, childcare facilities and/or other special arrangements that may encourage women's assistance).
- Land titling processes: if such mechanisms are to be established through project implementation, joint tenure of land should be promoted. Also, it should be assessed whether widowers and single women face additional restrictions to own land, and introduce corrective measures to lift these barriers.
- Financing products: if new financing products, such as credit schemes and guarantees, are to be implemented as project outputs, they should be designed taking into consideration differentiated gender needs. Women tend to have less access to credit, usually due to lack of collateral, but also to lesser understanding of finance concepts, and may prefer collective credit schemes. These special needs should be taken into account when designing these products, to ease access for women to participate.
- Institutional governance mechanisms to be created under project implementation, such as committees for a Water Fund and/or for a Seed Fund, should incorporate a female quota (i.e. 20%) in their structure. Also, gender-sensitive hiring procedures should be taken into account. The participation of women in decision-making processes should be promoted and documented.
- When sourcing staff and consultants, gender equality will be a guiding principle. Using gender-sensitive language in hiring procedures; determining a quota (i.e. 30%) or facilitating training for women so as they can access traditionally male-dominated positions, are some of the measures that could be implemented. Also, these procedures can be included as requirements for contractors to be hired to do the works.
- It would be advisable to design and implement local development plans (for the parishes) to be gender-sensitive.
- Also, if other studies and assessments need to be made, it is recommended that they incorporate a gender perspective.

The following figure 2 illustrates the key gender indicators that will be considered throughout the whole project process as it will be a transversal approach that will be present among the different project activities:

Vulnerability groups and gender analysis

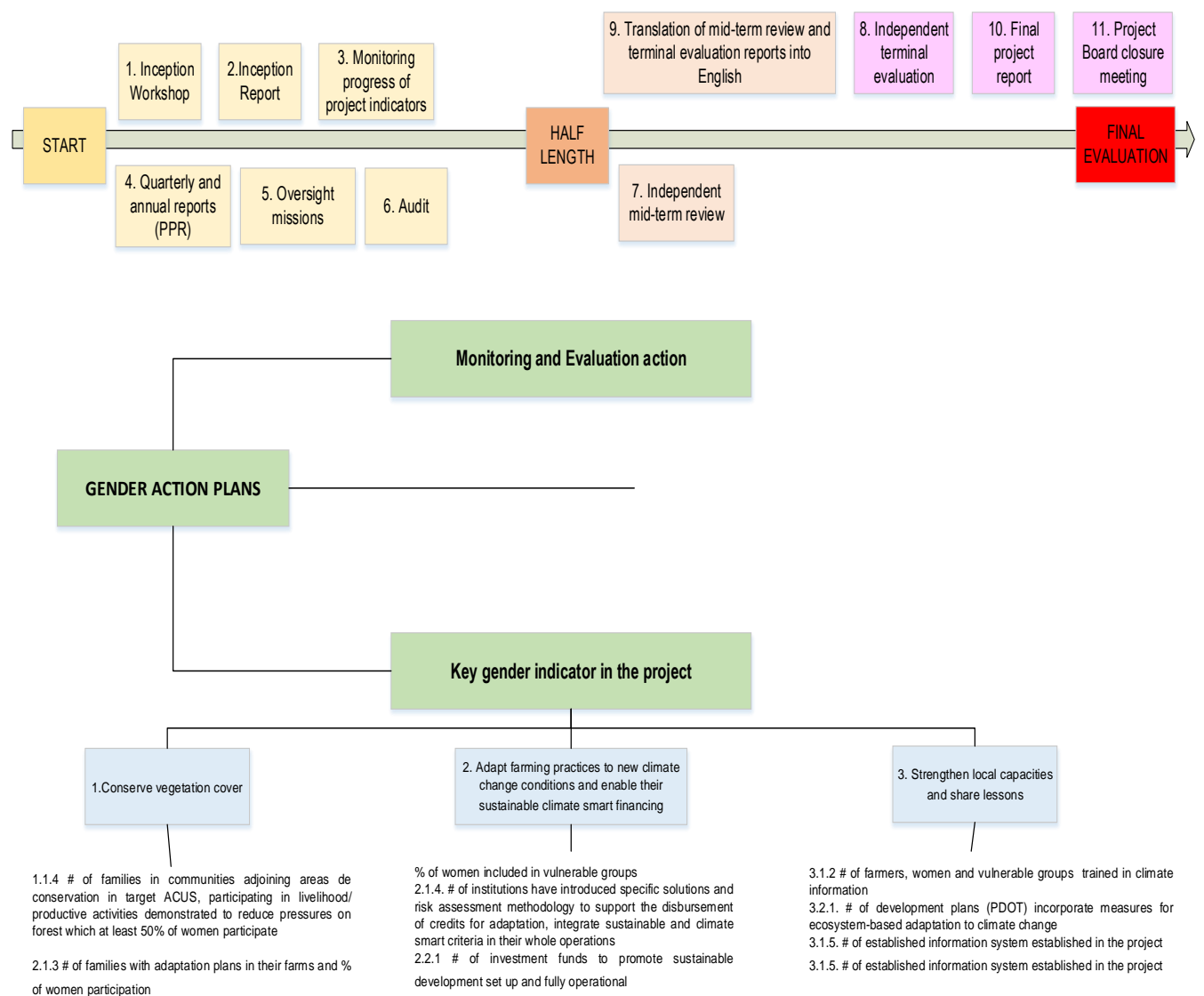


Figure 2: Gender processes and monitoring cycle

Gathering and Collecting Gender-Disaggregated Data

Below is an analysis of gender data from the parishes located in the Toachi Pilatón River watershed.

a. Sigchos

According to the Population and Housing Census conducted by INEC in 2010, the population is divided into: 50.08% men and 49.91% women. Following table shows a comparison of data obtained in 2001 and 2010 Population Censuses.

	PARROQUIAS	CENSO 2001			CENSO 2010		
		Hombre	Mujer	Total	Hombre	Mujer	Total
SIGCHOS	CHUGCHILAN	3.059	3.297	6.356	3.797	4.014	7.811
	ISINLIVI	1.591	1.719	3310	1.625	1.602	3.227
	LAS PAMPAS	1.053	1.001	2.054	1.024	919	1.943
	PALO QUEMADO	562	498	1.060	567	463	1.030
	SIGCHOS	3.969	3.973	7.942	3.978	3.955	7.933
	Total Cantón	10234	10488	20.722	10.991	10.953	21.944
Cotopaxi	Total Provincia	169303	180237	409.205	198.625	210.580	409.205

Fuente: INEC. 2010. Elaboración: Equipo Técnico GAD Municipal de Sigchos

Table 6 Comparison of the Population Censuses 2001 – 2010 in the Sigchos Parish

Considering the information of the Sigchos canton, and with results from Population Census carried out in 2010, the information in the PDOT was established that illiteracy is greater in the rural area. The illiteracy rate of women is 12.68%, out of a universe of 9,604 women older than five years, and is higher than that of men, which reaches 8.88% of a universe of 9570 men. The main reasons are: low economic, social and cultural conditions.

Parishes that have more illiterates are Sigchos and Las Pampas, but in the parish of Palo Quemado living conditions are better. Below is a summary of illiterates by gender, area and parish:

PARROQUIA	Sexo	Sabe leer y escribir	Área Urbana o Rural		Total
			Área Urbana	Área Rural	
SIGCHOS	HOMBRE	Si	761	2.197	2.958
		No	81	498	579
		Total	842	2.695	3.537
	MUJER	Si	779	1.931	2.710
		No	102	720	822
		Total	881	2.651	3.532
CHUGCHILAN	HOMBRE	Si	-	2.530	2.530
		No	-	633	633
		Total	-	3.163	3.163
	MUJER	Si	-	2.395	2.395
		No	-	991	991

		Total	-	3.386	3.386
ISINLIVI	HOMBRE	Si	-	1.108	1.108
		No	-	338	338
		Total	-	1.446	1.446
	MUJER	Si	-	993	993
		No	-	461	461
		Total	-	1.454	1.454
LAS PAMPAS	HOMBRE	Si	-	811	811
		No	-	110	110
		Total	-	921	921
	MUJER	Si	-	700	700
		No	-	117	117
		Total	-	817	817
PALO QUEMADO	HOMBRE	Si	-	460	460
		No	-	43	43
		Total	-	503	503
	MUJER	Si	-	374	374
		No	-	41	41
		Total	-	415	415
TOTAL CANTON			1.723	17.451	19.174

Table 7 illiterates by parish

The Ecuadorian state is working to incorporate and translate the gender approach into public policies under the principle of equality and non-discrimination established in the Constitution. Below is the statistical information obtained in the population census of the year 2010 for the canton of Sigchos.

Código	Cantón	Indígena		Afroecuatoriano/a		Montubio/a		Mestizo/a		Blanco/a		Otro/a	
		Mujer	Hombre	Mujer	Hombre	Mujer	Hombre	Mujer	Hombre	Mujer	Hombre	Mujer	Hombre
0507	Sigchos	41,4%	40,1%	0,7%	0,9%	3,1%	4,2%	52,8%	52,5%	1,9%	2,1%	0,1%	0,1%
1703	Mejía	7,2%	7,8%	2,4%	2,6%	0,8%	0,9%	86,8%	85,7%	2,8%	2,9%	0,1%	0,2%

Table 8 Ethnic self-identification by cantons

Código	Cantón	Tasa de analfabetismo		Escolaridad		*T.neta asist. Primaria		*T.neta asist. Secundaria		*T.neta asist. Superior		*T.neta asist. Básica		*T.neta asist. Educa. Media	
		Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.
0507	Sigchos	29,7%	19,3%	4,5	5,5	92,4%	92,8%	55,7%	59,0%	6,5%	5,9%	89,2%	88,8%	37,8%	42,7%
1703	Mejía	9,6%	4,2%	8,6	9,4	94,5%	94,1%	71,6%	73,8%	23,7%	22,1%	91,0%	91,0%	58,4%	56,8%

Table 9 Education by cantons

Código	Cantón	Tasa global de participación laboral		Población en edad de trabajar (10 años y más)		Población Económicamente activa PEA (10 años y más)	
		Mujeres	Hombres	Mujeres	Hombres	Mujeres	Hombres
0507	Sigchos	49,4%	66,9%	8.079	7.978	3.989	5.338
1703	Mejía	44,3%	68,3%	33.180	31.320	14.688	21.393

Table 10 Labour Market

Código	Cantón	% de las Mujeres Pobres por NBI	% de los Hombres Pobres por NBI	% de las Mujeres en viviendas INADECUADAS	% de los Hombres en viviendas INADECUADAS
0507	Sigchos	93,8%	93,7%	38,0%	38,0%
1703	Mejía	57,9%	58,7%	3,5%	3,4%

Table 11 Poverty for unsatisfied basic needs by Canton

According to Population Census carried out in 2010, vulnerable groups are located in the project area, including female heads of household or single mothers. Data results are list in the following table:

PARROQUIA	MADRES SOLTERAS
SIGCHOS	119
CHUGCHILAN	67
ISINLIVI	52
LAS PAMPAS	10
PALO QUEMADO	6
TOTAL CANTON	254
TOTAL PROVINCIA	4.577

- Fuente: INEC. 2010. Elaboración: Equipo Técnico GAD Municipal de Sigchos

Table 12 Single Mothers

In the canton of Sigchos, 90.89% of the population is located in rural communities and 9.11% is located in the urban part of the canton. Economically active population accounts for 58%, and 42% of the population is inactive. Following figure shows a distribution of the population by gender:

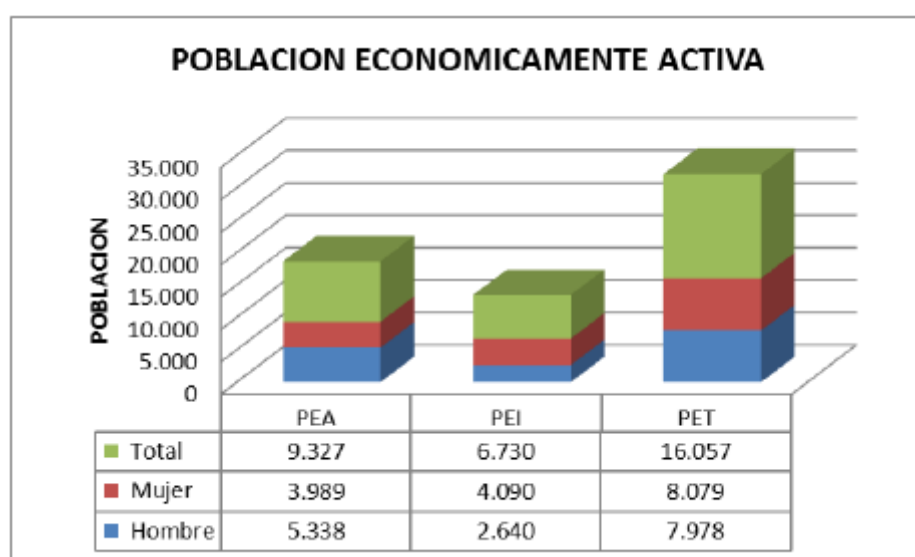


Figure 3 Distribution of the population by gender

According to the information presented in the PDOT, it is observed the distribution of the population by each parish that forms the canton of Sigchos. Following table shows disaggregated data by gender and population economically active and inactive.

CHUGCHILAN		PEA	PEI	PET
	Hombre	1.678	824	2.502
	Mujer	1.642	1.076	2.718
	Total	3.320	1.900	5.220
ISINLIVI		PEA	PEI	PET
	Hombre	689	493	1.182
	Mujer	649	603	1.252
	Total	1.338	1.096	2.434
LAS PAMPAS		PEA	PEI	PET
	Hombre	576	214	790
	Mujer	217	479	696
	Total	793	693	1.486
PALO QUEMADO		PEA	PEI	PET
	Hombre	318	117	435
	Mujer	186	173	359
	Total	504	290	794
SIGCHOS		PEA	PEI	PET
	Hombre	2.077	992	3.069
	Mujer	1.295	1.759	3.054
	Total	3.372	2.751	6.123
Total		PEA	PEI	PET
	Hombre	5.338	2.640	7.978
	Mujer	3.989	4.090	8.079
	Total	9.327	6.730	16.057

Table 13 Disaggregated data by gender and population economically active by parishes

In the Sigchos parish, 20% of the population is engaged in agriculture as a local consumption activity, 70% of the population is engaged in livestock, and 5% in community tourism. In the Sigchos parish, 20% of the population is engaged in agriculture as a local consumption activity. 70% of the population is engaged in livestock, and 5% in community tourism. The surplus agricultural products are for sale, among these include: the production of panela, beans, maize, zampo, pumpkin, mackerel, potatoes and the natural production of mortiño. On the other hand, traditionally livestock activity is often seen as a male activity and 70% of the population is engaged in this activity. The following table shows the distribution of the economic activities carried out in each of the parishes that make up the canton of Sigchos.

ACTIVIDADES PRODUCTIVAS CANTONALES						
ACTIVIDAD	Sigchos	Las Pampas	Palo Quemado	Chugchilán	Isinlivi	Promedios Cantón
Ganaderia	70	80	85	15	30	56%
Agricultura	20	15	10	40	55	28%
Turismo	5	0	0	40	10	11%
Otros	5	5	5	5	5	5%

Table 14 Cantonal productive activities

Above information shows that livestock is economic predominant activity in parishes located in the project area and the Sigchos canton.

In the socialization workshops of the project, data and information were collected from members of associations, organizations or groups of women's existing in the parishes located in the project area. These data collect helps to analyze gender situation in the project area. In the meetings, participate 27 people, which 20 were women's and 7 men. Below a list of data collected:

- Name of association, organization or group
- Number of women's participants
- Main economic activities of association, organization or group
- Type products produced by association, organization of group
- Land ownership

With these disaggregated data obtained, an approach of gender analysis could be made to know the gender issues in the project area, conclusions are below:

- active role of women in the socioeconomic activities including agriculture and livestock
- Women's are more sensitive to the changes in the ecosystems bordering the project area
- Women's work to support and ensure family feeding
- Women's lead their homes with special advise and expertise
- Women's learn from elderly people
- Women's want to be listen
- Women's want to participate in all projects located in the watershed

Following table summarizes results for Sigchos, Las Pampas and Palo Quemado:

Table 15 Gender Dissagregate data

Parish	Association, Organization or Group Name	Number of Women's	Main economic activity of the Association, Organization or Group	Type of products produced by Association, Organization or Group	Do you own any property? (At level of the Association or Individually?)
Sigchos, Las Pampas y Palo Quemado	Asojander	20	Organic farming Cleaning and Gardening	crops	individually
	Marianitas de Jesús	19	Silage Beef cattle	Pastures	Association and Individually
	De Naranjito	7	Beef cattle	Sugarcane Pastures	individually
	Asociación de Ganaderos	12	Beef cattle	Sugarcane Pastures Naranjilla	individually
	Asoapam	15	Beef cattle	Sugarcane Pastures	individually
	Sembrando un futuro	5	Beef cattle	Sugarcane Pastures Naranjilla	individually
	Campo Verde	6	Beef cattle	Sugarcane Pastures Naranjilla	individually
	Flor de Caña	47	Panela production	Sugarcane	Association and individually
	San Pablo	6	Panela production	Sugarcane	Association and individually

b. Las Pampas

As seen in the table 4 of illiteracy, the parish Las Pampas is a rural parish whose index is high, due to the poor economic and social situation of this parish.

Land use in the Las Pampas parish is used for livestock and agricultural activities. In the parish of Las Pampas its main activity is cattle raising with 80%, compared to 15% of the population that is engaged in agriculture with sugarcane, naranjilla, tomato, corn and beans.

According to the Population Census conducted in 2010, following indicators were obtained on the economically active female population and the number of women who receive income in this parish. Below a summary:

Análisis Estadístico del Sistema Económico de Las Pampas	
Año	2010
Indicador	Total
Población femenina asalariada	41,00
Población femenina de 10 y más años de edad	696,00
Población femenina económicamente activa	217,00
Población de 10 y más años de edad	1.486,00
Población económicamente activa	793,00
Población ocupada	778,00
Porcentaje de la población femenina asalariada	19,16
Porcentaje de la población femenina económicamente activa	27,36
Porcentaje de la población femenina asalariada en comercio al por mayor y menor	0,47
Porcentaje de la población femenina asalariada en manufactura	2,34
Porcentaje de la población femenina ocupada en el sector público	5,14
Porcentaje de la población femenina asalariada en agricultura, silvicultura, caza y pesca	9,35
Porcentaje de la población femenina ocupada en comercio al por mayor y menor	6,07
Porcentaje de la población femenina ocupada en agricultura, silvicultura, caza y pesca	60,75
Porcentaje de población femenina ocupada en manufactura	20,56

Table 16 Economically active female in Las Pampas parish

In 2008, in the parish of "Las Pampas" was created the women's association "Marianita de Jesus", which is supervised by the Superintendence of Popular and Solidarity Economy (SEPS). At present, the association made up of 18 women and they are owns of land for economic activities. Those activities are agriculture and livestock. For this association the main objective is to generate income for their families.

In Las Pampas parish, there is an important role of women in the economic activities. In 2010, according to data from INEC, population distribution in the productive sector were as shown in the table below:

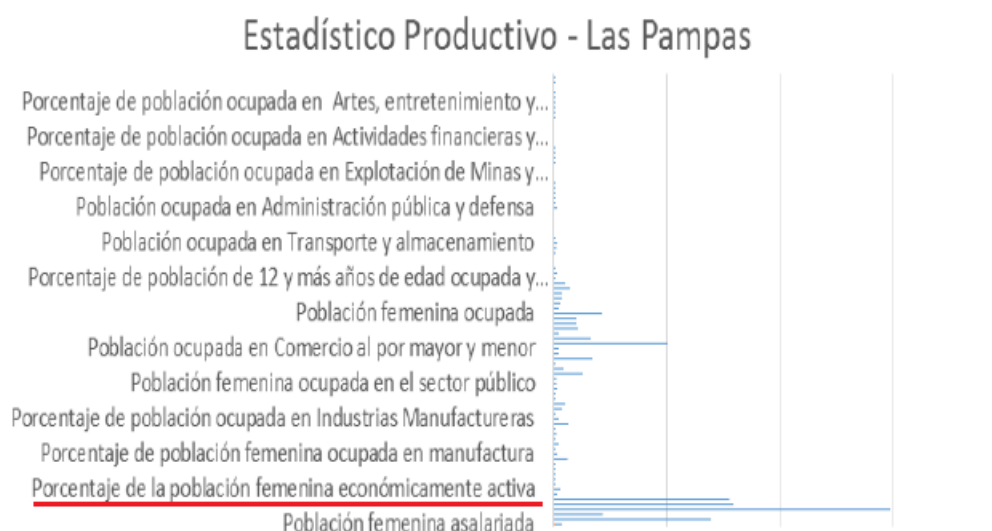


Figure 4 Population per productive sector in Las Pampas parish

In the parish of Las Pampas, at least 6 associations are located, where the role of women's is active for economic generation and for their family's economy. One of the most important associations is Flor de Caña Association whose main economic activity is the panela production and is made up of 47 women. Below information about economic situation for panela production:

SECTOR	(#) EMPRESAS	(#) EMPLEADOS	VALOR PRODUCCION ANUAL (S/. POR AÑO)
- Fabricación y refinación de panela y panela granulada (Sigchos, Las Pampas y Palo Quemado)	Existen productores que lo realizan de manera artesanal	Disponen de la mano de obra conformada por miembros de la familia	No se puede cuantificar, pero en la parroquia de Sigchos y las Pampas el 80% y Palo Quemado el 99% de las familias se dedican a esta actividad para poder subsistir.

Table 17 Economic Situation of Panela Production

c. Palo Quemado

Population of this parish are view like small communities, which are identified as precinct. The ethnic groups living in the parish are mostly mestizo 2% and montubio 98%.

According to table 3, number of men and women in this parish has been reduced by 2.83% between census 2001 and 2010. In 2010, Palo Quemado had 1030 habitants, which were distributed in 567 men and 463 women, those data represent 55% of men and 45% of women. Following table shows the population distribution by gender.

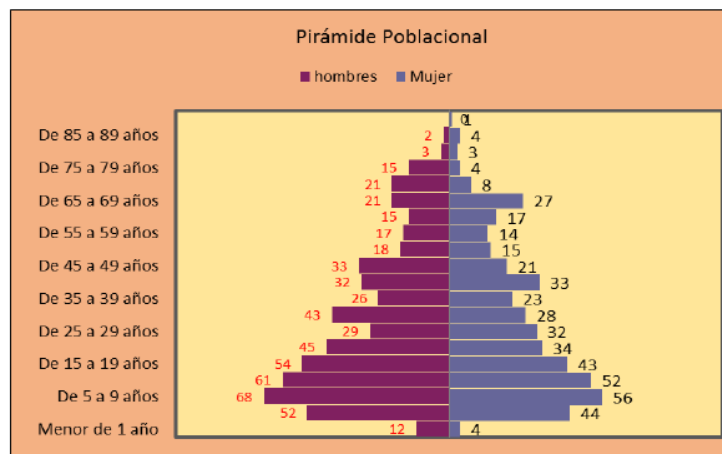


Table 18 Population Distribution by gender in Palo Quemado parish

According data from population census carried out in 2010, the economically active population was 318 men and 186 women that sum in total 504 people. While economically inactive population was 117 men and 173 women that sum 290 people. On the other hand, 91% of population can read and write.

Regarding poverty because unsatisfied basic needs 95,6% of population is poor.

In Palo Quemado parish, 46% of the population is engaged in agriculture, livestock and forestry and fishing; 28% is dedicated to industry and manufacturing, such as processing and industrialization, 1% of the population is dedicated to construction, 2% to wholesale and retail, 3% to transportation and storage, 1% is dedicated to the accommodation and food service, 1% is engaged in public administration activities, and 4% is dedicated to teaching.

In Palo Quemado parish is located the mining company MINAS DE LA PLATA, but population is not satisfied with the presence of this mining because operations has been generated serious environmental damage in the area.

d. Alóag

According to the Population Census carried out in 2010, the total number of habitants of Mejía were 3.2% of the population. This number represents the total population of Pichincha province, and economically active population represents 2.90% of the province. The illiteracy rate, including men and women over 15 years old, reached 9.1%.

In 2010, according to the population census, the total number of habitants in Canton Mejia was 41,552 women, which represents 51.10%, and 39,783 men, which represents 48.90%. The rural population comprised 64,824 habitants (79.70%) and surpasses the urban population that had 16,511 inhabitants (20.30%). A summary of this information is presented in the following table:

TABLA CEC 2		Población del Cantón Mejía								
Población	Mujeres	%	Hombres	%	Urbana	%	Rural	%	PEA	%
81.335	41.552	51,10	39.783	48,90	16.511	20,30	64.824	79,70	45.466	55,90
Fuente: INEC Censo de Población y Vivienda 2010 Elaboración: EQUIPO PDOT GAD MEJÍA 2014										

Table 19 Mejía Canton Population

In relation to gender and economic activities, population census showed that there are 5,249 people as producers, which 3,273 are men and 1,976 are women. Of these total, 2,573 (49.01%) are engaged in agricultural activities and 2676 (50.99) are in non-agricultural activities. A summary is presented in the following table:

TABLA CEC 3		Personas productoras por sexo y actividad		
SEXO		ACTIVIDADES AGROPECUARIAS	ACTIVIDADES NO AGROPECUARIAS	TOTAL
Masculino	Femenino	2.573	2.676	5.249
3.273	1.976			
Fuente: INEC, MAG, SICA III Censo Nacional Agropecuario Elaboración: EQUIPO PDOT GAD MEJÍA 2014				

Table 20 Economically Active population by gender

e. Manuel Cornejo Astorga (Tandapi)

According to the data obtained in the population census carried out in 2010, the rural territory of the parish consisted of 3661 habitants. These are distributed as follows:

UBICACIÓN	POBLACIÓN TOTAL	HOMBRES	MUJERES
MEJIA	81.335	39.783	41.552
MACHACHI	27.623	13.511	14.112
MANUEL CORNEJO ASTORGA	3.661	1791	1870

Table 21 Manuel Cornejo Astorga population

The economically active population represents 60% of the 2,197 people and the economically inactive population represents 40% of the 1,464 people.

POBLACIÓN	HOMBRES	MUJERES	TOTAL	%
PEA	1.255	942	2197	60%
PEI	785	679	1.464	40%
TOTAL	2.040	1.621	3.661	100%

Table 22 Manuel Cornejo Astorja Economically Active Population

The lands of this parish are suitable for development of agriculture and livestock economic activities, which are main sources of income and subsistence for population. Below table shows the main economic activities for this parish:

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	806	46,78
Industrias manufactureras	57	3,31
Suministro de electricidad, gas, vapor y aire acondicionado	9	0,52
Distribución de agua, alcantarillado y gestión de desechos	7	0,41
Construcción	71	4,12
Comercio al por mayor y menor	199	11,55
Transporte y almacenamiento	78	4,53
Actividades de alojamiento y servicio de comidas	134	7,78
Información y comunicación	5	0,29
Actividades financieras y de seguros	1	0,06
Actividades profesionales, científicas y técnicas	7	0,41
Actividades de servicios administrativos y de apoyo	42	2,44
Administración pública y defensa	14	0,81
Enseñanza	40	2,32
Actividades de la atención de la salud humana	8	0,35
Artes, entretenimiento y recreación	3	0,17
Otras actividades de servicios	12	0,70
Actividades de los hogares como empleadores	56	3,25
No declarado	155	9,00
Trabajador nuevo	21	1,22
	1723	100

Table 23 Manuel Cornejo Astorja Economic Activities

In the socialization workshops of the project, data and information were collected from members of associations, organizations or groups of women's existing in the parishes located in the project area. These data collect helps to analyze vulnerable group's situation in the project area. Below a list of data collected:

- Name of association, organization or group
- Number of women's participants
- Main economic activities of association, organization or group
- Type products produced by association, organization of group
- Land ownership

With these disaggregated data obtained, an approach of vulnerable groups' analysis could be made to know the group issues in the project area, conclusions are below:

- There is an association of the older adult
- The association has no legal status
- The association has no land for activities such as subsistence farming
- The association is made up of 30 women
- The association receives help from donations because it does not generate income

Following table summarizes results for Tandapi.

Parish	Association, Organization or Group Name	Number of Women's	Main economic activity of the Association, Organization or Group	Type of products produced by Association, Organization or Group	Do you own any property? (At level of the Association or Individually?)
Manuel Cornejo Astorga (Tandapi)	Association of agricultural products	8	Cattle raising	Cheeses	Association
	Pampas Argentinas	11	Cattle raising	Milk and panela	Individually
	Elderly Association	30	No		Association

Table 24 Vulnerable Group Dissaggregated data

f. El Chaupi

In PDOT document of the parish, it does not include information with gender analysis.

Agriculture and livestock have been the main sources of income and subsistence for this parish. A list of activities carried out in this parish are show below:

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	389	59,23
Explotación de minas y canteras	2	0,32
Industrias manufactureras	44	7,06
Suministro de electricidad, gas, vapor y aire acondicionado	5	0,80
Distribución de agua, alcantarillado y gestión de desechos	1	0,16
Construcción	25	4,01
Comercio al por mayor y menor	41	6,58
Transporte y almacenamiento	23	3,69
Actividades de alojamiento y servicio de comidas	8	1,28
Actividades financieras y de seguros	3	0,48
Actividades profesionales, científicas y técnicas	5	0,80
Actividades de servicios administrativos y de apoyo	10	1,61
Administración pública y defensa	7	1,12
Enseñanza	10	1,61
Actividades de la atención de la salud humana	7	1,12
Artes, entretenimiento y recreación	3	0,48
Actividades de los hogares como empleadores	12	1,93
No declarado	28	4,49
Trabajador nuevo	20	3,21
Total	623	100,00

Table 25 El Chaupi Economic Activites

According to the PDOT document, El Chaupi parish promotes economic activities that include women. A community project was carried out at the farm Llovizna, where 20 women are engaged in activities such as fruit dehydration and tea production.

Project Beneficiaries by Component

Component	Men	Women	Total	Elderly	Total direct beneficiaries
1. Conserve vegetation cover	2987	2633	5620	515	178 families
2. Adapt farming practices to new climate change conditions	3191	2952	6143	671	375 (250 for crops and 125 for livestock)
Component 3Sub-output	Responsible Party		Actors	Places	Number of beneficiaries
6. At least 6 parishes being trained to take care and use meteorological information generated by meteorological stations currently installed					
Producing climatological information.	INAHMI	Farmers and livestock ranchers Women's Association, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	553 families including 55% women	
7. Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.					
Elaboration of development and territorial planning	GADs, SENPLADES, Association of Ecuadorian Municipalities.	Associations, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	6 GADs	
8. Strategic plan of communication, education knowledge transference and replication					
Preparation of communication and training plan	Project Manager of the Project	Associations, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	Associations, Organizations and Population in general. Those are located in the project area.	
9. Systematization of information gathered during the whole project design and implementation using informatics platforms					

Implementing technological platform to manage data, knowledge and information related to adaptation climate change	MAE	Associations, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	Associations, Organizations and Population in general. Those are located in the project area.
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VULNERABLE GROUPS: GENDER EQUITY AND WOMEN'S EMPOWERMENT

Introduction

On the project areas, the main activities are subsistence agriculture and extensive livestock farming. In the area of Palo Quemado, farmers cultivate sugarcane to produce panela (unrefined whole cane sugar); there are about 450 ha of sugarcane plantations, 98% of the harvest is used to produce panela (GADPRPQ, 2013). 28% of population is engaged in the production of panela. According to primary data collection there are associations in the area composed of women in their entirety. Those are San Pablo Association with 6 women, Marianita de Jesús en Las Pampas composed by 18 women and Flor de Caña Association with 47 women. Panela is more profitable than other activities, but its artisanal production is based on the use of local trees for firewood. Each farmer uses about -three trees per week- to cook and reduce the sugarcane juice, contributing to deforestation, soil erosion and increasing climate vulnerability. Moreover traditional production of panela can contribute to negative health impact, due to the respiration of inorganic compounds, and local air pollution.

Vulnerability

Vulnerability is not even among groups: women, with higher poverty level and lower access to income generating activities, have fewer coping mechanism and hence they are more exposed to climate change. The project will focus on but not be limited to work with women associations, aiming to improve production, supporting sustainable management of ecosystems and reducing women's vulnerability. Moreover, the project will seek replication in other communities where adequate and that includes other vulnerability groups such as children and older adults.

Women have higher illiteracy rates, compared to men, 21.6% compared to 19.2% respectively. Moreover, in these communities, men have more years of schooling: with on average 4.7 years of schooling for men and 4.4 years for women. This gendered bias in literacy is also present at the national level, with a wider gap in rural areas (Table 1).

Illiteracy rates	Functional illiteracy rates	Digital illiteracy rates
------------------	-----------------------------	--------------------------

	Urban	Rural	Urban	Rural	Urban	Rural
Men	3.2%	4.6%	7.0%	20.2%	18.6%	34.4%
Women	10.7%	15.2%	8.9%	25.6%	24.7%	43.2%

Table 26: Illiteracy rates, Functional illiteracy rates and digital illiteracy rates (Source: Women and Gender Equality National Agenda, 2014 – 2017, based upon data from INEC (2013))

Selection criteria beneficiaries

The selection criteria for project activities to the different components was based on a triangulation methodology, which results from the interaction between documentary information, a review of the regulatory framework, and validation of actions with co-executors in field workshops, in general this component will considerate gender equality and empowerment of women, the project will encourage the participation of women and vulnerable groups during project activities, trough the gender actin plan

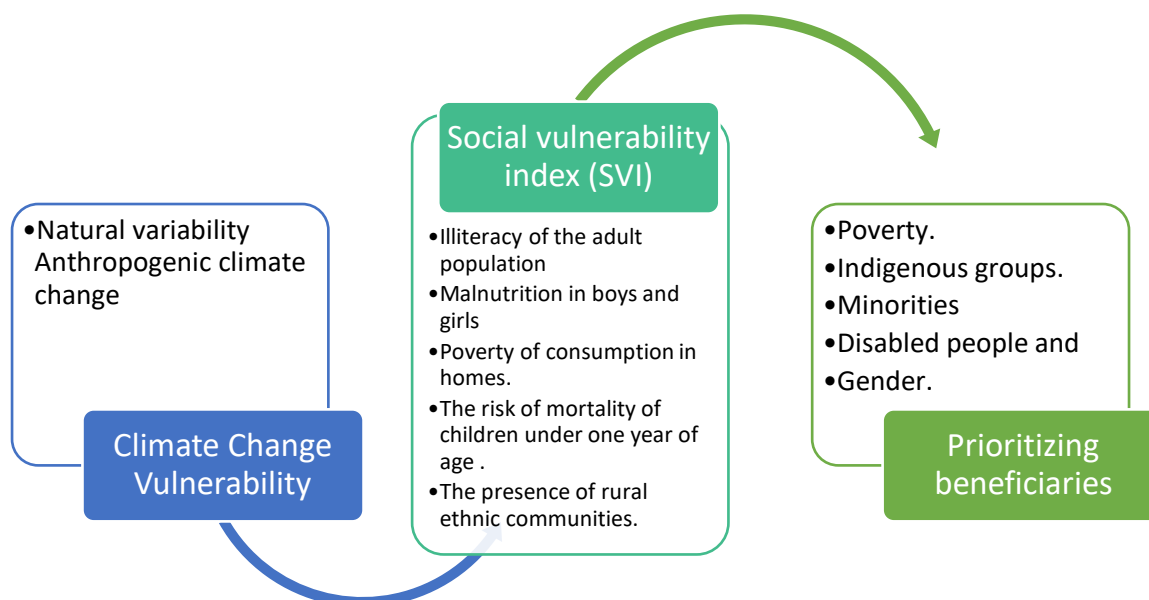


Figure 2: Methodology to define beneficiaries

Farm plans will be developed, promoting always at least 50% of women's active participation. It is necessary within this component to strengthen local communities' capacities on planning strategies, conservation practices and climate change, for this purpose a cross-sector program for awareness raising and communication is considered as detailed under component 3.

Component	Men	Women	Total indirect co-executors	Elderly	Total direct co-executors
Conserve vegetation cover	2987	2633	5620	515	840

Table 27: Potential beneficiaries in the project

Benefits of the Project for women and vulnerable groups

The establishment of family gardens, which helps especially women as head of household to enhance the daily diet of family members and even generate additional family income by selling surplus on local markets.

Under the first approach, the construction of sustainable management solutions in farming will focus on but not be limited to the most vulnerable populations, with specific target on women individually, or women associations where applicable. Specific vulnerability criteria for their proper selection will be defined in the early phase of the project.

Vulnerability groups and gender analysis

Component 3 has a particular focus on women empowerment. Indeed, because women are on average more vulnerable to climate change, by targeting women we assure higher adaptive capacity of the community and more sustainable reduction of community's vulnerability.

Local actors will be trained to interpret data obtained from meteorological stations. This training will be carried out in the field and will have as beneficiaries at least 500 people, from component one and two, of which at least 55% will be women. To train the target population focus groups, one to one trainings will be organized. The training will include the provision of generic climatic knowledge, and technical aspects on the meteorological stations.

Therefore, incorporating measures for ecosystem-based adaptation to climate change in the PDOTs, is very natural and will benefit the communities in the parishes, including women, associations, vulnerable groups and the community at large. Ecosystem based adaptation measures assure the alignment between ecosystem conservation and climate change adaptation. By conserving the local ecosystems, agriculture production is strengthened as well as community resilience to climate change. The opinion of vulnerable groups regarding changes in the ecosystem will be heard and considered

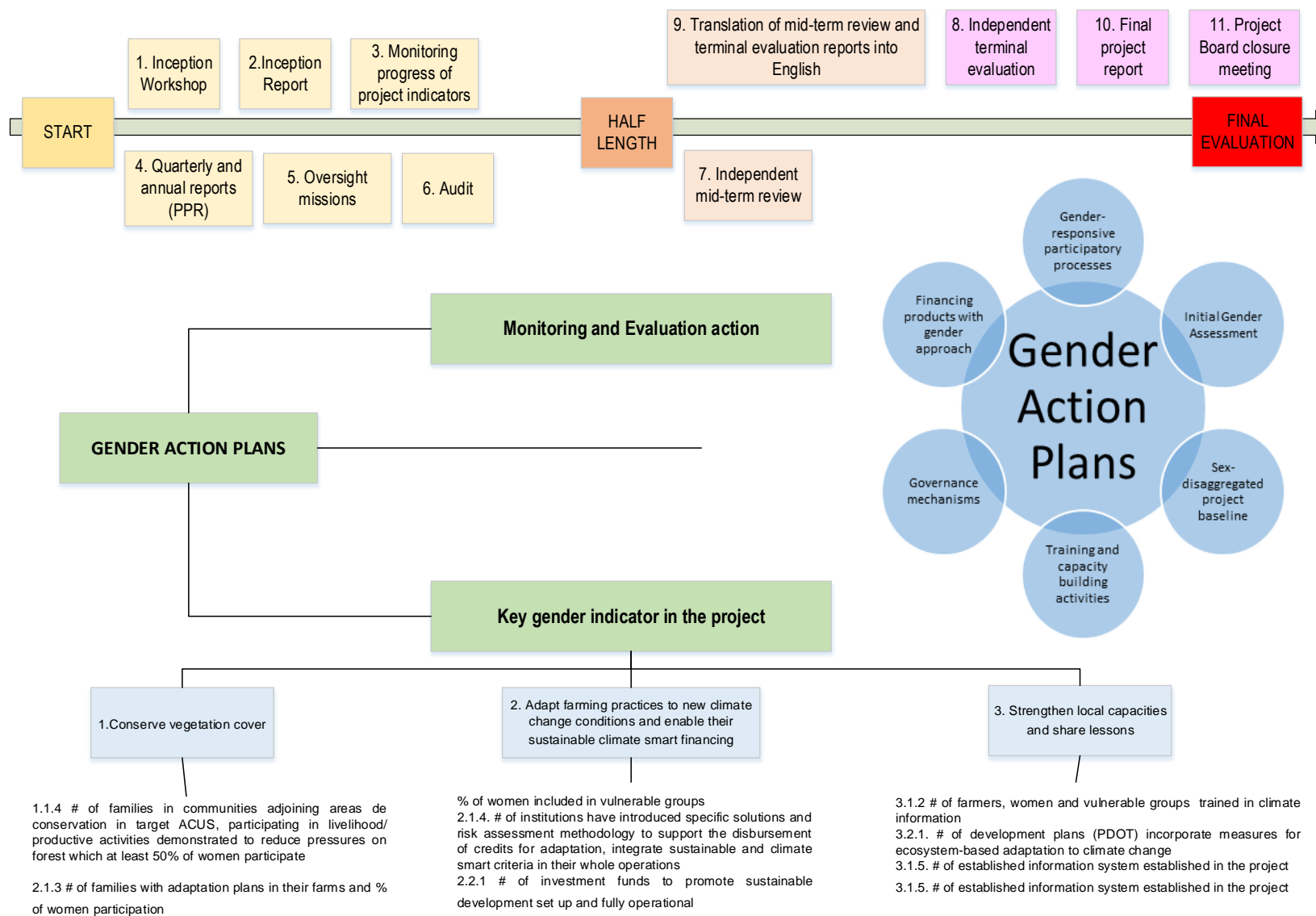
Project activities where they will participate actively

Objective	Activity
1.3.1 Incentive systems for set-asides on private and community lands based on ACUS have been strengthened	In this component, the sustainable production actions will be implemented according to the reality of each part of the Basin. For the "Pilaton" area, a change of technology with efficient kilns in the panela production process will be promoted, as well as the reduction in the use of forest in at least 30%. For the lower part, the creation of urban gardens will be promoted, sustainable productive alternatives and actions that include the participation of women and vulnerable groups.
1.4 Increase in # of families in communities adjoining conservation areas in target ACUS, participating in productive activities demonstrated to reduce pressures on forest with at least 50% of women participate	The effective participation of women in decision making, farm planning and sustainability strategies process within their productive activities will generate autonomous processes of adaptation to climate change. This activity is complemented by component 1 and will be evaluated with the number of farms plans that have at least 50% of participation of women and vulnerable groups.

Vulnerability groups and gender analysis

Objective	Activity
1.4.1 Planning and zoning of the river basin with a participatory and inclusive approach has been introduced	At both, the farm within the biocorredor level and ACUS of conservation level, it will be carried out planning and zoning, which will allow the access to credits and the strengthening of the local capacities. This activity will be mainly promoted by women.
1.4.2 Inclusion of governance activities with active women participation has started	The governance mechanisms of the productive activities, the declaration of protected areas and the functionality of the investment fund will count on the active participation of women.
2.1.1 Farm's zoning and plan elaboration.	This activity has a close relationship with item 1.4, because it requires the improvement of planning at a farm level with the active participation of women. These components and their interaction intend to benefit at least 840 people.
2.1.4 Technology change (ovens change to promote efficiency in the production of panela)	This activity complements the investment component of the project, for the sustainable production actions will be implemented according to the reality of each part of the Basin. For the "Pilaton" area, a change of technology with efficient kilns in the panela production process will be promoted, as well as the reduction in the use of forest in at least 30%. For the lower part, the creation of urban gardens will be promoted, sustainable productive alternatives and actions that include the participation of women and vulnerable groups.
2.3 Increase in the process of planning and zoning of farms in which at least 50% of women participate	The Project will start a territory planning process at a farm level to achieve protection, adaptation to climate change and sustainable use of resources, activities that are strongly linked to women's participation.
6.1.3 Capacity building for communities	Training 500 families in the use of climate data and their application in activities, such as: agriculture and livestock. This training will be address for 55% percent of women. Including field visits, food and transportation. An appropriate mechanism to transmit climate information to the population will be developed.
6.1.4 Development of training and information material	Designing of interactive content, infographics and generation of newsletters to training GAD population in the area including women associations, older adults and vulnerable groups. Policy briefs will be elaborated for policy makers.
6.1.5 Developing a communication strategy	Integrating the digital media technologies for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
8.1 Development of a communication strategy	Developing a communication plan addressed for stakeholders in the project including specific women associations and organizations.
8.2 Integration of ICT solutions and social media	Integrating the digital media technologies and different approaches for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
8.4 Development of training materials of sustainable agricultural practices	Training modular courses on sustainable agriculture and good agricultural practices, open to associations and selected farmers to participate. 12 modules, 6 theorists, 6 in the field and an on-site supervision within 6 months of completing the course. 50% women

Vulnerability groups and gender analysis



Bibliography

FAO. (2009). Bridging the gap. Obtenido de FAO'S Programme for Gender Equality in Agriculture and Rural Development: <http://www.fao.org/3/a-i1243e.pdf>

(2014). Género y Adaptación al Cambio Climático.

(s.f.). Mujeres y Hombres del Ecuador en cifras III.

Stock, A. (2012). El cambio climático desde una perspectiva de género. Obtenido de <http://library.fes.de/pdf-files/bueros/quito/09023.pdf>



“Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management.”

ANNEX 10

Definition of beneficiaries of the Río Blanco upper basin

República del Ecuador

August of 2017

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

Elaborated by: Juan Calles L. MSc.

Petitioner: YAPU Solutions & DSE Consultores

Date: July 28 of 2017

Methodology

To determine the beneficiaries of the project to be implemented in the Río Blanco upper watershed inside the scope of the Adaptation Fund, an analysis of the social and environmental conditions of the basin was carried out. The information provided by the Ministry of the Environment of Ecuador and official sources such as those of the 2016 Population Census was used. The process of information processing is described below.

Unit of analysis

The Río Blanco upper Basin is located in the territory of 3 provinces, and several parishes. However, for the present report the census sector was defined as the unit of analysis. The census sector is the smallest special unit defined by the INEC for the conduct of censuses. The use of the census sector was defined as the analysis basin shows a high dispersion of the population concentrated in the rural sector. Due to this condition, obtaining population information without field survey is very complex, and for this reason the estimate of the beneficiaries will be based on information from the available census of INEC (INEC, 2011).

Census information

The 2010 Population and Housing Census is a very important source of information as it contains details at the provincial, cantonal, parish and population and housing levels. Since 2011, these data are available for analysis and can be found on the official INEC website. In order to obtain INEC census data, ECLAC's REDATAM processor and the 2010 Census database were used. Using the REDATAN processor, data were collected at the parish level using the "Statistical Processor" function (Figure 1). The data obtained were exported to a spreadsheet and the values were assigned to the corresponding census code in the database of the variables.

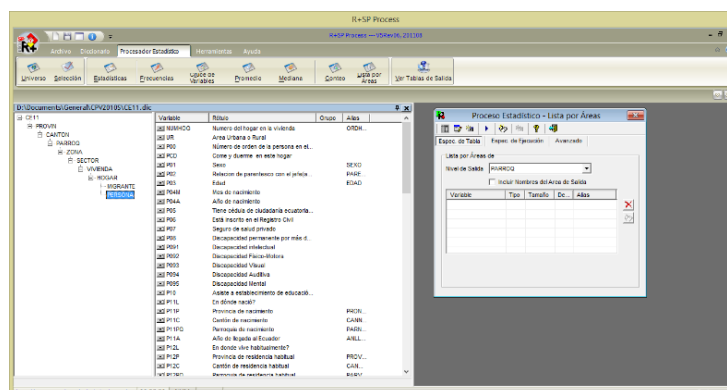


Figure 1. REDATAM Processor View.

Information processing

For the information processing was used the program ArcGis version 10.2 and Excel spreadsheets for the treatment of the data. The information collected was spatially analyzed based on the data available for the study basin.

To define the beneficiaries of the project, the following aspects will be considered:

- Location of defined villages to participate (points).
- Obtain population data of each point in relation to the census sector where it is located (polygons).
- Vulnerable areas (raster).
- Location of the measurements (polygons).
- Deforestation 2014-2016 (polygons).
- Data of the 2010 population census (INEC).

Outcomes:

Census tracts

A total of 186 census tracts were identified within the Río Blanco upper Basin (Figure 2). The project was located in the northern part of the basin, reaching a total of 54 census tracts, 50 in the rural area and 4 important population settlements (Sigchos, Palo Quemado, Tandapi and Las Pampas) Of the provinces of Cotopaxi and Pichincha (Figure 3).

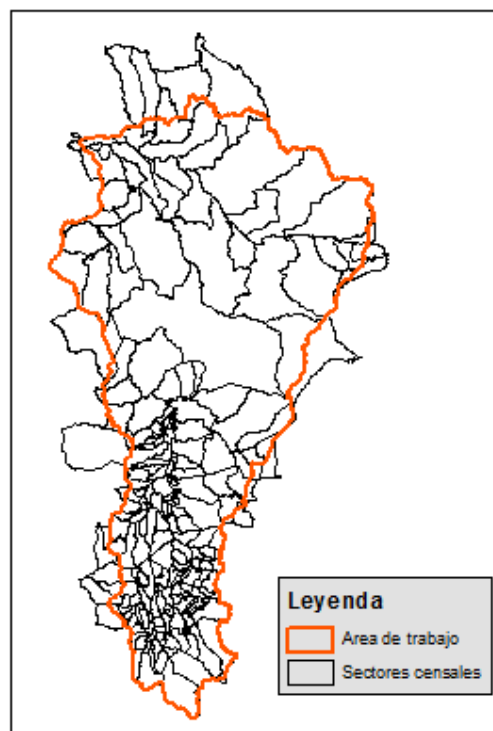


Figure 2. Census tracts in the Río Blanco upper watershed.

Annex 14. Definition of beneficiaries in the Río Blanco upper basin



Figure 3. Census sectors within the project intervention area in Río Blanco upper watershed.

A total of 234 human settlements of different sizes are located in the project's intervention area. The settlements are located mainly nearby of the Aloag-Santo Domingo road and on the road that leads to Sigchos (Figure 4).

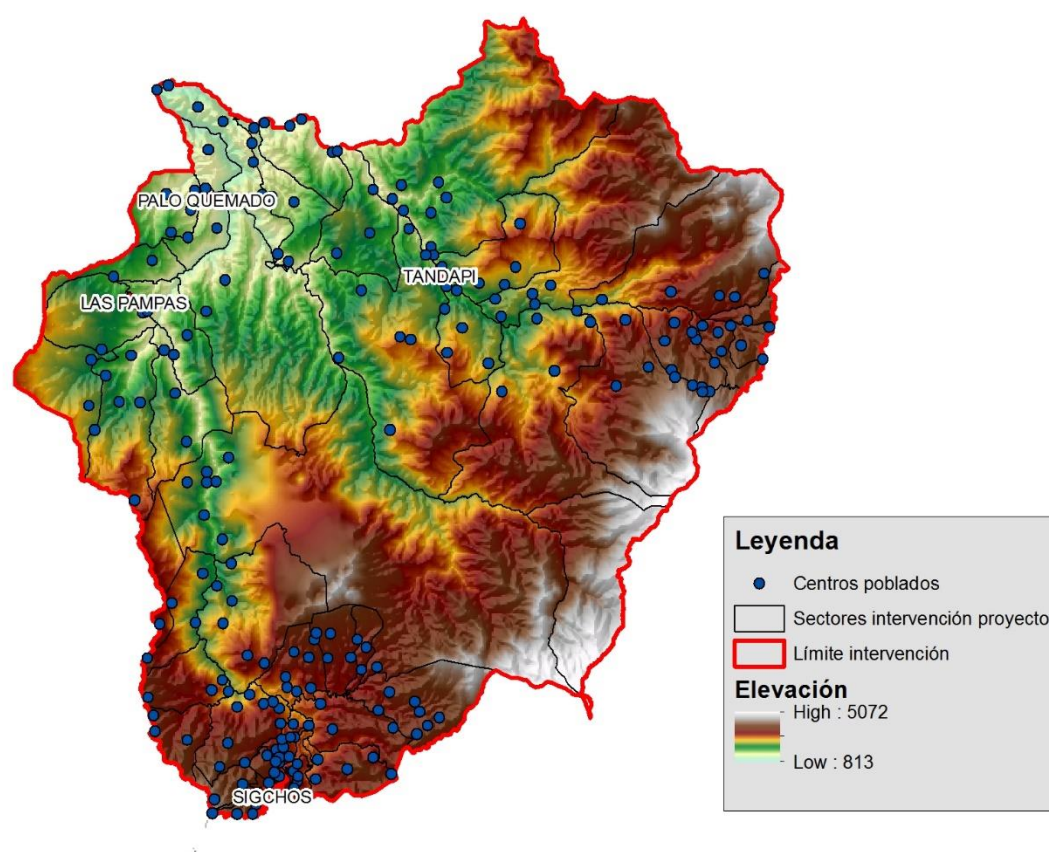


Figure 4. Location of human settlements within the project intervention area.

Population composition

In the analyzed basin there are a total of 43 200 inhabitants based on information from the census tracts present in the area. However, when defining the area of general intervention of the project, the number of inhabitants in this area is 10 450, with men 49.14% and women 50.86%.

Total population in the basin and in the project intervention area.

Area	Men	Women	Total
Basin	24258	25109	49367
Intervention area (rural sector)	5567	4975	10542
Intervention area (populated spots)	3070	3097	6167

Population by age group

Area	0-14 years	15-64 years	64 or more	Total
Basin	17504	22296	3400	43200
Área intervención	3498	5996	1048	10542
Área intervención	2075	3582	510	6167

(centros poblados)				
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Population density

The population settled in the basin is low and the majority of the population is located near the most important populated centers of the basin and near the main roads. The population density of the basin varies between 0.76 and 145 inhabitants per km2 in rural areas of intervention. Population density is an important criterion since it shows the dispersion in the rural area of the basin (Figure 4).

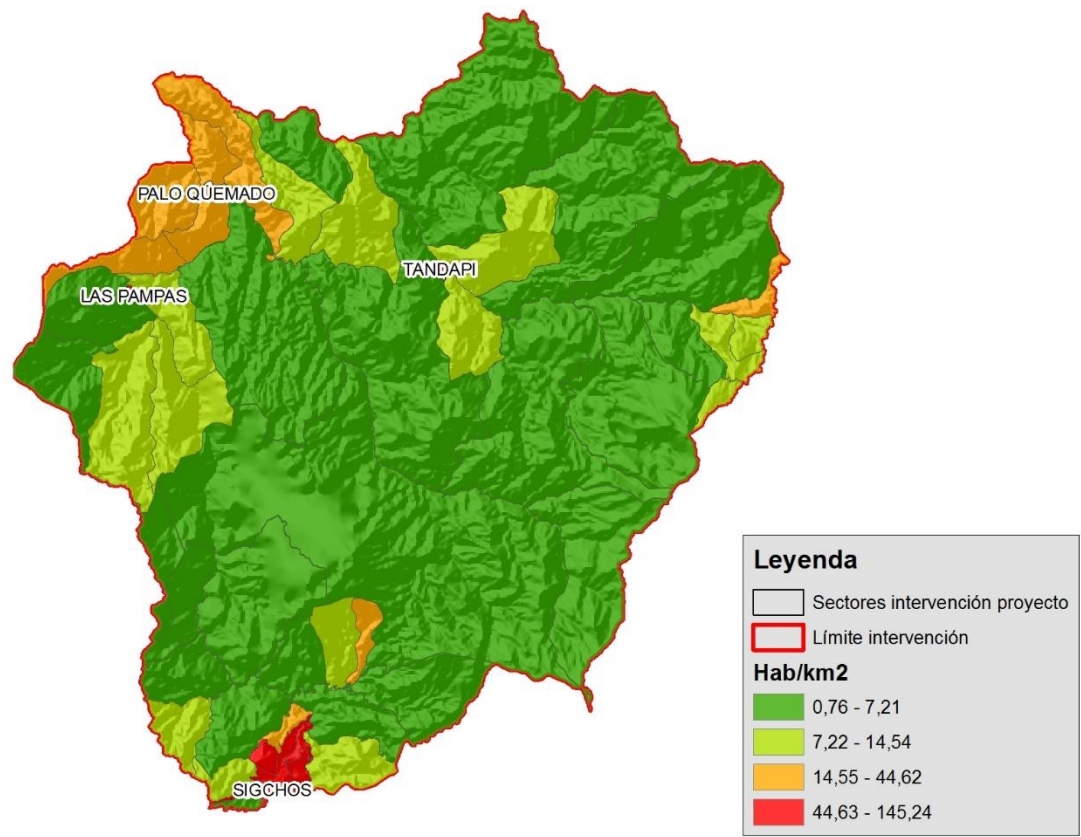


Figure 4. Population density in the intervention sectors of the project

Deforestation.

In the census tracts defined for component 1 between 2008 and 2014; 5.891,33 hectares were deforested, and between 2014 and 2016 a total of 2.200,14 hectares was deforested. This means deforestation of 8.091 hectares between 2008 and 2016 in the area in which the activities of component 1 (Figure 5).

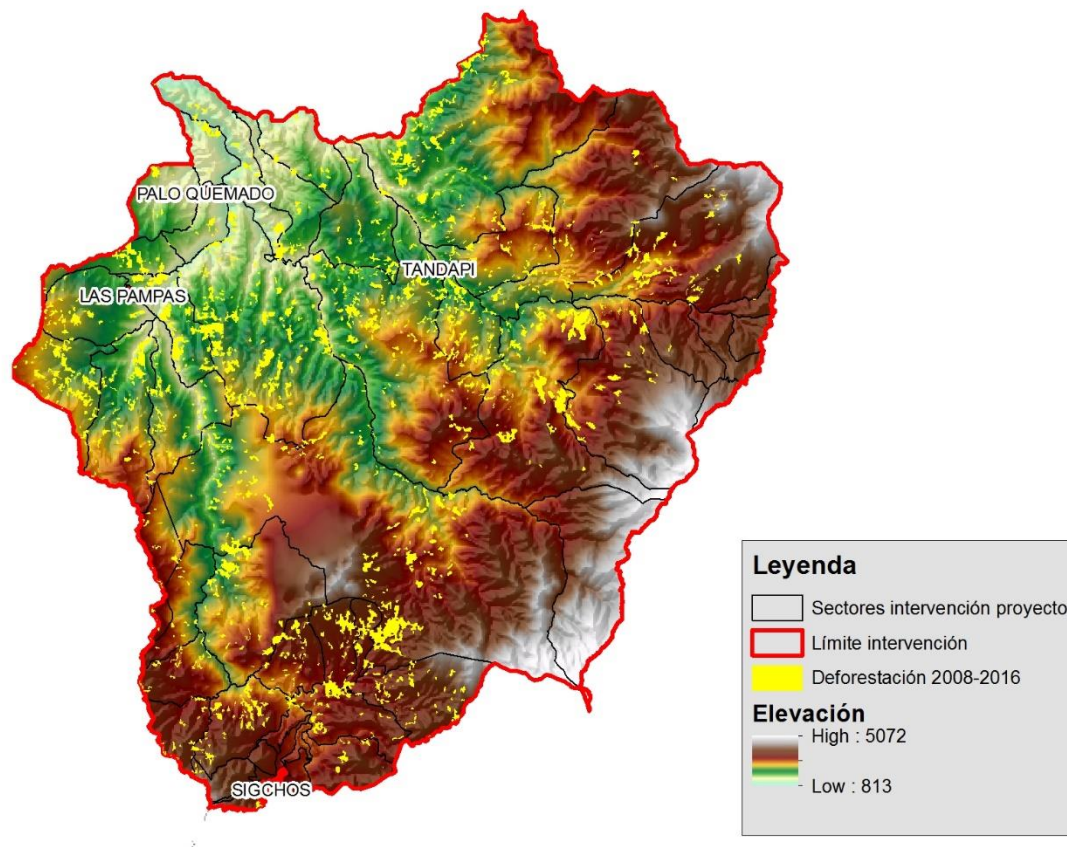


Figura 5. Cumulative deforestation between 2006 and 2016 in the intervention area.

In order to define the approximate number of beneficiary settlers per component, information was taken on the measures to be implemented and suggested by the vulnerability study of the basin and a spatial selection analysis was carried out to determine the census sectors to which the project components applies.

In the case of component 1, being a component of conservation and forests management the sectors selected are those with a higher remoteness, low population density and pressure for deforestation. The reference coverage used in this case was the so-called "Zonas_potenciales_regulacion_ciclo_hidrologico_protegidas_TOACHI" the same that was compared with the respective census sectors. A total of 30 sectors were selected from a total of 54 present in the project intervention area (Table 1). In the selected sectors they inhabit a total of 5.620 inhabitants. It is estimated that a total of 840 people would benefit directly from the activities of this component (Figure 6).

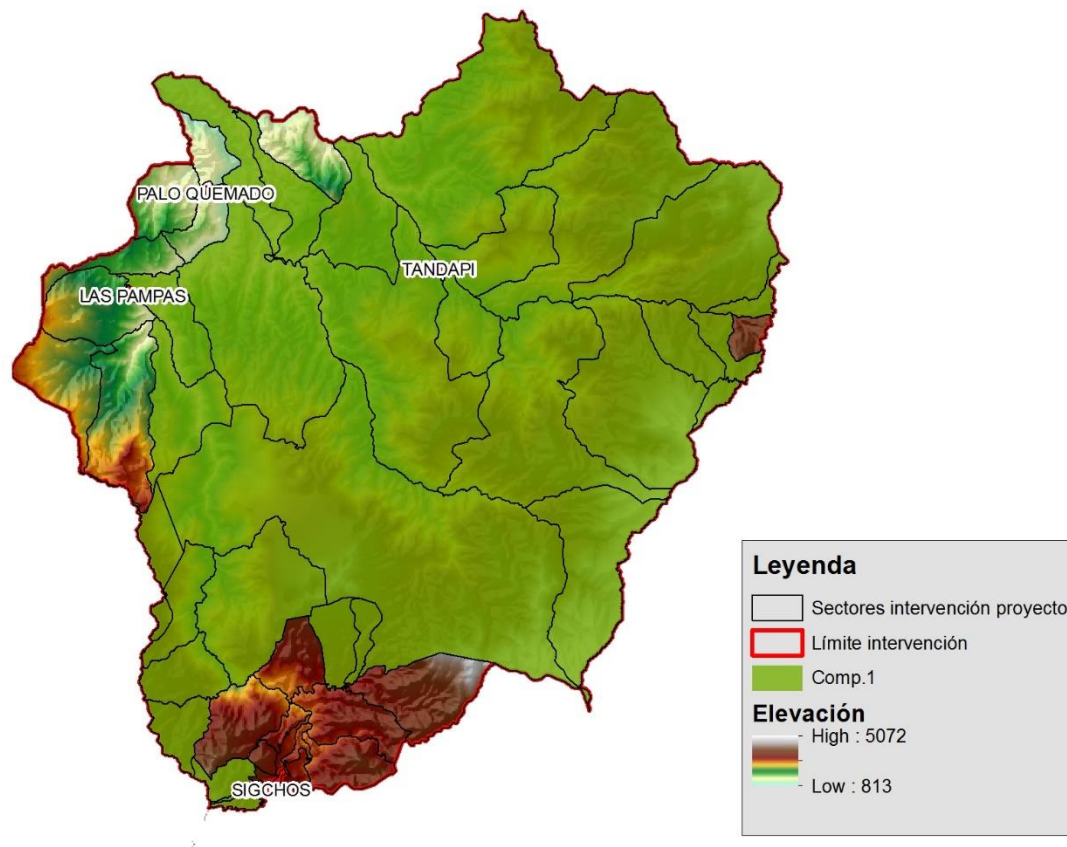


Figure 6. Location of sectors benefiting from the component 1.

In the case of Component 2, being a component of pasture and crop management, the selected sectors are those with a higher level of intervention, greater population density and pressure for deforestation due to the expansion of the agricultural frontier. The reference coverage used in this case was the so-called "Zonas_potenciales_sistemas_gestion_sostenible_TOACHI" which was compared with the respective census sectors. In this case, the project estimates an intervention in a total of 500 hectares. Considering 2 hectares per family for farmers we would need a total of 250 families to participate, the total direct beneficiaries would be approximately 1225 people. In the case of livestock farmers, the participation of 125 families is assumed, representing 625 people, giving a total of 1850 (Table 1). In this case, a total of 39 sectors were selected from the 54 present throughout the project intervention area.

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

Table 1. Total population benefited by component (Total, total men, total women, senior citizens).

Component	Men	Women	Total	Senior	Total direct beneficiaries
1. Conserve vegetation cover	2987	2633	5620	515	840
2. Adapt farming practices to new climate change conditions	3191	2952	6143	671	1850
3. Strengthen local capacities and share lessons	Por definir	Por definir	Por definir	Por definir	Por definir.

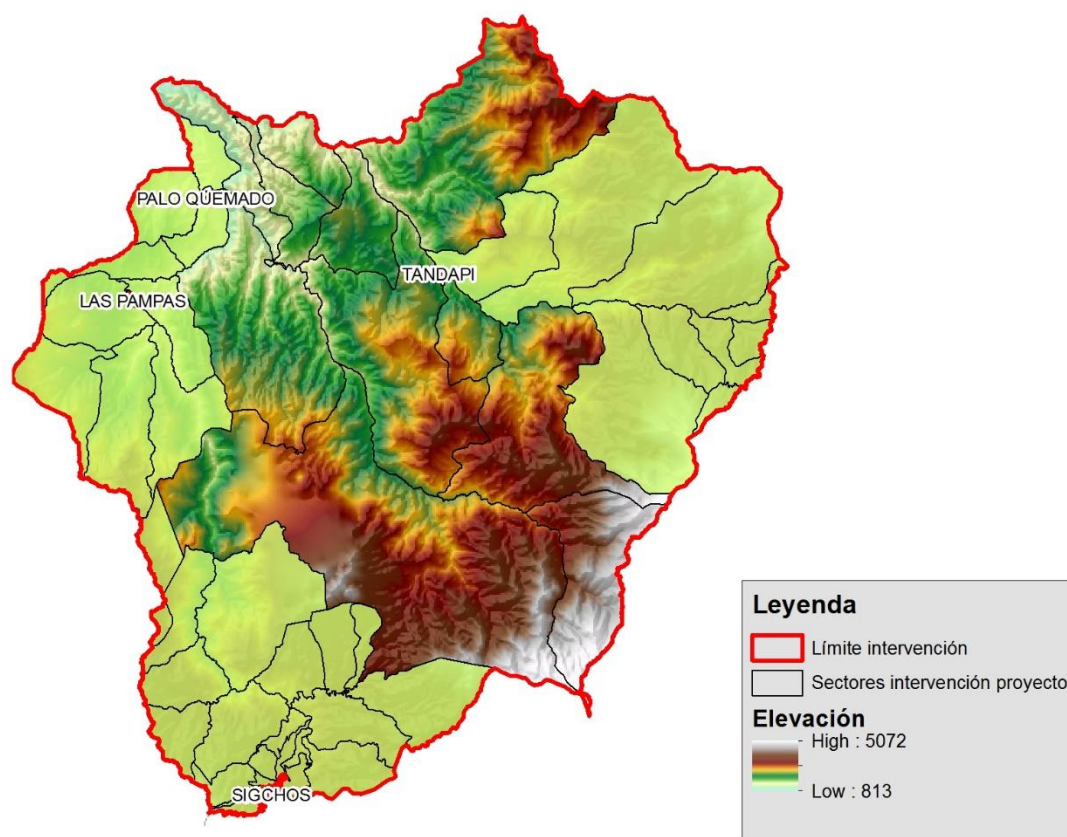


Figure 6. Location of sectors benefiting from the component 2.

Annex 11-A. Alternative approaches considered but not adopted in the project.

Barrier	Project action	Alternative approaches considered but not adopted
Local population not fully aware of climate-related impacts.	Prepare and execute a public communication and education plan (output 7)	At first, it was thought to concentrate on formal education actions. However, there is a need to inform and engage all local stakeholders. Therefore, it was decided to have a wide-spectrum action that includes communication and education to the range of local audiences.
Local development plans do not incorporate adaptation measures.	Mainstream in six development plans ¹ measures for climate change adaptation with a watershed perspective (output 6).	At first, it was considered to concentrate on municipal development plans. However, during the consultation process it was clear that parrish governments are closer to the local population. In addition, municipal plans include the urban areas that have complex issues that are not within the scope of the present project proposal. Therefore, it was decided to focus on the parrish development plans of the five key parishes, and the municipal plan of Sigchos, which is majoritarian rural.
Local production is based on extensive farming practices.	Introduce sustainable farming practices in the two main activities (i.e.,	It was thought to incentive agroforestry as an alternative to existing farming systems. Also, it was considered to incentive a change of crops. These were thought as alternatives to reduce the expansion of the agriculture frontier. However, it became obvious that these

¹ Parishes Manuel Cornejo Astorga, Aloag, El Chaupi, Palo Quemado, and Las Pampas, and the rural area of Sigchos. These parishes are in the lower basin of the Toachi – Pilatón water system.

Barrier	Project action	Alternative approaches considered but not adopted
	sugar cane and pasture) (output 4).	alternatives will not produce short-term benefits to the local farmers. Since the two most important activities are (i) the production of sugar cane and panela and (ii) cattle ranching, it was decided to better build on the interest of local farmers to improve their production to explore better markets. Sugar cane producers have been exploring forms to have their product certified to enter international markets.
Forest areas are not protected.	Increase the forest cover under conservation (output 1), improve the management of the existing protected forests (output 2), and take measures to trap sediments from eroded hillsides (output 3).	<p>The first idea was to incentive the use of Socio Bosque incentives. However, it was considered that this economic incentive will not necessarily contribute to give value of standing forests and vegetation to the local population (it is the central government which “pays” for conservation). The idea of combining Socio Bosque type incentives and a water fund is being explored. The concept is that water users value the conservation of the water sources and contribute to sustain the fund. The fund in turn, will finance (i) incentives to local land-owners, (ii) the management of the large state-own protected forests, and (iii) complementary measures for soil conservation and the control hill erosion. This is an idea in progress. During project preparation, the feasibility of establishing a water fund will be analysed.</p> <p>The artisanal sediment retention dams is an adaptation measure proposed by the consultants that analysed climate change incidence in priority watersheds of Ecuador. Local groups have arguments in favour and against their use. The feasibility of their use will be analysed during project preparation.</p>

Barrier	Project action	Alternative approaches considered but not adopted
Limited climate-related information	Potentiate meteorological and hydrometric data collection and use (output 5)	The first idea was to use stations that have been installed by HIDROTOAPI. However, it was found that they do not serve to provide watershed-wide information, and are not fully operative. Current ideas are to invest in new equipment for the stations managed by INAMHI. The main limitation is securing funding for their long-term operation and maintenance. The water fund seems a probable source of funding, but its feasibility has to be assessed during project preparation.

BUENAS PRÁCTICAS AGRARIAS

PARA ENFRENTAR AL CAMBIO CLIMÁTICO EN ECUADOR



MAGAP/GIZ- ProCamBío 2017

Buenas Prácticas Agrarias para enfrentar al Cambio Climático en Ecuador

Con la asesoría técnica y financiamiento de Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH por encargo del Ministerio de Cooperación Económica y Desarrollo (BMZ) del Gobierno Federal de Alemania, a través del Programa Biodiversidad, Cambio Climático y Desarrollo Sostenible (ProCamBío)

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El uso de un lenguaje que no discrimine ni marque diferencias entre hombres y mujeres es una de las preocupaciones de la Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Sin embargo, su utilización en nuestra lengua plantea soluciones muy distintas, sobre las que los lingüistas aún no han conseguido acuerdo. En tal sentido y con el fin de evitar la sobrecarga gráfica que supondría utilizar en español o/a - os/as para marcar la existencia de ambos sexos, se ha optado por utilizar el clásico masculino genérico, en el entendido de que todas las menciones en tal género representan siempre a hombres y mujeres, y abarcan claramente ambos sexos.

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ACAI	Asociación de Campesinos Agroecológicos de Intag
ACCRI	Asociación Agro-artesanal de Caficultores Río Intag
ADRA	Agencia Adventista de Desarrollo y Recursos Asistenciales del Ecuador
AGSO	Asociación de Ganaderos de la Sierra y Oriente
ANCUPA	Asociación Nacional de Cultivadores de Palma Aceitera
APECAP	Asociación de Cafetaleros Ecológicos de Palanda y Chinchipe
ASOPROGF	Asociación de Productores de Guarango y Frutales
BID	Banco Interamericano de Desarrollo
CC	Cambio Climático
CFC	Fondo Común para los Productos Básicos
CO₂	Dióxido de carbono
CH₄	Metano
CIALCOS	Circuitos Alternativos de Comercialización
CICC	Comité Interinstitucional de Cambio Climático
CIIFEN	Centro Internacional para la Investigación del Fenómeno de El Niño
CMNUCC	Convención Marco de las Naciones Unidas sobre el Cambio Climático
CODENPE	Consejo de las Nacionalidades y Pueblos del Ecuador
COICC	Corporación de Organizaciones Indígenas y Campesinas de Cusubamba
CORECAE	Corporación Ecuatoriana de Cafetaleros
COTESU/FOES	Fondo Ecuatoriano de Contravalor Suizo
ECOPAR	Corporación para la investigación, capacitación apoyo técnico para el manejo sustentable de los ecosistemas tropicales
DECOIN	Organización para la Defensa y Conservación Ecológica de Intag
DMQ	Distrito Metropolitano de Quito
IPCC	Grupo Intergubernamental de expertos sobre el Cambio Climático (Intergovernmental Panel on Climate Change, siglas que corresponden al término en inglés)
FAO	Organización de las Naciones Unidas para la Alimentación y la Agricultura (Food and Agriculture Organization of the United Nations, siglas que corresponden al término en inglés)
FAPECAFES	Federación Regional de Asociaciones de Pequeños Cafetaleros Ecológicos del Sur
FEPP	Fondo Ecuatoriano Populorum Progressio
FLIPA	Fondo Latinoamericano de Innovación en Palma de Aceite
GACC	Gestión de la Adaptación al Cambio Climático para Disminuir la Vulnerabilidad Social, Económica y Ambiental
GAD	Gobierno Autónomo Descentralizado
GEI	Gases de Efecto Invernadero
INAMHI	Instituto Nacional de Meteorología e Hidrología
INIAP	Instituto Nacional Autónomo de Investigaciones Agropecuarias
JADRAZOB	Junta de Agua de Riego y Consumo Humano de Cusubamba
LULUCF	Uso del Suelo, Cambios en el Uso del Suelo y Silvicultura (Land Use, Land Use Change and Forestry siglas que corresponden al término en inglés)

Lista de Acrónimos

MAGAP	Ministerio de Agricultura, Ganadería, Acuacultura y Pesca
MAE	Ministerio del Ambiente
MCCH	Fundación Maquita Cushunchic
MCPEC	Ministerio Coordinador de Producción, Empleo y Competitividad
MDL	Mecanismo de Desarrollo Limpio
MEER	Ministerio de Electricidad y Energía Renovable
MIPRO	Ministerio de Industrias y Productividad
NAMA	Acción Nacional Apropiada de Mitigación (Nationally Appropriate Mitigation Actions, siglas que corresponden al término en inglés)
N₂O	Óxido nitroso
OTCA	Organización del Tratado de Cooperación Amazónica
PACC	Proyecto de Adaptación al Cambio Climático
PIB	Producto Interno Bruto
PDOT	Plan de Desarrollo y Ordenamiento Territorial
PNBV	Plan Nacional del Buen Vivir 2013-2017
PNUD	Programa de las Naciones Unidas para el Desarrollo
PNFR	Plan Nacional de Forestación y Reforestación
PRAA	Proyecto Regional Andino de Adaptación al Cambio Climático
PREDECAN	Proyecto Apoyo a la Prevención de Desastres en la Comunidad Andina
PRODECI	Fundación Pro-Derechos Ciudadanos
PVC	Policloruro de Vinilo
RAL	Red Agroecológica de Loja
REDD	Reducción de Emisiones por Deforestación y Degradación forestal
REDD+	Reducción de Emisiones por Deforestación y Degradación forestal; y función de la conservación, la gestión sostenible de los bosques y el aumento de las reservas forestales de carbono
RESSAK	Red de Economía Solidaria y Soberanía Alimentaria del Territorio Kayambi
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación de México
SENAGUA	Secretaría del Agua
SENPLADES	Secretaría Nacional de Planificación y Desarrollo
SETECI	Secretaría Técnica de Cooperación Internacional
SIPA	Sistemas Integrales de Producción Agropecuaria
SNAP	Sistema Nacional de Áreas Protegidas
SCN	Segunda Comunicación Nacional de Ecuador
SNDGR	Sistema Nacional Descentralizado de Gestión de Riesgos
SGR	Secretaría de Gestión de Riesgos
TCN	Tercera Comunicación Nacional de Ecuador
UPA	Unidades de Producción Agropecuarias

Presentación

En Ecuador, se han identificado probables impactos del cambio climático en la agricultura. Los agricultores, promoviendo su conocimiento ancestral y cultural, han generado experiencias en la gestión de riesgos climáticos, basadas en las prácticas y tecnologías actuales. Es evidente que la gama de expresiones creativas de los productores, en diferentes áreas de conocimiento, ofrece una gran oportunidad para superar las asimetrías en el acceso a las herramientas y habilidades que mejoran la productividad, el aumento de su impacto social y la inclusión.

Los procesos de asistencia técnica y extensionismo rural buscan aumentar la resiliencia de los sistemas de cultivo y alimentos a los impactos del cambio climático, al tiempo que mantienen la producción de alimentos. Es así como la adaptación de los sistemas productivos al cambio climático es esencial para fomentar la seguridad alimentaria, mitigar la pobreza y la gestión sostenible, así como la conservación de los recursos naturales.

El objetivo de este documento es identificar y evidenciar como las Buenas Prácticas Agrarias (BPA) y las Buenas Prácticas Pecuarias (BPP) pueden aportar a la mitigación del Gas de Efecto Invernadero (GEI) y la adaptación al cambio climático. Este conjunto de experiencias es una herramienta para técnicos y productores a tomar acciones locales, con el propósito de promover la eficiencia de la producción y una agricultura más productiva y sostenible en un escenario de cambio climático.

Es así como la Coordinación General de Innovación del Ministerio de Agricultura, Ganadería, Acuacultura y Pesca (MAGAP), es asesorada por el Programa Biodiversidad, Cambio Climático y Desarrollo Sostenible (ProCamBío), de la Gesellschaft für Internationale Zusammenarbeit (GIZ), para la identificación y sistematización de buenas prácticas agrarias implementadas en el territorio nacional, considerando sus realidades locales, sean culturales y ancestrales, de gran utilidad para mitigar los efectos del cambio climático.

El conocimiento del cambio climático, el marco legal vigente en Ecuador y las prioridades de atención e innovación son clave para que el sector agrícola enfrente satisfactoriamente los riesgos agroclimáticos provenientes del cambio climático. Este documento es de utilidad para los extensionistas rurales y proveedores de asistencia técnica, que buscan fortalecer las capacidades de las organizaciones de productores con herramientas ejemplares para enfrentar el cambio climático.



Antecedentes

Entre 2014 y 2015, el Ministerio de Agricultura, Ganadería, Acuacultura y Pesca del Ecuador (MAGAP) con la asesoría técnica y el apoyo de la Cooperación Técnica Alemana (GIZ), a través de la Mesa de Cambio Climático de la institución, acompañó técnicamente la sistematización de veinte y nueve iniciativas, relacionadas a buenas prácticas agrarias que contribuyen a la adaptación y mitigación del cambio climático.

El trabajo se realizó en coordinación con el Ministerio del Ambiente (MAE) y motivó a la generación de la presente Guía sobre Buenas Prácticas Agrarias para enfrentar al Cambio Climático en Ecuador. Estas experiencias muestran como los productores agropecuarios, se adaptan al cambio climático y/o a la variabilidad climática.

Este documento es una contribución del Ministerio de Agricultura, Ganadería, Acuacultura y Pesca a la implementación de la Estrategia Nacional de Cambio Climático del Ecuador, política integral que guía la lucha contra el cambio climático. Aporta de manera directa a mejorar la capacidad adaptativa de la política agrícola del país a nivel nacional y en territorio.

El Ministerio de Agricultura, Ganadería, Acuacultura y Pesca del Ecuador (MAGAP) y la Cooperación Técnica Alemana agradecen a los productores, sus organizaciones y otros actores que contribuyeron a la sistematización de esta herramienta de trabajo.



Capítulo 1 Conociendo el Cambio Climático

En este capítulo, se hace una breve introducción al tema de cambio climático, se trabajan conceptos básicos y se describen de manera general las causas e impactos a nivel regional y en Ecuador. A la par, se explica qué es mitigación y adaptación al cambio climático, y se describe el marco legal nacional relacionado a la temática. Finalmente, se detalla a la innovación agrícola como una herramienta para enfrentar al cambio climático.

Introducción

En 1988 se estableció el Grupo Inter gubernamental de expertos sobre el cambio climático (IPCC) por el Programa de las Naciones Unidas para el Medio Ambiente y la Organización Meteorológica Mundial. El objetivo de este grupo es evaluar la magnitud y cronología del cambio climático, estimar sus posibles efectos ambientales y socioeconómicos, y presentar estrategias de respuesta realistas al cambio climático. Según el IPCC, se estima que para el año 2100 las concentraciones atmosféricas de CO₂ podrían alcanzar niveles entre 540 ppm y 970 ppm, lo que resultaría en un incremento de la temperatura entre 1,4 – 5,8 °C (IPCC, 2015).

La variación del clima influye directamente en la producción agropecuaria y en el suministro de agua en todo el mundo, y en Ecuador no es la excepción. El cambio climático genera impactos en diversas formas y en los distintos sectores que están relacionados directamente con la disponibilidad (calidad y cantidad) de agua, suelo y de recursos naturales. Por esta razón, existe una estrecha relación entre el cambio climático, la

seguridad alimentaria, y una posible crisis social y económica de las poblaciones (Easterling, y otros, 2007).

Ahí surge la importancia de generar y transmitir constantemente conocimientos, capacidades y/o tecnologías que aporten a la adaptación y mitigación desde territorio principalmente, concibiendo al mismo tiempo que el cambio climático es un eje transversal en todos los sectores de la economía y del desarrollo de un país, pero también de las medidas de desarrollo, toma de decisiones políticas y planificación territorial (GIZ, 2015).

Definiciones en cambio climático

Para comprender mejor el tema de cambio climático, se debe entender primero su marco conceptual e institucional. Según el IPCC, el cambio climático se define como “una importante variación estadística en el estado medio del clima o en su variabilidad, que persiste durante un período prolongado (normalmente decenios o incluso más). El cambio climático se puede deber a procesos naturales internos o a cambios del forzamiento externo, o bien a cambios persistentes antropogénicos en la composición de la atmósfera o en el uso de las tierras (IPCC, 2015).

La Convención Marco de las Naciones Unidas sobre el Cambio Climático (CMNUCC) en su Art.1, lo define en cambio como “un cambio en el clima atribuido directa o indirectamente a la actividad humana que altera la composición de la atmósfera mundial y que se suma a la variabilidad natural del clima observada durante períodos de tiempo comparables” (1992).

La CMNUCC distingue entre ‘cambio climático’ y ‘variabilidad climática’. La primera es atribuida a las actividades humanas que alteran la composición atmosférica; la segunda es atribuida a causas naturales (IPCC, 2015).

Según el Ministerio del Ambiente (MAE) la variabilidad climática es mayor a nivel regional o local que al nivel hemisférico o global (PACC,





2015). En este sentido, el Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN) precisa que la alteración en el clima es percibida como una alteración en la variabilidad del clima (en una escala temporal interanual o inter década), presentando efectivamente eventos con más frecuencia e intensidad. Por ejemplo, las ondas cálidas o frías cambian volviéndose más intensas y marcadas. Otro ejemplo son vientos más fuertes, casi tipo huracanados en algunos momentos, en lugares en donde esto no es común (CIIFEN, 2015).

Causas e impactos del cambio climático en Ecuador

Las variaciones en el clima, el efecto invernadero y el calentamiento global son fenómenos que suceden de manera natural, y que tienen su origen a partir de procesos internos de la naturaleza. Sin embargo, la alteración de estos fenómenos por acciones externas y persistentes del ser humano, provocan el aumento de Gases de Efecto Invernadero (GEI) en la atmósfera.

Aunque los impactos del cambio climático pueden ser sentidos primero y con mayor intensidad en aquellos países que ya poseen desafíos ambientales y de seguridad alimentaria, a la postre dicho cambio perjudicará a países de todas las regiones, por lo que es una problemática global.

En Ecuador ya se han evidenciado las consecuencias del cambio climático. La ocurrencia de eventos naturales extremos y el aumento de la variabilidad climática han caracterizado el clima en los últimos años y han ocasionado impactos sociales, ambientales y económicos significativos.

De acuerdo a la Segunda Comunicación Nacional sobre Cambio Climático¹, hasta el 2011 el Instituto de Meteorología e Hidrología del Ecuador (INAMHI) registró en Ecuador un aumento de 1,4 grados centígrados entre 1960 y 2006. En promedio, para ese periodo la precipitación anual

se incrementó en un 33% en la región Litoral y en un 8% en la región Interandina. Esta variabilidad extrema e inesperada del clima causa por ejemplo potentes precipitaciones, sequías exageradas debido a la escasez o abundancia de agua en algunos lugares; o que el suelo se erosione más rápidamente por la influencia de vientos fuertes.

Diversos sectores de la economía han sido afectados, sobre todo los relacionados directamente con la disponibilidad (calidad y cantidad) de recursos naturales como el agua o el suelo; un ejemplo de ello es el sector agropecuario que ha experimentado la disminución y muchas veces la pérdida total de cosechas, incremento de plagas y enfermedades en los cultivos, quebranto de la diversidad, entre otros (GIZ, 2015).

Impactos del cambio climático en el sector agropecuario del Ecuador

El multisector del agro es uno de los más importantes para el desarrollo del país; puesto que es primordial para la obtención de la seguridad alimentaria y los medios de vida de la población, ya que proporciona alimentos para el ser humano y los animales, fibras e ingresos a millones de personas, de manera directa a través de la producción, e indirecta a lo largo de la cadena de valor.

Según cifras de Banco Central del Ecuador, al 2014 su participación al Producto Interno Bruto (PIB) promedio en los últimos doce años fue del 8,5% ubicándose como el sexto sector que aporta a la producción. Sin embargo, a pesar de ser una parte clave para la economía nacional el agro es uno de los sectores que más contribuye a la emisión de GEI en Ecuador, considerando que sus actividades contribuyen a esta problemática con la emisión de dióxido de carbono (CO₂), metano (CH₄) y óxido nitroso (N₂O) generados en actividades como la extensión de la frontera agrícola, la ganadería y el uso de fertilizantes

¹ La Comunicación Nacional sobre Cambio Climático es un documento mediante el cual el país informa a la CMNUCC acerca de las acciones tomadas o previstas para enfrentar el cambio climático.



nitrogenados². Por ello, puede acentuar o reducir las emisiones de GEI que inciden en el calentamiento global (IPCC, 2014).

De acuerdo al quinto informe de evaluación del IPCC, cuanto más dependiente es la población rural de los ingresos económicos provenientes de la agricultura, es más sensible y vulnerable a los efectos del cambio climático.

En Ecuador, el cambio climático afecta a la agricultura en diversas formas, y casi todas son un riesgo para la seguridad alimentaria de las personas más vulnerables. Ha existido un incremento en la variabilidad climática que genera incertidumbre en la planificación de las actividades agrícolas, una mayor presión en los sistemas agrícolas, mayor frecuencia e intensidad en extremos climáticos, e incremento de plagas y enfermedades de los cultivos (FAO, 2015).

En 1998, las inundaciones en la Costa causaron problemas en el 24,4% de cultivos de arroz en la provincia de Guayas y en el 23,2% en la provincia de Los Ríos, además de otras afectaciones a los cultivos de maíz duro, caña de azúcar, entre otros productos. En general, se perdieron alrededor de 80.000 hectáreas de arroz, que representan aproximadamente el 19% de la superficie sembrada a nivel nacional; y el 62% de los hogares más vulnerables fueron afectados por las inundaciones porque tenían como principal fuente de ingreso el salario en estas áreas agrícolas (MAGAP, 2010).

Entre 2002 y 2007 diversos cultivos permanentes en todo el país se redujeron en un 11%; y los transitorios alrededor de un 24%.

Según la Segunda Comunicación Nacional sobre Cambio Climático, en septiembre de 2009 y enero de 2010, cuatro provincias (Cotopaxi, Tungurahua,

Bolívar y Chimborazo) sintieron un fuerte estiaje que provocó que el 98% de las tierras cultivadas presenten sequías con niveles que iban de grave a muy grave, y el 2% restante fueron declaradas en “pérdida total”. Con esto, alrededor de 18.000 familias campesinas fueron afectadas (MAGAP, 2010).

Los problemas generados por las sequías e inundaciones mencionadas anteriormente, contribuyeron a un alza de precios en los alimentos básicos hasta de un 30%.

En el caso del sector agropecuario, las condiciones climáticas afectan directamente a la producción agraria; e inciden sobre las condiciones de almacenaje, el transporte y conservación de productos, generan la presencia de plagas y enfermedades; alterando así las condiciones del mercado y afectando casi la totalidad de los procesos en las cadenas productivas.

Las consecuencias también se han relacionado con el aumento del estrés hídrico (disminución de la disponibilidad de agua); precipitación errática (los períodos más secos durante todo el año posiblemente serán menos secos, mientras que los períodos más húmedos se intensificarían); disminución en la productividad ganadera; cambios en la fenología de los cultivos; y pérdida de recursos filogenéticos, entre otros impactos críticos para el sector (BID, 2012).

A largo plazo el aumento de la variabilidad climática y en las temperaturas, los cambios en la disponibilidad de agua y otras características de un clima cambiante influirán desfavorablemente en la capacidad de los agricultores para producir alimentos (IPCC, 2014). En este marco se estimó que para el año 2030, si la temperatura aumenta en 2°C y la lluvia se reduce un 15% en la región, incluido Ecuador, la oferta de alimentos se podría afectar gravemente, en especial la de arroz (60%), seguido por papa (34%) y soja (5%) colocando a las poblaciones rurales vulnerables en una virtual crisis alimentaria (PREDECAN, 2009)³.

² Un tercio de estos gases a nivel global son emitidos principalmente por estas actividades; en América Latina, estas son relativamente bajas y representan alrededor del 7% del total de GEI, y el 12% de CO₂ (FAO, 2015).





En la Amazonia, en cambio, y según la Organización del Tratado de Cooperación Amazónica (OTCA, 2014) la pérdida de biodiversidad y el recurso agua serán muy afectados, provocando inundaciones de gran nivel.

A la par, las estimaciones sugieren que la productividad de la agricultura podría descender entre el 12 y 50% como resultado de los cambios de clima. Por ejemplo, se estima que para el año 2080 las pérdidas en Ecuador provocadas por los menores rendimientos podrían alcanzar el 20% en el caso del cacao y el café, y el 40% en el caso de la banana y la caña de azúcar (CEPAL, 2010).

Se debe entender que los impactos varían en función del sistema de producción agropecuaria y de su ubicación geográfica. De acuerdo al *Estudio de Vulnerabilidad actual a los riesgos climáticos en el sector de los recursos hídricos en las cuencas de los ríos Paute, Jubones, Catamayo, Chone, Portoviejo y Babahoyo* del Proyecto PACC (2009), las provincias de Manabí y Esmeraldas, y las zonas altas de la provincia de El Oro son especialmente vulnerables; mientras que gran parte de las provincias de Guayas y Los Ríos presentan riesgos menores.

Adaptación y mitigación del cambio climático

El cambio climático y sus impactos se sienten en el día a día, por ello es importante también saber que existen maneras de responder frente a los mismos. Conviene entender otras dos nociones importantes dentro del tema, estas son adaptación y mitigación del cambio climático.

Adaptación significa hacer ajustes en respuesta a los estímulos climáticos y sus efectos, para moderar el daño o aprovechar las oportunidades beneficiosas (IPCC, 2015).

La adaptación persigue dos objetivos: primero, ser un proceso de cambio continuo que permita

tomar decisiones informadas sobre los medios de vida en un clima cambiante, fundamentadas en información existente. Y segundo, que las personas aprendan a adaptarse combinando actividades, y generando capacidades dirigidas a enfrentar los riesgos actuales relacionados al cambio climático, las tendencias emergentes, y a gestionar la incertidumbre que les provoca el cambio climático (Oxfam, 2010)⁴.

La adaptación puede ser espontánea (activada por los cambios ecológicos de los sistemas naturales y los cambios del mercado o del bienestar en los sistemas humanos) o planificada (como consecuencia de una decisión política deliberada, basada en la conciencia de que las condiciones cambiaron o están por cambiar y se necesita pasar a la acción). También, puede ser en respuesta 'ex post', o en anticipación 'ex ante' a los cambios en las condiciones climáticas (PNUD, 2012).

Mitigación, en cambio, describe las intervenciones del ser humano para reducir las fuentes o mejorar los sumideros de gases de efecto invernadero. Involucra el desarrollo de políticas, a la transferencia de tecnologías, a la generación de capacidades locales y nacionales, y a la implementación de acciones tendientes a limitar y/o reducir las emisiones de GEI (IPCC, 2015).

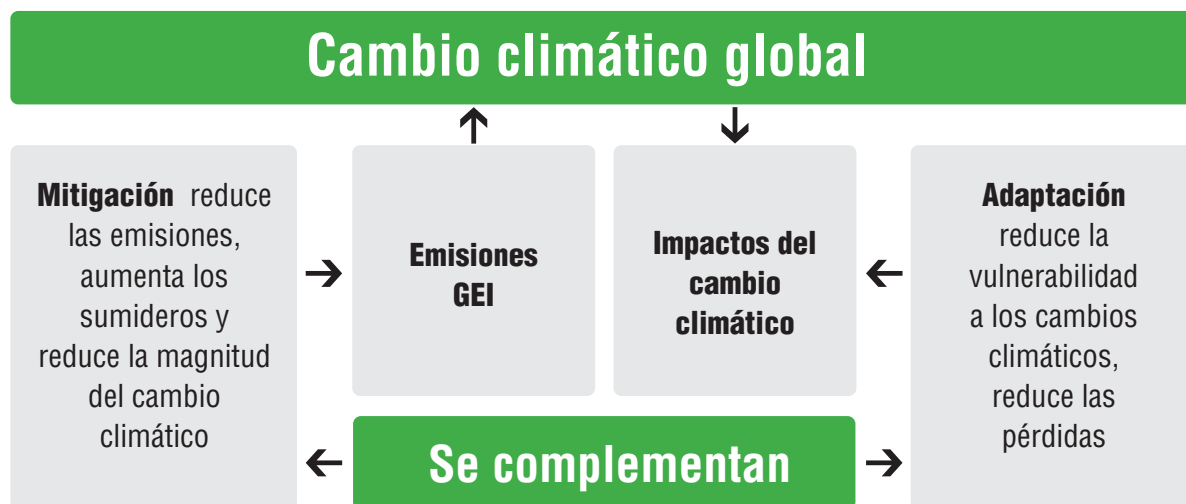
Es importante recordar que la mitigación es esencial y la adaptación es inevitable, ambas son complementarias y no excluyentes.

³ El proyecto de Apoyo a la Prevención de Desastres en la Comunidad Andina (PREDECAN) es una iniciativa de los países andinos, representados por la Secretaría General de la Comunidad Andina con el soporte financiero de la Comisión Europea, diseñado y ejecutado para mejorar los servicios en la gestión de riesgo de la subregión andina.

⁴ Oxfam es una confederación internacional de 17 organizaciones que trabajan junto a organizaciones socias y comunidades locales en más de 90 países.



Imagen 1. Mitigación y Adaptación al cambio climático



Adaptación y mitigación del cambio climático para el sector agropecuario del Ecuador

De acuerdo con el Grupo de Energía y Medio Ambiente del Programa de las Naciones Unidas para el Desarrollo (PNUD), las medidas de adaptación aplicadas al sector agropecuario deberán estar encaminadas a conservar los recursos naturales, elevar la productividad, equipar y fortalecer los sistemas de alerta temprana (2012).

En lo que respecta a mitigación, las acciones en el sector agrícola que se implementen deben ser enfocadas a disminuir las emisiones de GEI, e incrementar su captura. Estas acciones pueden efectuarse tanto en el abastecimiento como en el consumo de energía; y son aplicables tanto a la quema de combustibles como a las emisiones fugitivas (PNUD, 2012).

El Estado ecuatoriano es consciente de la importancia de priorizar la planificación, el diseño de políticas y la asignación de inversiones para el sector agrícola, tanto a nivel nacional como local. En aras de cumplir con este propósito se

está desarrollando actividades que apuntan a diversificar las oportunidades en los distintos sectores y ámbitos de la economía y del desarrollo en el país. Para ello, se ha logrado generar el compromiso e interés en los actores tanto de territorio, como a nivel del sector público y privado, logrando así generar responsabilidades compartidas, y mejorar la capacidad de respuesta (o la resiliencia) del Ecuador frente al cambio climático.

Un ejemplo de esto es el establecimiento de la Mesa de Cambio Climático, liderada por el MAGAP, la misma que tiene como objetivo trabajar el tema de cambio climático como eje transversal en las acciones que se emprendan en el multisector del agro.

En este contexto, el MAGAP está implementando el Seguro Agrícola desde mayo de 2010. El programa tiene como objetivo apoyar a los pequeños y medianos productores agrícolas en la reducción de las pérdidas ocasionadas por eventos climáticos y biológicos, por medio de mecanismos de protección de cultivos clave que permitan la recuperación de las inversiones y su estabilidad socioeconómica. Con el Seguro Agrícola, pequeños y medianos productores de la Sierra y Costa protegen sus cultivos de papa, trigo, arroz y maíz duro frente a problemas como excesos o escasez de lluvias, desborde de ríos e inundaciones, heladas, granizo, vientos huracanados, plagas, enfermedades incontrolables e incendios (MAGAP, 2010).



Marco institucional y regulatorio sobre cambio climático en Ecuador

El Gobierno de la República del Ecuador reconoce que el cambio climático es un desafío que puede afectar negativamente la seguridad, el desarrollo y el bienestar de la población. En consideración con este desafío, el Estado está realizando esfuerzos para reducir la vulnerabilidad de sus sistemas sociales, económicos y ambientales, y al mismo tiempo identificar los sectores de la economía en los cuales se pueda tomar las medidas a corto, mediano y largo plazo para reducir las emisiones de GEI a nivel nacional.

En este sentido el Gobierno cuenta con los siguientes instrumentos legales y normativos sobre el cambio climático:

- La Constitución de la República del 2008, en donde se hace referencia a la adopción de medidas adecuadas y transversales para la mitigación del cambio climático. Contiene dos artículos específicos que se relacionan con la gestión sobre cambio climático en el país. Uno de ellos es el Artículo 413 en donde se promueve la eficiencia energética; el desarrollo y uso de prácticas y tecnologías ambientalmente limpias y sanas; las energías renovables, diversificadas, de bajo impacto que no pongan en riesgo la soberanía alimentaria; el equilibrio ecológico de los ecosistemas; y el derecho al agua. Por otro lado, el Artículo 414 que se enfoca en la adopción de medidas adecuadas y transversales para la mitigación del cambio climático mediante la limitación tanto de las emisiones de GEI, como de la deforestación y la contaminación atmosférica; adoptando además medidas para la conservación de los bosques y la vegetación; y para la protección de la población en riesgo (Asamblea Nacional, 2008).
- El marco legal del Ecuador para proteger y conservar áreas silvestres representativas de los ecosistemas del país, el establecimiento del patrimonio nacional de áreas protegidas y la responsabilidad del gobierno nacional de administrar, manejar y conservar la flora y fauna silvestres existentes en el país. Desde el 2008, mediante Decreto 931, se transfirieron las competencias de forestación y reforestación del MAE al MAGAP; el MAE es el encargado de la administración del Sistema Nacional de Áreas Protegidas y Bosques Protectores. En el sector agropecuario se presentan adelantos sobre todo en el sector USCUS, en el que se han identificado y priorizado cinco medidas de mitigación: i) reducción de la deforestación de bosques nativos; ii) manejo sustentable de bosque con aprovechamiento de madera de bosque nativo; iii) forestación y reforestación para captura de CO₂; iv) reducción de emisiones vía sistemas productivos sostenibles (agroforestería); v) reducción de emisiones vía restauración y conservación de suelos. La cobertura que se pretende cubrir es de 650.000 hectáreas con una reducción de emisiones de 2.116.100 ton CO₂ eq y una captura de 365.700 ton CO₂ eq. El costo estimado es de 1.680 millones de dólares (MAE, 2015).
- El Decreto Ejecutivo No. 1815 del 1 de julio del 2009, mediante cual el señor Presidente de la República, Eco. Rafael Correa, declaró como política de Estado la adaptación y la mitigación del cambio climático y creó mediante Decreto Ejecutivo 104 del 29 de octubre 2009 la Subsecretaría de Cambio Climático (SCC) del Ministerio del Ambiente. A esto se suma el Decreto 033, sobre Regulación del mecanismo REDD+, y el Decreto 089, que trata la Regulación de Acciones Nacionales Apropriadas de Mitigación (NAMAs).
- La creación del Comité Interinstitucional de Cambio Climático (CICC), como órgano gubernamental de coordinación para la ejecución integral de políticas nacionales pertinentes al cambio climático en el 2010 mediante Decreto No. 945. Su responsabilidad es la de impulsar la implementación de la Estrategia Nacional de Cambio Climático. El comité está conformado por el MAE, el Ministerio de Relaciones Exteriores, Comercio e Integración, la Secretaría Nacional de Planificación y Desarrollo, los Ministerios Coordinadores de Patrimonio, Desarrollo Social, Sectores Estratégicos y Producción, Empleo y Competitividad, y las Secretarías de Agua y Gestión de Riesgos (MAE, 2011).



- La Estrategia Nacional de Cambio Climático 2012–2025 que fue establecida a través del Acuerdo Ministerial 095 del 19 de julio del 2012, formulada bajo una lógica de resultados en adaptación y mitigación”. En septiembre de 2014, el Acuerdo Ministerial 089 instituye al Ministerio del Ambiente como la Autoridad Nacional para aplicar Acciones Nacionales Apropriadas de Mitigación.

- El Plan Nacional para el Buen Vivir 2013–2017 que contextualiza al cambio climático como una problemática multisectorial de alcance nacional que debe ser abordado con medidas programáticas que generen resultados en el mediano y corto plazo (SENPLADES, 2013).

Actualmente, Ecuador cuenta con la Estrategia Nacional de Cambio Climático 2012-2025, misma que abordará un enfoque sectorial, agrupando medidas y acciones en el ámbito de mitigación y adaptación sobre la base de la priorización de sectores claves identificados. Los sectores priorizados tanto para adaptación como mitigación están descritos en la ENCC.

Ecuador participa en la lucha contra el cambio climático, es signatario de la CMNUCC, y suscribió el Acuerdo de París el 26 de julio de 2016, el cual establece medidas para la reducción de las emisiones de GEI a través de la mitigación, adaptación y resiliencia de los ecosistemas a efectos del calentamiento global.

Innovación y cambio climático en el sector agropecuario del Ecuador

Se genera la necesidad de innovar cuando las soluciones aplicadas a los problemas presentes en el agro ya no suelen dar respuesta. Esto ocurre cuando el problema resurge siendo inmune a soluciones anteriores, o porque las condiciones del contexto y el entorno se hayan modificado,

invalidando de la misma manera soluciones conocidas (Gupta, 2015).

La adaptación al cambio climático y la mitigación de las emisiones de GEI requieren del desarrollo y la adopción de nuevas prácticas agrícolas, novedosas estrategias de negociación de conflictos sociales y políticas y avanzadas técnicas de manejo de los recursos naturales. El ajuste de estas prácticas al contexto de los impactos actuales y futuros del cambio climático es esencial, por ello es indispensable la innovación agraria (FAO, 2010).

Los técnicos de diferentes ramas del agro y personas involucradas en la temática de innovación del MAGAP definen a la innovación agraria como un “proceso de generación, aplicación de nuevas ideas y adaptación de conocimientos para mejorar la productividad, competitividad y sustentabilidad de los actores del multisector del Agro en un contexto de cambio climático.”

Este tipo de innovaciones puede surgir a través de un descubrimiento inesperado, una experimentación sistemática, procesos de prueba y error o la combinación de soluciones. Se produce innovación en el sector sólo cuando la solución aportada (tras un proceso de experimentación) es adoptada y aceptada por sus beneficiarios potenciales (productores), resolviendo el problema que dio origen al proceso creador (MAGAP, 2015).

El MAGAP, a través de la Coordinación General de Innovación (CGI) fomenta la difusión de las innovaciones de los medianos y pequeños productores mediante la polinización cruzada de ideas y la creación de vínculos laterales entre los productores. Esto genera espacios para compartir sus ideas con los proveedores de conocimiento, originando una repartición justa de los beneficios, algunos de los cuales resultarán en las aplicaciones comerciales o de otro tipo.

Es evidente que la gama de expresiones creativas de la gente común, en diferentes áreas de conocimiento, ofrece una gran oportunidad para superar las asimetrías en el acceso de comunidades desfavorecidas a las herramientas y habilidades que mejoran la productividad, el aumento de su impacto social, y la inclusión (Gupta, 2013).





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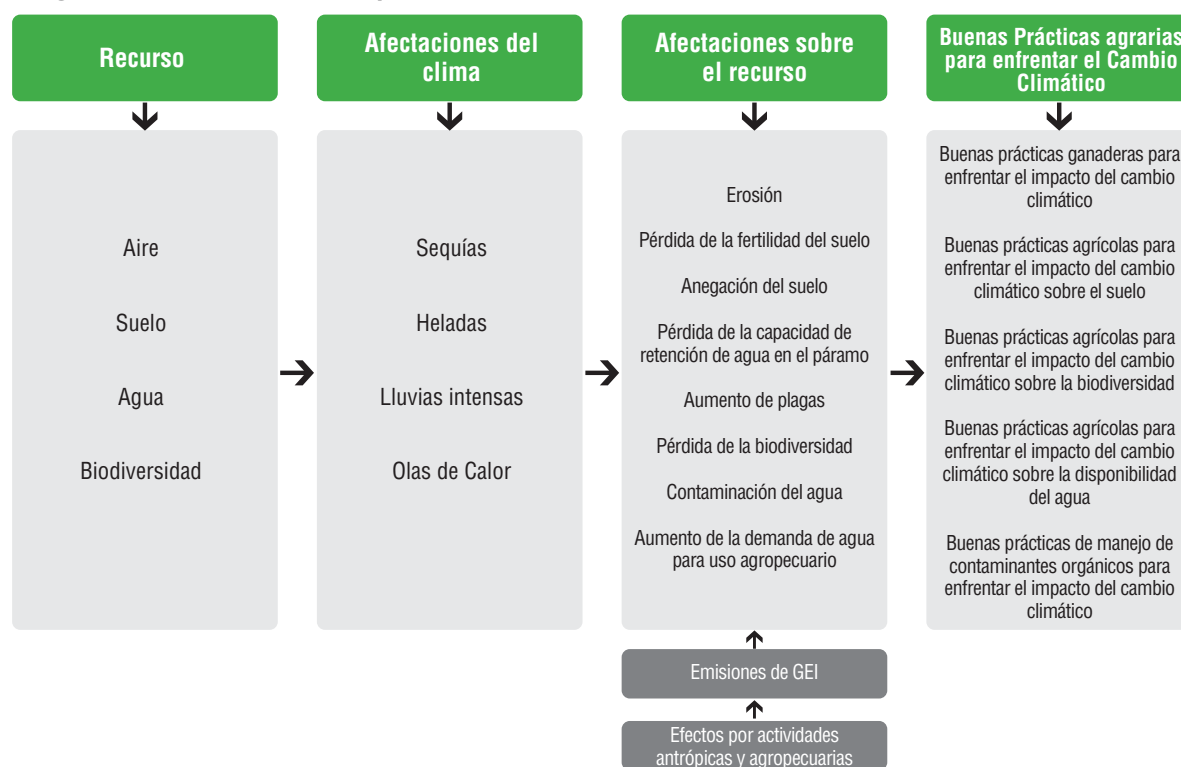
Las aplicaciones de buenas prácticas agrarias recopiladas en este documento son de gran ayuda para el trabajo del extensionista que brinda el servicio de asistencia técnica a los productores del país. Son instrumentos técnicos que pueden ser adaptados a la realidad de los productores locales, con el fin de mejorar su resiliencia a los impactos al cambio climático.

Los productores que son asesorados por los extensionistas del MAGAP generalmente demandan mantener o aumentar la productividad de la explotación agropecuaria. En un escenario de cambio climático, se deben tomar medidas oportunas junto a productores locales, especialmente pequeños productores, para mantener el acceso a alimentos seguros, diversos, sanos y rentables.

Las actividades agropecuarias del país están muy relacionadas con los saberes ancestrales de las regiones a las que pertenecen. Mantener y rescatar este conocimiento local es prioritario dentro de la asistencia técnica brindada por los extensionistas del MAGAP. En un escenario de cambio climático, las prácticas agrícolas ancestrales no siempre pueden ser sustituidas por actividades agropecuarias contemporáneas ya que algunas son perjudiciales a los recursos naturales.

En el siguiente esquema se indica cómo los extensionistas pueden identificar el impacto del cambio climático sobre los recursos naturales y qué medidas se pueden tomar para enfrentarlos.

Imagen 2. Identificación del impacto del cambio climático





Capítulo 2: Buenas prácticas agrarias para enfrentar al cambio climático en Ecuador

En este capítulo se presentan 29 experiencias rescatadas desde territorio, que narran de manera clara y sencilla las buenas prácticas agropecuarias implementadas por organizaciones, asociaciones, finqueros y ciudadanos/as en general, con las que se está dando una respuesta al tema de mitigación y adaptación al cambio climático en los diferentes subsectores del agro en Ecuador.

Por ello, en el primer bloque se relatan las buenas prácticas de ganadería sostenible en el que se refieren a experiencias relacionadas al repoblamiento de camélidos en el páramo, reducción de la frontera agrícola y fomento de la ganadería sostenible y buen manejo pecuario.

En el segundo bloque se narran buenas prácticas agroforestales sostenibles, con la presentación de experiencias sobre el uso de especies nativas forestales, fomento de hornos eficientes, conservación y restauración de remanentes de bosques y manejo eficiente de fincas integrales.

En el tercer bloque se analizan buenas prácticas de manejo sostenible de la tierra en el que se relatan experiencias relacionadas al uso de fertilizantes orgánicos, conservación y restauración de suelos, fomentos de la agroforestería, buen manejo del café de sombra, implementación de fincas análogas, recuperación de cafetales, cultivos orgánicos y fomento de invernaderos.

En el siguiente bloque se sistematizan buenas prácticas de manejo sostenible de la biodiversidad. Aquí se describen experiencias de producción agroecológica, fomento de huertos familiares, implementación de un micro invernadero, reactivación y fomento de granjas orgánicas e implementación de invernadero tubular.

En la siguiente unidad se señalan buenas prácticas en el manejo sostenible del agua, en el que se cuentan experiencias relacionadas al rescate y mejora de albarradas, fomento de acuerdos y ordenanzas relacionadas con este recurso, protección de caudales y microcuencas y cosecha de agua.

Finalmente, se describen buenas prácticas para el manejo de contaminantes orgánicos que relatan medidas relacionadas al fomento de biodigestor y cocinas mejoradas.



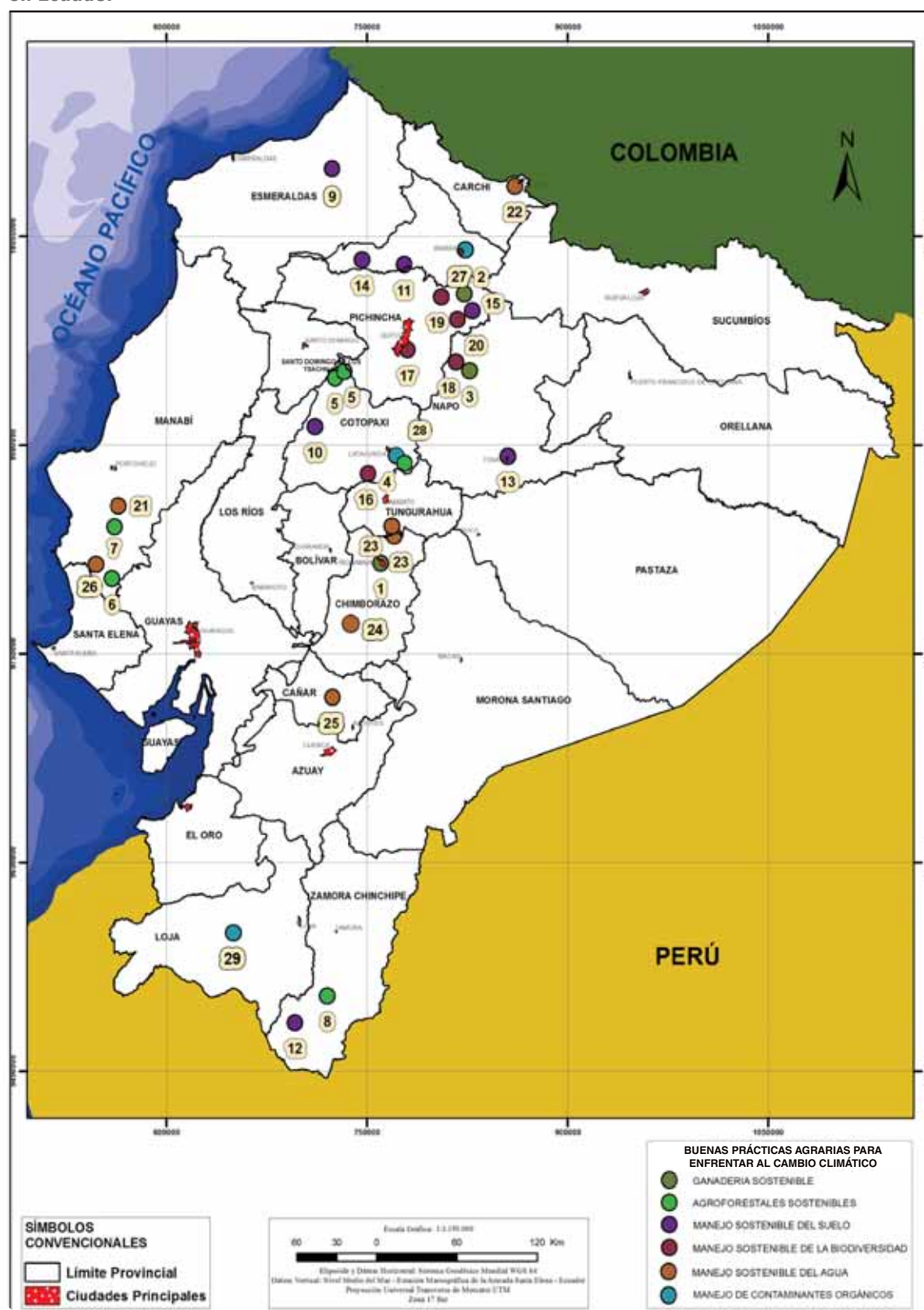


Tabla 1. Buenas prácticas agrarias para enfrentar al cambio climático en el Ecuador

BUENAS PRÁCTICAS AGRARIAS PARA ENFRENTAR AL CAMBIO CLIMÁTICO EN ECUADOR			
BUENAS PRÁCTICAS DE GANADERÍA SOSTENIBLE	Provincia	Cantón	Parroquia o Comunidad
1 Repoblación de camélidos para la reducción de la presión hacia la zona Alto Andina de Ecuador	Chimborazo	Riobamba	Pungalá
2 Reducción de la frontera agrícola y ganadería sostenible para la protección de los páramos en la zona de amortiguamiento del Parque Nacional Cayambe - Coca	Pichincha	Cayambe	San José de Ayora
3 Uso de bio-preparados para el control de enfermedades y aumento de la fertilidad del suelo en la producción de pastos en la micro-cuenca del Río Papallacta	Napo	Baeza	Papallacta
BUENAS PRÁCTICAS AGROFORESTALES SOSTENIBLES			
4 Uso de especies nativas para la conservación y recuperación de caudales de agua para riego y consumo humano en la micro cuenca del Río Nagsiche	Cotopaxi	Salcedo	Cusubamba
5 Disminución del uso de madera como fuente de energía, a través del uso de hornos eficientes para el procesamiento artesanal de la caña de azúcar	Cotopaxi	Sigchos	Las Pampas y Palo Quemado
6 Renovación de cafetales como incentivo para la conservación de remanentes de bosque en la cuenca del Ayampe	Manabí	Puerto López	Salango
7 Recuperación de los remanentes de los bosques degradados de la parte alta de la Cordillera Chongón-Colonche (cuenca del Río Ayampe), a través del incremento de la agrobiodiversidad	Manabí	Puerto López	Salango
8 Prácticas agroforestales y producción bajo invernadero, para enfrentar los impactos generados por las fuertes y abundantes lluvias en la localidad de Sabanilla	Zamora Chinchipe	Zamora	Sabanilla
BUENAS PRÁCTICAS DE MANEJO SOSTENIBLE DEL SUELO			
9 Utilización del raquis de la palma africana para mejorar la capacidad de retención de humedad en el suelo de fincas palmicultoras	Esmeraldas	Quinindé	Rosa Zárate
10 Conservación de suelos a través de uso de terrazas y agroforestería	Cotopaxi	Latacunga	Salvapamba
11 Uso de abonos orgánicos y agroforestería para la recuperación y conservación del suelo, en los cultivos de café de sombra	Imbabura	Cotacachi	Apuela
12 Manejo integrado de plagas y enfermedades en la finca de la Asociación APECAP	Zamora Chinchipe	Palanda	San Francisco del Vergel
13 Aumento de la fertilidad del suelo y resistencia de plagas y enfermedades, a través del uso de abonos orgánicos y patrones silvestres de naranjilla en la Comunidad Wamaní	Napo	Archidona	Cotundo
14 Conservación y recuperación de la fertilidad del suelo a través del uso de barreras vivas (bambú) y drenaje en la finca Bosque de Paz	Imbabura	Ibarra	San Miguel de Ibarra
15 Producción de plántulas de hortalizas bajo invernadero y conservación de fuentes de agua a través de la siembra de especies nativas	Pichincha	Cayambe	
BUENAS PRÁCTICAS DE MANEJO SOSTENIBLE DE LA BIODIVERSIDAD			
16 Producción agroecológica de hortalizas de la Asociación Agroecológica de Mujeres "Semilla y Vida"	Cotopaxi	Salcedo	Cusubamba
17 Implementación de huertos familiares en zonas peri-urbanas del Distrito Metropolitano de Quito	Pichincha	Quito	
18 Implementación de invernaderos familiares en fincas de pequeños agricultores en la zona de Papallacta	Napo	Baeza	Papallacta
19 Implementación de fincas integrales orgánicas como estrategia para recuperación de la fertilidad del suelo	Pichincha	Pedro Moncayo	Tupigachi
BUENAS PRÁCTICAS EN EL MANEJO SOSTENIBLE DEL AGUA			
20 Implementación de invernaderos tubulares en la comunidad la Buena Esperanza	Pichincha	Cayambe	Cangahua
21 Construcción de albardas (diques) para contrarrestar los problemas de sequía en las zonas rurales del cantón 24 de Mayo	Manabí	Sucre	Bahía de Caráquez
22 Delimitación de la frontera agrícola para la conservación de fuentes de agua, en la micro cuenca del Río Ángel	Carchi	Mira, Espejo y Bolívar	
23 Protección y reforestación del Cerro Igualata para la conservación y recuperación de caudales de agua, flora y fauna andina en las provincias de Chimborazo y Tungurahua	Chimborazo y Tungurahua	Guano y Quero	
24 Cosecha de agua de lluvia para la producción sostenible y el emprendimiento en zonas áridas de la parroquia Ilapo	Chimborazo	Guano	Ilapo
25 Sistemas de captación de agua para la producción agroecológica permanente de hortalizas de la Asociación Campesina de Pequeños Productores Chuya Mikuna	Cañar	Suscal y Cañar	Ducur, Chilchil y Chontamarca
26 Reparación de albardas para contrarrestar los problemas de sequía en el recinto La Estrella del Valle de la Virgen	Guayas	Pedro Carbo	Valle de la Virgen
BUENAS PRÁCTICAS PARA EL MANEJO DE CONTAMINANTES ORGÁNICOS			
27 Construcción de bio-digestores para el aprovechamiento del estiércol porcino en Intag	Imbabura	Cotacachi	Peñaherrera
28 Cocinas mejoradas en comunidades indígenas ubicadas en la zona Alto Andina de Ecuador	Cotopaxi	Pujilí	Guangaje
29 Producción de biogas, a través de un biodigestor, para la reducción de emisiones de gases de efecto invernadero	Loja	Paltas	Catacocha



Imagen 3. Ubicación geográfica de las buenas prácticas agrarias para enfrentar al cambio climático en Ecuador





Buenas prácticas de ganadería sostenible

1. Repoblación de camélidos para la reducción de la presión hacia la zona altoandina del Ecuador como medida de adaptación al cambio climático

a. Descripción del lugar

Esta experiencia se implementó en 1998 en varias provincias del Ecuador, pero nació en la provincia de Chimborazo. Hoy en día, son más de 3.000 familias indígenas y mestizas de la zona que están involucradas en el desarrollo del proyecto cuyo objetivo es la reintroducción de camélidos en zonas altas de los páramos, con

finés de protección ambiental y de generación de ingresos.

La zona altoandina de los páramos de Chimborazo está ubicada entre los 3.500 y 5.000 msnm, registrando temperaturas entre los 8 y 12°C y precipitaciones sobre los 1.000 mm anuales, con suelos franco-arcillosos y franco-arenosos.

b. Situación actual de la disponibilidad y manejo del recurso

La provincia de Chimborazo muestra altos déficits hídricos anuales del suelo que se ubican en un rango entre 250 mm hasta 800 mm.

El ecosistema páramo brinda dos servicios ambientales: la provisión continua de agua en cantidad y calidad, y el almacenamiento





de carbono. En la actualidad, el ecosistema está amenazado por impactos locales. La ganadería de bovinos y ovinos es la actividad de mayor impacto, ocupa mayor superficie y viene asociada a quemas estacionales. En este ámbito es importante destacar que el uso del suelo predominante de la región para fines agropecuarios con altas necesidades de agua para riego.

c. Impacto del cambio climático

De acuerdo con las proyecciones desarrolladas por el CIIFEN, y publicadas por el PACC, en el marco del estudio Estimación del Riesgo a Sequías, Heladas y otros Impactos del Cambio Climático que pueden afectar al Sector Agrícola de la Serranía del Ecuador y de las Cuencas de los ríos Chone y Portoviejo, se identifica a la provincia de Chimborazo como una zona muy propensa a las sequías (PACC, 2015).

En este sentido, la compactación del suelo puede intensificar la actual escasez de agua en la zona debido al cambio en la textura, disminuyendo así la capacidad permeabilizante del suelo. Por lo tanto, el agua puede llegar a ser insuficiente para el riego, lo que agravaría los conflictos en el lugar, sobre todo porque los campesinos de Chimborazo dependen totalmente de este recurso para producir y obtener ingresos económicos.

d. Descripción de la medida

En 1998, con el apoyo y la motivación del Padre Gabriel Barriga de la Diócesis de Riobamba, se planteó a las familias indígenas de la Parroquia Pungalá, comuna Teltetec, de Chimborazo, el dar impulso y concreción al repoblamiento de "llamas" (*Lama glama*) en los lotes familiares.

Estos animales son camélidos sudamericanos con características específicas de alta resistencia al frío y a la altura. La experiencia comenzó realmente en 2006 cuando se conformó la Asociación de Llamingueros INTIÑAN, la misma que agrupa a 400 socios, pero actualmente participan alrededor de 3.000 familias que crían y cuidan a 8.000 llamas en varias provincias del país.

La cría de llamas presenta ventajas económicas y ambientales; son vendidas como pie de cría debido a su rusticidad y fertilidad. La lana, cuero y carne también son aprovechadas; esta última es cotizada por su alto contenido nutricional con 24% de proteína. Además, sus heces son empleadas para la elaboración de abonos orgánicos.

Estos animales pueden llegar a transportar hasta 45 kg de peso, y consumen poca hierba pues se alimentan de rastrojos, pastos y forrajes de todo tipo y calidad; si se les compara con los ovinos y bovinos, las llamas consumen solo un 30% de los pastos y forrajes en comparación a un ovino, y un 10% de un bovino. Finalmente, por sus características anatómicas, sus pezuñas están provistas de una especie de almohadillas que no erosionan ni compactan los suelos de los páramos, que son de estructura frágil.

Actualmente estos animales han sido domesticados y forman parte del sistema productivo de las familias, y con el tiempo han reemplazado a otros animales altamente demandantes de pastos como ovinos y bovinos.

e. Requisitos para la implementación

La implementación de esta medida se considera viable en páramos alto andinos sobre los 3.500 metros.

Se necesita al menos un macho y 10 hembras llama, cada uno con un costo USD \$ 2.000, cuantía considerada como baja inversión, que puede realizarse mediante crédito, dependiendo de la capacidad de endeudamiento familiar y de la disponibilidad del espacio de pastoreo.





f. Resultados y co-beneficios de la implementación de la medida

El primer resultado de la medida fue que las familias tuvieron un incremento en sus ingresos económicos debido a la venta de los productos derivados de los camélidos, con lo que disminuyó la vulnerabilidad de las personas más pobres al cambio climático.

En términos de adaptación, el pastoreo de camélidos ejerce menor impacto sobre el suelo debido a las características morfológicas y fisiológicas del animal: tienen menor peso que las vacas, se apoyan sobre patas grandes sin pezuñas y con almohadillas, y no rompen y compactan el suelo, mejorando así su fertilidad y estructura. A la par, esto permite recuperar la capacidad de los suelos para retener y recargar agua.

Igualmente, la repoblación de camélidos

contribuye a la recuperación de la capa vegetal nativa ya que las llamas están adaptadas a comer paja seca y por ello no arrancan la hierba sino que la cortan sin destrozar la cobertura, lo que favorece a la recuperación de la fauna y flora del páramo. Finalmente, el metabolismo de estos animales les permite aprovechar mejor la comida, y sus necesidades alimenticias son menores que el de vacas, ovejas y caballos (Hofstede, 2001).

2. Reducción de la frontera agrícola y fomento de la ganadería sostenible para la protección de los páramos en la zona de amortiguamiento del Parque Nacional Cayambe – Coca





a. Descripción del lugar

La experiencia presentada a continuación fue desarrollada por varias familias de la Comuna Santo Domingo, parroquia San José de Ayora en el cantón Cayambe, provincia de Pichincha. El sitio pertenece a la zona de amortiguamiento del Parque Nacional Cayambe-Coca, ubicado en las faldas del volcán. La zona posee importantes áreas de páramo, ecosistema que proporciona servicios ambientales tales como almacenamiento de carbono en el suelo, acopio y distribución de agua para las tierras bajas.

La parroquia se encuentra a 77 km al nororiente de Quito, sobre los 2.700 msnm. Tiene una superficie de 138,59 km², que corresponde al 10,27% de la superficie de todo el cantón Cayambe. Los suelos son de tipo negro andino, profundos y de textura franco-arcillosa y franco-arenosa con alto contenido de materia orgánica y presencia de ceniza volcánica. En el lugar se tienen temperaturas promedio entre 8°C y 12°C, con precipitaciones entre 750 y 1.250 mm anuales.

b. Situación actual de la disponibilidad y manejo del recurso

En la parroquia San José de Ayora ha decrecido la diversificación productiva, y a la vez, se ha incrementado la extensión de pastizales y las áreas destinadas a la producción agrícola. Por ello, los campesinos llegan a competir por el recurso agua, sobre todo cuando este recurso escasea.

En el lugar, los efectos del cambio climático se hacen notar en las variaciones de temperatura que las personas perciben cotidianamente; por

ejemplo, los días son más calurosos y las noches más frías; también en los episodios imprevistos de fuertes precipitaciones que terminan afectando a la producción de la región. La elevación de la temperatura está relacionada al mismo tiempo con el aumento de la evapotranspiración de los cultivos, que demandan mayor consumo de agua.

El Plan de Desarrollo y Ordenamiento Territorial (PDOT) de Cayambe del 2012, subraya que la sobreutilización del suelo en el lugar es la principal causa de los procesos de erosión, deforestación y degradación del suelo.

c. Impacto del cambio climático

En la Parroquia San José, se ha expandido la frontera agrícola, en lo que era antes bosque natural, páramo y franjas de producción de agua. Esto tiene impactos en el páramo, los bosques y las áreas naturales protegidas, en donde la deforestación y las malas prácticas agroproductivas han llevado a la pérdida gradual del rendimiento del suelo, a la erosión y al deterioro del recurso hídrico. Esto a su vez ha provocado conflictos relacionados al uso del suelo y agua en zonas donde las actividades agropecuarias están restringidas.

Otra problemática presente en las zonas altas de la parroquia es la carencia de riego parcelario, lo que afecta directamente al rendimiento de los cultivos ya que la falta de un sistema de regadío influye en la baja productividad de esas tierras, tanto en temporadas secas como en heladas.

El MAGAP ante esta problemática ha implementado prácticas sostenibles como la roturación y manejo de suelos en la frontera agrícola. Ha impulsado la ejecución de actividades relacionadas con la agricultura y ganadería sostenible como los sistemas silvopastoriles, ha entregado insumos agroecológicos y animales menores a los agricultores.





d. Descripción de la medida

El proyecto de protección de los páramos inició en 1973, año en el cual la Reforma Agraria facilitó que varias familias de la comunidad de Santo Domingo accedieran a parcelas agrícolas, muchas de ellas habían sido trabajadores de esas tierras, sembrando papas, cebada y trigo. Después de la expropiación, varias zonas fueron convertidas en haciendas ganaderas para la producción de leche. En esa época, los campesinos de las comunas utilizaban la entonces Reserva Cayambe - Coca como espacio de pastoreo, implementación de cultivos y obtención de leña. Con la Ley de Gestión Ambiental y la Ley Forestal y de Conservación de Áreas Naturales y de Vida Silvestre de 1999, esas comunidades y sus familias emprendieron además procesos organizativos con la intención de mantener e incrementar los caudales de agua para consumo humano y regadío, ya que para esos tiempos se habían percatado de la reducción paulatina del agua y de las zonas de recarga hídrica debido a la sobre utilización del páramo y de los recursos naturales ahí presentes.

La acción marcó el inicio de un proceso de ganadería sostenible en el lugar, cuyo primer paso fue la reubicación de los animales en zonas más bajas, seguido de la implementación de mejores mezclas forrajeras y alimento balanceado para aumentar la producción de leche y garantizar la salud de los animales, pastoreo controlado con cercas eléctricas y sistemas de cortina rompe vientos con especies nativas, riego por aspersión, mejoramiento genético por inseminación artificial, asistencia técnica veterinaria, tratamiento del estiércol del ganado para utilizarlo como biol y disminuir el metano y capacitación de los ganaderos.

Actualmente, las familias reciben apoyo del MAGAP y acompañamiento técnico de la Asociación de Ganaderos de la Sierra y Oriente (AGSO), y mantienen un mercado seguro para ofertar su producción láctea.

La presente medida promueve la protección de la vegetación nativa del lugar y la rehabilitación de las áreas intervenidas en el ecosistema páramo,

recuperando los suelos que son ricos en materia orgánica.

e. Requisitos para la implementación

Esta medida puede replicarse en toda la zona andina, de preferencia en páramos ubicados junto a una reserva natural, en áreas de influencia o parque nacional.

Para la implementación exitosa es importante crear conciencia del respeto a la frontera agrícola por parte de los productores del sector. El proceso demanda mano de obra calificada y no calificada para las distintas fases: implementación de los pastizales, riego por aspersión, protección de las zonas altas proveedoras del agua de riego, y para la adquisición y manejo del hato ganadero.

La modalidad de trabajo en los distintos momentos fue la minga realizada a nivel comunitario y a nivel interfamiliar (dos o más familias). Los costos estimados son variables, sin embargo entre los principales rubros se encuentran a continuación:

Tabla 2. Costos de implementación del modelo de ganadería sostenible

Material	Costos
Implementación de mezclas forrajeras	1.500 USD/ha
Implementación de riego por aspersión	2.200 USD ha
Adquisición y manejo del hato ganadero	1.500 USD por semoviente.



f. Resultados y co-beneficios de la implementación de la medida

De acuerdo al MAE, hasta el año 2012, en Ecuador el 29% de la superficie total del territorio se registraba herbazal de páramo (2012); la parroquia San José de Ayora tiene una porción importante de este tipo de ecosistema, por lo que esta medida permite la protección de la vegetación nativa y promueve la recuperación de áreas intervenidas, constituyéndose en una actividad importante en la protección del páramo que pueden alcanzar un almacenamiento de 60 kg de carbono/m² que equivale a 60.000 kg de carbono/km² (Buytaert W., 2006). Por ello, y teniendo en cuenta el valor potencial de retención y la superficie, se podría estimar un valor de carbono fijado en el suelo de alrededor

de 2.400.000 kg, consiguiendo una interesante proyección en términos de mitigación de GEI en la zona implementada.

De igual manera, estas medidas aportan con el mantenimiento y mejora del rol ecológico de los bosques siempre-verdes montañosos o bosques nublados, que son fuente importante en la regulación hídrica (MAE, 2012).

Finalmente, se mejoró la articulación entre la práctica ambiental y la técnico productiva, importante al momento de querer dar sostenibilidad a los medios de subsistencia de las familias campesinas en todo tipo de ecosistemas, sobre todo en los más sensibles como los páramos.





3. Uso de biopreparados para el control de enfermedades y aumento de la fertilidad del suelo en la producción de pastos en la microcuenca del Río Papallacta

a. Descripción del lugar

La parroquia de Papallacta se ubica en la Cordillera Oriental de los Andes; pertenece al cantón Quijos, provincia de Napo. La superficie del lugar es de 312,9 km² (31.290 ha), correspondiente a una quinta parte del cantón; el 80% del territorio parroquial está ubicado en la zona de influencia de dos áreas protegidas: el Parque Nacional Cayambe Coca y la Reserva Ecológica Antisana (GAD de la parroquia de Papallacta, 2009).

De acuerdo al PDOT de Papallacta, el ecosistema páramo abarca el 50,7% del territorio; con un clima de alta montaña caracterizado por temperaturas que oscilan entre los 2 y 8 °C, con precipitaciones mayores a 500 mm al año. El 25% de sus suelos son franco-limosos de origen volcánico; alrededor del 65% están poco desarrollados. Su relieve es escarpado con pendientes mayores al 70% en la mayor parte del área (68,2%), lo que da lugar a deslizamientos y eventos de erosión. Por esta razón, en el PDOT parroquial se determina que solo el 3% de la parroquia presenta condiciones favorables para la agricultura y la ganadería.

b. Situación actual de la disponibilidad y del manejo del recurso

El MAE, en su Proyecto de Adaptación al Impacto de Retroceso Acelerado de Glaciares en los Andes Tropicales (PRAA, 2013), manifiesta que el páramo es un ecosistema frágil y sensible a la presión antrópica, especialmente al avance de la frontera agrícola, a las quemadas de pajonales, actividades ganaderas extensivas y a la desaparición de los bosques. La ganadería extensiva en la zona ha degradado la vegetación, compactando el suelo, alterado su capacidad de retención de agua y generado suelos pobres con baja fertilidad. Estos

problemas junto al desconocimiento del manejo y la mala genética de los animales disminuyeron la productividad del hato ganadero.

c. Impacto del cambio climático

Los resultados de los estudios climáticos realizados en 2010 y 2011 por el Ministerio del Ambiente con el apoyo del PRAA determinan probables escenarios de cambio climático en la microcuenca del Río Papallacta; pronostican el incremento sostenido de la temperatura y establecen para el mediano plazo probables escenarios de cambio climático en el lugar; coinciden así en pronosticar el incremento sostenido de la temperatura sobre todo en alturas superiores a los 3.000 msnm. Además, indican una alta variabilidad de las precipitaciones, lo que provoca erosión y pérdida de la fertilidad del suelo a través de la lixiviación de los nutrientes y el aumento de la escorrentía (PRAA, 2013).

d. Descripción de la medida

La medida se inició con la identificación de los recursos con los que contaban los finqueros en sus predios, y se evaluó el forraje presente en el lugar, el cual era de mala calidad porque había sido sembrado hace 15 o 20 años atrás, tiempo durante el cual jamás se realizaron trabajos de fertilización ni control de plagas. Por esta razón, los productores se habían visto obligados a llevar su ganado a la parte alta (páramo) para que se alimenten. Se procedió a la siembra de pastos de acuerdo al calendario lunar y a los requerimientos nutricionales del ganado. Luego, se realizó un plan de manejo para la fertilización y el control de plagas y enfermedades de los pastos.

Al mismo tiempo se mejoraron las instalaciones de las fincas, dividiéndolas en espacios más pequeños, pero dotados de todos los implementos para un adecuado manejo del ganado. Finalmente, los productores fueron capacitados durante ocho meses a nivel teórico y práctico, en producción de biopreparados para el control de enfermedades y aumento de la fertilidad del suelo.



e. Requisitos para la implementación

La medida puede ser replicada exitosamente en zonas de páramos, en donde los ganaderos deseen capacitarse para mejorar sus prácticas y optimizar los pastos para la producción pecuaria, aportando así con el cuidado y protección de este ecosistema vulnerable ante el cambio climático. Los costos para la ejecución total en la práctica fueron asumidos por el proyecto PRAA; como contraparte, los beneficiarios contribuyeron con mano de obra a través de mingas, mientras la Fundación ECOPAR brindó apoyo técnico. La remoción de la tierra se hizo de manera superficial con rastrillo y la siembra fue a voleo; a la par, se utilizaron cercas eléctricas para hacer circular a los animales por todo el potrero; las vallas podrían alternarse entre los productores. Del mismo modo, se colocaron bebederos y saladeros en lugares específicos de cada finca y el agua se movilizó con mangueras desde las casas de los ganaderos. Para la siembra de pastos se utilizó la siguiente mezcla forrajera:

- Pasto Azul,
- Ryegrass anual,
- Ryegrass perenne,
- Llantén,
- Trébol Rojo y
- Trébol Blanco

La mano de obra de los beneficiarios y su participación activa en los distintos espacios de capacitación no fue valorada, sin embargo un resumen de costos se puede apreciar en la siguiente tabla:

Tabla 3. Costo de implementación sistema de biopreparados para la fertilización de suelo

Material	Costos
Abonos y bidones	150 USD/ha
Pastos	400 USD/ha
Total	950 USD/ha

f. Resultados obtenidos y co-beneficios

Al aplicar biopreparados, la fertilidad del suelo aumentó, lo que disminuyó la incidencia de plagas y enfermedades, obteniendo así una renovación más rápida del pasto, por lo que se pudo rotar el ganado en un lapso más corto, de 30 a 45 días. Esto permitió mejorar el ecosistema páramo restituyendo su cualidad natural de almacenar agua. Esto a su vez aportó a una mejor adaptación del ecosistema frente a escenarios climáticos como el aumento de temperatura, la alta variación de la precipitación y la presencia de heladas.

De igual manera, los ganaderos, incrementaron su producción de pasto de 8.066,25 kg/ha a 13.544,29 kg/ha en tres meses por lo que desistieron de trasladar sus animales al páramo, evitando así que se sigan compactando los suelos, causando erosiones, escorrentías superficiales y contaminación de ríos y quebradas.



Buenas prácticas agroforestales sostenibles

4. Uso de especies nativas para la conservación y recuperación de caudales de agua para riego y consumo humano en la microcuenca del Río Nagsiche

a. Descripción del lugar

Las vertientes de la Morasuco están situadas en los orígenes de la microcuenca del Río Nagsiche en la comunidad Rumiquincha, en el cantón Salcedo, provincia de Cotopaxi. En la actualidad, su caudal de 45 litros por segundo es destinado al riego y al consumo humano, favoreciendo así la

vida y la producción de 450 familias indígenas de cinco comunidades de la parroquia Cusubamba.

Según su PDOT, al 2015 las comunidades presentes en el lugar son: Carrillos, Cobos San Francisco, Belén Cuatro Esquinas, San Ignacio y Compañía Baja. Dicho territorio se asienta entre los 3.000 y 3.100 msnm, con temperaturas de 12 a 14 °C, precipitaciones que no superan los 750 mm anuales y suelos franco-arenosos y arenosos (GAD de la parroquia Cusubamba, 2015).

b. Situación actual del manejo y disponibilidad del recurso

La provincia de Cotopaxi se encuentra en una zona que sufre desabastecimiento de agua, siendo Salcedo uno de los cantones que ha llegado a soportar hasta 11 meses de escasez de agua. El uso





de suelo predominante en la zona es agropecuario y, por lo tanto, con altas necesidades de agua para riego (GAD del cantón Salcedo, 2011).

Según sus habitantes la calidad del agua en la región se ha deteriorado debido al pastoreo en torno a los cuerpos de agua; actualmente no cuentan con la reserva suficiente de agua para el consumo humano y para la producción.

Por esta razón, el MAGAP, en coordinación con el Gobierno Autónomo Descentralizado Provincial de Cotopaxi, ejecutó un proyecto de recuperación de suelos en la parroquia Cusubamba.

c. Impacto del cambio climático

La zona presenta un déficit hídrico con altas temperaturas, causando incrementos en la evapotranspiración de las plantas. Por otra parte, la intensificación de días secos consecutivos provoca conflictos entre usuarios del agua.

d. Descripción de la medida

A partir de 2001, las 400 familias de las cinco comunidades pertenecientes a la Junta de Agua de Riego y Consumo Humano de Cusubamba (JADRAZOB) empezaron a tener racionamiento de agua. Las comunidades de la parte baja se vieron obligadas a negociar con las comunas de la zona alta (que habitan cerca de las fuentes de agua), quienes comenzaron un proceso de negociación con las comunas de la parte baja, se vieron obligadas a negociar con las comunas de la zona alta que son las poseedoras de las fuentes de agua; así que realizaron visitas y reuniones que culminaron en la compra de 30 ha de terreno identificadas como idóneas para la protección de los caudales.

Con las escrituras y el apoyo de instituciones como el Fondo Ecuatoriano Populorum Progressio (FEPP), se dió paso a la implementación de la medida que inició con la repoblación vegetativa y a la protección física de los terrenos adquiridos; luego se desarrolló un fuerte proceso de sensibilización y capacitación a las familias y comunidades aledañas mediante talleres, giras de observación e intercambios con otras organizaciones de la zona andina.

Con la participación de las cinco comunidades se construyeron nuevos tanques de reserva con el fin de asegurar el agua de riego durante los meses de sequía, y así disminuir su vulnerabilidad frente al cambio climático. Las instituciones FEPP, Acción Ecológica, CODENPE, GAD Provincial de Cotopaxi, y el ex INAR⁵ aportaron al proyecto mencionado con capacitación y sensibilización, también con repoblación vegetativa e infraestructura física; como contraparte, los usuarios contribuyeron con mano de obra y recursos económicos.

Como meta futura, se plantea la adquisición de 200 ha de terreno pertenecientes a la Hacienda Rumiquincha, a fin de ampliar la superficie de protección; dichos terrenos están ubicados en el margen derecho de las vertientes, y al adquirirlos será posible acceder a otras vertientes e incrementar los caudales disponibles para consumo humano y producción agrícola.

e. Requisitos para la implementación

Los costos de implementación de esta medida se detallan a continuación en la siguiente tabla:

⁵ El Instituto Nacional de Riego (INAR), fue reemplazado por la actual Subsecretaría de Riego y Drenaje del MAGAP





Tabla 4. Detalle de costos de implementación de la medida de biopreparados

Objeto adquirido	Costo
Adquisición de tierras	Se adquirieron 30 ha a un costo total de 15.000 USD; cancelados 10.000 USD en efectivo y 5.000 USD en materiales de construcción para la reparación de la iglesia de la comuna Rumiquincha. Los fondos fueron recaudados entre los usuarios de agua potable y riego.
Recuperación forestal	Se adquirieron 32.000 plantas de yagual (<i>Polylepis incana</i>) a través de viveros forestales de la parroquia y con el apoyo de la organización de segundo grado "Corporación de Organizaciones Indígenas y Campesinas de Cusubamba" (COICC)
Protección física de la zona	Se cercó con postes de cemento y alambre de púas. Los materiales fueron adquiridos en mercados locales a un costo total de 6.200 USD.
Reservorio de tierra y cemento	Capacidad de almacenamiento de 100 a 150 m ³ asciende a unos 2.500 USD.
Mano de obra	Con la finalidad de estimar el valor de mano de obra se destinó 10 USD por minga/familia; tres mingas para el riego de las plantas y dos mingas para la infraestructura de protección (calculado por 400 familias) se obtienen un valor total de 32.000 USD.

f. Resultados y co-beneficios de la implementación de la medida

La implementación de esta medida presenta beneficios para la reducción de GEI, en lo que respecta a la mitigación. Los bosques de *Polylepis* en Pífo alcanzan cifras de fijación de carbono de aproximadamente 2 MgC/ha/año (Mega gramos de carbono por hectárea al año). No obstante, se debe aclarar que las estimaciones de capacidad de secuestro por hectárea de bosque difieren entre fuentes y tipos de ecosistemas (Hofstede, 1999).

Sin importar la determinación de valores exactos de reducción del CO₂, la reforestación con 32.000 especies nativas en 30 ha de páramo ha generado un ecosistema con potencial de secuestro de carbono, gracias a sus suelos húmedos y con alto contenido de materia orgánica, lo que aporta en la reducción de GEI a nivel país.

Esta medida, a largo plazo, mejora los niveles de pH y fertilidad del suelo, además restablece la calidad, cantidad e infiltración del agua debido al control de erosión y sedimentación. Promueve la protección del páramo a través de la exclusión de las actividades ganaderas y agrícolas, lo que

favorece la restitución del ecosistema y reduce la vulnerabilidad de los distintos sistemas ante el cambio climático.

5. Disminución del uso de madera como fuente de energía, a través del uso de hornos eficientes para el procesamiento artesanal de la caña de azúcar

a. Descripción del lugar

La medida se desarrolló en dos parroquias: San Francisco de las Pampas y Palo Quemado, ambas situadas en la cordillera occidental de los Andes y pertenecientes al cantón Sigchos, provincia de Cotopaxi, a una altitud entre los 800 y 1.500 msnm. La zona cuenta con suelos franco-arcillosos de tipografía irregular, la temperatura oscila entre los 14 y 20 °C.

Los habitantes de la región se dedican tradicionalmente al cultivo y transformación de la caña de azúcar en atados de panela, actividad que representa su principal fuente de ingresos. Este proceso es artesanal y consiste básicamente en moler la caña para extraer su



jugo, el mismo que se cocina hasta producir la panela. Como fuente de energía utilizan madera o leña y bagazo de la caña, provenientes de sus bosques, lo que causa la deforestación del sector.

b. Situación actual del manejo y disponibilidad del recurso

Según el Mapa Histórico de Deforestación del Ecuador Continental el promedio anual de deforestación a nivel nacional, entre los años 2008 y 2012 fue del 0,60%, con una pérdida promedio de 74,4 ha de bosques por año (MAE, 2013). La zona donde se implementó la medida

tiene usos agropecuarios forestales. Presenta conflictos relacionados a la sobreutilización de la tierra como resultado de actividades de deforestación que fueron destinadas para el cultivo y transformación de la caña de azúcar (MAGAP, 2010).

El cultivo de caña de azúcar es importante para la economía nacional por su capacidad de generar empleo directo. El 80% de la producción (correspondiente a 74.100 ha) se dedica a la obtención de azúcar y alcohol etílico; el 20% (36.000 ha) a la fabricación de panela (Pilco Sarmiento, 2012).

Por ello es importante aclarar que la medida no proyecta la expansión de las tierras agrícolas para la producción de caña, sino el uso sostenible de las mismas y un uso más sostenible de los bosques en la región.





c. Impacto del cambio climático

La deforestación y/o quema de los bosques liberan dióxido de carbono almacenado en la materia orgánica, aumentando así los niveles de GEI en la atmósfera y provocando alteraciones en el clima del planeta. Por ello, cuando un bosque es destruido el carbono almacenado se libera a la atmósfera mediante la descomposición o la combustión de los residuos vegetales.

La disponibilidad de la madera se afecta debido a las sequías prolongadas que provocan incendios forestales y a la presencia de nuevas plagas. Las actividades humanas ejercen mayor impacto sobre la disponibilidad del recurso, crecimiento poblacional, la expansión de la frontera agrícola, el cambio de uso de suelo, entre otros.

d. Descripción de la medida

Un grupo de familias de la parroquia Las Pampas incursionó en la construcción de “hornos eficientes” que utilizan chimeneas como el medio adecuado para incrementar la concentración y el almacenamiento de calor; el resultado inmediato de la medida fue la disminución en la utilización de la madera como fuente de energía.

Estos hornos se construyen con ladrillo jaboncillo, con una dimensión de 6 m de largo por 2 m de ancho; la torre de la chimenea es de 3 m de alto, las pilas y la conducción hacia las chimeneas tienen entre 2 y 5 m de largo. Además de la instalación de la chimenea, se incorporan dos o tres tinajas de acero inoxidable (pailas) para el precalentamiento del jugo de caña, de modo que su cocción se realiza en menos tiempo.

Anteriormente se requería de $1/2 \text{ m}^3$ de leña para la cocción de 580 litros de jugo de caña; en la actualidad se utiliza solo $1/6 \text{ m}^3$ de leña para la cocción de la misma cantidad de jugo. El porcentaje de disminución en el uso de leña es de aproximadamente 60%.

Para replicar la medida, se recomienda el uso de estos hornos para fincas productoras de caña localizadas en altitudes entre 700 y 1.500 msnm. Si bien el cultivo de azúcar no requiere de un tipo

específico de suelo, para su adecuado desarrollo se requiere una profundidad mínima de 1 m. Las temperaturas más favorables son entre 18 y 24°C, con precipitaciones entre los 1.500 y 2.000 mm anuales. Las estribaciones de la Cordillera Occidental de los Andes en las provincias de Imbabura, Pichincha, Cotopaxi, Chimborazo y Bolívar, presentan características beneficiosas para la amplia expansión de la experiencia.

La medida es ya un referente en la parroquia porque otorga mayor eficiencia e inocuidad en la producción de panela, y por eso es visitada por productores/as de la zona occidental de Cotopaxi. Por ejemplo, la producción y comercialización de panela granulada al representar un valor agregado, mejora en el precio de venta y ayuda a que la producción llegue a ser exportada a través de la Fundación Maquita Cushunchic (MCCH), institución que apoya a los productores de la zona en la implementación de los hornos eficientes.

e. Requisitos para la implementación

La inversión estimada para la compra e instalación de un horno eficiente con tina de acero inoxidable de uso alimenticio, bordea los 20.000 USD según cifras de la Dirección Provincial Agropecuaria de Pichincha al 2015.

La mano de obra necesaria para la construcción o adecuación se calcula en 10 días de trabajo de un trabajador y un ayudante, con un costo promedio de 25 USD/día para el primero y de 15 USD/día para el segundo.

f. Resultados y co-beneficios de la implementación de la medida

Un resultado significativo de la medida es la reducción en un 60% de la cantidad de madera que se utiliza como fuente de energía para la cocción del jugo de caña. De esta forma, la medida apoya la reducción de la deforestación de los bosques remanentes en la zona que conlleva beneficios en términos de mitigación y disminuye la presión sobre los bosques.



Por otro lado, el tiempo destinado a la producción de panela por cada familia disminuyó de un promedio de 6 horas para procesar 580 litros de jugo de caña a dos personas trabajando 4 horas diarias. Su producción y comercialización de valor agregado ha tenido un incremento en el precio, lo que ha mejorado la economía familiar de las comunidades.

6. Renovación de cafetales como incentivo para la conservación de remanentes de bosque en la cuenca del Ayampe

a. Descripción del lugar

En las provincias de Guayas, Santa Elena y Manabí se extiende la Cordillera Costera, en donde se encuentra uno de los últimos remanentes de bosque seco del Ecuador. Estas zonas son altamente afectadas a consecuencia de las quemadas y la tala de vegetación nativa por efectos del avance de la frontera agrícola.

En Manabí se presentan generalmente dos épocas: la seca y la húmeda, y en la Parroquia Las Maravillas de Cascol, las lluvias se concentran en mayor cantidad y frecuencia en una sola época del año, de diciembre a mayo. El resto del tiempo hay escasez de precipitaciones y por lo tanto existe una sequía bien marcada, con alto déficit hídrico.

No obstante, según testimonios de la población local hoy en día se perciben cambios marcados en los patrones de precipitación en las dos estaciones, en invierno hay un bajo nivel de lluvia, y también se siente que la temperatura promedio ha aumentado durante el día y la noche. En el verano, el calor es muy intenso.

b. Situación actual de la disponibilidad y manejo del recurso

En la Parroquia Las Maravillas de Cascol se presentan los siguientes elementos de destrucción de los ecosistemas naturales: (1) afectación en el suelo por el aumento de la escorrentía, (2) erosión del suelo debido al viento y al agua, (3) pérdida del carbono orgánico, (4) aridez y disminución de los niveles de aguas subterráneas y superficiales.

La tala del bosque ha ocasionado una mayor exposición solar del suelo, lo que provoca una rápida descomposición de la materia orgánica y la pérdida de la capa húmica, por esta razón el sustrato en el lugar presenta poca estabilidad.

En las prácticas agrícolas tradicionales de la región no se produce una reposición del contenido de materia orgánica. Esto ha causado el agotamiento de los nutrientes del suelo; en estos casos, el uso intensivo de agroquímicos también genera impactos negativos ambientales y en la salud de los trabajadores agrícolas.

c. Impacto del cambio climático

La variabilidad de las condiciones climáticas en la zona han afectado los cultivos, en especial el de café, ya que es una zona con tradición en la producción de este producto. Existe un aumento en la presencia de plagas y enfermedades en el cultivo de café como la broca y la roya.

La producción de café en la zona decayó enormemente desde el año 2012 a cuatro quintales por hectárea/año por la falta de nutrientes del suelo. Por esta situación la población enfrentó condiciones económicas difíciles, pues sus plantaciones no han logrado recuperar la producción que tenían en años anteriores.

El diseño incluye 4.000 plantas por hectárea en el caso de la variedad de café *Sarchimor* y de 3125 en el caso de la variedad *Catucai*, por cada beneficiario que conserva bosques nativos en sus propiedades.





d. Descripción de la medida

Esta medida formó parte del proyecto “Enfrentando el Cambio Climático en la Cordillera Costera”, ejecutado desde febrero de 2011 por el CIIFEN; la misma contó con el apoyo del Gobierno Provincial de Manabí, Prefectura del Guayas, el Gobierno Municipal de Jipijapa y del MAGAP. Los beneficiarios fueron la Organización de Campesinos Las Maravillas de Cascol y la Asociación de Campesinos de Pedro Pablo Gómez.

La medida implementada se concentró en la conservación de los parches de bosque que se encontraban en las propiedades de los

beneficiarios. También apuntó a estabilizar el ecosistema de las fincas y evitar la erosión con la siembra de las plantas de café, en lugares donde había cafetales antiguos (CIIFEN, 2015).

Se enfocó en la renovación de 1 ha de cafetal longevo (que, en su mayoría tenía más de cuarenta años) con variedades de café mejorado de probada adaptabilidad y resistencia a plagas y enfermedades, con un diseño estructurado que incluye 4.000 plantas por hectárea en el caso de la variedad de café Sarchimor y de 3.125 plantas en el caso de la variedad Catucaí⁶ por cada beneficiario que conserva bosques nativos en sus propiedades.



⁶ Las variedades son de las zonas con climas similares a los que tiene la provincia de Manabí; fueron importadas de Brasil por el MAGAP.



La práctica ayudó a mantener la humedad del suelo y reducir la temperatura en los cultivos, lo que generó condiciones climáticas poco óptimas para la reproducción de roya y otras enfermedades; para ello se realizaron varias actividades descritas a continuación:

1. Siembra con variedades de café resistentes a la roya, tales como la Sarchimor y Catucai, pero también la Akaway arará⁷ (alta producción y resistencia a enfermedades).
2. Se capacitó en elaboración y aplicación de fertilizantes naturales (como el biol y compost) en el momento oportuno y con las dosis requeridas, tomando en cuenta siempre el manejo de la sombra⁸.
4. Se entregó kits agro cafetaleros auspiciados por el MAGAP, con el fin de instalar los germinadores donde se produjeron plantas con métodos orgánicos.
5. Se recibieron del MAGAP semillas certificadas de café, malla zaranda para cernir el sustrato para el llenado de fundas, sarán para la construcción de sombra para las plántulas, fundas de polietileno tamaño 6x8 pulgadas para producir plántulas de café y fertilizantes orgánicos para el suelo.

En total, se sembraron 413.593 plantas de café utilizando principios orgánicos, y en ningún caso se permitió la remoción de la vegetación nativa o la tala de bosque. La siembra se complementó con el manejo integral y las buenas prácticas de conservación del suelo, para lo cual CIIFEN brindó asistencia técnica y capacitación a las fincas inmersas en la medida, con el fin de generar aprendizajes, habilidades y destrezas en los beneficiarios/as.

e. Requisitos para la implementación

Para la implementación de la medida, CIIFEN facilitó equipos, insumos y asistencia técnica permanente, entre ellos: semillas, fertilizantes orgánicos, fundas de polietileno, malla zaranda, zaram, abre hoyos, tanques de plástico para la elaboración de biofertilizantes y bombas de mochila. Como contraparte, los beneficiarios aportaron con la mano de obra para la implementación y mantenimiento de viveros, elaboración de biofertilizantes, establecimiento y mantenimiento de plantaciones.

f. Resultados y co-beneficios de la implementación de la medida

La aplicación de esta medida contribuyó con la conservación de los remanentes de bosque que se encontraban en las propiedades de los beneficiarios. Se mantienen bajo convenio de conservación 410 hectáreas de remanentes de bosque con la Asociación de Campesinos Las Maravillas de Cascol; 5.989,25 hectáreas con la Asociación de Pedro Pablo Gómez; y 23 hectáreas bajo compromiso de conservación con la Pre Asociación de San Pablo, Palmital y Luz Amada. Un total de 6.422,25 hectáreas de remanentes de vegetación se hallan bajo compromiso de conservación.

La renovación de cafetales permitió estabilizar el sistema de las fincas, mantener la humedad del suelo, disminuir la erosión y reducir la temperatura en los cultivos, lo que generó condiciones climáticas para impedir la propagación de roya y otras enfermedades del café. Esto generó un incremento en la producción y por ende en los ingresos económicos de los agricultores.

Además, la medida promovió que los nuevos cafetales capturen carbono, y al mismo tiempo, eviten la emisión de GEI ya que al conservar remanentes se evita emisiones por deforestación.

⁷ Las variedades son de zonas con climas similares a los que tiene en la provincia de Manabí; fueron importadas del Brasil por el MAGAP

⁸ A veces mucha sombra en un cafetal impide que la fertilización cumpla con su objetivo relacionado a que las plantas absorben los fertilizantes.





7. Recuperación de remanentes de los bosques degradados de la parte alta de la Cordillera Chongón Colonche (cuenca del Río Ayampe) a través del incremento de la agrobiodiversidad

a. Descripción del lugar

El ecosistema presente en la parte alta del Río Ayampe, sector El Jaile, es de tipo Bosque Seco Pre-montano o Bosque húmedo de garúa (MAE, 2012). La temperatura media mensual del cantón Jipijapa es de 21°C, con niveles de precipitación media anual entre 500 y 900 mm. En el lugar, en general, el relieve es abrupto, con pendientes que

bordean el 40%; los suelos son disectados, tipo franco arenoso, limoso y/o arcillo limoso; en gran parte son profundos. El lugar es una zona cubierta de niebla en la mayor parte del año y bañada por un tipo de lluvia de baja intensidad llamada garúa (GAD del cantón Portoviejo, 2015).

b. Situación del recurso y su disponibilidad

En Pedro Pablo Gómez no hay suficiente agua para consumo humano, ni para las actividades productivas. La zona presenta sequías durante el año y los pobladores se sienten afectados directamente por los cambios bruscos de temperatura y variación de la precipitación, poniéndoles en estado de vulnerabilidad frente al cambio climático.





Según datos de la estación meteorológica ubicada en la parroquia Pedro Pablo Gómez, existen meses con lluvias inferiores a 20 mm en verano, y en invierno con precipitaciones mayores a 100 mm. Los principales meses de lluvia son de enero a marzo. Los valores más altos de temperatura corresponden a los meses con mayor precipitación y los valores más bajos a la época de verano.

c. Impacto del cambio climático

En Pedro Pablo Gómez la variabilidad climática ha ocasionado cambios en las precipitaciones durante las diferentes estaciones. En verano, los bajos niveles de lluvia provocan sequías causando una escasez del recurso hídrico tanto para el consumo humano como para las actividades productivas. Así mismo, la temperatura promedio es más alta durante el día y la noche. En invierno, los niveles de lluvia suben y se presentan fuertes inundaciones con días continuos de precipitaciones. A pesar de que la zona tiene una categoría media en términos de riesgo a sequías, los pobladores se sienten afectados directamente por la variabilidad extrema en el clima, poniéndoles en estado de vulnerabilidad frente al cambio climático.

d. Descripción de la medida

Esta medida formó parte del Proyecto “Enfrentando el Cambio Climático en la Cordillera Costera Ecuatoriana” del Centro Internacional para la Investigación del Fenómeno del Niño que contó con financiamiento de la Unión Europea (CIIFEN, 2014). Nació de la necesidad de conservar superficies de bosque natural en la parte alta de la cuenca del Río Ayampe.

Se enfocó en el fomento de fincas análogas y actividades productivas sostenibles para lo cual se sembraron árboles y plantas similares a los

ecosistemas nativos presentes en el lugar con el fin de promover y rescatar las funciones de los ecosistemas locales.

Las fincas análogas funcionan de manera parecida a un bosque, promoviendo la estabilidad ambiental, conservando la biodiversidad y facilitando la obtención de agua limpia dentro de los sistemas de producción. Además, suplen las necesidades de las personas, y proporcionan una amplia variedad de alimentos, combustible, forraje, madera y plantas medicinales.

En los sitios a intervenir se efectuó la valoración de los remanentes de bosque en donde se identificaron las especies florísticas existentes. Se evidenció la sucesión natural de las especies y la existencia de fauna asociada; con esta información se proyectó el diseño de las fincas análogas, considerando especies mejoradas multipropósito, entre ellas: cítricos, frutales y maderables, que reemplazarían a las especies nativas que al momento estaban ausentes y que proporcionarían el mismo servicio al ecosistema.

Posterior a ello, se procedió a la siembra del material vegetativo multipropósito que fue entregado por CIIFEN, entre los que se encuentran cítricos mejorados, frutales, especies forestales, y especerías propias del estrato suprimido como por ejemplo, la pimienta. En una acción similar, se colectaron plántulas forestales nativas que proveían de diferentes funciones ecológicas, como las maderables, retentivas de agua, alimento de avifauna, etc.; que son producto de la regeneración natural del sitio en intervención. Este material fue distribuido y plantado en los claros del bosque para garantizar el crecimiento óptimo de las plantas sembradas, la distribución idónea, la pertinencia al estrato vegetal, la exigencia de luminosidad y el asocio idóneo de vegetación acompañante.

El control de arvenses o malezas nobles que proliferan en la base de las plantas sembradas fue manual; esta acción se llevó a cabo cada vez que las mismas llegan al umbral de proliferación. En la época de verano, cuando el agua escasea,





se proporcionó riego a las plantas de manera manual y en acción periódica.

Finalmente, los beneficiarios fueron capacitados por los técnicos del proyecto en alternativas de producción saludable y elaboración de compost y biofertilizantes; con esto se procedió a hacer la

fertilización orgánica en toda la finca.

e. Requisitos para la implementación

Para la implementación de la medida se toman en cuenta los costos que se detallan en la siguiente tabla:

Tabla 5. Costos de implementación de la medida de recuperación de los remanentes de bosques del Río Ayampe

Actividades	Unidad	Total (USD)
Preparación del terreno	10 Jornales	150
Preparación compost	8 Jornales	120
Colección de plántulas	3 Jornales	45
Siembra	15 Jornales	225
Fertilización/año	10 Jornales	150
Mantenimiento – limpieza, podas y aclareos	2 mantenimientos año/ Jornales	200
Especies de plantas y costo de las no existentes en el predio a intervenir	Naranja valencia tardía	60
	Naranja tipo King	30
	Lima	60
	Limón	20
	Yuca	50
	Piña	20
	Pimienta	100
	Plátano baraganete	70
	Plátano dominico	70
	Guanábana mejorada	40
	Zapote	25
	Aguacate injerto	50
	Guayacán	10
	Cedrella	10
Adquisición de un kit de herramientas	1 excavadora de mano, 1 machete, 1 sierra de arco y 1 tijera de podar	100
Tanque para elaborar biol	Tanque con tapa de 250 litros	70
Transporte	Movilización	200
Bomba a mochila	Bomba CP3 de 20 litros	130
Cerramiento	3 rollos de alambre de púas de 500 m y 1 rollo de 100 m	190
Labor	6 Jornales	90
SUBTOTAL		2285



f. Resultados y co-beneficios de la implementación de la medida

Los problemas de la escasez del recurso hídrico se vieron reducidos notablemente gracias a la medida. En la región se evidencia un aumento de la biomasa del suelo que contribuye a mejorar la evapotranspiración en el lugar; esta acción a su vez incrementa el agua subterránea y asegura su aprovisionamiento.

Adicionalmente, esta medida de adaptación al cambio climático estimula la conservación de bosques naturales y la diversificación de cultivos, todo incorporado en la estructura de una finca análoga que promueve además la provisión de servicios ecosistémicos y la seguridad alimentaria. A la par, impulsa el rescate de conocimientos tradicionales, relacionados con plantas medicinales y otras especies no forestales.

8. Prácticas agroforestales y producción bajo invernadero, para enfrentar los impactos generados por las fuertes y abundantes lluvias en la localidad de Sabanilla

a. Descripción del lugar

La medida es implementada en una finca ubicada en el sector de Sabanilla, a 40 km de la ciudad de Loja, sobre la vía antigua que conduce a Zamora, en la cuenca media del río Zamora. La topografía del lugar es irregular, con pendientes que superan el 40%, y presencia de vegetación muy densa del tipo transición de la zona andina hacia la amazónica.

b. Situación y disponibilidad del recurso

En Sabanilla se observa un suelo tipo franco arcilloso limoso, con alta fragilidad; es una zona con pendientes pronunciadas, ubicada en las cercanías al río Zamora. Durante muchos años, la ganadería ha prevalecido en el territorio y es su principal actividad económica; ha causado importantes impactos en el suelo, como la erosión y deslaves en algunos lugares por pérdida de cobertura vegetal,

principalmente causado por el pisoteo del ganado. Por la alta pluviosidad los suelos se erosionan, reduciendo en un 30% la productividad del pasto (alimento para el ganado) y provocando accidentes y decesos de ganado, entre otros problemas. Esto afecta a los propietarios de las fincas ganaderas quienes venden los insumos de leche a las fábricas de productos lácteos de Loja y Cuenca. La demanda de leche es alta en la zona, pero paulatinamente el suministro de leche está disminuyendo según indican los productores.

c. Impacto del cambio climático

El propietario de la finca, quien vive en el lugar desde 1995, percibe que la zona siempre ha sido lluviosa, con casi 10 meses al año de precipitaciones. Sin embargo, en Sabanilla la lluvia es más intensa de lo normal y provoca grandes daños, como la pérdida de las cosechas al aire libre, pudrición de pastos donde pastorea el ganado, incremento de enfermedades propias de la época lluviosa, disminución de la producción de leche, entre otros.

d. Descripción de la medida

Al implementar la medida, el manejo de la finca cambió de ser intensivo (uso indiscriminado del suelo, deforestación y pérdida de biodiversidad) hacia un sistema agroforestal. Las actividades realizadas dentro de esta medida son las siguientes:

- Se combinó el pastoreo con la siembra de cultivos de ciclo corto y otras actividades agrícolas destinadas al auto consumo, desarrolladas con principios de la agroecología, como el uso de bioinsumos, el reciclaje y aprovechamiento de desechos orgánicos, el riego controlado, el manejo de plagas integrado, entre otros.

- Se sustituyó el ganado para carne por el lechero, con una productividad de leche que pasó de ser de 3 a 4 litros diarios, a 12 litros. Los ingresos adicionales se utilizaron para ampliar el hato ganadero y mejorar las capacidades del propietario de la finca en producción lechera y mejoramiento genético del ganado.



Se mejoró el uso del suelo en la finca a través de la división de potreros de entre 2 y 3 hectáreas, con el fin de que el ganado mude de manera sucesiva de un potrero a otro para que el pasto no se maltrate y perdure por más tiempo. Los potreros fueron intercalados con cultivos de ciclo corto.

Para realizar un mejoramiento de los pastos, se establecieron cambios en las pasturas experimentando con la variedad Jaragua (*Hyparrhenia rufa*), que rinde menos en cantidad pero genera leche de mejor calidad. El Mequerón (*Setaria sphacelata*), al contrario, ayuda a producir leche de menor calidad, pero es más abundante. Se completó la alimentación del ganado con King grass (*Pennisetum purpureum* y *Pennisetum typhoide*), que es mejor aprovechado por el ganado al ser más asimilable.

Por otro lado, se sembraron 20.000 plantas forestales propias de la zona, en 5 franjas de 400 m x 5 m, inter colocadas entre los potreros, especialmente con aliso (*Alnus glutinosa*). Esto brindó beneficios ecológicos y económicos si se lo compara con mantener pasturas degradadas debido a que el efecto de la sombra incrementa la producción de leche dentro de un rango de 10% a 22% en comparación a potreros sin árboles, porque se produce menor temperatura ambiental y se reduce el estrés calórico del ganado (lo cual

está asociado a que con una baja tasa respiratoria, se gasta menos energía y se consume más alimento) (Betancourt, Ibrahim, Harvey, & Vargas, 2003). Por lo demás, muchos de los árboles de las cercas son forestales y pueden ser aprovechados con el paso del tiempo.

Adicionalmente, se construyó un invernadero para mejorar la producción de cultivos de ciclo corto con la asesoría técnica de la Universidad Nacional de Loja y el apoyo de la oficina zonal de MAGAP.

e. Resultados y co-beneficios de la implementación de la medida

La medida fue exitosa porque genera servicios ambientales como el reciclaje de nutrientes del suelo, secuestro de carbono, corredores y refugios para la biodiversidad. Al mismo tiempo, asegura la producción de los cultivos de ciclo corto en la región lo que aumenta su resiliencia a la variabilidad climática.

A la par, ayudó a incrementar la producción de leche y carne lo que mejoró los ingresos de las familias asentadas en esta zona. Por ello, esta medida constituye una acción interesante para la adaptación al cambio climático, haciendo menos vulnerable a la población de Sabanilla.





Buenas prácticas de manejo sostenible del suelo

9. Utilización del raquis de la palma africana para mejorar la capacidad de retención de la humedad en el suelo de fincas palmicultoras

a. Descripción del lugar

La medida fue implementada en el sector “La Marujita”, entre la cabecera parroquial La Unión y la cabecera cantonal Rosa Zárate del cantón Quinindé, provincia de Esmeraldas, que de acuerdo al PDOT 2015 de Quinindé, está ubicado a una altura de 115 msnm con un clima húmedo tropical, temperaturas que varían entre 21 y 31°C

y precipitaciones medias anuales de 2.300 mm. Posee tipos de suelo que varían entre franco-limosos y franco-arenosos, y que son aptos para cultivos agrícolas, aunque en la actualidad la zona presenta un alto riesgo de movimientos de suelo, debido a su conformación, al cambio de uso de suelo, y a las fuertes precipitaciones que se concentran en pocos meses del año (GAD de la provincia de Esmeraldas, 2015).

b. Situación actual del manejo y disponibilidad del recurso

El cultivo de palma africana es importante a nivel país debido a sus múltiples usos, como por ejemplo biocombustible; su producción aporta a la economía nacional el 15% del PIB agrícola y el 1,8% del PIB total, mientras que su industrialización de aceites y grasas genera alrededor de 102 millones USD, contribuyendo con el 0,2% al PIB total. Para Quinindé, cuya





área sembrada se concentra en el centro y sur del territorio, constituye su mayor fuente de ingresos, pero la mayor parte del rendimiento (aprox. el 87%) proviene en su mayoría de fincas palmicultoras de tamaño intermedio: de entre 21 y 50 ha (Inverpal, 2014).

En la región donde se implementa la medida se hace un uso indiscriminado de fertilizantes compuestos por Nitrógeno (N) y Potasio (K), que aunque es provechoso para la siembra, deteriora la calidad del agua y la fertilidad de los suelos (GAD de la provincia de Esmeraldas, 2015).

c. Impacto del cambio climático

Las proyecciones climáticas de los modelos TL959, ETAYPRECIS⁹ proyectan que hasta el año 2040 se va a producir un incremento progresivo de hasta 3°C en la temperatura promedio mundial, en comparación con la temperatura actual. A esto, se suma las variaciones en los patrones y estacionalidad de la precipitación que están produciendo en general períodos más secos y calurosos.

El cultivo de palma no es ajeno a esta realidad, ya que debido a que demanda grandes cantidades de agua, es indispensable implementar medidas que mejoren el balance hídrico del suelo a través de la retención de humedad. Los suelos secos pierden capacidad de retener agua lo que genera escorrentías superficiales con procesos erosivos y pérdida de nutrientes de acuerdo al PDOT cantonal (2015).

d. Descripción de la medida

La experiencia de la finca “La Marujita”, inició en 2010 en el marco del proyecto regional “Cerrando Brechas en la Producción de Palma”. En ese momento, el Fondo Común para los Productos Básicos (CFC, por sus siglas en inglés) y la FAO aprobaron el proyecto piloto presentado por la Asociación Nacional de Cultivadores de Palma Aceitera (ANCUPA) y por el Fondo Latinoamericano de Innovación en Palma de Aceite (FLIPA), encaminado a cerrar las brechas de rendimientos existentes en las

fincas de pequeños y medianos agricultores de este producto. El proyecto tuvo una duración de cuatro años (de junio 2010 a junio 2014), y contó con un presupuesto total de 3.8 millones de dólares.

La finca “La Marujita” se sumó al proyecto, destinando 8 de sus 11 ha para la producción sostenible e implementando principios de buenas prácticas como el uso del raquis para fertilización y mejoramiento de la retención de humedad del suelo.

El raquis de palma africana es un residuo del proceso industrial de extracción de aceite que constituye aproximadamente el 50% en peso de la fruta. Como fertilizante se aplica alrededor de la corona de la palma en la superficie de las raíces, luego se le agrega hojas secas de la misma palma y fertilizantes adicionales esparcidos por encima. Puede aplicarse cada cuatro o cinco años dependiendo de la estructura del suelo y la humedad retenida. En el tiempo intermedio (dos o tres años) se deben aumentar nuevas hojas para la compostura (INIAP, 2012).

La cantidad de raquis necesaria para cada planta varía entre 300 y 400 kg por planta; no obstante, la aplicación en niveles mayores aumenta la masa orgánica y la capacidad de retención de agua. Es por eso que en la “Marujita” se aplican hasta 750 kg de raquis por planta.

La palma africana es un cultivo de rápido crecimiento, especialmente en los primeros años de su ciclo vital. Requiere de una temperatura de 24 a 26°C, con precipitaciones anuales de 1.500 y 1.800 mm de agua, y suelos fértiles de tipo arenoso por su gran necesidad de nutrientes (SICA, INEC & MAG, 2002).

⁹ En Ecuador se encuentran disponibles tres modelos dinámicos de alta resolución espacial para estudios de escenarios de cambio climático que son: El PRECIS (25 km, Escenarios A2 y B2) (Centella & Benzanilla, 2008), el ETA (56KM, escenarios A2 y B2) (Rodríguez Soares & Marengo, 2008) y el TL959 (20 km, escenario A1B) (Kusunoki et al., 2008) (MAE, 2010).



e. Requisitos para la implementación

Se recomienda que durante el proceso de implementación se utilicen mulas para transportar el raquis dentro de las fincas, con el fin de prevenir la compactación del suelo por el empleo de maquinaria de carga pesada, o animales mayores.

f. Resultados y co-beneficios de la implementación de la medida

Esta medida mejoró la capacidad de retención de la humedad en el suelo, y redujo el uso de fertilizantes tradicionales en un 50% lo que representa una disminución en la emisión de GEI.

La aplicación de los fertilizantes químicos, en combinación con raquis y otros residuos, frena

la pérdida por escorrentía de fertilizantes, la volatilización y lixiviación. En ese marco, un dato interesante es que la capacidad de retención del suelo sin el uso de raquis es de 40%, pero con raquis aumenta al 70 y el 80%. De esta manera, esta medida contribuye a contrarrestar, por un lado, las épocas de sequía y por otro, la contaminación de los ríos y cuerpos de agua; en general se dispone de mayores reservas del recurso, tanto para consumo humano como para regadío.

Se evidenció que al año de implementar la medida, el rendimiento del fruto aumentó 2,5 kg de peso por planta, por lo que la cosecha fue más abundante. Se conoce que la recolección de frutos sin raquis es de aproximadamente 15 toneladas/ha/año; la finca La Marujita cosecha 21 ton/ha/ año; por lo que los ingresos económicos de la finca se incrementaron.





Adicionalmente, existió una mayor concienciación sobre los impactos que causa el uso de fertilizantes y fungicidas sobre el ambiente y la salud de los agricultores. Los productores ahora conocen los efectos del cambio climático y la necesidad de implementar buenas prácticas en el ciclo de producción de la palma.

10. Conservación del suelo a través del uso de terrazas y agroforestería

a. Descripción del lugar

La práctica se implementa desde hace 15 años en una finca de la comunidad de Salviapamba, parroquia Ignacio Flores del cantón Latacunga. La extensión de la finca es de 10 ha y se ubica sobre los 3.000 msnm, con temperaturas promedio de 8 y 14°C, precipitaciones entre 500 y 1.200 mm anuales, suelos franco-arcillosos y de cangahua. La zona presenta predios familiares con diversas limitaciones productivas y fuerte deterioro del suelo.

b. Situación actual del manejo y disponibilidad del recurso

La provincia de Cotopaxi experimenta continuamente escasez de agua hasta por 11 meses del año, en el caso más extremo. Esta región es mayoritariamente agropecuaria con grandes necesidades de agua; el déficit hídrico y la falta de protección de las zonas de recarga del recurso han provocado estrés hídrico, afectando su disponibilidad (cantidad) para el consumo humano y para la producción.

El proceso de degradación agrava el problema de agua en la región debido principalmente a la pérdida de la capacidad del suelo para retenerla. El Informe sobre Desertificación emitido en el país el año 2012 revela que el 47% del territorio presenta problemas de degradación de suelos causada por la erosión, pastoreo excesivo, contaminación y deforestación. Las zonas de altura más afectadas corresponden

a las provincias de Cotopaxi, Tungurahua y Chimborazo (MAE, 2012).

c. Impacto del cambio climático

Los escenarios de cambio climático proyectados y planteados a través de modelos climáticos como el TL959 (aumento de la temperatura promedio y de la intensidad de las lluvias en la región andina del país) del Instituto de Investigaciones Meteorológicas y la Agencia Japonesa Meteorológica, señalan que la disponibilidad del agua para la producción de la región se reduciría significativamente en los próximos años. Los suelos degradados con poca cobertura vegetal son sensibles a las lluvias intensas. Además, el proyecto PACC determinó un aumento de noches frías en las regiones sierra centro y norte del país; como el caso de la provincia de Cotopaxi que tiene un alto riesgo a heladas.

En este contexto, la falta de agua, los procesos de degradación de los suelos y la presencia de noches más frías, tornan más vulnerables a los productos agrícolas ante el cambio climático. Esto puede provocar a futuro que la seguridad alimentaria y el medio de vida de los habitantes de la región sean amenazados.

d. Descripción de la medida

La implementación de esta medida contempla la sensibilización y motivación a las familias para involucrarse en el proceso de conservación del suelo, el desarrollo de prácticas agroforestales en sus terrenos y la construcción de terrazas de banco en los suelos duros (cangahua) utilizando maquinaria pesada.

Las terrazas de banco de tierra son una práctica de conservación de suelo y agua que consiste en construir desniveles o escalones formados por cortes y rellenos en sentido perpendicular a la pendiente del terreno, con el objeto de reducir la velocidad de escurrimiento y minimizar la erosión del suelo, conservar su humedad y aumentar el rendimiento de los cultivos (Sagarpa, 2009).



Una vez construidas las terrazas de banco y durante los primeros años, se sembraron especies forestales nativas, especies vegetales y leguminosas para aportar con abonos verdes, que son esenciales para la incorporación de nutrientes y biomasa en el suelo.

e. Requisitos para la implementación

Esta medida puede ser implementada en las provincias de la sierra centro y norte del Ecuador que posean terrenos de al menos 1 ha en zonas de ladera, con suelos de cangahua y posibilidad de regadío.

El valor de la implementación de terrazas de banco, sistemas agroforestales y la siembra de abono verde dentro de 1 ha de terreno, se refleja en la siguiente tabla.

Tabla 6. Costos de la implementación de terrazas de banco y modelo de agroforestería

Actividades	Valor Estimado
Terrazas de banco (incluye uso de maquinaria)	1.800 USD
Plantación de especies forestales nativas (Quishuar, Chilca, Pumamaqui, Yagual, Romerillo y Aliso)	500 USD
Siembra de abonos verdes (vicia y avena) para recuperación de suelos	500 USD
Valor Total	3.000 USD

f. Resultados y co-beneficios de la implementación de la medida

Con la implementación de esta medida hubo mayor disponibilidad de agua y mejor captura de CO₂, porque se corrigió la infiltración en los suelos y el aporte de biomasa; existió recuperación de flora y fauna, así como de terrenos abandonados, fue evidente la reducción de la erosión eólica y el arrastre de sedimentos por efecto del escurrimiento superficial.

Adicionalmente, esta práctica es una alternativa para hacer frente a los incrementos de la temperatura promedio y de la intensidad de la lluvia en la región. Por otra parte, aunque se conoce que existen más posibilidades para resistir a las heladas, el agua para riego es otra solución para que la producción agrícola sea menos vulnerable ante ellas.

11. Uso de abonos orgánicos y agroforestería para la recuperación y conservación del suelo en los cultivos de café de sombra

a. Descripción del lugar

La Asociación Agro-artesanal de Caficultores Río Intag (AACRI) fundada en 1988, está conformada por unas 300 familias de pequeños productores y forma parte de la Corporación Ecuatoriana de Cafetaleros (CORECAE) y del Consejo Nacional de Caficultores del Ecuador. Se encuentra en la parroquia de Apuela, en Intag, Cantón Cotacachi. La extensión de la parroquia es de 220,8 km² y forma parte de las cuencas del Río Intag y parte del Río Guayllabamba, con una altitud de 1.200 hasta los 2.900 msnm. El clima varía de templado a cálido y húmedo, con temperaturas entre los 12 y 27°C (INEC, 2001)

AACRI cuenta con alrededor de 800 hectáreas de cultivo de café de sombra; las plantaciones en fase de producción tienen un rendimiento de 2.000 quintales al año, de los cuales la mayor parte se exporta a Europa y Japón.



b. Situación actual de la disponibilidad del recurso y su manejo en la zona

En la región predominan los cultivos de pasto para la explotación de ganado de carne y leche, la caña de azúcar para elaboración de alcohol y panela, así como maíz duro, café de sombra y fréjol, destinados a la venta. Las prácticas agrícolas tradicionales empleadas en el cultivo de estos productos, que implican la tala de árboles nativos, uso intenso de agroquímicos y fungicidas, han ocasionado una pérdida de nutrientes en el suelo.

c. Impacto del cambio climático

Los productores perciben la variabilidad climática en la región. En la época de verano, que va desde

junio a septiembre, los niveles de precipitación han disminuido y el agua es escasa mientras que en el invierno, de mayo a octubre, se han vuelto más intensos. Esta situación produce avenidas en las laderas y deslaves de terrenos ya que aumenta la degradación de los suelos y causa erosión. Además, afecta a la productividad de café en la zona.

d. Descripción de la medida

Con el fin de recuperar y conservar la calidad de los suelos en Apuela, AACRI implementó un modelo de siembra bajo sombra y recuperación de cafetales, con ayuda de técnicas de agroforestería y permacultura. Esta medida contó con la colaboración de la Organización para la Defensa y Conservación Ecológica de Intag (DECOIN), el MAGAP y el MAE.



Se sembró en su mayoría café Típica Mejorada, de Costa Rica, una variedad similar al Bourbon, resistente a las enfermedades.

La sombra a los cafetales es provista por los frutales, como el plátano y en menor proporción naranja y mandarina, entre otros. Se encuentran además árboles maderables que son utilizados tanto para sombra como para madera y para proveer hojarasca que ayuda a mantener la humedad del suelo y los nutrientes del mismo. Las leguminosas son una de las mejores plantas para esta técnica, pero deberán estar a la distancia correcta para que se logre un equilibrio entre luz, sombra y el crecimiento de ambas plantas.

El modelo para la mejora y conservación del suelo se compone de algunas estrategias:

1. Las partes planas son siempre las ideales para sembrar ya que en parcelas sembradas en laderas con pendientes mayores a 40°, con suelos poco profundos, existe mayor cantidad de piedras que quitar.
2. Se debe sembrar cada planta a una distancia de 30 a 50 cm de la superficie y lograr un buen grado de humedad.
3. Es mejor que el suelo tenga una textura ligeramente arcillosa.
4. Es importante identificar las necesidades nutricionales del cultivo.
5. Se debe incorporar abonos orgánicos como Bocashi¹⁰ y compuestos de minerales (basados en polvo de roca fosfórica) para mejorar la estructura del suelo, incorporar nutrientes y microorganismos benéficos para nutrir y regular el pH del suelo.

En las fincas en donde se implementó la medida se establecieron barreras vivas con especies nativas de árboles que brindan sombra dentro del cafetal, nutren los suelos, aumentan la porosidad y mejoran su capacidad de retener el agua.

La distancia de siembra entre las barreras rompevientos dependerá de la inclinación del terreno y la altura de las plantas usadas. Esta estrategia ayuda a controlar la erosión del suelo, a retener los sedimentos del suelo y los residuos vegetales que transporta el agua que escurre sobre el terreno.

e. Requisitos para la implementación

Los costos de implementación de la medida se detallan en la siguiente tabla:

Tabla 7. Costos de implementación de la medida agroforestal en los cultivos de café de sombra

Rubro	Costos
Planta de café	Aporte de MAGAP
Plántula de especie forestal	0,50 USD promedio en vivero local
Cromatógrafo	0,80 USD c/u
Volqueta de piedra	200 USD cada viaje
1 saco de gallinaza por ha	20 USD
1 litro de melaza por ha	2,00 USD

¹⁰ El Bocashi es un preparado con gallinaza, melaza, cascarilla de arroz, tierra y agua, se lo fermenta por 15 días. Se debe comprobar que la humedad del compuesto sea más que un 40% y esto se lo determina tomando un puñado de mezcla y comprimiéndolo en una mano; el material no debe desmoronarse al abrir la mano, ni gotear.



f. Resultados y co-beneficios de la implementación de la medida

El sistema agroforestal implementado protege a las plantas de café durante los cambios meteorológicos extremos, como las sequías y las tormentas fuertes. Los árboles actúan como barreras para el viento y ayudan a reducir el deslave y la erosión de los suelos.

Estas plantaciones requieren menos fertilizantes, pesticidas y herbicidas sintéticos que las plantaciones de café al sol. Su mayor sombra, además, reduce la temperatura entre las 10 de la mañana y las 2 de la tarde, cuando las matas de café suelen experimentar la mayor tensión por el calor. Además promueven la biodiversidad porque proporcionan un refugio a los pájaros y otros animales.

Finalmente, esta medida permitió disminuir casi un 70% el cambio de uso de suelo; las personas se dedican a trabajar en sus fincas y no tienen necesidad de talar bosques para convertirlos en potreros.

12. Manejo integrado de plagas y enfermedades en la finca de la Asociación APECAP

a. Descripción del lugar

La Asociación de Cafetaleros Ecológicos de Palanda y Chinchipe (APECAP) fue creada en noviembre de 2002. Cuenta con 225 socios y es acreedora de una certificación orgánica y de comercio justo. Se ubica en el área de influencia del Parque Nacional Yacuri, creado en 2012 por el MAE, cuya importancia radica en su gran



biodiversidad y fuentes hídricas. En la parte alta de Palanda, además se encuentran otras dos áreas protegidas, el Parque Nacional Podocarpus y la Reserva Privada Jocotoco, haciendo de este lugar un refugio de fauna y flora.

b. Impacto del cambio climático

Los productores perciben que durante los últimos años el clima y las estaciones son más variables en Palanda, los veranos perduran más de lo normal y los inviernos son más fuertes, lo que influye directamente en sus actividades agrícolas; esta variabilidad provoca que las enfermedades de las plantas sean más recurrentes. Las plantaciones de café han presentado un incremento de plagas y enfermedades como la roya y la broca lo que ha causado grandes pérdidas de producción.

c. Descripción de la medida

La propiedad en donde se desarrolla la medida tiene un enfoque orgánico como alternativa de manejo integral; se adoptó luego del proceso de fortalecimiento promovido por la Federación Regional de Asociaciones de Pequeños Cafetaleros Ecológicos del Sur (FAPECAFES) y el MAGAP.

El modelo de finca integral implementado se enfocó principalmente al cultivo de café de sombra con el fin de fortalecer el sistema agroproductivo del lugar y evitar la incidencia de enfermedades y plagas en los cafetales, entre otros beneficios.

La medida contempló las siguientes actividades:

Se hizo una planificación de la finca para optimizar el espacio físico en base a sus características y mantener un microclima estable dentro de la misma, con el fin de hacer frente a eventos climáticos extremos.

Para que se reduzca la exposición a las sequías y que se recuperen las fuentes de agua, se procedió a reforestar con especies nativas.

La propiedad también es ganadera pero se ha optimizado el uso del suelo mediante la implementación de potreros.

Las plantas de café fueron sembradas sobre pendientes que llegan hasta 30%, a una distancia de 1,5 m x 1,5 m, y dos metros de calle. Al mismo tiempo, el 40% del cultivo está bajo sombra controlada por la presencia de frutales tales como el cacao (*Theobroma cacao*), el árbol de jaca (*Artocarpus heterophyllus*) y árboles como el Guararo (*Myroxylon balsamum*).

Se procedió a quitar los árboles grandes que demandan abundante agua, porque captan la humedad del suelo, como en el caso del pachaco (*Schizolobium parahybum*).

Los árboles maderables fueron ubicados exclusivamente en las cercas y en zonas de alta pendiente (> 40°). Dentro del cultivo se sembró guaba para la producción de materia orgánica y fijación de nitrógeno. Para mejorar la medida de recuperación fue necesario incorporar materia orgánica (humus).

Otra estrategia fue sembrar otras variedades de café con mayor resistencia como el Caturra 11 de origen brasileño, el típica mejorada.

Conjuntamente, para enfrentar la roya se emplearon insumos preparados en base a sales minerales, azufre, boro, cal, zinc, entre otros, lo cual ha ayudado a controlar la enfermedad, y la APECAP tiene un recetario para difundir esta técnica para roya.

Finalmente, al diversificar la finca, se promovió la producción de miel de abeja, maíz, huertos de hortalizas, frutales (naranja, limón, guanábana, nono, membrillo, borojó, papaya, guayaba) y la crianza de animales menores como cuyes, gallinas, tilapias, entre otros.





e. Requisitos para la implementación

Los costos necesarios para la implementación de esta medida son detallados en la siguiente tabla:

Tabla 8. Costos referenciales al 2015 para implementar medidas frente a la Roya y otras enfermedades del café

Actividades	Costos en USD
Costo de una planta de café	0,50 USD
Elaboración de curvas de nivel (nivel en A)	15 USD por jornal
Siembra de árboles en barreras vivas (35 árboles por día) para rodear los cuarteles de ganado	15 USD por jornal
Producción de lechugines para reforestación en barreras vivas (laurel, guato, porotillo), que rodean la finca y los cuarteles de ganado	0,25 USD /unidad
Mantenimiento de vertientes y bosque natural	15 USD por jornal
Abonamiento por ha (Ecoabonaza 50 kg)	9 USD
Compra de semilla típica (adaptada a Palanda) para enfrentar las sequías	0,50 USD por unidad
Siembra de café (35 árboles por día)	15 USD por jornal
Limpieza de las hierbas con rozadora (1 vez cada dos meses)	40 USD
Dosis o coctel para prevenir la roya	4,50 USD/kg
Construcción de invernadero marquesina para secado de café (capacidad 20 a 25 qq)	1.000 USD

e. Resultados y co-beneficios de la implementación de la medida

El uso de fungicidas naturales empleados en la finca permitió que la incidencia de plagas y enfermedades que afectaban frecuentemente a las plantas de café sea menor. Esto a su vez reduce los efectos secundarios en la salud de los agricultores y la contaminación ambiental.

El deshierbe manual benefició al aumento en la materia orgánica y funciona como abono natural ayudando a mantener y conservar la humedad en el suelo. Además, la disminución en el uso de agroquímicos facilita una regeneración de los nutrientes del suelo lo que permite que el café mantenga su calidad.

Finalmente esta medida promueve una diversificación, mejora el acceso a los alimentos y el flujo de ingresos económicos de los productores de la región.

13. Aumento de la fertilidad del suelo y resistencia de plagas y enfermedades, a través del uso de abonos orgánicos y patrones silvestres de naranjilla en la Comunidad Wamaní

a. Descripción del lugar

En el país y especialmente en la Amazonía ecuatoriana, el cultivo de naranjilla (*Solanum quitoense*) constituye un rubro económicamente atractivo para los agricultores y sus familias. Según las estadísticas agropecuarias del Instituto Nacional de Estadísticas y Censos (INEC, 2001) la superficie cultivada en el país alcanzó 9.459 ha con rendimientos de 2,9 Tm/ha, involucrando más de 7.000 UPA's. Actualmente, el cultivo se encuentra presente en las provincias de Morona Santiago, Pastaza, Tungurahua, Napo, Orellana, Zamora Chinchipe, Sucumbíos, Pichincha e Imbabura.

En la comunidad de Wamaní, ubicada en la provincia de Napo, cantón Archidona, se aplicaron técnicas de producción basadas en la reducción de agroquímicos, lo que mejoró sustancialmente su producción y generó bie-nestar de al menos a 28 personas que trabajan en las cerca de 8 hectáreas intervenidas.

El lugar en donde se encuentra la finca del estudio no tiene pendientes pronunciadas, al contrario, son tierras aptas para la actividad agropecuaria.



Los principales productos agrícolas que están en la zona son la naranjilla, cacao, café, yuca, maní, fréjol, maíz, papa china; pero la naranjilla es el rubro más atractivo para las familias de la zona.

b. Situación actual de la disponibilidad y manejo del recurso

La problemática de la producción de naranjilla en la región se concentra en el desgaste progresivo del suelo por la insuficiencia de nutrientes en el mismo, y en el indiscriminado uso de agroquímicos; en este contexto, el suelo se empobrece constantemente, y pierde la capacidad para la producción. Este deterioro produce que los agricultores se trasladen a zonas cada vez más alejadas en busca de mejores condiciones en el suelo, lo que repercute en el cambio de uso, en la expansión de la frontera agrícola en la zona y en la dinámica social local.

A esta realidad se deberá sumar otros impactos producidos después de aplicar fertilizantes, entre los más importantes están la contaminación del suelo con plaguicidas y la emisión de N_2O como uno de los GEI.

c. Impacto del cambio climático

En la Amazonia, el cultivo de la naranjilla está relacionado con la degradación de suelo, deforestación, contaminación del agua, entre otros factores; como consecuencia de esto, se generan condiciones que hacen más vulnerables a los ecosistemas y a los pobladores a los impactos del cambio climático. Entre los más importantes se puede mencionar la presión sobre la calidad del suelo, el aumento de la desertificación y la degradación de los suelos.





Los agricultores locales mencionan que cada vez las lluvias son impredecibles y varían respecto a cada año; por otro lado, el sol es cada vez más fuerte y afecta a las plantas, disminuyendo los rendimientos. En Wamaní la huella del cambio climático se ve en la calidad de los suelos, después de cada precipitación, seguido de un día de sol intenso, éste se agrieta sobre todo en las zonas inclinadas, y en las partes planas se compacta, aumentando cada día la erosión y el desgaste del mismo.

d. Descripción de la medida

Esta medida apunta a la disminución paulatina de las aplicaciones de agroquímicos y aporta a la adaptación y mitigación al cambio climático. Se implementó en el 2008, cuando varios agricultores junto con sus familias diseñaron, planificaron, ejecutaron y transfirieron varias opciones de manejo de un agro ecosistema sostenible con la finalidad de apuntar al mejoramiento de la fertilidad de los suelos, la nutrición de las plantas y el mantenimiento del equilibrio natural.

Cada agricultor levantó un gallinero de 6x6 m² para albergar 40 aves aproximadamente, entre gallinas y gallos criollos. El estiércol junto con el aserrín que se colocan en las camas del gallinero sirven de materia prima para la elaboración del compost.

La materia orgánica proveniente de las aves, de la basura de la cocina y de desperdicios de las cosechas, es empleada en la planta de abonos construida cerca del gallinero. A través de estos procesos de descomposición, la comunidad elabora abonos sólidos y líquidos, como por ejemplo el compost y el biol, que son aplicados para la nutrición y protección de las plantas.

Otro proceso es la lombricultura que genera humus. En una planta de abonos se puede llegar a recolectar aproximadamente 100 kg de compost y 5 litros de purín de lombriz mensualmente y cada 4 meses 600 litros de biol.

La utilización de herbicidas se redujo a cero porque en este momento la labor de deshierba se la realiza de manera manual.

En el lugar también se realiza una práctica enfocada en la injertación¹¹, la cual es realizada en un patrón de naranjilla silvestre llamado apumpo, que fortalece la resistencia de las plantas a plagas del suelo, disminuyendo así el uso de agroquímicos.

e. Requisitos para la implementación

Para la construcción del gallinero, la compostera y la planta de abonos se estima un costo aproximado de 650 USD. Para los cinco agricultores, el costo de implementación es de 3.250 USD/ha. aproximadamente.

f. Resultados y co-beneficios de la implementación de la medida de mitigación

La medida implementada por los productores de Wamaní contribuyó a gestionar y mejorar la materia orgánica del suelo, lo cual promueve la reducción de agroquímicos y fungicidas, disminuyendo así las emisiones de GEI.

La productividad del suelo se incrementó debido al uso de fertilizantes naturales adecuados que promueven la biomasa y aumentan el retorno del carbono al suelo.

Además los costos de mantenimiento y producción de la naranjilla pueden llegar a disminuirse significativamente por la incorporación de materia orgánica, biofungicidas y bioplaguicidas elaborados dentro de la finca; lo que repercute directamente en la economía familiar de los agricultores en la amazonia ecuatoriana.

Sin embargo, no basta solamente con la reducción de fertilizantes y el aumento de uso de abonos orgánicos para mejorar la gestión

¹¹ La injertación es un método de propagación vegetativa artificial de los vegetales en el que una porción de tejido procedente de una planta es unida a otra para que ambas plantas crezcan como una sola.



del suelo para disminuir los GEI, sino que será necesario que los agricultores y comunidades de la zona se capaciten para hacer un uso y aplicación correcta, utilizándolos en las dosis precisas, en el momento adecuado y bajo las condiciones óptimas (Roberts, 2007).

14. Conservación y recuperación de la fertilidad del suelo a través del uso de barreras vivas (bambú) y drenaje en la finca Bosque de Paz

a. Descripción del lugar

La finca ecológica Bosque de Paz es un proyecto privado (o micro empresarial) familiar que comenzó a funcionar en 1995 con la compra de tierras pobres y con mal manejo agrícola, en la parroquia El Limonal. Tiene una extensión

de 15 hectáreas y para lograr su fin emplea los principios de la restauración ecológica, de la permacultura y la agroforestería.

Bosque de Paz se encuentra en el km 42 de la vía Ibarra – San Lorenzo, al norte del país, en las estribaciones occidentales de los Andes. La finca se encuentra a una altura de 960 msnm, con clima subtropical; el paisaje que lo rodea está conformado por montañas deforestadas y habitadas por pequeñas fincas, con un entorno semidesértico. La vegetación dominante en la región está compuesta de hierbas y gramíneas, el clima es seco y caliente.

b. Situación actual de la disponibilidad y manejo del recurso

La vegetación nativa de la zona fue cambiada por cultivos de fréjol (*Phaseolus communis*), yuca





(*Manihota ipi*), varios frutales, entre otros productos. En el lugar se tiene la costumbre de quemar el campo después de la cosecha, lo que acaba con la materia orgánica presente y estructura del suelo.

Debido a la deforestación, los incendios y los métodos inapropiados de trabajar la tierra, se perdió la capa de materia orgánica del suelo, la capacidad de infiltración, la evapotranspiración y retención del agua, haciendo que el sustrato sea compacto e improductivo en la cuenca del río Gualupe y en la zona de Bosque de Paz.

c. Impacto del cambio climático

Los productores perciben que la estación seca se ha alargado cada año un poco más. Este cambio en los patrones está acelerando la degradación del suelo y reduce su capacidad productiva. Este proceso demanda mayor cantidad de abono en el suelo, lo que incrementa los costos de producción.

d. Descripción de la medida

Se implementaron varias actividades basadas en agroecología, permacultura y regeneración natural, con el fin de recuperar el suelo. Se establecieron líneas de reforestación de plantas fijadoras de nitrógeno y especies provenientes de los mismos remanentes de bosques de las partes altas de la cuenca, con el fin de frenar la erosión por viento a lo largo de los cuerpos de agua y quebradas.

Se realizó una combinación de cultivos bajo sombra controlada con especies maderables y hortalizas. Se intercambiaron los cultivos con la vegetación del bosque secundario en proceso de restauración. Antes de sembrar, se consideró la exigencia de luz y sombra de las diferentes especies.

La siguiente medida fue la de reforestar con varios tipos de bambú ya que ésta especie es de rápido y fácil crecimiento. Algunas especies empleadas fueron: caña Guadúa o *Guadua angustifolia* (sin espinas o con espinas), *Bambusa vulgaris*

(amarillo, verde chino de bambú), *Phyllostachys pubescens*, *Asper Dendrocalamus* (bambú gigante), *Phyllostachys nigra*, *Dendrocalamus latiflorus*, *Phyllostachys aurea*, *Dendrocalamus longispiculata*, *Dendrocalamus oldhamii*, *Guadua angustifolia* bicolor, *Bambusa Tulda*, *Guadua aculeata* y *Bambusa ventricosa*, entre otras.

Adicionalmente, se construyeron zanjas con una leve inclinación de entre 5 y 7 grados, para desviar el exceso de agua en época de lluvia, y para aportar agua en época seca. Es importante no trabajar sobre pendientes que superen los 30 grados de inclinación y es obligatorio hacer hoyos grandes y llenarlos con abono orgánico para que la planta sobreviva hasta que tenga suficiente capacidad de penetrar las capas duras (arcilla) y absorber minerales de las capas más profundas. Debe existir una distancia de 2,5 m entre cada planta.

En el Bosque de Paz se utilizó pasto vetiver (*Vetiveria zizanioides* syn. *Chrysopogon zizanioides*) como barreras vivas para control de la erosión y conservación de suelos. El vetiver se adapta a todo tipo de suelo y una vez establecida puede resistir sequías e inundaciones y tiene una alta tasa de supervivencia. Al momento de plantar se debe agregar materia orgánica (compost o biol) y mucha humedad.

Finalmente, se implementó un sistema de riego artesanal para los cultivos basado en el encajonamiento del caudal del río, a través de un muro de piedras y malla, para optimizar el flujo de agua y disminuir la sedimentación. De esta manera, el agua fue encaminada por surcos en función de las curvas de nivel y la misma topografía del lugar.

e. Requisitos para la implementación

Los costos de implementación de la práctica se detallan en la siguiente tabla.



Tabla 9. Costos de implementación de barreras vivas de bambú

Rubro	Costos
Plántula cualquier frutal	0,75 USD
Plántula de bambú (depende del tipo)	Entre 2 a 10 USD
Plántula de pasto Vetiver (ahora venden este producto como parte de la sostenibilidad del lugar)	1 USD
Volqueta de piedra (para el encajonamiento del río)	75 USD
Malla para sostener los muros (rollo de 100 m)	300 USD
Manguera (100 m)	60 USD
Tubo para agua (10 m)	30 USD

f. Resultados y co-beneficios de la implementación de la medida

El conjunto de medidas implementadas permitieron ordenar el uso de la tierra, y fomentar el manejo sostenible de los recursos naturales, en función de la dinámica propia de la región.

Esta medida promueve el proceso de recuperación natural del suelo y la generación de materia orgánica, con el fin de recuperar la fertilidad y la estructura del suelo, apaleando el impacto de la variabilidad climática en la zona.

Adicionalmente, ha suscitado la recuperación de la biodiversidad local, ya que en 1995, cuando inició el proyecto, se registraron apenas 12 especies de aves en el lugar, pero en el último inventario al 2014 se reconocieron 87 tipos diferentes de aves; además se registraron otros animales como el puerco espín, armadillo, ardilla y guatusa.

15. Producción de plántulas de hortalizas bajo invernadero y conservación de fuentes de agua a través de la siembra de especies nativas

a. Descripción del lugar

La Red de Economía Solidaria y Soberanía Alimentaria del Territorio Kayambi (RESSAK) está ubicada en el cantón Cayambe en la provincia de Pichincha, y está compuesta por varias organizaciones de pequeños productores agropecuarios del cantón Cayambe y Pedro Moncayo, estas son: Agropaca, BioVida, Asoproc, La Campesina, Turujita, Junta de Agua La Esperanza, UNOPAC y el Pueblo Kayambi; en total suman 630 familias.

El cantón Cayambe se encuentra ubicado en la parte nororiental de la Provincia de Pichincha, su extensión es de 1.203 km² y el rango de altitud va de 1.900 hasta más de 4.500 msnm. El clima es variado entre los valles y páramos del cantón, con una temperatura promedio de 15°C en todo el territorio. Específicamente en el lugar de intervención, el clima es seco con poca disponibilidad de agua, poca nubosidad, soles intensos y fuertes vientos.

El paisaje está conformado principalmente por montañas y pendientes pronunciadas; entre los ecosistemas presentes se encuentran el Bosque seco Montano Bajo, Bosque Húmedo Montano, Bosque Pluvial y el Páramo. Los suelos poseen texturas gruesas principalmente en pendientes, donde la necesidad de aplicar medidas de conservación es inminente y también de mecanismos para evitar la rápida infiltración del agua y la erosión (GAD del cantón Cayambe, 2015).

b. Situación actual de la disponibilidad y manejo del recurso

Según los registros de precipitación de la Estación Meteorológica Cayambe, del INAMHI al 2014, se puede observar que las lluvias han mostrado una



gran variabilidad durante los últimos 10 años, presentando registros mínimos de 700 mm hasta máximas precipitaciones de 1.400 mm anuales. Esta dinámica afecta directamente a los cultivos, a la alimentación de los animales, a la vegetación y a la salud de las personas.

c. Impacto del cambio climático

En la zona de Cayambe el agua es escasa, pero a esto se suma las repercusiones de la variabilidad climática que son sentidas por las comunidades locales, y que se expresa en forma de una pluviometría irregular e impredecible, sobre todo en la época seca, o por periodos de sequía extrema.

A esto se debe sumar la presencia de vientos más fuertes y heladas con mayor frecuencia durante todo el año, lo que no era común anteriormente, ya que este fenómeno se lo esperaba solo en dos momentos: a finales de diciembre y en febrero. Ahora, los inviernos son más largos y fuertes, por ello aparecen en mayor número las plagas que afectan a las cosechas y los productos secos ya que dificulta la conservación del material genético.

d. Descripción de las medidas

Esta medida se basa en la construcción de invernaderos para el cultivo controlado de especies productivas importantes para la zona y sus comunidades; este modelo de producción agrícola es desarrollado por la RESSAK con el fin de asegurar la provisión de material genético en la zona para disminuir la vulnerabilidad al cambio climático y mantener los niveles de seguridad alimentaria y acceso a mercado. La organización trabaja en la propagación y abastecimiento de semillas y plántulas, ya que son la materia prima para la producción hortícola de las comunidades.

Producir plántulas bajo invernadero permite proveer este material tanto en épocas de sequía, como en lluvia extrema, vientos fuertes, heladas y granizadas. Adicionalmente, las comunidades mejoran la calidad del material vegetal.

Inicialmente se estableció un invernadero comunitario de germinación de aproximadamente 200 m², formado por una estructura metálica para

la instalación de bandejas de germinación de las hortalizas. Las bandejas deben ser de material plástico constituidas con varios orificios, para la germinación individual de las plántulas.

Al cabo de 15 días aproximadamente, pueden ser ya entregadas a los productores para su trasplante en el sitio definitivo al aire libre. Las variedades que se emplearon son: lechuga, crucíferas, acelga, cebolla, apio, remolacha, entre otras.

Posteriormente, se construyó un invernadero con estructura de madera para producción de hortalizas con dimensiones de no más de 60 m². Estos invernaderos permiten que las familias aseguren un porcentaje de alimento en caso de que factores climáticos extremos causen disminución en las plantas a campo abierto.

A la par, se realizó un manejo agroforestal de los huertos, mediante la reforestación con árboles, arbustos nativos y frutales, combinada con la producción agropecuaria, con la finalidad de aumentar la humedad de la zona y cuidar las fuentes de agua, restituyendo el equilibrio ecológico del suelo; para ello, los pobladores siembran especies nativas, y se aprovechan los árboles para formar barreras vivas que minimizan el impacto del viento sobre los cultivos. Las especies mayormente utilizadas son: Aliso (*Alnus glutinosa* sp.), Marco (*Ambrosia arborescens*), Pumamaqui (*Oreopanax ecuadorensis*), Arrayán (*Myrtus communis*), entre otros.

Algunos de los socios han implementado sistemas sencillos para la cosecha y almacenamiento de agua de lluvia, a través de tanques en los techos de las viviendas, como formas de aportar con alternativas para el abastecimiento permanente del agua y su uso posterior en los huertos. Estos sistemas constan de implementos sencillos y de fácil adquisición ubicados en tanques elevados, que direccionan el agua por medio de la gravedad a los sistemas de riego parcelario.

e. Requisitos para la implementación

Los costos aproximados del sistema se detallan en la siguiente tabla:



Tabla 10. Costos de implementación de un sistema de producción de plántulas de hortalizas bajo invernadero

Rubro	Costo
Invernadero comunitario para germinación	2.000 USD
Invernadero de 60 m ² para cultivo de plantas (sin considerar la instalación de un sistema tecnificado de riego por goteo)	1.500 USD
Implementación de un sistema de riego parcelario con las características mencionadas	800 USD
Sistema de recolección de agua en tanques	400 USD

f. Resultados y co-beneficios de la implementación de la medida

La medida implementada permite asegurar los cultivos y las cosechas de la zona y reducir la vulnerabilidad de la comunidad ante eventos extremos como fuertes heladas, vientos y granizadas.

Se ha asegurado la provisión de material genético en la zona, y mejorado las condiciones productivas de los cultivos ante la ausencia o el exceso de lluvia. Finalmente, el manejo agroforestal protege los cultivos, aumenta la fertilidad del suelo y mantiene las fuentes de agua.



Buenas prácticas de manejo sostenible de la biodiversidad

16. Producción agroecológica de hortalizas de la Asociación Agroecológica de Mujeres “Semilla y Vida”

a. Descripción del lugar

La parroquia de Cusubamba está ubicada entre los 2.850 y 3.150 msnm en el cantón Salcedo, provincia de Cotopaxi. Presenta una temperatura promedio anual de 7 a 14°C, precipitaciones que no superan los 750 mm anuales y suelos franco-arenosos y arcillosos. En la zona predomina el ecosistema Bosque Húmedo Montano propio de la zona alta de la cordillera occidental de

los Andes, caracterizado por la presencia de páramos, montañas, lagunas y pendientes pronunciadas.

b. Situación actual del manejo del recurso

En la actualidad el cantón Salcedo presenta problemas de contaminación en ríos y quebradas además de un deterioro de los páramos, debido al uso incontrolado de químicos y a malas prácticas en la agricultura.

En la parroquia de Cusubamba, se ha identificado un deterioro en la vegetación natural debido a las malas prácticas productivas y a la ausencia de bosques; el ambiente se ha tornado más seco y con altas variaciones de temperatura entre la noche y el día (GAD de la parroquia Cusubamba, 2015).





Cusubamba está considerada entre los lugares más afectados por los procesos de erosión de sus suelos debido al uso de las prácticas agrícolas inadecuadas y la expansión de la frontera agrícola. Con la finalidad de frenar la erosión y reducir los impactos de los agroquímicos sobre los recursos hídricos y los suelos, se están implementando sistemas integrales de producción agropecuaria.

c. Impacto del cambio climático

El uso indiscriminado de agroquímicos para la producción agrícola y la deforestación en el páramo liberan grandes cantidades de GEI a la atmósfera, contribuyendo de esta manera al cambio climático.

Los GEI atribuidos a la agricultura y al cambio de uso de suelo son el CO₂ y el N₂O. El primero se libera principalmente a través de la deforestación o quema de combustibles fósiles; esto se debe a la característica propia de los bosques de secuestrar el CO₂ e integrarlo en su materia orgánica; cuando son talados o quemados, liberan el gas a la atmósfera; el segundo por la sobre utilización de fertilizantes nitrogenados.

d. Descripción de la medida

La medida se implementó a partir del 2015 y consistió en la socialización y transmisión de buenas prácticas para la producción agropecuaria por parte de los técnicos del Fondo Ecuatoriano Populorum Progressio (FEPP) a un grupo de mujeres identificadas con el tema y fundadoras de una asociación de carácter informal orientada a la implementación de Sistemas Integrales de Producción.

Cada una de las socias destinó un área de su terreno para la implementación de parcelas agroecológicas productivas. Para recuperar los suelos erosionados y de poca fertilidad se emplearon abonos orgánicos antes de la siembra. Se sembró especies como lechuga,

rábano, col, remolacha y zanahoria de manera ecológica, es decir, evitando totalmente el empleo de fertilizantes o pesticidas químicos, sino únicamente biol como abono natural.

Las comunidades recibieron apoyo en sistemas de riego y capacitación en temas de abonos orgánicos, nutrición y equidad de género, como parte de un trabajo integral.

En el año 2007, la organización de mujeres tuvo sus primeras experiencias de comercialización asociativa mediante casas abiertas aprovechando las festividades de las parroquias de Cusubamba y Mulalillo. Las autoridades de los GADs municipal y provincial valoraron la iniciativa y animaron a la asociación a comercializar sus productos también en Salcedo y otros cantones de Cotopaxi, aprovechando las ferias cantonales y provinciales.

En el año 2010, la asociación de mujeres se regularizó, tomando el nombre de: Asociación Agroecológica de Mujeres “Semilla y Vida” con 22 socias pertenecientes a la comunidad Compañía Baja.

Actualmente, la venta de los productos producidos por la Asociación se realiza en la feria de productos orgánicos de Salcedo. La alcaldía ha establecido tres días de feria a la semana para productos agroecológicos con precios más altos en comparación a los productos sembrados a la manera tradicional.

Los huertos agroecológicos se implementan en la zona media del cantón debajo de la frontera agrícola, que está regulada a través de una ordenanza municipal. Con la finalidad de recuperar las áreas degradadas a causa de las deforestaciones y malas prácticas agrícolas se está trabajando también en la conservación de los páramos, a través de la disminución de la carga animal.

e. Requisitos para la implementación de la medida

Para la implementación de la medida





implementada en Cusubamba se necesitó lo siguiente por cada hectárea:

- Semillas de abonos verdes para recuperación del suelo de acuerdo a su grado de afectación.
- Semillas de hortalizas (20.000 plantas por hectárea)
- 10 toneladas de materia orgánica

Para la preparación de los suelos se requirió del uso de maquinaria debido a su característica de suelo duro. En la siembra de las semillas se trabajó a través de mingas comunitarias y se requirió de 8 a 10 personas por hectárea.

La materia orgánica, como de las semillas de abono verde y de las hortalizas, fue entregada por parte del MAGAP. Los costos del uso de maquinaria y mano de obra son la contraparte de los actores.

Tabla 11. Detalle de estos costos de implementación del modelo de producción agroecológica de hortalizas

Insumos	Costo
10 toneladas de material orgánico	1.000 USD
Semillas de abono verde	300 USD
Semillas de hortalizas (20.000 x 3 centavos)	600 USD
Maquinaria para la renovación del suelo	1.200 USD
Total	3.100 USD

f. Resultados y co-beneficios de la implementación de la medida

Gracias a esta medida se logró la recuperación de tierras agrícolas en zonas debajo de la frontera agrícola, lo cual hizo decrecer la presión ejercida sobre el ecosistema páramo en la zona con medidas de recuperación como la reforestación.

A nivel de salud, la comunidad observó una mejora en la salud de su familia, especialmente por la reducción del uso de plaguicidas y una alimentación más variada, con productos frescos libres de agroquímicos.

Si bien no se tienen datos exactos sobre el cambio en la calidad de agua de los ríos y quebradas, la implementación de la producción agroecológica, según testimonios y percepciones de varias familias, elevaron la calidad del agua y redujeron la contaminación de los cuerpos de agua.

Finalmente, se puede decir que las pequeñas fincas de producción orgánica manejadas por familias campesinas demuestran gran capacidad para reducir emisiones de GEI, mantener y aumentar el almacenamiento de carbono de suelos y biomasa, y son más eficientes en el uso de recursos para la producción de alimentos.

17. Implementación de huertos familiares en zonas periurbanas del Distrito Metropolitano de Quito

a. Descripción del lugar

El Distrito Metropolitano de Quito (DMQ) se encuentra en la zona andina del Ecuador está rodeado de montañas, nevados y muchos valles. Esta geografía tiene una relación directa con el clima y sus variables como el viento, la humedad, la presencia de granizadas y heladas, etc.

La medida se desarrolla en el barrio la Argelia dentro del DMQ, en tierras propias y comunitarias, en donde se aplican técnicas de producción agropecuaria basada en principios agroecológicos en una extensión aproximada de 16.450 m², que pertenecen a las 13 socias quienes conforman la agrupación. En este territorio, existen parcelas de 500 a 1.800 m², dedicadas a la producción agrícola de cultivos anuales como papas, maíz, fréjol y habas como actividades extras para el autoconsumo de las familias.

b. Situación actual del manejo del recurso y su disponibilidad



Quito es altamente vulnerable a los impactos del cambio climático no sólo por su ubicación geográfica, sino también por su variada topografía. El INAMHI y la Secretaría de Ambiente del DMQ han registrado un aumento de episodios extremos en Quito, como las sequías de fines de 2009 y 2010, y las lluvias intensas experimentadas en abril de 2011.

c. Impacto del cambio climático

El aumento de la temperatura media anual y la mayor frecuencia e intensidad de eventos extremos como precipitaciones, temperaturas, sequías, vientos, entre otros, representan una

amenaza para el sector agrícola rural ubicado en los alrededores de la capital.

El microclima generado por la zona urbana y una parte de la rural, por estar cubierta de casas, concreto y asfalto, genera un aumento de temperatura de aproximadamente 1°C, respecto al resto de la zona, fenómeno conocido como “isla de calor”, el aumento de la temperatura contribuye a las reacciones de los gases de combustión presentes en la atmósfera. En algunos casos no sólo resulta afectada la temperatura de la ciudad sino también de sus alrededores, alterando el clima regional.

Es por esto que las alternativas de agricultura agroecológica periurbana diversificada es una opción atractiva, especialmente en zonas vulnerables tanto a las condiciones de pobreza como a las climáticas.



d. Descripción de la medida

La medida fue implementada por la Asociación de Mujeres Emprendedoras de la Argelia Alta y apunta al fomento de los huertos familiares periurbanos en el DMQ.

Inicialmente se adecuó un huerto demostrativo de 1.500 m² en tierras comunitarias, donde se practicaron todas las técnicas agroecológicas de producción. Un área de 60 m² dentro del huerto demostrativo está cubierta por un invernadero con sistema de riego por goteo y existe también una zona de propagación de plántulas y otra para la elaboración de insumos orgánicos.

Los huertos individuales tienen superficies que van desde los 500 hasta los 1.800 m², con el mismo espacio dedicado a la cubierta bajo invernadero, pero con ausencia de un sistema tecnificado de riego; el resto del terreno se encuentra dedicado a cultivo a campo abierto y un espacio para la elaboración de insumos orgánicos como por ejemplo el humus de lombriz.

La modalidad de siembra es de rotación planificada, y tiene la finalidad de aprovechar los beneficios que cada especie puede otorgar para romper con los ciclos de vida de las plagas. Las gramíneas y leguminosas son incorporadas como abonos verdes.

Todos los desechos de labores culturales, postcosecha y cocina de la casa son incorporados al suelo, previo tratamiento de compostaje para estabilizar la materia orgánica.

Para el riego manual de las plantas, al momento se utiliza el agua potable del suministro de cada socio. Esto es una debilidad, debido a que los costos de producción se encarecen.

Alrededor del huerto se han sembrado especies leñosas y semileñosas que sirven como barreras rompimientos (cercas vivas), para proteger los cultivos e infraestructuras de fuertes vientos presentes en la zona. Con respecto a la elaboración y aplicación de insumos orgánicos que se producen internamente en cada uno de los huertos, se encuentran procesando bocashi,

bioles, té de frutas, insecticidas botánicos, trampas naturales, compost y humus.

Adicionalmente, se construyó un centro de acopio para el procesamiento de las cosechas previo a su comercialización.

e. Requisitos para la implementación de la medida

Los costos totales de la medida de adaptación son 3.248 USD aproximadamente, que corresponde a un tiempo estimado de implementación de dos años para una socia, en un terreno de 1.200 m². Cabe indicar que para las estimaciones de los costos, se ha valorado la mano de obra y el costo de la tierra.

f. Resultados y co-beneficios de la implementación de la medida

Con esta medida la seguridad alimentaria y la economía familiar se ven fortalecidas debido al ahorro en el presupuesto familiar, ya que no es necesario comprar determinados alimentos en el mercado externo.

El cambio de actitud respecto a las prácticas agropecuarias habituales, enfatizando la producción orgánica, aumentó el consumo de alimentos sanos a nivel familiar a través de la diversificación de la dieta.

La medida también resulta en el mejoramiento en los aspectos socioeconómicos y la calidad de vida de las familias, pues la producción agroecológica está encadenada a mercados especializados por medio de circuitos alternativos de comercialización (CIALCOS) y ferias fomentadas como política pública dentro del MAGAP.

18. Implementación de invernaderos familiares en fincas de pequeños agricultores en la zona de Papallacta



a. Descripción del lugar

La parroquia Papallacta tiene una población de 920 habitantes y una superficie de 312,9 km²; se encuentra en la cordillera oriental de los Andes, dentro de la zona de influencia de dos áreas protegidas: Parque Nacional Cayambe-Coca y la Reserva Ecológica Antisana. El 80% del entorno consiste en ecosistema páramo y bosque nublado de altura. La precipitación promedio anual de la zona es de 2.000 mm, con una temperatura promedio que va de 8°C a 12°C (GAD de la parroquia de Papallacta, 2009).

Las fuentes de abastecimiento de agua para Quito provienen de tres microcuencas, que pertenecen a los sistemas de la subcuenca del río Quijos y la cuenca del río Napo; en estos lugares, el paisaje está rodeado de humedales, ríos y cascadas pendientes con relieves escarpados, característico de Papallacta; el mayor porcentaje del suelo se encuentra en pendientes mayores al 70%.

b. Situación actual de la disponibilidad del recurso y su manejo en la zona

Debido a las características mencionadas en Papallacta, una de las limitantes para el desarrollo normal de las actividades agrícolas es el exceso de agua, sobre todo en los meses de invierno, sin dejar de lado las bajas temperaturas



que se agudizan con la incidencia de los vientos, heladas o fríos impredecibles. La presencia permanente de precipitaciones abundantes en la zona, sumado al paisaje y al tipo de suelo, hace que las condiciones ambientales para el desarrollo de los cultivos sean hostiles.

Únicamente el 3% del territorio es considerado como adecuado para la producción agrícola, y en el resto predominan los pastizales dedicados para la alimentación del ganado bovino (por lo cual el páramo de Papallacta está muy compactado).

c. Impacto del cambio climático

Según los productores locales en los últimos años las condiciones climáticas se han vuelto más extremas con temperaturas extremadamente bajas en la noche. Ahora llueve más y con mayor fuerza, lo que causa impactos en los cultivos.

Hay días en que la intensidad del sol y viento son muy fuertes. El PDOT de la parroquia Papallacta menciona la dificultad de la zona para la producción agropecuaria. Los productores, con ayuda del MAE a través del proyecto PRAA, se especializaron en la producción de cultivos andinos como la papa y otros productos, con el objetivo de adecuar las condiciones para el desarrollo de las plantas; esto ayuda a contrarrestar el exceso de agua que existe en la zona y las condiciones climáticas extremas, para asegurar su alimentación.

d. Descripción de la medida

Con la finalidad de fortalecer la capacidad adaptativa de los pobladores de Papallacta a la variabilidad climática actual y el fortalecimiento de la seguridad alimentaria, el MAE, a través del PRAA, ha implementado desde el año 2013 varios microinvernaderos familiares como un mecanismo alternativo de producción agrícola.

Los microinvernaderos familiares permiten cultivar en ambientes controlados, con condiciones óptimas de temperatura y cantidad de agua, alimentos andinos y de hortalizas, para que estén disponibles durante todo el año, además que evitan la pérdida de las cosechas.

Los microinvernaderos se encuentran ubicados en lugares aptos y cercanos a las viviendas; se presta especial atención para evitar construirlos en sitios donde se acumule mucha agua. Cubren una superficie de 40 m² (10m x 4m) y tienen una altura de 3,5 metros; su estructura es de madera, recubierta con plástico de invernadero y malla (sarán) para las ventanas, permitiendo así la ventilación.

El esqueleto sobre el cual se asienta se encuentra conformado por postes laterales y centrales, que miden 3 y 4 metros respectivamente, distribuidos uniformemente en el contorno (siete postes laterales por lado) y en el centro (tres palos centrales). Los pilotes de madera utilizados son de eucalipto, previamente tratados con alquitrán, para evitar la pudrición. A partir de esto, la estructura se complementa con largueros, carguero y cumbrera. Las paredes poseen “ventanas” para la ventilación del espacio interior.

Esta medida cuenta con la instalación de un sistema de riego, que en principio se basa en cintas de goteo, sin embargo en la práctica no ha resultado ser beneficioso debido al manejo de los mismos. Por ello, hasta este momento los productores utilizan el agua de riego que se abastece de las tomas por gravedad o a su vez de tanques reservorios, solamente por medio de mangueras para el riego localizado.

e. Requisitos para la implementación de la medida

Para la construcción de un microinvernadero se necesita un día de trabajo, pero requiere del apoyo de la comunidad.

El costo estimado de la implementación de un microinvernadero familiar, con las características mencionadas, varía entre los 800 y 1.200 USD, de acuerdo a las percepciones generales de los beneficiarios. Este costo fue cubierto por el MAE, a través del PRAA, con el aporte de la mano de obra de la comunidad. La tabla detalla los valores mencionados:



Tabla 13. Costos de la implementación de invernaderos familiares en la zona de Papallacta

Detalle	Valor	Responsable
Invernadero	800-1.200 USD	PRAA
Mano de obra	750 USD al mes, por persona	Comunidad
Semillas	Depende de la especie	PRAA

f. Resultados y co-beneficios de la implementación de la medida

La medida mejora la capacidad adaptativa de los productores frente a las condiciones extremas de clima en la zona, especialmente por el exceso de precipitaciones, vientos y temperatura extrema.

A través de la infraestructura descrita, se logró diversificar la producción de hortalizas. Esta medida asegura la disponibilidad de alimentos en las comunidades y el ahorro en la canasta básica. Además, constituye una fuente de ingreso adicional para las familias.



19. Implementación de fincas integrales orgánicas como estrategia para recuperación de la fertilidad del suelo

a. Descripción del lugar

La parroquia Tupigachi, en el cantón Pedro Moncayo, limita al norte con la provincia de Imbabura, al sur con Tabacundo, al este con la parroquia Ayora (cantón Cayambe) y al oeste con el sector de Mojanda. En la zona, la precipitación promedia anual es de 496,8 mm, con meses muy secos desde junio a septiembre; los meses más lluviosos son de marzo a mayo, seguido por octubre y diciembre. Actualmente, el eje de la economía de la parroquia es la producción de flores.

La potencialidad económica de la zona está en la producción agrícola. El suelo presenta las mejores características para el cultivo de productos como maíz, papa, cebada, trigo, así como flores frescas de exportación. La parroquia está formada por varias comunidades que forman parte de la asociación Turujita, entre ellas la de Ñaño Loma.

b. Situación actual del recurso y su disponibilidad

La comunidad Ñaño Loma de la parroquia Tupigachi tiene una temperatura que varía de 12°C a 18°C, con presencia de fuertes vientos en los meses de junio a septiembre y una evapotranspiración alta, lo que provoca condiciones de sequía.

El suelo en la comunidad Ñaño Loma, como en la mayoría de la parroquia Tupigachi, corresponde a suelos de relieve moderadamente ondulado, con pendientes inferiores al 12% en más del 80% de la superficie; su fertilidad es media, con textura variable, desde arenosa hasta arcillosa.

b. Impacto del cambio climático

El desgaste y erosión del suelo en la comunidad Ñaño Loma, y en casi toda la parroquia, se

acrecientan por la variabilidad climática. Las estaciones climáticas han cambiado, no se cumplen los meses de época seca y de lluvia establecidas y existen eventos climáticos extremos no habituales como las heladas que han ocasionado la pérdida de los cultivos de la zona.

c. Descripción de la medida

Esta medida fue implementada por la Organización Turujita que reúne a 8 comunidades de la Parroquia Tupigachi, en el cantón Pedro Moncayo. El objetivo principal para crear la organización fue para recuperar la calidad del suelo en Ñaño Loma, mediante la reactivación de granjas orgánicas integrales; el proyecto tiene más de diez años desde que inició, pero por la fuga de mano de obra a las floricultoras y la utilización de los terrenos familiares para esta actividad, no hubo continuidad en la iniciativa. No obstante, desde hace dos años se han retomado las actividades.

Dos socios de la organización poseen huertos propios de alrededor de 5.000 m², con pendientes de entre 10 y 30% en donde han sembrado variedad de cultivos para el autosustento; ahí tienen chanchos, cuyes, gallinas y borregos. Su producción es orgánica y emplean los excrementos de animales como fertilizantes para mejorar la calidad del suelo.

Las granjas están a campo abierto y se encuentran bajo la influencia directa de las condiciones meteorológicas de la zona, que pueden ser en algunas ocasiones adversas, otras favorables. Sus huertos tienen alrededor de 4 años y están divididos en pequeños recuadros de 10 m² cada uno.

A la vez, los borregos y vacas pastorean el forraje, para ello y como parte de su espacio, tienen un sector donde se ha sembrado pasto mejorado, combinado con Ryegrass (*Lolium multiflorum*, L. *perenne*), tréboles (*Tripholium spp.*) y pasto azul (*Dactylis glomerata*). Así se alimentan los animales que al mismo tiempo que proveen proteínas, abastecen del material base para hacer el compost.



La siembra no es compleja, y se basa en la combinación de especies de autoconsumo y son sembradas en hileras en contra de la pendiente. Asimismo, tienen barreras vivas o cortinas contra viento formadas de alisos (*Alnus sp.*), planta que protege las huertas de los eventos del clima y provee de nitrógeno al suelo.

Los desechos vegetales son transformados en fertilizantes ricos en nutrientes a través del compostaje; la técnica de descomposición aeróbica es realizada en un tanque de plástico de 30 litros, al que se le tapa y después de un mes se tienen los primeros resultados.

Se utiliza un motocultor, que es un pequeño arador, provisto de motor y ruedas, que se conduce a pie empujando un manubrio alto, ya que al ser pequeño se mueve con mayor flexibilidad en la huerta.

e. Requisitos para la implementación de la medida

Los costos de implementación de una granja orgánica de 500 m², son los que se detallan en la Tabla 14.

f. Resultados y co-beneficios de la implementación de la medida

La medida mejora las condiciones del suelo porque fomenta la agrobiodiversidad de la zona.

De esta forma, la medida también disminuye el riesgo de erosión eólica y se mejora la fertilidad y estructura del suelo por los aportes de materia orgánica provenientes de los desechos de los animales.

Tabla 14. Costos de la implementación de una finca integral orgánica

Producto	Unidad	Costo en mercado local
Tractor	1 hora	25 USD (se necesitan un promedio de 3 horas)
Motocultor	1 unidad	1.500 USD
Semillas de papa	1 quintal	25 USD
Maíz y otros cereales	1 quintal	20 USD (promedio c/u)
Semillas de Llantén	1 kilo	10 USD
Hortalizas	1 tarro	4 USD (promedio)
Gallinaza	1 saco (para 4 m ²)	1,25 USD
Aliso	1 planta (necesario 30 plantas)	0,30 USD, en total 10 USD
Mezcla de reglas, pasto azul, trébol blanco	3 sacos (25-35 libras para 9-10 familias)	670 USD, 70 USD cada familia
Pasto mejorado	1 saco (se necesitan un promedio de 25 libras)	200 USD, 50 USD para cada familia

Las leguminosas y los árboles de aliso generan mayor fijación de nitrógeno en el suelo. Al mismo tiempo, la no utilización de agroquímicos reduce la emisión de GEI a la atmósfera. Además la medida aporta con alimentos sanos para la nutrición familiar y es una fuente de ingresos económicos.



Buenas prácticas en el manejo sostenible del agua

20. Implementación de invernaderos tubulares en la comunidad La Buena Esperanza

a. Descripción del lugar

El cantón Cayambe se encuentra ubicado en la parte nororiental de la provincia de Pichincha; su altitud va desde los 1.900 hasta más de 4.500 msnm. La comunidad Buena Esperanza se encuentra ubicada en la Parroquia Cangahua, a 3.200 msnm. La población rural del cantón es de 39.327 habitantes. El paisaje está constituido por pendientes pronunciadas, el clima es seco con

poca disponibilidad de agua, poca nubosidad, soles intensos y fuertes vientos.

Los agricultores de la comunidad La Buena Esperanza, junto con sus familias, se dedican a la producción de diversos cultivos y cría de animales. La mayoría de fincas son aprovechadas para la siembra de pastos para ganado, pero en la actualidad la comunidad está también implementado invernaderos tubulares comunitarios para la producción; para ello cuentan con el apoyo del MAGAP.

b. Situación actual de la disponibilidad y manejo del recurso

En la parroquia Cangahua, según su PDOT 2011-2021, se destina una gran porción de territorio a la agricultura, la misma que cuenta con riego. Pero en la comunidad La Buena Esperanza la disponibilidad de agua para la producción agrícola es limitada,





no solo por la poca disponibilidad, sino por la variabilidad de las precipitaciones anuales; existen períodos con precipitaciones intensas, pero otros muy secos. El agua de riego proviene de los turnos de agua provistos por la Junta de Agua (GAD de la parroquia de Cangua, 2011).

c. Impacto del cambio climático

Los pobladores de la comunidad La Buena Esperanza mencionan que el clima y su variación anómala afecta a la agricultura. El invierno y el verano ya no tienen una estacionalidad marcada.

La comunidad siente escasez de lluvia por períodos extensos; en la época seca hay temperaturas más altas durante el día y se presentan súbitamente heladas por las madrugadas con mayor frecuencia. En la época lluviosa existen precipitaciones fuertes que provocan que el agua se acumule en el suelo, y se inunden los cultivos. Sin embargo, en esa estación de la misma manera hay ocasiones que no llueve.

Este cambio en las características normales de estacionalidad genera incertidumbre en los comuneros, respecto al apareamiento de las precipitaciones durante todo el año, sobre todo para definir las fechas exactas para las labores de siembra. Cuando no es realizada correctamente, la germinación y desarrollo de las plantas es visiblemente afectado.

Junto a estos fenómenos, aparecen igualmente las granizadas y las heladas. Las dos causan problemas en la producción agrícola y afecta las condiciones de vida de las personas.

En la actualidad los habitantes de la zona perciben que la intensidad del sol es mayor que antes, sin importar la época del año. Esto afecta a las personas al momento de realizar las labores agrícolas a las plantas por la deshidratación que

causa y finalmente, al suelo porque acelera los procesos de pérdida de humedad.

d. Descripción de la medida

La comunidad ha implementado el cultivo bajo invernaderos tubulares como medida de adaptación. Estas acciones son impulsadas por el MAGAP desde el 2013. La finalidad es la de fortalecer la seguridad alimentaria y disminuir la vulnerabilidad del cultivo, a través de la diversificación de la producción destinada principalmente al autoconsumo. Se realizan procesos de capacitación en seguridad alimentaria y producción de alimentos a las familias involucradas.

Un invernadero tubular tiene unas dimensiones de 6 x 24 m² y 3 metros de altura. En el interior están distribuidas camas en donde se siembran los distintos cultivos.

En las camas se producen una variedad interesante de hortalizas que anteriormente no se cultivaban en la zona, tales como vainita, pepinillo, tomate de mesa, tomate de árbol, pimiento, zuquini, brócoli, coliflor, cilantro, apio, perejil, cebolla paiteña, acelga, zanahoria, entre otros. De esta manera se incentiva el manejo de varias especies hortícolas dispuestas aleatoriamente en la superficie del invernadero.

El invernadero cuenta con un sistema de riego por goteo abastecido directamente de una acequia, a través de un sistema de reserva (o tanque), con un filtrado simple que conduce el agua por gravedad. De esta manera, la disponibilidad de agua es permanente durante todo el año.

Algunos métodos agroecológicos utilizados en la producción son: fertilización del suelo por medio de abonos orgánicos provenientes de estiércol de animales que son criados por los agricultores, especialmente cuyes y borregos. También se aplican preparados de biol, que junto con melaza, son adicionados al agua de riego.





La presencia de plagas en el cultivo es mínima. Por ejemplo, en los veranos intensos aparecen los pulgones, pero son controlados por medio de la aplicación de preparados naturales que contienen: ají, ajo, jengibre y alcohol.

e. Requisitos para la implementación de la medida

El costo promedio de implementación de un invernadero tubular comunitario, con las características mencionadas, es de 1.200 USD, según el tamaño y característica; si se quiere incluir el sistema de riego por goteo, los costos aumentan en función del método que se quiere colocar.

Cabe mencionar que para la instalación de la infraestructura descrita, el MAGAP contrató una empresa especializada, la cual empleó 3 días para la construcción del invernadero; el costo supone solo materiales y mano de obra; y previo a la instalación, los técnicos del MAGAP analizaron la factibilidad y topografía del terreno. Estos costos no son valorados al momento de calcular el precio de cada invernadero para la comunidad.

f. Resultados y co-beneficios de la implementación de la medida

La producción del invernadero optimiza el manejo y controla el exceso de agua lluvia en la zona, mejora el acceso a alimentos diversificados, producidos limpiamente, brinda una alternativa agrícola permanente que impacta directamente en la economía familiar.





Disminuye la vulnerabilidad de la comunidad a los efectos del cambio climático por las siguientes razones:

Este sistema protegido o invernadero tubular promueve que la demanda de agua de las plantas que están adentro y que tienen condiciones ambientales diferentes con respecto a las cultivadas al aire libre, sea controlada de manera eficiente, optimizando así el uso del recurso agua en la zona.

El sistema de riego por aspersión usado en los invernaderos ayuda a que la dosis y frecuencia de aplicaciones de agua sea controlada, en función de los requerimientos hídricos de cada tipo de cultivo, en cada etapa de su desarrollo, dentro del invernadero.

En los últimos años, gracias a la medida, hay un aprovechamiento eficiente del agua de riego y abastecimiento permanente durante todo el año, evitando el desperdicio; y por ello, el sistema de riego fue instalado en conjunto con el invernadero tubular comunitario.

En términos de fortalecimiento organizativo, la medida mejoró la capacidad de respuesta comunitaria ante alteraciones climáticas extremas, mediante la búsqueda inmediata de soluciones y estrategias para el bien común.

También se percibió un fortalecimiento de las capacidades de los beneficiarios sobre producción agroecológica. Reciben el apoyo de técnicos del MAGAP, quienes visitan permanentemente el invernadero tubular comunitario para asesorar sobre problemas y recomendar acciones de mejora.

Finalmente, el fortalecimiento de la seguridad alimentaria de las familias que participan de la iniciativa, a través de la iniciativa ha sido uno de los beneficios más sentidos por los pobladores.

21. Construcción de albardas (diques) para contrarrestar los problemas de sequía en las zonas rurales del cantón 24 de Mayo.

a. Descripción del lugar

La experiencia de la parroquia Sucre del cantón 24 de Mayo, provincia de Manabí, tiene una antigüedad de 12 años; se localiza entre los 150 y 500 msnm, con una temperatura promedio de 25°C y con precipitaciones mayores a 1.000 mm/año. La zona tiene suelos franco-limosos.

b. Situación actual del manejo y disponibilidad del recurso

La provincia de Manabí afronta escasez de agua prácticamente en todo su territorio, en especial durante los meses de junio a noviembre. Los déficits mensuales de agua llegan a ser hasta de 100 mm en esta estación del año de acuerdo al servicio meteorológico del INAMHI (2015). El sur de la provincia presenta un déficit del balance hídrico anual del suelo de 250mm hasta 943.5mm. La insuficiente disponibilidad del agua puede mantenerse hasta por 8 y 12 meses en el año.

c. Impacto del cambio climático

Los modelos climáticos PRECIS, ETA y TL95 prevén incrementos de la temperatura en todos los meses del año de entre 0.77°C a 0.91°C (MAE, 2010). El modelo TL959 anticipa incrementos de la temperatura y aumento de la presencia de lluvias intensas en la mayor parte del territorio manabita. Las fuertes lluvias soportadas en esta provincia están provocando inundaciones y pérdida de tierras de vocación agrícola.

A mayor temperatura y variabilidad climática existe mayor demanda de agua para riego, provocando mayores conflictos por la disponibilidad de agua entre los productores de café, maíz, caña de azúcar y cacao de la provincia.





d. Descripción de la medida

La implementación de esta medida propone contrarrestar los problemas de sequía de la región. El agua almacenada asegura la producción agrícola. Para los agricultores la necesidad más urgente es el riego para lotes de maíz, viveros de café y para los pequeños huertos que proveen la alimentación cotidiana.

Para la implementación de albarradas, fue necesario que la población promueva en zonas de recarga hídrica la repoblación y recuperación vegetal natural circundante que ayuda a la protección de las zonas de recarga hídrica.

Las albarradas se ubicaron en el lugar más idóneo dentro del área de recarga hídrica protegida por bosque y vegetación. El suelo franco limoso

favoreció la impermeabilización de las paredes sin tener que instalar otros materiales como geomembrana. La colocación de vegetación natural (bosquetes) sobre las albarradas incentivó la repoblación vegetal natural circundante.

La maquinaria agrícola realizó movimientos de tierra hasta alcanzar profundidades entre 2 y 5 m, accediendo a las capas sólidas del suelo. Se compactó el terreno excavado, con el fin de atenuar la infiltración del agua al momento de almacenarla.

Las albarradas construidas en el cantón 24 de mayo son utilizadas por varios grupos familiares y cuentan con capacidad de almacenamiento suficiente para 15 familias.





e. Requisitos para la implementación

La implementación de las albarradas requirieron de muy pocos materiales; sin embargo, se precisó de un tractor de oruga o retroexcavadora por periodos de entre 8 y 40 horas, tiempo calculado para la excavación de un reservorio natural con capacidad de almacenamiento entre 500 y 5.000 m³. En el caso del cantón 24 de mayo, la maquinaria pesada fue facilitada por los GADs municipal y provincial.

Las familias que instalaron sistemas de riego por inundación requirieron de mangueras móviles que fueron colocadas en el filo de la albarrada y orientadas hacia cada parcela para aprovechar la gravedad en la conducción del agua. Los costos de la implementación de una albarrada se detallan en la tabla a continuación.

Tabla 15. Costos de implementación de albarradas

Capacidad de almacenamiento	Costos/hora de uso maquinaria
500 m ³	320 USD/ 8 horas de uso maquinaria
5.000 m ³	1.600 USD/ 40 horas uso de maquinaria

Cabe recalcar que esta medida puede ser implementada en zonas del litoral con marcados periodos de estiaje, como las provincias de Manabí, Santa Elena, Guayas y Esmeraldas; donde la temporada seca supera los 4 meses y la lluviosa alcanza precipitaciones superiores a los 1.500 mm anuales. El rango de temperatura debe oscilar entre los 20 y 30°C considerado como favorable para la vegetación circundante a las albarradas.

f. Resultados y co-beneficios de la implementación de la medida

La implementación de las albarradas para el almacenamiento de agua lluvia en épocas de invierno en zonas de recarga hídrica, conjuntamente con un manejo sostenible en la cobertura vegetal de sus alrededores, ha mejorado el balance hídrico del suelo. En épocas de sequía, los reservorios naturales proveen a las familias del recurso necesario para los cultivos de corto plazo, preservando así su seguridad alimentaria y la comercialización de los productos que les representan importantes ingresos económicos.

La instalación de sistemas tecnificados de riego optimiza el uso del agua, porque se cuenta a mediano o largo plazo con caudales suficientes para los cultivos en épocas de verano.

22. Delimitación de la frontera agrícola para la conservación de fuentes de agua, en la microcuenca del Río Ángel

a. Descripción del lugar

La microcuenca del Río Ángel, que forma parte de la gran cuenca del río Mira y que drena al Pacífico en Colombia, nace en los páramos de El Ángel y desciende 50 km hasta unirse con el río Chota, cerca de la población de Mascarilla, donde se transforma en el río Mira. La microcuenca abastece a tres cantones de la provincia: Mira, Espejo y Bolívar.

La experiencia de conservación se desarrolló y continúa vigente en los cantones Mira y Espejo, pertenecientes a la provincia de Carchi. Esta zona presenta suelos arcillosos, franco-limosos y de cangahua, y se encuentra ubicada entre los 1.500 y 2.400 msnm en la parte baja; mientras que la parte alta llega hasta los 4.200 msnm.

Los cantones Mira y Espejo viven de la agricultura, ganadería, caza y silvicultura. El porcentaje de la población empleada en estos sectores asciende al 36,14% (GAD de la provincia de Carchi, 2011).



b. Situación actual del manejo del recurso

La zona de amortiguamiento de la Reserva El Ángel es óptima para las actividades agropecuarias. Gran parte del agua para la población de los cantones Mira y Espejo se origina ahí. Esto ha promovido el avance de la frontera agrícola, la introducción de ganado y también varios conflictos.

Los productores de cultivos de secano de las zonas altas de la provincia (proveedoras de agua) están demandando más agua de riego, pues actualmente existen menos precipitaciones y el tiempo seco de verano se va prolongando. Las zonas media y baja de la provincia (receptoras de agua) también ejercen gran presión sobre la disponibilidad del recurso.

c. Impacto del cambio climático

El cambio climático provoca una mayor temperatura en la zona y menor cantidad de lluvia prácticamente durante todos los meses del año. Se intensifica la demanda del recurso hídrico para riego y consumo animal, al mismo tiempo que disminuye la oferta de agua en la provincia.

El modelo climático TL959 pronostica un aumento de la temperatura para todos los meses del año y cambios en los patrones de precipitación. Los estudios de vulnerabilidad al cambio climático para la microcuenca del río Ángel indican que la temperatura media aumentó entre 1,5 y 2°C por encima del promedio multianual del período 1971-2000.





d. Descripción de la medida

El proceso de intervención se inició en el año 2010 con el apoyo de la Corporación Randi-Randi. El objetivo de la medida de adaptación fue la de establecer acuerdos con las familias y comunidades propietarias de los terrenos donde el agua nace para disminuir la presión sobre la frontera agrícola y favorecer la productividad de los terrenos. Adicionalmente, se entregaron incentivos que aporten a la sostenibilidad de las actividades productivas y a la protección de los bosques y zonas no intervenidas.

Los incentivos entregados por la mancomunidad procuraron responder a dos tipos de necesidad: la primera para mantenimiento y mejoramiento de infraestructuras de riego en los predios de las zonas altas con materiales apropiados, y la segunda para enfrentar el avance de la frontera agrícola por la falta de alimentos para los animales con semillas de pastura mejorada. El criterio para establecer el valor entregado para cada familia o comunidad se obtuvo a partir del análisis de costos de productividad de un terreno, realizado por el equipo técnico de la misma mancomunidad.

Una de las prioridades de la intervención fue lograr un mayor involucramiento de los equipos técnicos ambientales de los GADs municipales Mira, Espejo y Bolívar (mancomunidad) para socializar la experiencia y para promover una participación más activa de las juntas de regantes de agua. Esto se pensó para garantizar la sostenibilidad del recurso en el futuro.

e. Requisitos para la implementación

La medida puede ser implementada en zonas de recarga hídrica que reciben precipitaciones sobre los 800 mmm donde exista una estructura de familias y/o territorios que acceden a agua de consumo humano y riego en predios de vecinos (propietarios privados, comunitarios).

La negociación con los propietarios privados de terrenos circundantes a las fuentes de agua consistió en incentivarlos con la entrega de semillas de pastos, materiales para riego, especies forestales y asesoría técnica para la producción, con recursos provenientes del GAD cantonal de Mira y la mancomunidad. La inversión promedio fue de entre 1.500 y 2.000 USD por familia.

Paralelamente, se desarrollaron campañas de sensibilización ambiental, a nivel general sobre el recurso hídrico y su importancia. La mancomunidad y el GAD cantonal de Mira han invertido alrededor de 60.000 USD por año en concursos y en la elaboración de material de difusión.

f. Resultados y co-beneficios de la implementación de la medida

La protección de los bosques en las zonas de recarga hídrica, a través del manejo sostenible del agua por parte de las familias del sector, favorece la disponibilidad del líquido vital y mejora el balance hídrico del suelo en áreas intervenidas, y/o de protección.

De esta manera, las comunidades logran enfrentar de alguna manera la sequía que representa una gran amenaza en la región. A la par, se promueve y fortalece la organización comunitaria, elemento fundamental para lograr este tipo de compromisos.

La medida permitió lograr acuerdos recíprocos por el recurso agua. Se alcanzó un compromiso de conservar 230 ha de páramo a cambio del apoyo de la mancomunidad para la legalización de escrituras de los terrenos.

23. Protección y reforestación del Cerro Iguata para la conservación y recuperación de caudales de agua, flora y fauna andina en las provincias de Chimborazo y Tungurahua





a. Descripción del lugar

El cerro Iqualata se sitúa entre el cantón Guano de la provincia de Chimborazo y Quero de Tungurahua. Las condiciones agroclimáticas de la zona corresponden a las del páramo altoandino, localizado entre los 3.800 y 4.200 msnm, con temperaturas que oscilan entre los 6 y 10 °C. En ese lugar se unieron 2.218 familias que integran 25 comunidades, con el objetivo de acceder al agua para consumo humano. Se conformaron las asociaciones regionales de “Agua Chazo”, “Santa Fe de Galán” y “Hulcangas”, que impulsaron la protección del cerro Iqualata con el fin de conservar y recuperar los caudales de agua, la flora y fauna de la región.

La vegetación local está conformada por pajonal, arbustos y especies forestales nativas; en ese

sentido, el MAGAP apoya en la repoblación vegetal de la zona con especies anuales, perennes (frutales) y forestales de doble propósito: protección de los suelos contra erosión y generación de ingresos como es el caso de la especie de árboles de Guarango (*Prosopis pallida*) de la familia de las leguminosas.

b. Situación actual del manejo y disponibilidad del recurso

La región sierra centro soporta una gran escasez de agua durante la mayor parte del año. Existe una sobreutilización del páramo por actividades agro-productivas que provoca una disminución de su capacidad de recarga hídrica.

En el territorio del cerro Iqualata existe alta densidad de Unidades de Producción





Agropecuarias (UPAs) cuya producción se ve afectada con el incremento de la variabilidad climática.

c. Impacto del cambio climático

En la zona en donde se desarrolla la medida hay insuficiencia de agua. Las causas, según los pobladores, son la sobreutilización de los páramos, mayores niveles de calor y los cambios en la estacionalidad de la precipitación.

Se hace evidente el aumento en la temperatura promedio de la región sierra centro entre 1,2 y 2°C en comparación con años anteriores. Esta tendencia ocasiona períodos de sequías más intensas y reduce significativamente la disponibilidad del agua, tanto potable para uso doméstico, como de riego para el sector agrícola.

d. Descripción de la medida

La medida para la protección del cerro Igualata tuvo su origen en el año 2004, y nació con el fin de frenar el avance de la frontera agrícola, quema de pajonales, caza indiscriminada y la introducción de ganado bravo, que son actividades que han provocado una pérdida de la capacidad de retención de agua del suelo, y la disminución de flora y fauna características del sector.

Las asociaciones regionales de Agua Chazo, Santa Fe de Galán y Hulcangas junto a la Fundación Ayuda en Acción Ecuador, implementaron las siguientes acciones como medidas para la recuperación y conservación de caudales:

Inicialmente, se estableció un plan de manejo para definir las áreas de protección y reforestación con especies nativas. Con los dueños de los terrenos aledaños a las fuentes de agua, se adquirió 300 ha en los dos cantones para reforestación.

Luego se elaboró un reglamento de uso del páramo, a fin de evitar abusos con respecto al agua, a la flora y a la fauna. Se estableció una organización de control permanente con guardabosques para vigilancia, prevención de ingreso de ganado y protección de áreas reforestadas.

Posteriormente, se realizaron mingas para instalar postes de pambil, cercar con alambre de púas y construir zanjas de drenaje. Existe un guardabosque en la comunidad que se encarga una o dos veces por semana de revisar la totalidad del área de intervención.

El MAGAP apoyó en la repoblación vegetal de la zona con frutales y forestales con el propósito de proteger los suelos contra erosión y generar ingresos, por ejemplo Huarango (*Prosopis pallida*).

e. Requisitos para la implementación

Para la implementación de esta medida, las labores de instalación de postes de pambil, cercado con alambre de púas y construcción de zanjas de drenaje y la reforestación de 300 ha durante un período de 3 meses, se realizaron a base de mingas. En promedio, cada una de las 2.218 familias participó en al menos 2 mingas. Del mismo modo se realizó un trabajo conjunto para el mantenimiento y reparación de la infraestructura montada.

Durante la fase de adquisición de las tierras a ser reforestadas en los cantones de Guano y Quero, las familias adquirieron con sus propios recursos 300 ha a un valor de 120.000 USD (400 USD por ha). Los Gobiernos Provinciales de Tungurahua y Chimborazo gestionaron la adquisición de especies nativas, principalmente yaguales, con viveros del lugar.

Aunque la protección de fuentes hídricas es aplicable en todo lado, se estima que esta medida tiene mayor viabilidad en sistemas de agua comunitarios, ubicados en la región andina, donde exista una base organizativa sólida.





f. Resultados y co-beneficios de la implementación de la medida

La reforestación con especies nativas a fin de recuperar el ecosistema, y su protección mediante la restricción de la ganadería y la agricultura, mejoraron la infiltración de agua en el suelo, garantizando de esta manera la disponibilidad del recurso para los distintos usos y usuarios de la zona.

El páramo es un ecosistema con alta potencia de secuestro de carbono debido a sus suelos húmedos y con alto contenido de materia orgánica. Aunque no se pueden hacer cálculos exactos sobre la cantidad de carbono almacenado con esta medida, la reforestación con especies contribuye significativamente en la reducción de GEI.

Adicionalmente se han mejorado los niveles de pH y fertilidad del suelo por la recuperación de biomasa, igualmente la calidad y cantidad de agua, gracias al control de erosión, sedimentación e infiltración. Se pudo recuperar el caudal que actualmente es de 30 litros/segundo.

24. Cosecha de agua de lluvia para la producción sostenible y el emprendimiento en zonas áridas de la parroquia Llapo

a. Descripción del lugar

Esta práctica se ha implementado con familias pertenecientes a la Asociación de Productores de Guarango y Frutales (ASOPROGF), que demandaban constantemente agua para riego; todas ellas habitan en las comunidades de Chingazo Alto, Chingazo Bajo, San José de Chocón y Santa Rosa de Cullog de la parroquia Llapo, cantón Guano, provincia de Chimborazo. La ubicación específica de la intervención es la zona de influencia del volcán Tungurahua, entre 2.800 y 3.000 msnm. En el lugar se presenta una temperatura promedio de 14°C, precipitaciones que no superan los 500 mm anuales y una humedad relativa del 45%, según información de la estación meteorológica de la Escuela Politécnica de Chimborazo.

De acuerdo con el mapa de Cobertura y Uso de Suelo, publicado por el MAGAP en 2011, el área de intervención se caracteriza por tener suelos franco-arenosos y arenosos dedicados al uso agropecuario.

b. Situación actual del manejo y disponibilidad del recurso

Según las proyecciones del CIIFEN, publicadas por el Proyecto PACC, y en el marco del estudio “Estimación del Riesgo de Sequías, Heladas y otros Impactos del Cambio Climático que pueden afectar al Sector Agrícola en la Serranía del Ecuador y en las cuencas de los ríos Chone y Portoviejo”, la provincia de Chimborazo presenta un alto riesgo de sequías. Esto pone en riesgo la producción y medios de vida de los habitantes de la zona que dependen totalmente del riego, para garantizar su producción y obtener ingresos económicos.

En la actualidad, la disponibilidad limitada del recurso agua, sumado a los efectos del cambio climático que se perciben en el lugar, intensifica los conflictos por el recurso y disminuye la cantidad utilizable para regadío.

c. Impacto del cambio climático

En la provincia de Chimborazo se registran altos déficits hídricos anuales del suelo, en un rango entre 250 y 800 mm. Las actividades agropecuarias que predominan en la zona demandan grandes cantidades de agua, y por ello es prioritario la implementación de medidas de protección de zonas de recarga hídrica a fin de evitar conflictos entre los distintos usos y usuarios, y para evitar la inseguridad alimentaria, la pérdida del capital natural, los suelos descubiertos y la erosión eólica, entre otros.

d. Descripción de la medida

En 2013, la Fundación Ayuda en Acción Ecuador empezó a promover la cosecha de agua lluvia para la producción sostenible y el emprendimiento en zonas áridas, como una respuesta al déficit hídrico.



Primero se sensibilizó a las familias de la región; luego se implementaron reservorios con capacidades desde 30 hasta 50 m³ para conducir el agua para riego a nivel de finca. Los reservorios fueron construidos bajo la modalidad de mingas familiares, utilizando maquinarias excavadoras.

El material que ha sido utilizado para el recubrimiento de los reservorios es geomembrana, con la finalidad de garantizar su impermeabilidad. La conducción del agua captada en las laderas de las vías rurales es conducida hacia el reservorio a través de un desarenador¹². En el caso de varias fincas se utilizaron también tubos de 10 cm de diámetro para una conducción más rápida hacia los reservorios.

Para obtener riego parcelario, se instalaron de 200 a 300 metros de manguera desde el reservorio hasta los huertos familiares. Algunas familias invirtieron adicionalmente 200 USD en bombas eléctricas de agua con una potencia de 1HP (caballo de fuerza).

Se plantaron especies anuales, perennes (frutales) y forestales de doble propósito para la protección de los suelos contra erosión y generación de ingresos como en el caso de la especie de árboles de Huarango (*Prosopis pallida*) de la familia de las leguminosas.

e. Requisitos para la implementación

Se considera viable aplicar la medida en la zona andina o subtropical que presente las siguientes



¹² Estructura hidráulica que tiene como función remover las partículas de cierto tamaño que la captación de un fuente superficial permite pasar



características: Precipitaciones de 500 a 1.000 mm/año y períodos de estiaje, así como topografía irregular con suelos franco-arenosos y arenosos.

La inversión en infraestructura para la cosecha y conducción del agua hasta la finca tiene un costo que no supera los 1.500 USD por familia y que permite regar alrededor de 2.000 m².

f. Resultados y co-beneficios de la implementación de la medida

La cosecha de agua de lluvia, a través de una conducción del recurso por los costados de las vías en época de invierno hacia reservorios familiares, permitió garantizar la disponibilidad de agua para riego de las parcelas en épocas de sequía, la seguridad alimentaria y los ingresos económicos de las familias.

Por otro lado, la siembra de especies forestales mejoró la estructura del suelo, evitando el avance de dunas de arena y la desertificación que pueden afectar a suelos arenosos y desnudos presentes en la región.

Los árboles sembrados cumplieron con el propósito de ser cortinas rompevientos y dar

sombra a los cultivos. Es importante destacar que las variedades forestales sembradas requieren de poca agua, la especie de *Prosopis allida* (Huarango) puede vivir en regiones que no presentan precipitaciones mayores a 200 mm al año; y su fruto aporta a la alimentación de la población y del ganado por sus valores nutricionales.

25. Sistemas de captación de agua para la producción agroecológica permanente de hortalizas de la Asociación Campesina Chuya Mikuna

a. Descripción del lugar

La Asociación Campesina de Pequeños Productores Chuya Mikuna, que en idioma kichwa significa “comida limpia”, es una organización agro-empresarial, ubicada en la Provincia de Cañar, Cantón Suscal. Agrupa productores de las comunidades de Kollauku, Pachón, Suscal Viejo, Zambo, Loma, San Javier, Chilchil Bajo, Chilchil la Capilla, Apangoras, Jalupata, Romipungo y Lugmas. Las comunidades que la conforman se muestran en la siguiente tabla.

Tabla 16. Comunidades que conforman La Asociación Campesina de Pequeños Productores Chuya Mikuna

Zona	Comunidad	Características
Alta	San Javier, Apangoras, Rumipungo	Zonas elevadas donde existe la presencia de páramo y climas fríos, con alturas de 3.000 msnm.
Media	Kollauku, Zambo Loma, Chilchil Bajo, Jalupata, Lugmas	Zonas con climas templados, donde se encuentran remanentes mínimos de vegetación natural. Alturas de 2.500 msnm.
Baja	Pachón, Suscal Viejo, Chilchil la Capilla	Zonas con climas temperados y en valles. Alturas de 1.600 msnm.



La organización trabaja en procesos de fortalecimiento organizativo, para conservar las cuencas hidrográficas de la provincia de Cañar. Participa de manera coordinada mediante un modelo socio organizativo de autogestión, recuperando el saber campesino, que es compartido entre los socios y otras organizaciones similares. Esta organización tiene una trayectoria de más de 20 años (en 2005 fue reconocida mediante Acuerdo Ministerial Nro. 050116 del Ministerio de Industrias y Productividad -MIPRO)¹³.

Actualmente son 44 productores que impulsan el trabajo enfocado en la seguridad y soberanía alimentaria; la mayoría son mujeres que trabajan para mejorar y diversificar la producción agroecológica de hortalizas en esta provincia, a través de una buena gestión del agua, y del fortalecimiento de la gestión comercial (los excedentes de la producción se comercializan en ferias locales y otros nichos) a través del ingreso a nuevos segmentos de mercado.

b. Situación actual de la disponibilidad del recurso y su manejo en la zona

Según los productores la cantidad de agua en la provincia de Cañar no es suficiente para abastecer la producción agrícola y el consumo doméstico; las lluvias cada vez son escasas en número de eventos. En invierno hay eventos muy intensos de precipitación que dañan sus cultivos.

c. Impacto del cambio climático

El clima ha cambiado desde hace algunos años; según los agricultores hoy en día “cualquier época del mes o año puede llover o hacer sol”, lo que les produce inestabilidad y afecta a sus actividades agrícolas, ganaderas y la salud de las personas.

Hace algunos años se acostumbraba sembrar: maíz, fréjol, arveja, lenteja, camote, trigo, cebada, achira, zanahoria blanca y jícama, destinados al autoconsumo, pero paulatinamente esta actividad disminuyó debido a que en época seca, no disponen de suficiente agua para regar las

parcelas; y en invierno tienen el riesgo de perder las cosechas por el exceso de lluvias.

Por ello, hoy en día los agricultores consideran que no pueden fijar fechas exactas de siembra, ni establecer el rendimiento de los cultivos.

d. Descripción de la medida

Las fincas de los socios de Chuya Mikuna tienen un plan de producción en huertos agroecológicos conformado por un 55% destinado al cultivo de hortalizas como por ejemplo lechuga, acelga, col, col morada, espinaca, coliflor, brócoli, culantro, nabo; un 30% a productos con raíces y bulbos como zanahoria, remolacha, rábano, cebolla colorada; y el 15% a la siembra de tomate de mesa y productos andinos. Este plan se encuentra diseñado en función de la estación climática y toma en cuenta la época de lluvias (diciembre a abril) y la época seca (mayo a diciembre).

La organización promueve la implementación de huertos agroecológicos conscientes de que en verano el acceso al agua es limitado, pero en invierno hay en exceso. Los predios tienen extensiones menores a 1.000 m², destinados a la producción agrícola principalmente, y el resto de la superficie destinada a la producción de pastos, ganadería y conservación de especies arbóreas nativas como el yagual (*Polilepis incana*), aliso (*Alnus glutinosa*), y pumamaqui (*Oreopanax ecuadorensis*).

Los productos hortícolas son utilizados principalmente para el autoconsumo y los excedentes se comercializan en circuitos alternativos de comercialización o ferias agroecológicas fomentadas por el MAGAP.

Tanto en la costa como en la sierra generan ingresos de 20 dólares aproximadamente cada quince días, y dinamizan el intercambio de productos entre las regiones del país.

¹³ La organización fomenta la solidaridad y trabajo en beneficio social y económico, velando por la seguridad alimentaria de la población por medio del acceso a alimentos sanos, fomentando la producción amigable con la naturaleza por medio de la diversificación y rotación de los cultivos, manejo integrado de plagas y enfermedades, utilización de semillas e insumos locales (abonos orgánicos), y sistemas agroforestales enfocados en la conservación de las cuencas y microcuencas.



Adicionalmente, por la escasez de agua en verano y su exceso en invierno, Chuya Mikuna desarrolló una medida de adaptación para el acceso constante al agua para riego: implementó un sistema de captación y tuberías desde el canal principal hacia los predios de los campesinos.

Esta medida permite una producción constante de los cultivos y facilita la distribución del agua en el huerto. En épocas de exceso de agua, el diseño hidrológico permite modificar los patrones de flujo del agua, con la finalidad de almacenar y captar el agua de lluvia.

e. Requisitos para la implementación

La construcción de huertos agroecológicos de 1.000 m², con un diseño de 100 camas de 10 m² (1 m de ancho x 10 m de largo) y en cada cama de cultivo se siembra con una densidad de 250

plántulas de diferentes hortalizas, tiene un costo aproximado de 650 USD.

La instalación del sistema de captación y transporte de agua fue realizada con el apoyo de varias instituciones lideradas por la organización sin fines de lucro VECO Andino, quien cubrió los costos de materiales y la comunidad aportó con la mano de obra. Aproximadamente, la implementación de esta medida de adaptación tiene un valor de 3.000 a 4.000 USD por beneficiario. Cabe resaltar que la percepción actual del precio varía en función de la cercanía con la fuente de agua.

f. Resultados y co-beneficios de la implementación de la medida

Con esta medida los socios de Chuya Mikuna han mejorado su resiliencia frente al cambio





climático, reflejado en la producción continua de diversos alimentos durante todo el año, sin depender de la disponibilidad o el exceso de agua en el lugar.

Su práctica, que comprende la implementación de sistemas de producción agroecológica, combinado con un diseño hidrológico, revaloriza el uso del agua para la producción de alimentos sanos de autoconsumo, pero también constituye una estrategia de conservación de cuencas hidrográficas.

Las acciones descritas mejoran la capacidad de respuesta comunitaria ante alteraciones climáticas extremas mediante la búsqueda inmediata de soluciones y estrategias para el bien común, la cual fomenta y retiene la mano de obra en el campo; por otro lado mejora la salud familiar al disponer de alimentos sanos y genera la capacidad de adaptarse a las nuevas condiciones climáticas.

26. Reparación de albarrada para contrarrestar los problemas de sequía en el recinto La Estrella del Valle de la Virgen

a. Descripción del lugar

El recinto La Estrella del Valle de la Virgen se encuentra en la parroquia Valle de la Virgen, del cantón Pedro Carbo, provincia del Guayas, a una altura de 97 msnm. Su territorio está influenciado por el bosque seco tropical y tumbesino. Por ello, el paisaje en el que se encuentra el recinto es seco y con escasa vegetación en el lugar; el agua es escasa, tanto para las actividades cotidianas, como para el consumo personal o los cultivos.

La agricultura y ganadería son sus principales actividades y por ello la población se dedica al cultivo de arroz, maíz y banano, principalmente, pero también a la cría de animales menores. Las

siembras la realizan únicamente cuatro meses al año (en época lluviosa), porque solo en ese momento hay agua para las plantas; los otros ocho meses son secos, momento en que las labores se concentran en cosechar, como por ejemplo, el banano de sus propios huertos.

La época seca se extiende de mayo a diciembre mientras que la época lluviosa se produce de enero a abril. Las precipitaciones anuales se encuentran entre 500 y 1.000 mm. La velocidad del viento varía en el día con 1,14 m/s y 4,5 m/s por la noche.

En la mayor parte de la zona, los suelos son sedimentarios de origen aluvial, los mismos que son aprovechados para cultivos de ciclo corto. Existe poca vegetación remanente en la zona.

b. Situación actual de la disponibilidad del recurso y su manejo en la zona

Los principales riesgos por desastres naturales en la provincia son las inundaciones y las sequías. El cantón Pedro Carbo presenta una distribución desigual en la disponibilidad de agua, debido a que los cuerpos de agua presentan niveles de contaminación por: carga orgánica, presencia de sustancias tóxicas y presencia de microorganismos patógenos (GAD de la provincia del Guayas, 2012-2021).

c. Impacto del cambio climático

CIIFEN realizó un estudio en 2007 en el cual manifestó la existencia de cambios en los patrones de precipitación en la zona, pronosticando un incremento de períodos secos en la costa central del Ecuador (cuencas de los ríos Guayas y Chone). Las lluvias no son uniformes durante la época de invierno; adicionalmente, existen altas temperaturas durante el día.

Si los patrones de vulnerabilidad actual en el sector se mantienen, una de las provincias más afectadas desde el punto de vista agrícola y de recursos hídricos será la provincia del Guayas, por mostrar una tendencia hacia veranillos más prolongados, lo que influirá en las condiciones de vulnerabilidad de las familias, disminuyendo así





el acceso a un sustento diario y acentuando la situación de pobreza.

d. Descripción de la medida

La recuperación e implementación de albarradas comunitarias contribuyen a la recolección de agua de lluvia en época de invierno y conservación del recurso en la temporada de sequía. La medida se implementó con el apoyo del proyecto “Enfrentando el cambio climático en la cordillera costera”, ejecutado por el CIIFEN con financiamiento de la Unión Europea, la Prefectura del Guayas y la población del recinto La Estrella del Valle de la Virgen.

La principal función de una albarrada es la filtración del agua, permitiendo que los suelos sean más productivos. Es construida a través de muros de tierra que se llenan mediante un proceso lento de acumulación de agua de lluvia y de fuentes hídricas internas provenientes de las escorrentías durante el periodo de invierno.

Esta medida constituye una técnica ancestral y contribuye a proveer de agua en épocas de sequía y drenaje en invierno.

En el caso del recinto La Estrella, la albarrada comunitaria se encontraba en estado de abandono, el agua que se lograba captar se contaminaba a medida que pasaba el verano, sin lograr su fin de proveer de agua limpia a la comunidad.

Para su recuperación, se realizó el dragado, la limpieza y el refuerzo del lado externo de la albarrada con ayuda del Comité Barrial, los técnicos del proyecto CIIFEN y la Prefectura del Guayas. Esta última brindó la maquinaria necesaria para el dragado de la albarrada que es el elemento más costoso en el momento de limpiar los reservorios de agua (por hora de trabajo puede llegar a costar 35 USD).

Debido a la contaminación del agua por el ingreso de los animales domésticos como las cabras, se optó en cercar toda la albarrada. Adicionalmente, se planteó una normativa para el acceso al agua, con el fin de asegurar la calidad de la misma y el mantenimiento de la albarrada.

Alrededor de la albarrada se sembró hace algunos años el piñón (*Jatropha curcas*), plantados en dos hileras a modo de cerca viva. Esta actividad tuvo como debilidad que se convirtió en un refugio de roedores y culebras, por ello se promovieron cercas vivas de limoncillo (*Swinglea glutinosa*), arbusto espinoso de tallo leñoso, que en condiciones de temperatura extrema y poca agua se convierte en un muro de protección, ya que es de rápido crecimiento y resistente a sequías. En condiciones óptimas puede llegar a crecer hasta 10 m de altura y 40 cm de ancho.

Como barrera rompevientos se colocó caña guadua (*Guadua angustifolia*) sembradas a dos filos, con una distancia entre planta de 50 cm (pueden llegar a medir hasta dos metros). Y se mantuvo sobre los taludes la vegetación pionera para que haya una mejor retención del suelo, disminuyendo la cantidad de sedimentos que pueda caer al agua y contaminarla.

Los dos tipos de vegetación sembradas en las rampas de la albarrada cumplen con la función de amortiguamiento y protección, tanto del viento como del polvo, reduciendo así la erosión y la evapotranspiración del agua retenida en estos reservorios.

Adicionalmente, los pobladores del recinto La Estrella aprendieron las técnicas para crear un repelente natural que inhibe el ataque de animales domésticos a los sistemas agroforestales, evitando que se coman los cercos naturales.

De esta forma, se promovió que este sumidero artificial de agua se encuentre en condiciones óptimas para ser un reservorio que provea agua de buena calidad y cantidad a los pobladores.

e. Requisitos para la implementación

Los costos de implementación de esta medida fueron cubiertos por CIIFEN y el GAD Provincial del Guayas, que apoyó con la maquinaria para la limpieza. Los costos se detallan en la siguiente tabla:



Tabla 17. Costos de reparación de la albarrada del recinto La Estrella del Valle de la Virgen

Rubro	Costos
Plantas de limoncillo	0,45 USD c/u
Plantas de caña guadua	1 USD c/u
Limpieza de albarrada	1.500 USD
Cerca de alambre (100 metros)	35,00 USD c/ rollo de 100 metros
Alimentación en mingas	Asumida generalmente por las comunidades
Asesoramiento técnico en siembra, mantenimiento de vegetación	Asumido por CIIFEN

zona y es un ejemplo a replicar en el resto de la provincia del Guayas en donde el Gobierno Provincial está implementando otros reservorios en otras zonas, con la proyección de rescatar las mejores experiencias de la comunidad.

Finalmente, esta medida de adaptación contribuyó a la recuperación de los conocimientos ancestrales, revalorizando con ella un saber que ha demostrado su validez en muchas otras zonas del país.

f. Resultados y co-beneficios de la implementación de la medida

Esta medida permitió el acceso al agua en cantidad y calidad durante las épocas secas especialmente en los largos periodos de sequía propios de la zona (8 meses). Además, la reforestación con limoncillo en los filos de la albarrada y de la caña guadua, aportó a la disminución de la escorrentía al incrementar la cubierta vegetal, garantizando el almacenamiento de agua en el lugar. De esta forma, la comuna aumentó su capacidad adaptativa frente al cambio climático sin dejar de lado sus actividades cotidianas.

En la albarrada se llegó a almacenar aproximadamente 170.000 m³ de agua, permitiendo que el agua fluya a través de acuíferos y reservorios internos. La medida benefició a 50 familias en la



Buenas prácticas para el manejo de contaminantes orgánicos

27. Construcción de biodigestores para el aprovechamiento del estiércol porcino en Intag

a. Descripción del lugar

Esta experiencia se implementó a partir del año 2004, con 25 familias campesinas en la zona de Intag, comunidad El Paraíso, parroquia Peñaherrera en la provincia de Imbabura. El lugar se ubica entre los 1.000 y 2.000 msnm, con temperaturas en el rango de 14 y 20°C y precipitaciones entre 2.000 y 3.000 mm anuales; los suelos de la región son franco-arcillosos y franco-limosos.

b. Situación actual de la disponibilidad y del manejo del recurso

En la actualidad, Imbabura es una de las provincias que tiene mayor cantidad de granjas de ganado porcino. En varias fincas se emplea el excremento de estos animales mezclado con pasto (sin tratamiento previo) como materia orgánica para los terrenos, ignorando que su descomposición constituye una importante fuente de emisión de GEI en el sector agrícola.

En este sentido, el Estado respalda proyectos que incluyan mecanismos de desarrollo limpio, impulsa la producción de biogás y abono orgánico a través de biodigestores que utilizan los excrementos de animales.

El biodigestor tiene varios fines, entre los que se destacan: el aprovechamiento del potencial





energético de los desechos de biomasa para degradarlos de forma más controlada y rápida; el tratamiento de los excrementos para evitar que se conviertan en contaminantes peligrosos; la producción de biogas y bioabono con los cuales se contribuye a la eficiencia energética y a la remediación de suelos degradados; pero, sobre todo, la eliminación del CH_4 , y, con ello mitigar los efectos del cambio climático.

c. Impacto del cambio climático

La ganadería porcina desencadena abundantes emisiones de GEI debido principalmente a la producción de CH_4 en el proceso de digestión de los animales. En cantidad muy inferior, la descomposición del estiércol también genera metano en ausencia de aire. Esto se puede constatar, por ejemplo, en las piscinas utilizadas para almacenar estiércol y purines en las granjas industriales.

d. Descripción de la medida

La Asociación de Campesinos Agroecológicos de Intag (ACAI) e instituciones como el Fondo Ecuatoriano de Contravalor Suizo (COTESU/FOES), Pro-Derechos Ciudadanos (PRODECI) y Ayuda en Acción trabajaron en conjunto para dar respuesta a la abundante producción de desechos orgánicos generados por la crianza de cerdos, posible foco de contaminación.

El tratamiento adecuado de estiércol permite obtener materia orgánica para la producción agrícola familiar; también provee de energía, sustituyendo el uso de leña para la cocción de los alimentos.

Uno de los requerimientos para implementar biodigestores es seleccionar fincas que tengan entre cuatro y 20 cerdos que generen abundantes desechos orgánicos. Las técnicas de instalación y manejo del biodigestor se deben ajustar según las condiciones de cada territorio.

e. Requisitos para la implementación

La inversión para la instalación del biodigestor alcanza un monto entre 300 y 600 USD. Entre los materiales requeridos para la instalación de un biodigestor se encuentran:

- Tubería de policloruro de vinilo (PVC)
- Manguera
- Soga manila, kit de accesorios
- Boya de neumáticos usados
- Pomas de plástico
- Tanques
- Plástico tubular polietileno con protección ultravioleta

f. Resultados y co-beneficios de la implementación de la medida

El manejo apropiado de los desechos de los cerdos mejoró los ingresos de las familias y favoreció a la limpieza y bienestar ambiental. Los desechos forman una fuente de materia orgánica sólida (compost) y líquida (bioles) para la producción agrícola. Adicionalmente, la medida contribuye a una reducción de emisiones de GEI provenientes de las actividades productivas del sector agropecuario y secuestro de CH_4 .

Además, se genera energía limpia a través del uso de biogas, con lo cual se elimina progresivamente la combustión de leña o petróleo como fuentes de energía.

28. Cocinas mejoradas en comunidades indígenas ubicadas en la zona altoandina del Ecuador.

a. Descripción del lugar

Esta experiencia se implementó en el año 2007 en la zona altoandina de Cotopaxi por la Agencia Adventista de Desarrollo y Recursos Asistenciales del Ecuador (ADRA) en las comunidades de la parroquia Guangaje, integrada actualmente por 74 familias indígenas de bajos recursos económicos. Su ubicación está sobre los 3.200 msnm, con temperaturas entre los 6 y 12°C y precipitaciones entre 500 y 1.200 mm anuales. El territorio presenta varias limitaciones productivas



Buenas prácticas para el manejo de contaminantes orgánicos

y alto deterioro de sus ecosistemas de páramo y bosque; por tanto, la disponibilidad de fuentes de energía como la leña es muy escasa.

b. Situación actual de la disponibilidad y del manejo del recurso

El promedio anual de deforestación del 2008 al 2012 en Ecuador fue del 0,60% con una pérdida promedio de 74,4 mil hectáreas de bosques por año. Aunque la tasa de deforestación a nivel nacional ha decrecido en un 0,11% en los períodos de 1990 a 2000 y 2008 a 2012 (MAE, 2012), el Estado ecuatoriano busca consolidar la gestión sostenible de los bosques, enmarcada en el modelo de gobernanza forestal, y promover asociaciones productivas y emprendimientos empresariales que presenten alternativas

económicas a la deforestación y al comercio de vida silvestre.

El Mapa de Uso Adecuado y Conflicto de Uso de la Tierra del Ecuador Continental predice para esta zona conflictos de uso por sobreutilización de la tierra, como resultado de actividades de deforestación y altas presiones hacia los bosques (MAGAP, 2010).

c. Impacto del cambio climático

La deforestación o quema de bosques libera el CO² almacenado en la materia orgánica, aumentando así los niveles de GEI en la atmósfera y provocando los cambios de clima en el planeta.

Por otro lado, el cambio climático afecta de manera indirecta a la disponibilidad de la madera, debido a la presencia de nuevas plagas y a incendios





forestales por sequías prolongadas. Sin embargo, es importante aclarar que las actividades antropogénicas como el crecimiento poblacional y la sobreutilización de suelos agrícolas ejercen mayor impacto sobre la disponibilidad del recurso porque expanden la frontera agrícola, factor causante de la deforestación.

El cambio climático puede afectar a las áreas deforestadas; en un modelo de circulación general atmosférica elaborado por el Laboratorio de Ciencias Atmosféricas Goddard (2015), se ha demostrado que los grandes cambios en la cobertura vegetal afectan a la lluvia, aunque no es la vegetación el factor determinante, sino la correlación entre la humedad del suelo, la vegetación y la energía (fundamentalmente solar) que se necesita para convertir el agua en vapor de agua, que forma parte del aire.

Las tierras deforestadas quedan desnudas y son más sensibles a los cambios del clima y más proclives a deslizamientos o movimientos en masa cuando se encuentran en pendientes. Una dificultad más: lluvias más intensas pueden causar la pérdida de nutrientes en los suelos volviéndolos infértiles.

d. Descripción de la medida

El emprendimiento surgió como fruto de la inquietud de un grupo de mujeres de la Parroquia Guangaje varias problemáticas que les aquejaban como condiciones climáticas poco favorables, largas caminatas, grandes esfuerzos y fuertes gastos para conseguir leña, poca salubridad de la madre o persona responsable de la preparación de alimentos, molestias respiratorias por la presencia de humo en la cocina. Al enterarse de la experiencia de las “cocinas mejoradas” desarrollada por ADRA, institución con sede en Cuzco - Perú, las mujeres de la zona solicitaron apoyo técnico y financiero a la citada institución.

El primer paso del proceso de capacitación para la construcción de las cocinas mejoradas, mantenimiento y salubridad, consistió en la motivación y organización del grupo, ya legalmente constituido, de 36 mujeres, todas madres de familia.

Posteriormente se procedió a implementar

las cocinas en cada hogar, con asesoría y acompañamiento técnico. Estas cocinas se pueden construir con una plancha de hierro que va colocada encima de una caja de bloques, ladrillos o adobes, y dentro de los bloques se coloca una caja de combustión hecha de baldosas o teja en donde se quema la leña que calienta la plancha para cocinar. Se puede fabricar la plancha para tener una o dos hornillas.

En la actualidad se han incorporado al proyecto más familias de las comunidades, alcanzando 74 familias.

e. Requisitos para la implementación

La medida requiere de una inversión (considerada baja) de alrededor de 300 USD por familia para mano de obra y adquisición de materiales. Para la instalación del horno se necesita ladrillo, bloque y cemento; planchas de hierro para las hornillas y latón para la chimenea.

Esta práctica tiene grandes posibilidades de ser replicada en la zona andina donde la leña es escasa, la temperatura ambiental es baja y los problemas respiratorios de las familias son comunes. La medida genera varias bondades para la vida intrafamiliar y tiene bajos costos de implementación.

f. Resultados y co-beneficios de la implementación de la medida

La implementación de cocinas mejoradas en las viviendas de las familias de la zona, ha reducido la presión sobre los bosques remanentes y el ecosistema páramo, y benefició a más de 40 familias de las zonas rurales, en la parroquia Guangaje.

Por otro lado, la reducción de la presión hacia el páramo como ecosistema con alta potencia de secuestro de carbono en sus suelos húmedos y con alto contenido de materia orgánica, colaboran decisivamente en la reducción de GEI, debido a la presencia de pastizales que pueden tener de 20 a 40 mg de peso seco por hectárea, lo cual representa de 10 a 20 mg de carbono por hectárea (Hofstede, 1999).

Las mujeres beneficiarias consideran que



el proyecto ha repercutido positivamente en actitudes y prácticas familiares, con respecto a la preparación de los alimentos y cuidado del medio ambiente. Se ha logrado mayor conciencia acerca de la importancia del uso sostenible de recursos naturales en las zonas andinas, por lo que se explota menos la vegetación y los bosques para obtener leña.

Adicionalmente, los logros a nivel intrafamiliar percibidos por las madres de familia, pueden enumerarse a continuación:

- Reducción en el uso de leña a una tercera parte
- Temperatura más cálida en el espacio familiar
- Disminución de potenciales riesgos para la salud, especialmente riesgos respiratorios
- Avance en hábitos de limpieza y salubridad de las personas que preparan los alimentos, generalmente las madres
- Rápida preparación de los alimentos

29. Producción de biogás, a través de un biodigestor, para la reducción de emisiones de gases de efecto invernadero

a. Descripción del lugar

La parroquia Catacocha es parte del Cantón Paltas, Provincia de Loja; se encuentra a una altura promedio de 1.820 msnm y cuenta con dos tipos de clima: tropical y frío, con una temperatura promedio de 18°C. En términos generales, la precipitación en la zona se compone de lluvias temporales y fuertes, presente entre diciembre y mayo; y la época seca se la siente de junio a diciembre, aunque esta temporalidad ha cambiado con los años.

El paisaje del lugar es muy seco, la vegetación es escasa, no existen cuerpos de agua ni ríos cerca. Catacocha pertenece a la cuenca binacional

del Catamayo – Chira, específicamente a las subcuencas de Playas y Catamayo.

b. Situación actual del recurso y su disponibilidad

La provincia de Loja, en particular la Parroquia de Catacocha, se caracteriza por sequías prolongadas, debido al limitado régimen de humedad y al clima muy seco. En gran parte del año (entre 7 y 10 meses), el crecimiento de plantas no es posible sin riego y por ello el recurso en riesgo, por la variabilidad climática, es la no disponibilidad de agua suficiente.

En la zona, el agua limpia es un recurso escaso debido a que históricamente se han producido fuertes sequías en la región, como la ocurrida entre 1967 y 1969, cuyos efectos no se han logrado revertir todavía y hasta se han incrementado con el paso del tiempo. A esto se suman las malas prácticas agrícolas, la manera incorrecta de criar animales menores, y un paisaje local que está compuesto de fuertes pendientes, clima muy seco y bosques deforestados. Estos factores influyen directamente en la reducción en los caudales de agua, pobre fertilidad del suelo, infiltración de agua y aumento de la escorrentía superficial, lo que ha motivado a las autoridades locales a racionar rigurosamente el suministro de agua.

Para evitar esta situación y contribuir con la reducción de contaminación de las quebradas (por los desechos de cerdo) y el desarrollo local, la Red Agroecológica de Loja (RAL) conformada por 17 organizaciones, apoyó entre el 2014 y 2015, a algunos propietarios de fincas con la instalación de biodigestores, para generar energías alternativas, a partir de estiércol de cerdo.

c. Impacto del cambio climático

El incremento de la variabilidad climática de la región ha ocasionado un aumento de plagas en los cultivos, desgaste de suelo, incremento de temperatura, y eventos naturales extremos cada



vez más acentuados como las sequías que se presentan en la región.

El recurso agua en el cantón está en riesgo, y una de las razones es la mala disposición de los desechos de animales menores, como los cerdos, que terminan en los vertederos cercanos a las chancheras; este problema se agrava por las altas temperaturas del lugar que vuelven insoportable el olor en esos sitios, originándose por ello enfermedades.

Hoy en día ya existen regulaciones importantes en la región, una de ellas es la ordenanza sobre Saneamiento Ambiental y Control Sanitario del Cantón, que exige que los desechos de animales sean tratados antes de ser incorporados nuevamente al ciclo suelo - planta - animal. La población, impactada por esta normativa, pero apegada a su actividad económica, desarrolló una alternativa para el manejo sanitario de los

desechos provenientes de sus criaderos, con el fin de no contaminar la poca agua del sistema hídrico del cantón.

d. Descripción de la medida

La obtención de gas metano a partir del estiércol de animales (de cerdo en este caso particular) es uno de los mecanismos con que las familias en Catacocha enfrentan la problemática de la contaminación del agua por desperdicios de animales. La medida aporta a la reducción de CH⁴, producto de la fermentación del estiércol de los animales.

El proceso empieza con el lavado del piso del corral de engorde de los puercos (o chanchera). En condiciones anteriores, esta mezcla de heces y agua era descargada en las quebradas, contaminando así los afluentes que desembocan





más abajo y que eran utilizados por la población en sus quehaceres diarios.

Actualmente, esto ya no sucede porque las excretas son almacenadas en un tanque de cemento de 2 m³, cubierto con una tapa de madera, acción particular que ayuda a que los desechos no se acumulen ni se filtren en las quebradas.

Las dimensiones del corral dependen de la cantidad de animales que se va a albergar; en promedio, en una finca pequeña o familiar puede medir unos 8 metros de largo por 4 metros de ancho, con un total de superficie de 32 m², albergando un máximo de 65 chanchos. Su piso deberá ser de cemento con un desnivel de 3% para garantizar las buenas condiciones de higiene de los animales y que el agua con la que se lava las heces baje fácilmente a los contenedores o tanques de recolección. Se debe colocar desagües en puntos clave, para que no se inunde el lugar. Las paredes son de bloque, con una altura de 1,2 metros y sostienen un techo de zinc.

Después de lavar el piso de la chanchera, la mezcla cae en un pozo o depósito, a través de un tubo conector que une el tanque y la manga; este cóctel se va reposando paulatinamente en la base de la manga hasta lograr separar el gas del sólido. La manga de plástico (especial para esta causa) mide 12 metros de largo. La mezcla debe ser constantemente removida con un palo, para que no tape el paso al sistema biodigestor. El sistema es adaptable a la cantidad de cerdos que existan en el lugar, ya que a la manga del biodigestor se puede reducir o extender de acuerdo a las necesidades; puede funcionar con los desechos mínimos de un cerdo, o sin recibir la mezcla 4 meses.

En el tubo plástico se produce un proceso de fermentación anaeróbica (sin oxígeno) de la mezcla, a través de la cual se obtienen luego de unos 30 días promedio, un líquido alcalino rico en nutrientes y materia orgánica estabilizada llamado biol.

El biol es elaborado a partir del estiércol, a través de un proceso lento, que depende mucho del clima: en zonas donde la temperatura sobrepasa los 30°C, el abono está listo para su destilación en un mes promedio; pero en zonas con climas más fríos, se completa luego de 60 días. El producto es un abono orgánico natural que no solo es estimulante foliar para plantas, sino un completo potenciador de los suelos; este se lo está utilizando para la recuperación de terrenos deteriorados por el mal uso y abuso de productos químicos y para la regeneración de plantas. El gas, en cambio, es utilizado para cocinar.

Lo fundamental para el manejo del biodigestor es que el tanque recolector no se tape, porque si esto ocurre, los desperdicios se rebosan y dañan la manga. Por ello, es importante colocar en el sistema una válvula de escape, conformada por una poma con agua la cual regula la cantidad de gas en la manga y un tubo por el que sale hacia la instalación de la cocina.

La manga del biodigestor debe estar protegida o tapada por un techo, sobre todo en climas cálidos y con vientos fuertes, para proteger el sistema y el plástico de la manga (que es lo más costoso en un biodigestor); la cubierta puede ser construida de manera sencilla, lo que no involucra mayor inversión, pero si el sistema no tiene techo, puede tener un tiempo de vida de apenas 15 años, a una temperatura promedio de 18°C. En climas extremos, como es el caso de Catacocha, la cubierta de protección es muy necesaria porque sin ella el tiempo de vida puede ser menor a los 15 años.

e. Requisitos para la implementación

Los costos de implementación de un biodigestor para 65 chanchos se detallan a continuación; en la zona de intervención estos valores fueron financiados mayormente por cada beneficiario (la membrana plástica fue entregada por la RAI).

Esta medida puede llegar a ser una respuesta para las personas que no logran tener permiso de funcionamiento para su actividad de faenamiento,



Tabla 17. Costos de reparación de la albarrada del recinto La Estrella del Valle de la Virgen

Detalle	Cantidades	Costos en USD
Arena	3 m ³	40
Grava	3m ³	40
Bloques	100 unidades	25
Láminas de Zinc	9 m	6,5
Pirola	3m	10
Manguera 3 pulgadas	rollo de 100 m	40
Malla industrial	10 m	100
Tubos de plástico	10 m	60
Mano de obra en zonas alejadas (1 maestro y un ayudante)	180 USD (oficial) y 120 USD (el ayudante) por semana	600
Mano de obra en zonas cercanas (1 maestro y un ayudante)	120 USD (oficial) y 90 USD (el ayudante) por semana	420
Plástico especial para biodigestor	25 m, se adquieren por rollos de 100 metros, costo 480	120
Tubo de cemento	Unidad	30
Total		890 a 1.070 USD

CO₂ y llega a tener un potencial de calentamiento global muy inferior.

Adicionalmente, la práctica contribuye al mejoramiento en el tratamiento de las aguas residuales provenientes del faenamiento de carne y mejora así la descarga hídrica. Esta acción tiene impacto directo en la calidad y cantidad del recurso hídrico del cantón y en la preservación de la biodiversidad existente en los cuerpos receptores. Esto ha sido significativo en un cantón donde el agua es escasa, y por los efectos de cambio en el clima, lo es más cada día.

por parte de la autoridad competente. Este grupo puede plantear al biodigestor para el manejo de desechos, y para el cuidado de las quebradas.

f. Resultados y Co-beneficios de la implementación de la medida

La medida apoya a la reducción de emisiones de GEI de las siguientes maneras: las excretas que antes quedaban sin tratar o quedaban depositadas en el agua o en el suelo, dejan de emitir CH₄ libremente; y hoy en día existe una alternativa al modo de cocinar los alimentos, usando menos la leña. De esa manera, complementariamente a la buena práctica se reducen emisiones ya que al quemar el gas metano, éste se convierte en



- Asamblea Nacional. (2008). Constitución Política del Ecuador. Quito, Ecuador.
- BID. (2012). El cambio climático y la producción agrícola. Obtenido de <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=36736182>
- CEPAL. (2010). La Economía del Cambio Climático en América Latina y el Caribe - Síntesis. Santiago, Chile.
- CEPAL. (2015). Innovaciones Institucionales y en Políticas sobre Agricultura y Cambio Climático. Evidencia en América Latina y el Caribe. Obtenido de http://repositorio.cepal.org/bitstream/handle/11362/39534/S1500791_es.pdf?sequence=1
- CIIFEN. (2014). Conservación y manejo de recursos naturales, Proyecto Enfrentando el cambio en la Cordillera Costera. Obtenido de http://cordilleracostera.org/portal/images/pdf/Conservacion_y_manejo_de_recursos_naturales_fin.pdf
- CIIFEN. (2015). Adaptación y mitigación frente al cambio climático. Obtenido de http://www.ciifen.org/index.php?option=com_content&view=category&id=102&layout=blog&Itemid=135&lang=es
- CIIFEN. (2015). Renovación de cafetales como medida No- Regrets. Proyecto Enfrentando el cambio climático en la Cordillera Costera. Obtenido de http://cordilleracostera.org/portal/images/pdf/renovacion_cafetales_conservacion.pdf
- CMNUCC. (1992). Convención Marco de las Naciones Unidas sobre el Cambio Climático. Obtenido de <https://unfccc.int/resource/docs/convkp/convsp.pdf>
- Easterling, W., Aggarwal, P., Batima, P., Brander, K., Erda, L., Howden, M., . . . Tubiello, F. (2007). Food, fibre and forest products. Obtenido de <https://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter5.pdf>
- FAO. (2010). Adaptación de la agricultura al cambio climático. Obtenido de http://www.fao.org/fileadmin/templates/tci/pdf/backgroundnotes/webposting_SP.pdf
- FAO. (2015). Estimación de emisiones de gases de efecto invernadero en la agricultura- Un manual para abordar los requisitos de los datos para los países en desarrollo. Obtenido de <http://www.fao.org/3/a-i4260s.pdf>
- GAD de la parroquia Cusubamba. (2015). Plan de Desarrollo y Ordenamiento Territorial Cusubamba 2015. Obtenido de <https://www.google.com.ec/search?q=PDOT+PARROQUIA+CUSUBAMBA&oq=PDOT+PARROQUIA+CUSUBAMBA&aqs=chrome..69i57j0j8&sourceid=chrome&ie=UTF-8>
- GAD de la parroquia de Cangua. (2011). Plan de Desarrollo y Ordenamiento Territorial de Cangahua 2011-2021. Obtenido de <http://canchagua.gob.ec/cotopaxi/wp-content/uploads/2014/10/Def.-PDOT-DE-LA-PARROQUIA-CANCHAGUA.pdf>
- GAD de la parroquia de Papallacta. (2009). Plan de Desarrollo y Ordenamiento Territorial de Papallacta. (S. N. Información, Productor) Obtenido de <http://gadprpapallacta.gob.ec/napo/wp-content/uploads/2014/10/P.D.O.T-PAPALLACTA.pdf>
- GAD de la provincia de Carchi. (2011). Plan de Desarrollo y Ordenamiento Territorial del Carchi 2011- 2031. Obtenido de http://www.carchi.gob.ec/ley_transparencia/2013/s/plannedesarrollo.pdf
- GAD de la provincia de Esmeraldas. (2015). Plan de Desarrollo y Ordenamiento de Quinindé. Obtenido de http://app.sni.gob.ec/sni-link/sni/PORTAL_SNI/data_sigad_plus/sigadplusdocumentofinal/0860000160001_PDOT%20ACTUALIZACION%202015_18-08-2015_12-32-18.pdf
- GAD de la provincia del Guayas. (2012-2021). Plan de desarrollo y Ordenamiento Territorial del Cantón Pedro Carbo. Obtenido de <http://www.guayas.gob.ec/dmdocuments/ley-de-transparencia/literal-k/Senplades%20PLAN%20ORDENAMIENTO%20TERRITORIAL.pdf>



- GAD del cantón Cayambe. (2015). Plan de Desarrollo y Ordenamiento Territorial del cantón Cayambe 2015-2025. Obtenido de http://www.municipiocayambe.gob.ec/images/ley_transparencia/LOTAIP/PDYOT%20GADIP%20Cayambe%2010-06-2015.pdf
- GAD del cantón Portoviejo. (2015). Plan de Desarrollo y Ordenamiento Territorial Parroquia Jipijapa. Obtenido de http://cordilleracostera.org/portal/images/pdf/Conservacion_y_manejo_de_recursos_naturales_fin.pdf
- GAD del cantón Salcedo. (2011). Plan de Desarrollo y Ordenamiento Territorial de Salcedo. Obtenido de http://app.sni.gob.ec/sni-link/sni/PORTAL_SNI/data_sigad_plus/sigadplusdocumentofinal/0560000110001_FINAL-PDYOT-COTOPAXI-2015_17-08-2015_18-17-17.pdf
- GIZ. (2015). Buenos Principios Agrícolas en Banano Vinculados a la Adaptación al Cambio Climático. Experiencias de Productores en la Provincia de El Oro. Ecuador.
- Gupta, A. K. (2013). Tapping the Entrepreneurial Potential of Grassroots.
- Gupta, A. K. (2015). Policy interventions for augmenting grassroots innovations: Perceptions, Processes and Performance. SRISTI.
- Hofstede, R. (1999). El páramo como espacio para la fijación de carbono atmosférico. Serie Páramo 1, Serie 1.
- Hofstede, R. (2001). El impacto de las actividades humanas en el páramo. Quito, Ecuador: Proyecto Páramo y Arya Yale,.
- Ibrahim, M., Harvey, C., Vargas, B., & Betancourt, K. (2003). Efecto de la cobertura arbórea sobre el comportamiento animal en fincas ganaderas de doble propósito en Matiguás, Matagalpa, Nicaragua. Agroforestería en las Américas. Nicaragua.
- INAMHI. (2015). Detección de Cambio Climático en el Ecuador. Obtenido de <http://www.serviciometeorologico.gob.ec/cambio-climatico/>
- INEC. (2001). Informe de estadísticas Agropecuarias. Obtenido de <http://www.ecuadorencifras.gob.ec/estadisticas-agropecuarias-2/>
- INIAP. (2012). Inducción de callos embriogénicos en explantes INIAP de Palma Africana (Erais guienesas) con Resistencia y/o tolerancia a la pudrición de cogollo. Quito, Ecuador.
- Inverpal. (2014). Informe estadístico sobre la Palma. Obtenido de <http://www.inverpal.com/datos-estadisticos-de-la-palma-africana/>
- IPCC. (2014). Cambio climático 2014: Informe de síntesis. Contribución de los Grupos de trabajo I, II y III al Quinto Informe de Evaluación del Grupo. Obtenido de https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_es.pdf
- IPCC. (2015). Informe de síntesis cambio climático 2001- Anexo B - Glosario de Términos. Obtenido de <https://www.ipcc.ch/pdf/glossary/tar-ipcc-terms-sp.pdf>
- IPCC. (2015). Introducción Grupo Intergubernamental de Expertos sobre Cambio Climático. Obtenido de <https://www.ipcc.ch/pdf/ipcc-faq/ipcc-introduction-sp.pdf>





- Laboratorio de Ciencias Atmosféricas Goddard. (2015). Modelo de circulación general atmosférica. Obtenido de <http://www.btb.termiuplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&index=est&srchtxt=LABORATORIO%20GODDARD%20CIENCIAS%20ATMOSFERICAS>
- MAE. (2010). Validación y análisis de consenso de modelos de escenarios de cambio climático para el Ecuador. Obtenido de <http://www.ambiente.gob.ec/wp-content/uploads/downloads/2014/07/Informe-An%C3%A1lisis-de-Consenso.pdf>
- MAE. (2011). Segunda Comunicación Nacional sobre Cambio Climático. Obtenido de <http://unfccc.int/resource/docs/natc/ecunc2.pdf>
- MAE. (2012). Estrategia Nacional sobre Cambio Climático.
- MAE. (2012). Reporte Nacional de Desertificación, Degradación de la Tierra y Sequía. Quito-Ecuador.
- MAE. (2012). Sistema de Clasificación de Ecosistemas de Ecuador. Obtenido de http://www.ambiente.gob.ec/wp-content/uploads/downloads/2012/09/LEYENDA-ECOSISTEMAS_ECUADOR_2.pdf
- MAE. (2013). Mapa Histórico de Deforestación del Ecuador Continental. Quito, Ecuador.
- MAE. (2015). Contribución a la mitigación del Cambio climático en el sector USCUS del Ecuador. Obtenido de <https://info.undp.org/docs/pdc/Documents/ECU/DOCUMENTO%20T%C3%89CNICO%20INDC,%20SECTOR%20%20USCUS.pdf>
- MAGAP. (2010). Programa nacional de innovación tecnológica participativa y productividad agrícola. Ecuador.
- OTCA. (2014). El Cambio Climático en la Región Amazónica. Obtenido de http://otca.info/portal/admin/_upload/publicacoes/531-libro.cambio.climatico_esp.pdf
- Oxfam. (2010). Adaptación al cambio climático. Capacitar a las personas que viven en la pobreza para que puedan adaptarse al CC. Obtenido de <https://www.oxfam.org/sites/www.oxfam.org/files/cambio-climatico-adaptacion-res>
- PACC. (2009). Estudio de vulnerabilidad actual a los riesgos climáticos en el sector de los recursos hídricos en las cuencas de los ríos Paute, Jubones, Catamayo, Chone, Portoviejo y Babahoyo. Obtenido de <http://www.pacc-ecuador.org/wp-content/uploads/2013/12/CAMBIO-CLIMATICO-Final.pdf>
- PACC. (2015). Ecuador gestion en la lucha frente al cambio climático. Obtenido de <http://www.pacc-ecuador.org/cambio-climatico/concepto>
- PACC. (2015). Estimación del Riesgo a Sequías, Heladas y otros Impactos del Cambio Climático que pueden afectar al Sector Agrícola de la Serranía del Ecuador y de las Cuencas de los ríos Chone y Portoviejo. Obtenido de https://www.researchgate.net/profile/Ruben_Basantes/publication/261798786_Estudio_de_vulnerabilidad_actual_a_los_riesgos_climaticos_en_el_sector_de_los_recursos_hidricos_en_las_cuencas_de_los_Rios_Paute_Jubones_Catamayo_Chone_Portoviejo_y_Babahoyo/links/0
- Pilco Sarmiento, J. (2012). Ecuaquímica- Informe técnico de la palma. Obtenido de http://www.ecuaquimica.com.ec/info_tecnica_cana.pdf
- PNUD. (2012). Integración del cambio climático en los procesos nacionales de desarrollo y en la programación de países de las Naciones Unidas. Guía para ayudar a los equipos de las Naciones Unidas en los países a transversalizar los riesgos y las oportunidades del CC. Obtenido de <http://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Change/Capacity%20Development/PNUD-Gu%C3%ADa-CambioClim%C3%A1ticoES-Web.pdf>



- PRAA. (2013). Sistematización de experiencias y lecciones aprendidas del proceso de incorporación de la variable de adaptación al cambio climático en los Planes de Desarrollo y Ordenamiento Territorial locales en la zona de intervención del PRAA en Ecuador. Obtenido de <http://www.ambiente.gob.ec/wp-content/uploads/downloads/2014/07/Sistematizacio%CC%81n-inclusio%CC%81n-CC-en-PDOT%C2%B4s.pdf>
- PREDECAN. (2009). Articulando la gestión del riesgo y la adaptación al cambio climático en el sector agropecuario: lineamientos generales para la planificación y la gestión sectorial.
- Roberts, T. (2007). Fertilizer Best Management Practices: Right product, right rate, right time and right place. The foundation of bestmanagment practices for fertilizer, International Fertilizer Industry Association,. Bruselas.
- SAGARPA. (2009). Desarrollo Rural. Ficha técnica sobre la elaboración de terrazas de banco. Obtenido de http://www.sagarpa.gob.mx/DesarrolloRural/Documents/fichasCOUSSA/TERRAZAS_DE_BANCO.pdf
- SENPLADES. (2013). Plan Nacional para el Buen Vivir 2013-2017: Construyendo un estado plurinacional e intercultural. Quito, Ecuador.
- SICA, INEC & MAG. (2002). III Censo Nacional Agropecuario. Quito, Ecuador.





Adaptación al cambio climático: Proceso de ajuste al clima real o proyectado y sus efectos. En los sistemas humanos, la adaptación trata de moderar o evitar los daños o aprovechar las oportunidades beneficiosas. En algunos sistemas naturales, la intervención humana puede facilitar el ajuste al clima proyectado y a sus efectos.

Amenaza: Se usa aquí para describir un evento climático definido físicamente que tiene el potencial de causar daños, tales como eventos de lluvias intensas, sequías, inundaciones, tormentas, heladas y cambios a largo plazo en las variables climáticas promedio, como lo es la temperatura.

Antropogénico: Resultante o producido por acciones humanas.

Cambio Climático: Variación del estado del clima, identificable (por ejemplo, mediante pruebas estadísticas) en las variaciones del valor medio o en la variabilidad de sus propiedades, que persiste durante largos períodos de tiempo, generalmente decenios o períodos más largos. El cambio climático puede deberse a procesos internos naturales o a forzamientos externos tales como modulaciones de los ciclos solares, erupciones volcánicas o cambios antropógenos persistentes de la composición de la atmósfera o del uso del suelo. La Convención Marco de las Naciones Unidas sobre el Cambio Climático (CMNUCC), en su artículo 1, define el cambio climático como “cambio de clima atribuido directa o indirectamente a la actividad humana que altera la composición de la atmósfera global y que se suma a la variabilidad natural del clima observada durante períodos de tiempo comparables”. La CMNUCC diferencia, pues, entre el cambio climático atribuible a las actividades humanas que alteran la composición atmosférica y la variabilidad climática atribuible a causas naturales.

Capacidad de adaptación: Es la propiedad de un sistema de ajustar sus características o su comportamiento para poder expandir su rango de tolerancia bajo la variabilidad climática existente o condiciones climáticas futuras.

Fomento de la capacidad: Proceso de desarrollo de técnicas y capacidades en transición para que personas o instituciones puedan participar en todos los aspectos de la adaptación, mitigación, e investigación sobre el cambio climático.

Impactos: Efectos en los sistemas naturales y humanos. El término impactos se emplea principalmente para describir los efectos sobre los sistemas naturales y humanos de episodios meteorológicos y climáticos extremos y del cambio climático. Los impactos generalmente se refieren a efectos en las vidas, medios de subsistencia, salud, ecosistemas, economías, sociedades, culturas, servicios e infraestructuras debido a la interacción de los cambios climáticos o fenómenos climáticos peligrosos que ocurren en un lapso de tiempo específico y a la vulnerabilidad de las sociedades o los sistemas expuestos a ellos. Los impactos también se denominan consecuencias y resultados. Los impactos del cambio climático sobre los sistemas geofísicos, incluidas las inundaciones, las sequías y la elevación del nivel del mar, son un subconjunto de los impactos denominados impactos físicos.

Mitigación: Intervención antropogénica para reducir las fuentes o mejorar los sumideros de gases de efecto invernadero.

Resiliencia: Capacidad de los sistemas sociales, económicos y ambientales de afrontar un suceso, tendencia o perturbación peligrosa respondiendo o reorganizándose de modo que mantengan su función esencial, su identidad y su estructura, y conservando al mismo tiempo la capacidad de adaptación, aprendizaje y transformación.

Riesgo (relacionado con el clima): Potencial de consecuencias en que algo de valor está en peligro con un desenlace incierto, reconociendo la diversidad de valores. A menudo el riesgo se representa como la probabilidad de acaecimiento de sucesos o tendencias peligrosos multiplicada por los impactos en caso de que ocurran tales sucesos o tendencias. Los riesgos resultan de la interacción de la vulnerabilidad, la exposición y el peligro. El término riesgo se utiliza principalmente en referencia a los riesgos de impactos del cambio climático.

Sequía: Fenómeno que se produce cuando la precipitación ha estado muy por debajo de los niveles normalmente registrados, causando unos serios desequilibrios hidrológicos que afectan de manera adversa a los sistemas terrestres de producción de recursos.

Transferencia de tecnología: Conjunto de procesos que abarcan el intercambio de conocimiento, fondos y bienes entre las diferentes partes interesadas que conduce a la difusión de la tecnología para la adaptación o mitigación al cambio climático. Como concepto genérico, el término se utiliza para englobar tanto la difusión de tecnologías como la cooperación tecnológica entre y dentro de los países.

Vulnerabilidad al cambio climático: Propensión o predisposición a ser afectado negativamente. La vulnerabilidad comprende una variedad de conceptos y elementos que incluyen la sensibilidad o susceptibilidad al daño y la falta de capacidad de respuesta y adaptación.

Fuente: IPCC, 2014

Información sobre Adaptación al Cambio Climático (CC) Realizadas por el Ministerio de Agricultura, Acuicultura y Pesca hasta diciembre de 2016								
OBJETIVO ESPECÍFICO DE ENCC		UNIDAD	IDENTIFICACION	COMPONENTES Y ACTIVIDADES	SITUACION ACTUAL	PRESUPUESTO	IMPACTOS	PORCENTAJE DE PROTAGONISMO
Clasificación de Objetivos	Objetivo Específico de la ENCC frente a la Adaptación al CC, al que apunta su acción de trabajo		Nombre del proyecto relacionado a la Adaptación al CC y breve descripción	Componentes y actividades (o acciones) relacionados con medidas de Adaptación al CC	Situación actual del proyecto y avance de la ejecución del componente/ actividad enfocada a Adaptación al CC	Valor asignado al presupuesto, fuente de financiamiento y de esto indique el monto ejecutado a la actualidad.	Que impacto ha tenido su proyecto/actividad acción en los beneficiarios directos o indirectos con las medidas de Adaptación al CC	Asigne un porcentaje estimado de protagonismo que tiene cambio climático en su proyecto enfocado a Adaptación al CC
OE 1	Identificar e incorporar prácticas apropiadas para mitigar el cambio climático y en el sector agropecuario, que pueden además fortalecer y mejorar su productividad y competitividad	Subsecretaría de Ganadería	"Promoción del manejo ganadero climáticamente inteligente, integrando la reinvención de degradación de tierras y reduciendo los riesgos de desertificación en provincias vulnerables"	Apoyo a la reconversión y uso adecuado del suelo para el fomento de la productividad pecuaria con base a prácticas y técnicas silvopastoriles	Se cuenta con la aprobación de financiamiento del Fondo Mundial para el Medio Ambiente (GEF por sus siglas en inglés). En proceso de suscripción.		Reducción de degradación de suelos, reducción de emisiones de GEI, técnicas de adaptación y mitigación al cambio climático.	80%
OE 1	Implementar medidas que garanticen la soberanía alimentaria frente a los impactos del cambio climático	INSTITUTO NACIONAL DE INVESTIGACIONES AGROPECUARIAS - INIAP	Desarrollo de alternativas para el manejo integrado y control biológico de plagas y enfermedades de cultivos de importancia económica: Cauchito, bono cañante de la enfermedad suramericana de las hojas	Generación de clones de cauchito resistentes al hongo Microcyclus, agente causal de la enfermedad suramericana de las hojas; clones con mayor productividad (mayor a 512,64 kg cauchito seco/ha/año).	Actividades finalizadas.	Las actividades en Cauchito fueron financiadas con los fondos de los proyectos de inversión del INIAP, para el 2014 y 2015 se asignó a este rubro un total de US\$ 318.154,72.	Estos clones se liberarán en el 2016 y se espera que sean adoptados por los productores de cauchito de las zonas de Los Ríos, Santo Domingo, Esmeraldas, Pichincha y Guayas.	80%
			Desarrollo de alternativas para el manejo integrado y control biológico de plagas y enfermedades de cultivos de importancia económica: Palma Africana, gusano barrenador de la raíz y escarabajo de la raíz.	Aplicación de hongo entomopatógeno Beauveria bassiana y Metarhizium anisopliae para el control de Sagalassa valida y Strategalobus insectos plaga de palma africana, en laboratorio y campo	Proyecto Finalizado	El proyecto fue financiado por SENESECT y el monto ejecutado ascendió a US\$ 23.187,38 dólares.	Se ha capacitado a policultores de la zona de Santo Domingo y Quiminde, y existe el interés por parte de ellos para la aplicación de estos entomopatógenos.	50%
			Desarrollo de alternativas para el manejo integrado y control biológico de plagas y enfermedades de cultivos de importancia económica: Mulaeca, agnoka negra y ceratita capitata.	* Desarrollo de soluciones prácticas para la producción de mulecas en el Ecuador, mediante la implementación de tecnologías menos contaminantes y sostenibles que propicien la mejora en la rentabilidad del sector. * Manejo integrado del tripo de la mancha roja en plantaciones de banana.	Actividades finalizadas.	Fortalecimiento Institucional (Fondo de Inversión) US\$ 10.019,15 Ejecución 90% Asignado - Promocia US\$ 66.591,68 Ejecución 98,11%	Productores orgánicos de la provincia de El Oro, disponen de varias alternativas de manejo de las principales plagas del banana. Muchos de ellos ya lo han implementado y otros están en proceso.	90%





			Desarrollo de genotipos de fréjol común con resistencia a sequía y a pudriciones radiculares empleando herramientas moleculares y procesos participativos para las principales áreas de producción de Ecuador.	Incrementar la productividad de las leguminosas mediante investigación en mejoramiento genético, manejo agroecológico de estos cultivos, sistemas de semilla, y capacitación y difusión del consumo en localidades de las provincias Cacha, Imbabura, Bolívar, Chimborazo, Cañar, Azuay y Loja	Proyecto finalizado.	El proyecto fue financiado por SENESCYT y el monto ejecutado asciende a US\$ 97.777,65 dólares. Adicionalmente se incluye los fondos aportados por INIAP que para los años 2014 y 2015 fue de US\$ 87.778,86. En total el proyecto tuvo un presupuesto de US\$ 185.556,51	Con el proyecto se generaron y liberaron dos variedades de fréjol, la primera denominada INIAP 484 Centenario variedad de grano rojo mantado con resistencia genética a roya, antracnosis, pudrición angular y pudrición de la raíz, apto para cosecha en vaina verde y en grano seco, e INIAP 485 Urcuquí variedad de grano negro, resistente a roya y antracnosis, apto para cosecha en grano seco para el mercado interno, externo y la agroindustria. Estas variedades fueron obtenidas a través de investigación participativa con los CIAT. (Centros de investigación agrícola local) de las diferentes zonas de influencia del proyecto, beneficiando directamente a los agricultores locales.	80%
			Evaluación participativa de líneas avanzadas de cebada tolerantes a sequía para ser liberadas como nuevas variedades en cinco zonas cederas de Chimborazo.	Variedad tolerante a estrés hídrico, puede ser cultivado en las zonas cederas de las provincias de Cacha, Imbabura, Pichincha, Cotopaxi, Tungurahua, Chimborazo y Cañar, en áreas con precipitación entre los 2200 a 3400 mm.	Variedad de cebada "Palmita" liberada a mediados de año del 2014	Las actividades en Cacha fueron financiadas con los fondos de los proyectos de inversión del INIAP. Para el 2014 y 2015 se asignó a este rubro un total de US\$ 189.016,50	Se realizará el estudio de impacto que está teniendo la nueva variedad, especialmente en la zona de Palmita, en donde se la desarrolló. El promedio de rendimiento experimental está en las 2 t/ha que supera ampliamente al promedio nacional que está en las 0,5 t/ha.	80%
			Generación de clones y variedades de papa tolerantes a sequía para la sierra central.	Variedad tolerante a estrés hídrico cuyo rango principal de adaptación es para zonas con deficiencia hídrica de las provincias de Cotopaxi y Chimborazo.	Variedad de papa "Josefina", liberada a mediados del año 2015.	Las actividades en Papa fueron financiadas con los fondos de los proyectos de inversión del INIAP. Para el 2014 y 2015 se asignó a este rubro un total de US\$ 536.713,46	Se debe realizar estudio de impacto de la variedad en la situación del campesino, especialmente de los pertenecientes a las zonas potenciales. En condiciones de reducida precipitación (< 400 mm) INIAP-Josefina presenta tolerancia a la reducida precipitación, poca tibia de 36% más de rendimiento comparada con Supercoba.	80%



OE 1	Implementar medidas que garanticen la soberanía alimentaria frente a los impactos del cambio climático (pedir explicación)	Viceministerio de Acuicultura y Pesca/Subsecretaría de Acuicultura	Cambio de la matriz energética: Pre factibilidad para conectar camaroneras del Litoral Ecuatoriano para conectar a las redes eléctricas de distribución.	1. La recopilación de la información. 2. La formación de los proyectos típicos de evaluación. 3. La evaluación del proyecto. 4. Conclusiones y recomendaciones.	Se ha entregado la ubicación georeferenciada de las camaroneras, existe información entregada por la Agencia de Regulación y Control de Hidrocarburos referente a los consumos de diesel para la operación de las bombas.	Por ejecutar, se tiene el informe de la empresa Pública de servicios ESVOL-TECH EP	Por ejecutar, de acuerdo a informe final beneficiará a las provincias de Guayas, Esmeraldas, Manabí, Santa Elena y El Oro.	Se beneficiaron aproximadamente 2.828 camaroneras que se encuentran registradas, las mismas que ocupan un área total de 147.556 hectáreas
OE 1	Implementar medidas que garanticen la soberanía alimentaria frente a los impactos del cambio climático	Viceministerio de Acuicultura y Pesca/Subsecretaría de Recursos Pesqueros	Regulación y rescambio de artes y aparejos de pesca de la flota pesquera artesanal de la costa continental ecuatoriana. Fortalecimiento de las Capacidades de los pescadores artesanales de las regiones Costa y Galapagos	1. Talleres de buenas prácticas de pesca 2. Entrenamiento en el uso y manejo de artes de pesca de bajo impacto ambiental. 3. Rescambio de artes de pesca de bajo impacto ambiental Protocolos para certificaciones de calidad de productos pesqueros	1. Realizados 50 talleres de transferencia de conocimientos. 2. Realizadas 6 campañas de buceo para extracción de maraña efectuada.	Se ha realizado con fuente de financiamiento fiscal.	Se han beneficiado pescadores artesanales de diferentes calas y pesqueras artesanales de las provincias de Esmeraldas, Manabí, Santa Elena, Guayas, El Oro y Los Ríos.	Se aporta 100% a garantizar la soberanía alimentaria y actividades pesqueras del país. Los talleres se han impartido a 2.033 pescadores artesanales.
OE 1	Implementar medidas que garanticen la soberanía alimentaria frente a los impactos del cambio climático	Viceministerio de Acuicultura y Pesca/Subsecretaría de Recursos Pesqueros	Regulación y rescambio de artes y aparejos de pesca de la flota pesquera artesanal de la costa continental ecuatoriana. Fortalecimiento de las Capacidades de los pescadores artesanales de las regiones Costa y Galapagos	1. Talleres de buenas prácticas de pesca 2. Entrenamiento en el uso y manejo de artes de pesca de bajo impacto ambiental. 3. Rescambio de artes de pesca de bajo impacto ambiental Protocolos para certificaciones de calidad de productos pesqueros	1. Realizados 50 talleres de transferencia de conocimientos. 2. Realizadas 6 campañas de buceo para extracción de maraña efectuada.	Se ha realizado con fuente de financiamiento fiscal.	Se han beneficiado pescadores artesanales de diferentes calas y pesqueras artesanales de las provincias de Esmeraldas, Manabí, Santa Elena, Guayas, El Oro y Los Ríos.	Se aporta 100% a garantizar la soberanía alimentaria y actividades pesqueras del país. Los talleres se han impartido a 2.033 pescadores artesanales.
OE 4	OE 4	Viceministerio de Desarrollo Rural/Subsecretaría	Implementar sistemas de cosecha, almacenamiento y aprovechamiento de agua	Construcción de 167 micro reservorios, en el cantón Guano, provincia de Chimborazo	Posee un 100% de ejecución del proyecto	El monto del contrato es de \$ 261.989,54	El proyecto beneficia a 167 familias, a través de la implementación de	40%



		la de Riego y Drenaje	para pequeños y medianos productores a nivel nacional.				financiados por el Estado	pequeños reservorios que permiten almacenar y dotar de agua para riego en las épocas de déficit hídrico	
			Construcción de 207 micro reservorios revestidos de geomembrana en el cantón Guano, provincia de Chimborazo.	En ejecución, posee un 85 % de avance de obra.	El monto del contrato es de \$ 299.647,37 procedentes de recursos del Estado	40%	El proyecto beneficia a 207 familias, a través de la implementación de pequeños reservorios que permiten almacenar y dotar de agua para riego en las épocas de déficit hídrico		
			Contratar la construcción de 130 micro reservorios con revestimiento de geomembrana, el cantón Ambato, provincia de Tungurahua. (Pellaco)	Posee un 100% de ejecución del proyecto	El monto del contrato es de \$ 192.733,82 de procedentes de recursos fiscales	40%	El proyecto beneficia a 130 familias, a través de la implementación de pequeños reservorios que permiten almacenar y dotar de agua para riego en las épocas de déficit hídrico		
			Construcción de 85 micro reservorios revestidos con geomembrana en los cantones Sagualí, Paqueta y Sigloso de la provincia de Cotacachi.	En ejecución, posee un 90 % de avance de obra.	El monto del contrato es de \$ 202.015,00 procedente de recursos del Estado	40%	El proyecto beneficia a 85 familias, a través de la implementación de pequeños reservorios que permiten almacenar y dotar de agua para riego en las épocas de déficit hídrico		
			Construcción de 138 micro reservorios revestidos con geomembrana, cantón Salcedo, provincia de Cotacachi.	En ejecución, posee un 85 % de avance de obra.	El monto del contrato es de \$ 239.180,62 de procedente de recursos del Estado	40%	El proyecto beneficia a 138 familias, a través de la implementación de pequeños reservorios que permiten almacenar y dotar de agua para riego en las épocas de déficit hídrico		
			Construcción de 130 Micro reservorios e implementación de un km de riego tecnificado para 0,25 Has en los cantones Iñabura, San Cristóbal y Santa Cruz, provincia de Galápagos	En ejecución, posee un 70% ejecución.	El monto del contrato es de \$ 1.047.105,58 de procedentes de recursos del Estado	40%	El proyecto beneficia a 130 familias, a través de la implementación de pequeños reservorios que permiten almacenar y dotar de agua para riego en las épocas de déficit hídrico		
			Estudio de calidad de agua en el sistema de riego Pozo Honda - Manabí	No se ha ejecutado el proyecto debido a que no se cuenta con la asignación presupuestaria correspondiente.	Se requiere de \$ 140.000 USD aproximadamente para la ejecución de dicho proyecto	80%	El proyecto beneficia a 600 familias		
OE 4	Manejar el patrimonio hídrico con un enfoque	Viceministerio de Desarrollo Rural/Subsecretaría de Riego y Saneamiento Rural	*Fomento a la producción agrícola a través de la implementación de sistemas de riego tecnificado	En ejecución, posee un 80% de avance de obra.	El presupuesto del proyecto es de el monto del contrato	40%	El proyecto permite beneficiar a 180 familias de la provincia de		



	integral e integrado por Unidad Hidrográfica, para asegurar la disponibilidad, uso sostenible y calidad del recurso hídrico para los diversos usos humanos y naturales, frente a los impactos del cambio climático	la de Riego y Drenaje	de uso y aprovechamiento del recurso hídrico para el desarrollo rural y la soberanía alimentaria"	productores. Construcción de la Línea de conducción en el predio Saldando	Se realizaron 5 estudios de casos en la Sierra norte y centro, y en la Costa del Atlántico y presentó en el 2015.	El estudio se financió con aportes de a GTZ por un monto de USD 15 000	en de \$ 1 097 830,15, procedentes de recursos del Estado	Guayas, a través del mejoramiento de la línea de conducción principal se pretende mejorar la disponibilidad y distribución de agua para la producción agrícola de la zona	100%
OE 5	Conservar y manejar sosteniblemente el patrimonio natural y ambiental y los ecosistemas terrestres y marinos, para contribuir con su capacidad de resiliencia frente a los impactos del cambio climático. OE 1: Implementar medidas que garanticen la soberanía alimentaria frente a los impactos del cambio climático	Viceministerio de Desarrollo Rural /Coordinación General de Riegos Comerciales	Las líneas de acción, estrategias y políticas de la CGRC trasladas a la AFC a través del fomento de los CIALCO. Estos representan en su mayor parte sistemas de comercialización vinculados a producción de las AFC que se caracterizan por alta diversificación, muchas agroecológicas o en transición. En ese contexto, tanto la producción como la comercialización muestran evidencias de sostenibilidad ecológica, económica, social y cultural. Integran actores y prácticas que pueden considerarse favorables para la adaptación al CC.	De manera específica, durante 2013 y 2014 se realizó un estudio que identificó la construcción de una Red Comercial y productiva y de comercialización en circuitos alternativos cortos, como medidas de adaptación al cambio climático.	Se realizaron 5 estudios de casos en la Sierra norte y centro, y en la Costa del Atlántico y presentó en el 2015.	El estudio se financió con aportes de a GTZ por un monto de USD 15 000	en de \$ 1 097 830,15, procedentes de recursos del Estado	Guayas, a través del mejoramiento de la línea de conducción principal se pretende mejorar la disponibilidad y distribución de agua para la producción agrícola de la zona	100%
OE 5	Conservar y manejar sosteniblemente el patrimonio natural y ambiental y los ecosistemas terrestres y marinos, para contribuir con su capacidad de resiliencia frente a los impactos del cambio climático.	INSTITUTO NACIONAL DE INVESTIGACIONES AGROPECUARIAS	Gestionar información y conocimiento sobre impactos de cambios climáticos en eco-corredores	Programa Participativo de Investigación para analizar el impacto de las prácticas agrícolas sobre variables ambientales, para lo cual, se evalúa la cantidad de agua, fertilidad del suelo, y	Este proyecto terminó su ejecución en diciembre del 2013.	Proyecto Financiado en forma compartida con GTZ. Ejecutado únicamente a partir de diciembre del 2013.	Proyecto Financiado en forma compartida con GTZ. Ejecutado únicamente a partir de diciembre del 2013.	Los resultados de este proyecto se enfocó principalmente en la adaptación a CC, el 50% restante fue	



terrestres y marinos, contribuir con su capacidad de respuesta frente a los impactos del cambio climático	AS - INIAP	de subsecuencias relevantes en Amazonia (Río Quijos)	biodiversidad utilizando herramientas SIG, y modelos de simulación (SWATT). En cuanto a las estrategias y actividades de adaptación al cambio climático, se estableció un Programa Participativo de Investigación/Desarrollo para promover la integración e interacción de la agricultura y ganadería - forestera, como estrategia para mejorar la calidad ambiental, la seguridad alimentaria y promover el desarrollo sostenible de las comunidades rurales de la Subcuenca.		Las contrapartes (GIZ-INIAP) contribuyeron con cada uno. \$45000	ecuatoriana es posible liberar al menos un 25% del área actual utilizada como pasturas para dedicarla potencialmente a la producción agroforestal (Cultivos-árboles-pasturas y Ganadería), que a su vez tienen el potencial de absorber cerca de dos tercios partes del carbono emitido por el ganado bovino.	dirigido a la evaluación del impacto socio ambiental de la expansión e intensificación del manejo de pasturas en la Subcuenca del Río Quijos.
Desarrollar protocolos para rescatar especies forestales en peligro de extinción del bosque seco del llitoral ecuatoriano.		Desarrollar herramientas biotecnológicas para la propagación masiva y conservación de especies forestales para la sierra y el llitoral ecuatoriano, con fines de reforestación como medida de adaptación al cambio climático	Proyecto en ejecución, fecha de finalización junio 2016. Hasta el momento el proyecto tiene un avance del 94,29%.	El proyecto fue financiado por SENESCYT con un presupuesto de US\$ 962.784,00 de los cuales a la fecha se ha ejecutado US\$ 699.861,46 ; los saldos restantes han sido retirados por el Ministerio de Finanzas al final de los años fiscales 2011 y 2014.		Hasta el momento se ha obtenido el protocolo estandarizado de la técnica de organogénesis in vitro (involución, multiplicación, enraizamiento y adaptación in vitro de plantas) en tres especies para el llitoral: guayacán sabanero, balauano y amarillo de Guayaquil y para la sierra: cedro, laurel de cera y yagual. Con base en estos protocolos se puede realizar producción de plantas de estas especies para reforestar con especies nativas las zonas de influencia del proyecto.	31%
Investigación y definición de sistemas silvopastoriles para el uso sostenible de la tierra en la Eco región andina para enfrentar problemas asociados a cambios climáticos.		En la macro-cuenca del río Chumborazo, por diez años consecutivos, se evaluó con un enfoque participativo el comportamiento y sostenibilidad de varias alternativas silvopastoriles con especies forestales: Buddlejaceae H.B.K., Buddlejaceae Keny y Polytechnia resocosa Hier. asociadas a pasturas mixtas con especies de Lolium multiflorum, Lolium perenne L., Deschampsia glomerata L. y Trifolium repens L. todas compuestas con una pradera natural a campo abierto compuesta de: Heliconia (Heliconia sp.), Taro (Canna officinalis) y Ruízia (Ruízia L.). La sostenibilidad de las alternativas silvopastoriles se evaluaron en base de un grupo de descripciones de sostenibilidad como medida del efecto positivo o negativo ; los cuales se relacionan con la Base de recursos, Función del Sistema (manejo y eficiencia técnica y económica) e Impacto sobre otros	Esta actividad es el resultado de la ejecución de varios proyectos durante varios años, en la actualidad se continúa con su evaluación a través del proyecto GEF/FORESTAL que está por culminar en diciembre del 2015.	Las actividades en Forastería fueron financiadas con los fondos de proyectos de inversión del INIAP, para el 2014 y 2015 se asignó a este rubro un total de US\$ 177.631,49.		Los resultados de esta investigación permiten una mejor utilización y difusión de las alternativas silvopastoriles para el uso sostenible de la tierra en el piso alto de la eco región andina, por parte de las comunidades rurales de escasos recursos económicos. El sistema silvopastoril con yagual es la mejor opción de uso sostenible del suelo para esta región, debido a sus características como capacidad de adaptación, mayor biomasa aérea, carbono secuestrado y tolerancia a cambios climáticos. Las alternativas silvopastoriles	Se corresponde a un 80% el objetivo principal de estas actividades son las poblaciones vulnerables, que pueden beneficiarse de estas alternativas de adaptación al CC.



OE 5	Conservar y manejar sustancialmente el patrimonio natural y sus ecosistemas y sus territorios para contribuir con su capacidad de respuesta frente a los impactos del cambio climático.	ADAPTACION Y MITIGACION	Generar tecnología agroforestal con especies forestales nativas en tierras de uso agrícola de predios de comunidades vulnerables de los Andes (Microcuenca Río Chimborazo)	Evaluar Red de Unidades de Conservación de RGFs prioritizados, en sistemas integrados en predios productores y comunidades de las áreas de acción. Evaluar fenológicamente fuertes semillas y producir en el vivero de la micro cuenca del río Chimborazo plantas de calidad de un RGF.	Esta actividad es el resultado de la ejecución de varios proyectos durante varios años, en la actualidad se continúa con su evaluación a través del proyecto GENFORESTAL, que está por culminar en diciembre del 2015.	ASIGNADO (2011 - 2015): 14,852,300.69 DEVENGADO (2011 - 2015): 12,494,945.25	promovieron un mayor confort de pastoreo, reflejado por un incremento sensible de +0.5 °C en horas críticas de mayor frío, respecto de la temperatura a campo abierto, lo cual se puede interpretar como un ahorro energético para aumentar la producción de leche, en condiciones de estrés ambiental.	100%, ya que las tecnologías agroforestales aportan beneficios relacionados con el mejoramiento de estructura, humedad y protección física del suelo frente a los efectos del sol, lluvias y vientos fuertes, en épocas secas se reportan aumentos en la humedad del suelo, factor que puede favorecer la producción agrícola.
			El establecimiento de plantaciones forestales en fincas cercenadas con tierras degradadas, permite mejorar los suelos, ya que contribuyen a la recuperación de la macro y micro fauna, mediante la regulación de los ciclos hidrológicos y la temperatura, creando nuevos hábitats para especies que migraron a otros sitios. Es importante mencionar que este conjunto de acciones permiten que los macroorganismos mejoran la fertilidad de estos suelos debido a la degradación de los minerales presentes a disponibles.	De acuerdo con los registros del MAE la tasa de deforestación			1. Impacto Económico: Mejorada la situación económica de 787 beneficiarios del incentivo. 2. Impacto Social: Al generar ingresos de trabajo. 3. Impacto Ambiental: Mediante la recuperación de suelo, la disminución de la presión sobre el bosque nativo manteniendo la biodiversidad silvestre y agrícola.	
			Acción: Convertir suelos erosionados y degradados en productivos para la obtención de materia prima para el aumento de la industria forestal, madera originaria de plantaciones.	Acción: Ayudar a la disminución de la presión sobre el bosque nativo suministrando materia prima a la				



			industria forestal originaria de plantaciones, conservando así los recursos naturales existentes.	anual en de 60'000 hectáreas aproximadamente. Mediante establecimientos forestales con fines comerciales se evidencia la disminución de la presión sobre el bosque nativo. Hasta la fecha se han registrado 50000 ha a nivel nacional que serán fuente de materia prima de productos y subproductos para la industria de la madera y otros.	SE REALIZA SE SEGUIMIENTO	18000		Cambios en los parámetros biológicos del recurso	40%	
OE 5	Conservar y manejar integralmente el patrimonio natural y sus ecosistemas terrestres y marinos, contribuyendo a la capacidad de respuesta frente a los impactos del cambio climático.	Instituto Nacional de Pesca	PROGRAMA CANGREJO (proyecto de gano corriente)	Seguimiento de las capturas de cangrejo del engrejo que promueva el buen aprovechamiento de los recursos y de su entorno.						
OE 7	Incluir la gestión integral de riesgos frente a los eventos extremos atribuidos al cambio climático en los ámbitos y actividades a nivel público y privado	Viceministerio de Desarrollo Rural/Coordinación General de Innovación	Estrategia de Difusión Agroclimática	Articulación intra e interministerial para la aplicación en territorio de acciones y políticas en tres temáticas: proyección agroclimáticas y prevención de eventos climáticos adversos; Impacto del clima en prácticas agrícolas y productividad; Clima e incidencia de plagas y enfermedades.	Se estableció la Mesa Técnica Agroclimática (MTA) con la articulación entre las instancias del MAGAP junto al INAMHI, INIAP y AGROCALIDAD.	5 35.000.00		Impacto en el desarrollo de políticas del multisector del agro	30%	
OE 8	Implementar medidas para incrementar la capacidad de los sistemas de los habitantes para enfrentar los impactos del cambio climático	INSTITUTO NACIONAL DE INVESTIGACIONES AGROPECUARIAS - INIAP	Generar datos, información y conocimiento sobre vulnerabilidad de las poblaciones rurales y sistemas frágiles en los suelos y estragos para enfrentar los problemas asociados a riesgos (Cantón Saraguro).	1. Se han desarrollado alternativas tecnológicas amigables con el manejo de los recursos suelo, agua y biodiversidad, como mecanismo de adaptación al cambio climático. 1.1 Se dispone de un estudio sobre el "Análisis integral de la vulnerabilidad en la agricultura de los pueblos de Saraguro Ecuador". 1.2. Se dispone de al menos dos alternativas tecnológicas relacionadas con el manejo del recurso suelo. 1.3 Se dispone de al menos dos alternativas tecnológicas relacionadas con el manejo del recurso agua. 1.4 Se dispone de al menos dos alternativas tecnológicas relacionadas con el manejo del recurso biodiversidad. 2. Se han implementado sistemas de producción agropecuaria de manejo de los recursos suelo, agua y biodiversidad. 2.1 Se dispone de al menos 60 sistemas	El proyecto de cambio climático en Saraguro utiliza los Enfoques de Gestión Integrada de Recursos Naturales y Manejo de Recursos Naturales Adaptados al Cambio Climático (PACC). El presupuesto era de USD 100000. Actualmente, el fondo MAE PNUT, el INIAP en los últimos tres años, 2013-2015, han invertido cerca de USD 150000 dólares, con fondos de proyectos de inversión. Esperamos que al menos estos últimos			1. Al menos 1500 personas de las 21 comunidades de Saraguro que forman parte del proyecto, han accedido sus ingresos, por tener que sus cultivos alternativos que son establecidos con el manejo de los recursos agropecuarios. 2. Al menos 300 personas de producción de las 21 comunidades de Saraguro implementan prácticas de manejo de recursos naturales que han mostrado que en la época crítica de sequía y de lluvias intensas, no tienen problemas en la producción de un	El proyecto fue diseñado para que el 100% de las personas de actividades de investigación, validación, transferencia de la tecnología y generación de alternativas se encuentren involucradas a la Adaptación al Cambio Climático.	



OE 8/OE1	Implementar medidas para incrementar la capacidad de respuesta de los asentamientos humanos para enfrentar impactos del cambio climático	Viceministerio de Desarrollo Rural/Coordinación General de Innovación	Red de Cambio Climático y Seguridad Alimentaria. Está en funcionamiento una red de 24 técnicos facilitadores del programa, capacitados a nivel nacional para desarrollar acciones en cada una de las provincias en torno al tema de cambio climático.	de producción que integran las alternativas de manejo de recursos naturales. 2.2. Se dispone de al menos 34 micro reservorios que han facilitado la cosecha de agua y que han beneficiado al menos a 700 personas de 21 comunidades de Saraguro. 2.3. Se disponen de al menos 60 familias produciendo cultivos alternativos como la mora con base al agua de riego de los micro reservorios. 3. Se han publicado artículos técnicos y científicos sobre alternativas de manejo de recursos naturales. 3.1. Se dispone de un artículo científico enviado y aprobado para ser publicado en el "Journal of Water Conservation". 3.2. Se dispone del borrador final de un boletín técnico de prácticas de agricultura de conservación para la Subcuenca del río Chumbo.	la cosecha y distribución del agua en lo que se ha priorizado en estos años ya que Saraguro muestra evidencias de variación climática y cambio climático, a través del incremento de la temperatura y la disminución de la precipitación. El proyecto ha avanzado en un 60% de ejecución y se aspira a conseguir las metas propuestas en un plazo de dos años más de ejecución. Será importante que se realice una evaluación externa o al menos una visita a las acciones en Saraguro para que se vean las evidencias y los beneficios	dos años, 2016-2017, se dispoga de USD 50000 dólares por año para las actividades de Cambio Climático en Saraguro, ya que también tenemos otras actividades de Cambio Climático en Chiborazo y Cutur.	cultivos.	100%
OE 8/OE2	Implementar medidas para incrementar la capacidad de respuesta de los asentamientos humanos para enfrentar impactos del cambio climático	Viceministerio de Desarrollo Rural/Coordinación General de Innovación	MITPPA	Componente #1: de innovación tecnológica agropecuaria, busca la implementación de métodos y técnicas agropecuarias, rescatando saberes ancestrales y articulándolos con nuevas tecnologías innovativas para mejorar la productividad agropecuaria, enfatizando la cooperatividad de las cadenas agro productivas, la agricultura familiar el sunak kawasy, la soberanía alimentaria y el cambio de la matriz productiva.	Incremento de productividad Tecnificación de uso de fertilizantes y abonos Promoción de uso de semillas Promoción de la mejora genética animal Producción de semillas mejorada Manejo integrado de plagas y enfermedades Buenas Prácticas de Cosecha y Poscosecha Acceso a crédito Consolidación de la Agricultura Familiar	\$ 441,051,771.00	50% de incremento promedio del rendimiento en los 324,830 hectáreas intervenidas, para el 2017. 223,321 familias beneficiadas en temas de mejora de producción mediante mecanismos innovativos, para el 2017. 1,670 organizaciones fortalecidas asociatividad en optimización de la infraestructura agro productiva.	30%
				Componente #2: de asistencia técnica y capacitación mediante el desarrollo y aplicación de buenas prácticas agropecuarias, a través de la asistencia técnica, extensión rural, difusión de información participativa, capacitación,	Capacitación para el incremento de producción, manejo de cosecha y poscosecha Fomento de asociatividad			



					Fortalecimiento organizativo y participación activa de los pequeños y medianos productores imbuídos en el Proyecto, con énfasis en el proceso de cambio de la matriz productiva y la agricultura familiar. Este componente contempla las siguientes estrategias de intervención	Fortalecimiento de organizaciones financieras Alfabetización financiera Campañas de difusión masiva Fomento de redes Plataforma virtual de capacitación			
					Componente #3: de mejoramiento de infraestructura y equipamiento agro productivo.	Centros de servicios locales (Mecanización, agua, procesamiento y almacenamiento) Laboratorios auxiliares, Centros de producción de arroz eficiente, Unidades de Asistencia Técnica (UAT), Infraestructura y equipamiento agro productivo			
OE 8	Implementar medidas para incrementar la capacidad de respuesta de los humanos para enfrentar impactos del cambio climático	ADAPTACION Y MITIGACION	Viceministerio de Desarrollo Rural/Coordinación General de Innovación	RECONVERSION AGROPRODUCTIVA SOSTENIBLE EN LA AMAZONIA ECUATORIANA	Impulsar el desarrollo agro productivo sostenible de los pobladores rurales de la región Amazónica ecuatoriana, crédito, asistencia técnica y extensión rural participativa, enmarcados en la planificación integral productiva de cada finca.	Se mejorará en un 100% la carga animal por ha., logrando así mayor productividad y reducción de hecatóreas de pastoreo. Construcción de 2000 pascuas de tierra de 950 m ² . Hasta el año 2017 se incrementará en un 80% aproximado la producción de toneladas métricas de frutales en la Amazonia. Hasta el año 2017 se incrementará en un 70% la producción de plantas medicinales en la Amazonia, durante la ejecución del proyecto. Los productores de frutales amazónicos disminuirán en un 25% sus costos unitarios de producción al 2017.	\$ 426,215,211.00	182,157 personas residentes en la Amazonia ecuatoriana	30%
OE 8	Implementar medidas para incrementar la capacidad de respuesta de los humanos para enfrentar impactos del		Viceministerio de Desarrollo Rural/Coordinación General de Innovación	Estrategia Hombre a	Contribuir a la soberanía alimentaria mediante el incremento de la producción agropecuaria, avícola y pesquera, a través de la asistencia técnica e innovación permanente en los territorios	Productivo: se basa en el diagnóstico participativo rural donde se identifican áreas prioritarias, ejes productivos que se agrupan de manera territorial. Es decir, se identifican factores en	\$ 33,722,348.00	Está siendo aplicada en 160 Parroquias, 30 cantones, 291,000 UPPAs, 2,030,000 ha	30%



OEB/OEI	Implementar medidas para incrementar la capacidad de respuesta de los asentamientos humanos	Viceministerio de Desarrollo Rural/Proyecto de Reactivación del Café y Cacao fino de Aroma	Declaración de emergencia para el sector de Cacao por la afectación de Momila septiembre 2015	En períodos de altas precipitaciones de han observado consecuencias como problemas graves en la floración, pestes y enfermedades vegetales que se incrementaron debido a las condiciones ambientales, reduciendo el rendimiento y la producción o incluso que las	donde el MAGAP puede generar un cambio importante y se hace énfasis en ellos.	<p>Desarrollo Rural: apoya que el Ministerio se asocia a otras organizaciones e instituciones para que juntos promuevan procesos sistémicos de planificación a nivel parroquial y provincial. La idea es que el MAGAP convoque a discusión y los GADS se articulen de una manera estructural para poder optimizar la inversión pública en distintos ejes como el productivo, crédito, desarrollo social, vivienda, educación, etc.</p> <p>Economía sostenible y rural: busca lograr que no se desapitalice el campo y que los negocios se queden dentro. Esto en un contexto de envejecimiento de la mano de obra y de descomposición de las estructuras familiares en donde las mujeres al interior de las fincas generalmente no pueden acceder a abonos, semillas ni mano de obra. Este eje plantea un sistema de servicios, cobijados por las organizaciones de campesinos dentro del marco de la economía popular y solidaria, en donde se crean varios servicios que están encadenados de manera similar a como lo hace la agroindustria.</p>	\$ 6,511,097.00	Cobertura 170.000 hectáreas de plantaciones de cacao a nivel nacional, para proveer a los productores los insumos necesarios para el control del bongo, con el fin de	30%



OE 8/OE7	enfrentar los impactos del cambio climático	Despacho Ministerial	"Proyecto AgroSeguro para pequeños y medianos productores y pescadores artesanales del Ecuador" El Proyecto AgroSeguro es un proyecto emblemático del Gobierno Nacional, cuyo objetivo es mitigar las pérdidas ocasionadas por eventos climáticos y biológicos adversos en el sector agropecuario	inundaciones destruyeron también áreas de cultivo o afectaron su producción. Al haber pérdidas en producción, también bajó las exportaciones de cacao.	manual. Mitigar los efectos de la motilla, mediante la entrega de insumos (kit de emergencia, conque los productos para mitigar o controlar, dosis, fungicidas y químicos) y a capacitación productores.	reducir las pérdidas actuales, ocasionadas por el mismo.	25%
			La póliza de seguro agropecuario es una herramienta de intervención que puede ser aplicada en cada región del país, tomando en cuenta el medio de vida vulnerable (agricultura, ganadería y pesca). Implementar un sistema permanente de aseguramiento productivo subvencionado por el Estado, en beneficio de pequeños y medianos productores agropecuarios y pescadores artesanales del Ecuador, enfocado en proteger la inversión económica que realiza el pequeño y mediano agricultor a sus cultivos contra fenómenos climáticos y biológicos imprevistos, mediante la contratación del Seguro.		Seguro Agrícola.- De acuerdo a la información actualizada al mes de diciembre del 2015, se cuenta con una superficie asegurada de 766.128, 45 ha y un número total de pequeños y productores asegurados de 204.077. Seguro Ganadero.- Pequeños y medianos productores asegurados 313, con un total de animales asegurado de 1432. Pesquero.- Seguro artesanales asegurado asciende a 328, con un total de motores asegurados de 459.	El impacto generado por el Proyecto AgroSeguro, es positivo, considerando que las provincias de mayor producción o colocación de pólizas son: Guayas, Los Ríos, Manabí y Loja en las cuales se ha creado ya una cultura de aseguramiento en los pequeños y medianos productores.	



Información sobre Mitigación al Cambio Climático (CC) hasta diciembre de 2015									
Clasificación de objetivos	Objetivo Específico de la ENCC frente a la Mitigación al CC, al que apunta su acción de trabajo	Subsecretaría/ Coordinación General	Nombre del proyecto relacionado a la Mitigación al CC y breve descripción	Componentes y actividades (o acciones) relacionados con medidas de Mitigación al CC	Situación actual del proyecto y avance de la ejecución del componente/ actividad enfocada a Mitigación al CC	Valor asignado al presupuesto, fuente de financiamiento y de esto indique el monto ejecutado a la actualidad.	Que impacto ha tenido su proyecto/actividad acción en los beneficiarios directos o indirectos con las medidas de Mitigación al CC	Asigne porcentaje estimado de protagonismo climático en su proyecto enfocado a Mitigación al CC	
OE 1	Identificar e incorporar prácticas apropiadas para mitigar el cambio climático y en el sector agropecuario, que pueden además fortalecer y mejorar su eficiencia productiva y competitividad	Subsecretaría Ganadería	"Promoción del manejo ganadero climáticamente inteligente, integrando la reinversión de la degradación de tierras y reduciendo los riesgos de desertificación en provincias vulnerables"	Apoyo a la reconversión y uso adecuado del suelo para el fomento de la producción pecuaria con base a prácticas y técnicas silvopastoriles	Se cuenta con la aprobación de financiamiento del Fondo Mundial para el Medio Ambiente (GEF por sus siglas en inglés). En proceso de suscripción.		Reducción de degradación de suelos, reducción de GEI, técnicas de adaptación y mitigación al cambio climático.	80%	
OE 1	Identificar e incorporar prácticas apropiadas para mitigar el cambio climático y en el sector agropecuario, que pueden además fortalecer y mejorar su eficiencia productiva y competitividad. Fomentar la aplicación de prácticas de GEI en los procesos relacionados con la provisión de servicios y la generación de bienes, desde su fabricación, distribución, consumo hasta su disposición final.	Viceministerio Rural Desarrollo General de Comerciales	Las líneas de acción, estrategias y políticas de la CGRC buscan fortalecer AFC a través del fomento de los CIALCO. Estos representan en su mayor porcentaje sistemas de comercialización vinculados a producción de las AFC que se caracterizan por alta diversificación, por muchas agroecológicas o en transición. En ese contexto, tanto la producción como la comercialización muestran evidencias de sustentabilidad ecológica, económica, social y cultural. Integran actores y prácticas que pueden considerarse favorables para la mitigación del CC.	Diseño de plan de producción para los CIALCO con las AFC. Fortalecimiento y fomento de CIALCOs. Fortalecimiento de capacidades de productores de CIALCOs. Promoción y posicionamiento del consumo social y ambientalmente responsable. Manejo de información sobre los sistemas de producción y de comercialización de las AFC.	No existe un proyecto específico. Las acciones desarrolladas en la CGRC, en el marco del PAPP y el Plan Estratégico son las que contribuyen a estos objetivos específicos.	Gasto corriente: 124918,31 Ejecutado 90% Gasto de inversión: USD, 198.000, no se cierran los procesos en marcha.	Se refleja en los datos de avance del GPR y Plan Estratégico enviados en días anteriores al Viceministerio de Desarrollo Rural.	10%	
OE 1	Identificar e incorporar prácticas apropiadas para mitigar el cambio climático y en el sector agropecuario, que pueden además fortalecer y mejorar su eficiencia productiva y competitividad	AgroCalidad/Coordinación General de Alimentos - Dirección de Gestión de Orgánicos	Evaluación de Insumos permitidos en producción orgánica: Este plan permite establecer que insumos como plaguicidas que se encuentran controlados, los cuales facilitan el manejo de plagas y la utilización de fertilizantes dentro de la producción orgánica así como la evaluación de los kits entregados por el MAGAP.	Comité de evaluación de insumos, Normativa para la evaluación de insumos, manual de aplicación de la normativa para evaluación de insumos.	Se encuentra planificado iniciar en el 2016	Presupuesto aún no ha sido asignado sin embargo se encuentra contemplado dentro de la Programación Anual de la Planificación para el 2016	Los agricultores cuentan con listados de productos que pueden ser utilizados en agricultura orgánica (plaguicidas, fertilizantes), lo que permitirá el desarrollo de la agricultura orgánica en el Ecuador.	80%	
OE 1	Identificar e incorporar prácticas apropiadas para mitigar el cambio climático y en el sector agropecuario, que pueden además fortalecer y mejorar su eficiencia productiva y competitividad	AGROCALIDAD/Coordinación General de Alimentos - Dirección de Inocuidad de alimentos	Normativa General para promover y regular la producción orgánica - ecológica - biológica en Ecuador: Se trabaja en una normativa que permita reglamentar al sector orgánico, de esta manera se	Crear sistemas de certificación orgánica y agroecológica garantizando su accesibilidad y generalización.	AL: CERTIFICACIÓN ORGÁNICA: Mediante Decreto Ejecutivo No. 3609, de 14 de enero del 2003, publicado en el Registro Oficial Edición Especial No. 1, de 20 de marzo del 2003 se	Presupuesto aún no ha sido asignado sin embargo se encuentra contemplado dentro de la Programación Anual de la Planificación para el 2016	La difusión a los actores dentro de la certificación orgánica y el manejo de normativa, actualmente está en	25%	



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					disminuirán en un 25% sus costos unitarios de producción al 2017.				
OE 1	Identificar e incorporar prácticas apropiadas para mitigar el cambio climático y en el sector agropecuario, que pueden además fortalecer y mejorar su eficiencia productiva y competitividad	Viceministerio de Desarrollo Rural/Coordinación General de Innovación	PTTPA las Plantas de Abonos la Planta de Bioinsumos en Quevedo	Plan Piloto Invierno y Verano para la entrega de kits del Cultivo de Arroz y Maíz para las provincias de Guayas y los Ríos	Entrega de Kits (semillas, fertilizantes, y fungicidas) a los pequeños y medianos productores, en convenio con la UNA EP	\$ 426.215.211,00	182.157 personas residentes en la amazonia ecuatoriana	30%	
OE 1	Identificar e incorporar prácticas apropiadas para mitigar el cambio climático y en el sector agropecuario, que pueden además fortalecer y mejorar su eficiencia productiva y competitividad	Viceministerio de Desarrollo Rural/Coordinación General de Innovación	Estrategia Hombre a Hombre	Kits de semillas e insumos para el aumento de las cadenas agroproductivas de la sierra para el aumento de la productividad por ha	Fortalecimiento de la cadena agro productiva del plátano barragante para los pequeños productores plataneros de la provincia de Manabí	\$ 33.722.348,00	Está siendo aplicada en 160 Parroquias, 20 cantones, 291.000 UPA's, 2.030.000 has	30%	
OE 2	Implementar medidas que aporten a la integridad y conectividad de los ecosistemas relevantes para la captura y el almacenamiento de carbono y manejar sustentablemente los ecosistemas intervenidos con capacidad de almacenamiento de carbono	VICEMINISTERIO DE AGRICULTURA Y GANADERÍA/SUB. DE PRODUCCIÓN FORESTAL.	Establecimiento de 120000 hectáreas de plantaciones forestales con fines comerciales a nivel nacional, que tiene como objetivo general fomentar el desarrollo de procesos de forestación y reforestación a materia prima a nivel nacional.	Acción: Fomentar el incremento del área boscosa del país con el establecimiento de plantaciones forestales comerciales, las cuales a su vez contribuyen a la captura y secuestro del carbono de la atmósfera.	Mediante la difusión del Programa de Incentivos se fomenta el establecimiento de plantaciones forestales con fines comerciales. En el 2015 se han realizado 11 talleres a nivel nacional, participaciones en ferias y 6 reportajes en medios informativos, constituyendo una herramienta para captar mayor superficie para reforestar y de esta manera reducir la presencia de carbono en la atmósfera.	ASIGNADO (2011 - 2015): 14.852.300,69 DEVENGADO (2011 - 2015): 12.494.945,25	1. Impacto Económico: Mejorando la situación económica de 787 beneficiarios del incentivo. 2. Impacto Social: Al generar fuentes de trabajo. 3. Impacto Ambiental: Mediante la recuperación de la superficie de la disminución del bosque nativo y reduciendo la presencia de carbono en la atmósfera.	10%	



				En periodos de altas precipitaciones se han observado consecuencias como problemas graves en la floración, pestes y enfermedades vegetales que se incrementaron debido a las condiciones ambientales, reduciendo el rendimiento y la producción o incluso que las inundaciones destruyeron también áreas de cultivo o afectaron su producción. Al haber pérdidas en producción, bajan las exportaciones de cacao.			Monitoreo en campo de la incidencia de la enfermedad a fin de definir el grado de afectación para la aplicación oportuna de fungicida y control manual. Mitigar los efectos de la monilia, mediante la entrega de insumos (kit de emergencia, contiene los productos para mitigar o controlar, dosis, fungicidas químicos) y capacitación a productores.	\$ 6,511,097.00	Cobertura 170.000 hectáreas de plantaciones de cacao a nivel nacional, para proveer a los productores insumos necesarios para el control del hongo, con el fin de reducir las pérdidas actuales, ocasionadas por el mismo.	30%



OE 3	Fortalecer la implementación de medidas para fomentar la eficiencia y soberanía energética, así como el cambio gradual de la matriz energética, incrementando la proporción de generación de energías de fuente renovable, contribuyendo así con la mitigación del cambio climático	de de Viceministerio de Agricultura y Ganadería /Subsecretaría Agrícola	Proyecto Nacional De semillas para Agroalimetas Estratégicas CUP: 133600000.0000.3775567 - componente :Agro energía. OBJETIVOS: -Cubrir con la demanda de biocombustible de ECOPAS a partir de la molenda de caña de azúcar. -Captar e identificar semilleros de caña de azúcar, el cual serviría como material vegetativo para multiplicar nuevas áreas con la siembra de caña de azúcar. -Contribuir al desarrollo del Buen Vivir Rural, generando alternativas de ingresos al sector rural ecuatoriano, utilizando la producción de agro energía, inclusive biocombustibles, a partir de biomasa precantando la soberanía alimentaria y aportando al cambio de la matriz energética con el uso de energía renovable. -Sustituir parcialmente el uso de combustibles fósiles en el parque automotor nacional, y por ende reduciendo los impactos ambientales que generan las emisiones de los mismos combustibles fósiles.	Fomentar y socializar la producción de materias primas de primera generación (caña de azúcar) para la producción de biocombustibles líquidos, para de esta manera sustituir parcialmente el uso de combustibles fósiles en el parque automotor nacional, y por ende reduciendo los impactos ambientales que generan las emisiones de los mismos combustibles fósiles. Manejar adecuadamente plagas y enfermedades, de aplicaciones oportunos para el control de maleza, identificar suelos apropiados para la siembra del cultivo. Dosificar el uso necesario de fertilizantes en base a las necesidades específicas del cultivo	Se fomentó y identificó un total de 5357,5 hectáreas como semilleros de caña de azúcar. Se identificó más de 10000 hectáreas en las que se puede desarrollar nuevas áreas del cultivo de caña de azúcar.	Con Extractum programativa 360-0118-0000-57-00-003-001-730504-0900-001 con Descripción de Maquinarias y Equipos (Arrendamiento) con el fin de establecer canteros para la siembra de semilla de caña de azúcar	Se captó un total estimado de 19.512,015 kg de CO2, por el desarrollo del cultivo de caña de azúcar. Se beneficiaron directamente 391 productores con la siembra de caña de azúcar, indirectamente 1600 personas, ubicadas principalmente en la Provincia de Guayas y Cádiz, siendo los cantones de intervención de Simón Bolívar, Yaguachi, Naranjal, Naranjito, Milagro, El Trunfo, La Troncal. Se estima un aporte de 26.251,750 litros de alcohol anhidro requerido para la mezcla biocombustible.	80%	
OE 5	Promover la transformación de la matriz productiva, incorporando medidas que contribuyen a reducir las emisiones de GEI y la huella de carbono, el aprovechamiento sostenible de los recursos naturales renovables y el uso responsable de los recursos naturales no renovables.	de de Viceministerio de Acuicultura y Pesca/Subsecretaría de Recursos Pesqueros	Plan de contingencia para los afectados por la eliminación de la flota langostinera artesanal industrial.	Compensar a los propietarios de las embarcaciones	Hasta la presente fecha se han podido desguazar 61 embarcaciones y se ha realizado los pagos por el concepto de 55 embarcaciones de un total de 62 embarcaciones	El proyecto fue aprobado con un monto de \$12.000.000,00 de dólares, dicho monto está destinado para la ejecución del segundo componente: "Compensar a los propietarios de las embarcaciones" y se financia con recursos fiscales	Incrementar el estatus sanitario, la inocuidad, la investigación científica y tecnológica en la producción primaria del sector agropecuario, acuícola y pesquero de las provincias de Esmeraldas, Manabí, Guayas, Santa Elena y El Oro.	Enfocar el 70% y/o 60% respectivos de la subvención a los micro-emprendimientos productivos de los tripulantes de la pesca de arrastre	70%
OE 5	Promover la transformación de la matriz productiva, incorporando medidas que contribuyen a reducir las emisiones de GEI y la huella de carbono, el aprovechamiento sostenible de los recursos naturales renovables y el uso responsable de los recursos naturales no renovables.	INSTITUTO NACIONAL DE INVESTIGACIONES AGROPECUARIAS - INIAP	Ejecutar un programa para conservación y uso sostenible de recursos genéticos forestales priorizados por comunidades circundantes a bosques húmedos y secos en los Andes y Amazonía.	Desarrollar una estrategia para la Conservación y Uso Sostenible de Recursos Genéticos Forestales priorizados, mediante la difusión de Sistemas Integrados y el fomento de emprendimientos de comunidades locales en las áreas de acción.	Proyecto en ejecución, fecha de finalización junio 2016. Hasta el momento el proyecto tiene un avance del 77,75%.	El proyecto fue financiado por SENESCYT con un presupuesto de US\$ 700.000,00 de los cuales a la fecha se ha ejecutado US\$ 433.077,27 ; los saldos restantes han sido retirados por el Ministerio de Finanzas al final de los años fiscales 2013 y 2014.	A través del proyecto se han realizado semilleros y propagación de especies forestales como cedro, posón, abunao, balisamo, chuncho, laurel, almindro y	70%	70%



							Estas plantas se han entregado a las comunidades que se encuentran en el área de acción del proyecto, con el fin de promover la conservación y uso sostenible de los recursos genéticos forestales. Las comunidades beneficiarias se encuentran en: Tena, Sub-cuenca del Río Quijos, Micro cuenca del río Chimborazo y Loja.	
OE 5	Promover la transformación de la matriz productiva, incorporando medidas que contribuyen a reducir las emisiones de GEI y la huella de carbono, el aprovechamiento sostenible de los recursos naturales renovables y el uso responsable de los recursos naturales no renovables.	AGROCALIDADCoordinación General de Inocuidad de Alimentos - Dirección de Gestión de Orgánicos	Capacitación en la Producción Orgánica: por medio de este plan se proporcionan herramientas que se requieren para que los agricultores interesados en cambiar su producción de convencional a orgánica la puedan realizar así como fortalecer las capacidades de los agricultores orgánicos ya existentes	Creación de un plan nacional de capacitación a partir de las necesidades del sector orgánico.	Se encuentra planificado iniciar en el 2016	Presupuesto aún no ha sido asignado sin embargo se encuentra contemplado dentro de la Programación Anual de la Planificación para el 2016	El impulso de la producción orgánica permitirá conservar medianamente las prácticas orgánicas, así como contribuir con la soberanía alimentaria y con el proyecto Ecuador Verde.	10%
OE 5	Promover la transformación de la matriz productiva, incorporando medidas que contribuyen a reducir las emisiones de GEI y la huella de carbono, el aprovechamiento sostenible de los recursos naturales renovables y el uso responsable de los recursos naturales no renovables. ADAPTACION Y MITIGACION	Viceministerio de Desarrollo Rural/Coordinación General de Innovación	RECONVERSIÓN AGROPRODUCTIVA SOSTENIBLE EN LA AMAZONIA ECUATORIANA	Impulsar el desarrollo agro productivo sostenible de los pobladores rurales de la región Amazónica incentivos, crédito, asistencia técnica y extensión rural participativa, en la planificación integral productiva de cada finca.	Se mejorará en un 100% la carga animal por ha., logrando así mayor productividad y reducción de hectáreas de pastoreo. Construcción de 2000 piscinas de tierra de 950 m2. Hasta el año 2017 se incrementará en un 80% aproximado la producción de toneladas métricas de frutos en la Amazonía. Hasta el año 2017 se incrementará en un 70% la producción de plantas medicinales en la Amazonía, durante la ejecución del proyecto. Los productores de frutos amazónicos disminuirán en un 25% sus costos unitarios de producción al 2017.	\$ 426.215.211,00	182.157 personas residentes en la amazonia ecuatoriana	30%
OE 5	Promover la transformación de la matriz productiva, incorporando medidas que contribuyen a reducir las emisiones de GEI y la huella de carbono, el aprovechamiento sostenible de los recursos naturales renovables y el uso responsable de los recursos naturales no renovables. ADAPTACION Y MITIGACION	VICEMINISTERIO DE AGRICULTURA Y GANADERÍA/SUB. DE PRODUCCIÓN FORESTAL	Establecimiento de 120000 hectáreas de plantaciones forestales con fines comerciales a nivel nacional, que tiene como objetivo general fomentar el desarrollo de procesos de forestación y reforestación a nivel nacional, como fuente de materia prima a nivel nacional.	Acción: Convertir suelos erosionados y degradados en productivos para la obtención de materia prima para fomento de la industria forestal madera originaria de plantaciones.	El establecimiento de plantaciones forestales con líneas comerciales en tierras con predisposición a degradación y degradadas, permiten mejorar los suelos, ya que contribuyen a la recuperación de la macro y micro fauna, mediante la regulación de los ciclos	ASIGNADO (2011 - 2015): 14.852.900,69 DEVENGADO (2011 - 2015): 12.494.945,25	1. Impacto Económico: Mejorando la situación económica de 787 beneficiarios del incentivo. 2. Impacto Social: Al generar fuentes de trabajo. 3.	100%

				<p>hidrológicos y la temperatura, creando nuevos hábitats para especies que migraron a otros sitios. Es importante mencionar que este conjunto de acciones permiten que los microorganismos mejoren la fertilidad de estos suelos debido a la degradación de los minerales presentes a disponibles.</p>	<p>Impacto Ambiental: Mediante la recuperación de la disminución de la presión sobre el bosque nativo manteniendo la biodiversidad silvestre y agrícola</p>
				<p>De acuerdo con los registros del MAE la tasa de deforestación anual es de 60.000 hectáreas aproximadamente. Mediante el establecimiento de plantaciones forestales con fines comerciales se evidencia la disminución de la presión sobre el bosque nativo. Hasta la fecha se han registrado 50000 ha a nivel nacional que serán fuente de materia prima de productos y subproductos para la industria de la madera</p>	
				<p>Acción: Ayudar a la disminución de la presión sobre el bosque nativo suministrando materia prima a la industria forestal originaria de plantaciones, conservando así los recursos naturales existentes.</p>	



**Increasing adaptive capacity of local communities, ecosystems
and hydroelectric systems in the Río Blanco upper watershed
(Toachi-Pilatón watershed) with a focus on Ecosystem and
Community Based Adaptation and Integrated Adaptive
Watershed Management**

Overview adaptation measures and selection methodology

ANNEX 12-A

República del Ecuador

August of 2017

Annex 12: Overview adaptation measures and selection methodology

The following adaptation measures have been reviewed and identified as potential solutions to be implemented with local populations in the Río Blanco upper watershed. Their selection has been done on an “a priori” basis and was drawn from the UN Environment MEbA project’s catalogue of 40 EbA measures as published on the respective website

The Microfinance for Ecosystem-based-Adaptation to Climate Change (MEbA) project published a systematization to identify adaptation measures that could be promoted through microfinance products and services. The 40 selected principles may be implemented independently or in conjunction to support smallholder producers in adapting to climate change effects. The applied criteria to pick them between multiple ancestral and current practices were:

1. Have a positive impact on household economies in the short term;
2. Increase social and/or economic resilience of human populations vulnerable to climate change;
3. Diminish the pressure on ecosystems and the services they provide;
4. Reduce risks associated with climatic events in productive activities;
5. Protect, restore or use biodiversity and ecosystems in a sustainable way.

A total of 40 measures has been identified by the MEbA project as suitable EbA activities:

ORGANIC FERTILIZERS	SUSTAINABLE FOREST MANAGEMENT
SOIL CONDITIONING	INTEGRATED NUTRIENT MANAGEMENT
CONSERVATION AGRICULTURE	INTEGRATED PEST MANAGEMENT
AGROECOLOGY	NATURAL RETAINING WALLS
ORGANIC AGRICULTURE	PERMACULTURE
BEEKEEPING	AQUACULTURE
SEED BANKS	FILTER DAMS
WINDBREAKS	RAINWATER RESERVOIRS
BIODIGESTERS	SOIL RESTORATION
FOG CATCHERS	DRIP IRRIGATION
SOLAR DEHYDRATORS	CROP ROTATION
CROP DIVERSIFICATION	AGROSILVOPASTORAL SYSTEMS
DRAINAGE SYSTEMS	AGROFORESTRY SYSTEMS
ECOTOURISM	SILVOPASTORAL SYSTEMS

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EFFICIENT BIOMASS STOVES	NATURAL SHADE
FIREBREAKS	AGRICULTURAL TERRACES
SOLAR HYDROPONICS	INFILTRATION PITS
FAMILY ORCHARDS	MIXED-PLANT NURSERIES
GREENHOUSES	WARU-WARUS
VERMICOMPOST	CONTOUR TRENCHES

The measures were organized in descriptive fact sheets that contain the required information to put into practice each EbA option as well as to detail economic and ecosystem benefits where respective research was available. The fact sheet binder demonstrates that adaptation to climate change cannot be addressed from a unique front or with a single approach.

- Conservation agriculture

Conservation agriculture attempts to conserve natural resources and ensure that they are used efficiently, through the integrated management of soil, water and biological resources available on the farm, while using residual biomass to keep soil covered during crop production. It contributes to environmental conservation in three fundamental ways: through minimal-till farming to reduce soil disturbances, through permanent covering of the soil with mulch or cover crops to conserve moisture and nutrients and through crop rotation to avoid the dissemination of pests, diseases and weeds. Conservation agriculture diminishes the impact on crops of frost, drought, strong winds, intense rainfall, changes in rainfall patterns and sudden temperature changes. This is mainly due to the protection of the soil by the establishment of a permanent layer of organic matter that helps regulate moisture and temperature in the root zone. Impacts such as the greater need for agricultural inputs and erosion can be mitigated by improving soil structure and fertility, whereas pest incidence is decreased by interrupting the pest cycle through crop rotation. Conservation agriculture could reduce the amount of sediments released to a nearby water source by up to 70%.

- Seed banks

Seed banks are a mechanism set up by groups of local producers to store and classify, in safe, dry and dark locations, the most resilient and adaptable seeds offering the best product quality. The aim of a seed bank is to maintain a reserve of the local genetic diversity to strengthen small farmers' autonomy, sustainability and food security. Seed banks operate like money banks: farmers borrow seeds before planting and return them with interest after the harvest. Seed banks enhance food security by preserving seeds with high agricultural and ecosystemic value that adapt to changing climate conditions. They make it possible to develop and preserve varieties that are more resistant to drought, flooding, extreme heat, frost and other climate events. Seed banks also offer the potential to diminish the impact of phenological changes on agricultural production. If they are set up as a business, they diversify income, which enhances overall producer resilience

- Windbreaks

Windbreaks comprise one or more rows of trees and shrubs of different heights placed perpendicular to the prevailing wind direction. Their purpose is to reduce the force of the wind close to the ground, and thus its mechanical action on crops, pasture and livestock. They are used to curb wind erosion and to help regulate climate conditions on farms. Windbreaks may also be used as living fences that demarcate the boundaries of a property or zones within it. In addition to their main purpose, they provide benefits such as climate regulation and landscape improvement. Windbreaks are used mainly to diminish the impact of strong winds that may damage crops and cause soil erosion. They also reduce the effect on crops of drought, extreme heat and even frost, due to the microclimate that trees foster. Strong winds may cause 70% to 100% of a crop to be lost or damaged, especially in the case of bananas, sugar cane, vegetables and fruit trees. Windbreaks may reduce wind speed by 60% to 80%. Other benefits include the generation of a favorable microclimate for plant development and the reduction of wind erosion. These barriers also help regulate soil and air temperatures, reduce evapotranspiration and improve the distribution of soil moisture and the provision of such marketable products as fruits, seeds, timber and firewood.

- Crop diversification

Crop diversification refers to growing various agricultural products on a single plot, especially two or more crops in alternating rows. Various diversification models exist but they can all be broadly referred to as polyculture, including: intercropping, mixing annual crops with fruit and forest trees and planting different vegetable varieties. Several objectives may be sought, including controlling herbivorous insects, achieving biological control by cultivating antagonist species, efficiently using horizontal and vertical spaces in a plot or increasing farmers' income. Diversified systems are generally more resilient than single-crop systems. Through the growing of a variety of crops, diversification increases food security and reduces the need for agricultural inputs. Mixed systems are more resilient to pests, extreme temperature changes, drought and changing rainfall patterns. Diversification is an alternative for distributing losses in the event of crop damage or if harvest yields decrease. Crop diversification has a series of benefits for a plot, including the recycling of nutrients, the establishment of microclimates, the regulation of local hydrological processes and the management and control of pests and plant diseases. Another advantage of mixed systems is the greater stability of the yield when climate conditions change, with a variability coefficient 30% lower, on average, than with monoculture.

- Vermicompost

Vermicompost is an organic, nutrient- rich fertilizer that results from the degradation of organic matter. Vermicompost contributes nutrients and adds organic matter to the soil while improving its structure, with a positive effect on fertility, infiltration capacity and moisture retention. Applying vermicompost to poor soils slows their deterioration and considerably increases their productivity. This minimizes the need to resort to chemical fertilizers and pesticides and increases food security. Vermicompost lessens the impact of sudden temperature changes on crops and conditions the soil, making it more resilient

to drought and changing rainfall patterns. Improving the soil structure through vermicompost application also reduces the likelihood of erosion. The systematic application of vermicompost restores poor and unfertile soils. The solid and liquid vermicompost produced is a high-quality organic fertilizer and a substitute for chemical fertilizers.

- Drip irrigation

Drip irrigation allows for the optimal usage of water and fertilizers through their application close to crop roots. This is achieved by delivering small water flows at low pressure through a variable number of emission points, called drippers, and at a high application rate, which saves water. Water is saved in two ways: it is made to seep into the soil without evaporating or running off, and it is delivered at the root zone, just where the plants need it. The effects on crops of drought, extreme heat and changing rainfall patterns may be mitigated with drip irrigation systems through the efficient water use. The water savings allows production to continue where and when less water is available, which increases food security. The primary ecosystemic benefit is efficient water use. Drip systems have been able to reduce water consumption by up to 70% compared with conventional irrigation systems.

- Crop rotation

Crop rotation consists in sequentially producing plant species in a given location by alternating crops every year, every two years or every three years. This diversified production system prevents the build-up of pests and diseases as well as the exhaustion of the soil that usually occur with production of a single crop (or crops of a single family) in successive agricultural cycles. The rotation sequence is planned such that the requirements of one crop complement those of the next in order to maintain the soil nutrient balance. The threats of changing rainfall patterns, drought, frost and intense rainfall may be managed on a single piece of cropland, but at different times in the year, by rotating crops resistant to adverse climate conditions. Crop rotation increases food security and decreases the need for agricultural inputs, in addition to being an efficient way to control pests and diseases. Crop rotation keeps the soil covered, promotes biological equilibrium, diminishes pest cycles and diseases, incorporates nutrients and conserves energy. Benefits also stem from reduced pesticide and fertilizer use due to the greater availability of nutrients, the breaking of pests' life cycles and the intensification of biologic activity in the soil.

- Agrosilvopastoral systems

Agrosilvopastoral systems combine techniques that associate tree species (forest or fruit) with livestock and crops on the same land, with the aim of bringing about significant ecologic and economic interaction. These combinations may coexist in the same space and time or be arranged sequentially, and the aim is to optimize output and ensure sustained yields with less environmental impact. Each element in the system contributes to the others: the trees provide shade to the animals and crops; the animals fertilize the soil and propagate the seeds; and the crops constitute food for the animals. Regenerating the forest cover establishes a microclimate that helps mitigate the impacts on crops of

sudden temperature changes, changes in rainfall patterns, extreme heat, intense rainfall and strong winds. Trees generate organic matter that rebuilds the soil. This augments its infiltration and moisture-retention capacity, which reduces the effect of droughts. Animal manure raises the soil nutrient content, reduces the need for agricultural inputs and has positive effects on productivity. Carbon sequestration and the potential for climate change mitigation also increase. Diversified production associated with restoring arboreal vegetation in livestock areas is the main benefit of this system. This allows small producers not only to improve the conditions in their environment but also to reduce the risk of financial loss to which they are frequently exposed.

▪ Agroforestry systems

An agroforestry system consists of a series of techniques designed and implemented to utilize multiple strata of an agroecosystem: from timber-yielding trees, fruit trees and annual crops to shrubs, herbs, creeper species and tubers. The aim is to raise productivity in a diversified system that will have less of an environmental impact than conventional agriculture. The process makes the system more resilient and promotes the sustainable use of agricultural and forest products. Timber species are replenished with native varieties which are mostly grown in nurseries and later transplanted. The presence of trees reduces exposure to the sun, wind and rain and regulates air and soil moisture. These factors promote the establishment of a microclimate and mitigate the effects on crops of extreme heat, wind and intense rainfall as well as drought and frost. This diversified system enhances food security, decreases the potential for soil erosion by wind or water and reduces the need for greater agricultural inputs, due to beneficial interactions among species in different strata. These systems have reversed the loss of productivity stemming from environmental degradation associated with conventional cultivation practices. For example, yields of agroforestry systems have been found to be more than 100% higher than those of slash and burn practices.

It is assumed that all proposed EbA options have clear and measurable benefits for the health of ecosystems and the services they provide. Additional scientific data gathering should form part of periodic reviews for Monitoring and Evaluation to support the still limited availability of academic studies on the actual impact of EbA.

Selection criteria for implementation with individuals

Selection criteria for the identification of suitable adaptation measures for individual farmers need to be flexible and take into account each farmer's specific situation, such as:

- Access to important infrastructure such as roads
- Inclination of plots or grazing grounds
- Soil texture and quality
- Actual crops cultivated or livestock bred, including varieties and types
- Availability of critical inputs
- Pricing of inputs in each area

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The combination of these critical productivity drivers will not only determine the productivity of farmers under business-as-usual scenarios in face of adverse climate impacts, but also define what adaptation measures promise not only the optimum results, i.e. economic and ecosystem benefits, but also if their implementation is feasible at all. For example, if certain inputs for the implementation of adaptation measures are not available, cannot be transported to the farm due to the lack of access roads or are prohibitively priced, must be analyzed on a case by case basis.

The proposed project to be funded by the Adaptation Fund will seek the cooperation with the UN Environment's MEbA project which has successfully been implemented with five microfinance institutions in Colombia and Peru between 2013 and 2017. Currently, the UN Environment's office in Panama is assessing the possibility to implement its solutions in Ecuador and is analyzing interested financial institutions. The MEbA project has developed a set of 18 tools and solutions that are intended to be adjusted to any given environment. It has been verified with the responsible project coordinator that a simple request to apply the solutions in Ecuador y the Ministry of Environment would be sufficient to provide access.

The solutions of the MEbA project are detailed as follows:

1. Publication: Microfinance for Ecosystem-based Adaptation: Options, Costs and Benefits. This document contains the descriptive, systemized factsheets of 40 EbA/CSA options. It is mainly aimed at financial intermediaries.
2. Publication: Andean agriculture in the face of climate change. This document serves as a reference on key project concepts and is the basis of awareness-raising materials for FIs and clients.
3. MEbA economic game: board game for awareness-raising and marketing activities to promote investment in EbA options. This game is applicable and adaptable for FIs and clients.
4. Set of simplified EbA/CSA fact sheets: a graphic summary of the methodology for the effective implementation of EbA/CSA measures, for use in awareness-raising among clients and credit officers of financial intermediaries.
5. MEbA credit methodology: financial lending method containing policies, procedures and tools to increase the capacity of FIs to finance EbA/CSA measures autonomously.
6. CEUS software: a financial credit analysis tool that incorporates climate and market criteria to obtain a client's cash flow adjusted to climate risks.
7. Quick analysis for FIs (QuickScan): a tool that enables FIs interested in the MEbA concept to conduct a quick assessment of their portfolio, processes and procedures that are susceptible to climate risks.
8. Prioritization of EbA/CSA measures: allows FIs to select the measures most appropriate to the local context according to a cost-benefit analysis.

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9. Cost matrix and systematization of EbA/CSA measures: itemized database with costs of EbA/CSA options that may be parameterized.
10. Demonstration farms: model farms with examples of EbA/CSA options that are developed with financial intermediaries and their strategic allies for training activities and credit promotion to clients.
11. EbA capacity index: tool that estimates the adaptive capacity of clients with an ecosystem-based approach.
12. Verification tool: allows financial intermediaries or technical allies to validate the correct implementation of EbA/CSA measures.
13. Publication: Microcredits to reduce the vulnerability of small agricultural producers to climate risks - the perspective of the Colombian Andes and the Peruvian Andes. Supporting documents for decision-makers in the promotion of public policies on microfinance and ecosystem-based adaptation.
14. MEbA Training Program: curricular material on MEbA basic concepts for staff of financial intermediaries and strategic partners.
15. Training of trainers manual: practical activities to train staff on the provision of technical assistance to farmers on EbA/CSA alternatives. Its use is linked to demonstration farms or plots.
16. Criteria for the selection of strategic allies: a document that details the concept and requirements to develop strategic alliances between FIs and training providers in EbA/CSA measures.
17. Communication guidelines: general communication guidelines for financial intermediaries to share information with small-scale farmers to raise awareness on climate change and sustainable adaptation options.
18. Guidelines on agro-climate risk: a document that has been prepared to identify, classify, manage and monitor possible climate impacts in the agricultural credit portfolio of microfinance institutions.

In the current context, i.e. the definition of suitable selection criteria and prioritization methodologies for actionable EbA measures to be introduced by the proposed project, tools number 8 (Prioritization of EbA/CSA measures) and 9 (Cost matrix and systematization of EbA/CSA measures) provide all necessary bases to introduce a case by case which can be executed by trained personnel.

The following components are being analyzed in the framework of the Cost-Benefit Analysis (CBA) as developed by the MEbA project:

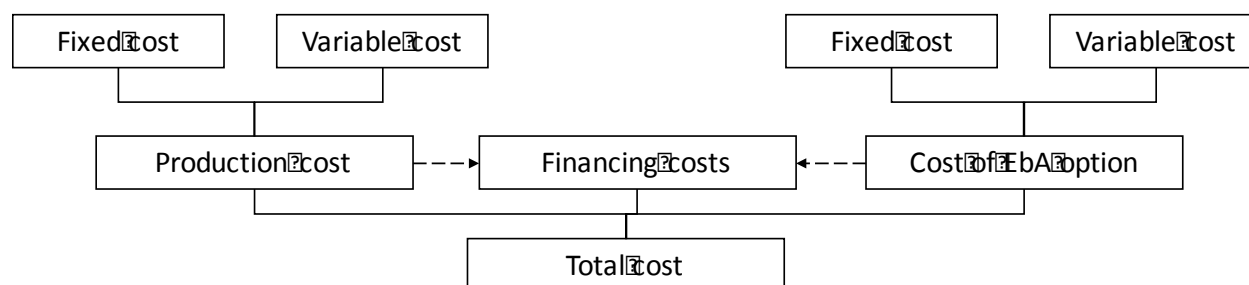
A. Costs:

In order to perform the CBA, farmers' costs and cash flow data are required in their production system, information that is obtained by an MFI agent directly from the

productive unit through the semi-structured survey developed by FS (V2.2).

1. **Production Costs:** Production costs are divided into fixed costs and variable costs. Fixed costs correspond to the purchase or rental of equipment, machinery and land or production plots, in addition to other inputs that do not vary with production. And variable costs are all costs that vary with production such as labor, seeds, fertilizers, pesticides, etc.
2. **EbA option implementation cost:** corresponds to the cost of implementing an EbA adaptation measure. These costs have to be identified from detailed investigation of the items required to implement an EbA measure in the context of specific area.
3. **Financing costs (if applicable):** Costs that represent the financing of the production and the implementation of an EbA option, as well as the interest rates charged by said financing. These costs depend on the actual production as well as the EbA option to be implemented

The different cost categories define the total cost of an EbA-aligned production, taking all necessary elements into account:



B. Sales price:

To calculate the benefits generated by the production process it is necessary to know the average selling price of the harvested product. This information will be collected by the project in the process of developing the implementation.

C. Yield:

The yield corresponds to the ratio between the total production of a crop harvested per hectare of land used. This information will be collected by the project in the process of developing the implementation.

D. Benefits:

4. **Potential yield increase (%):** corresponds to the potential increase in crop productivity given the implementation of an EbA adaptation measure. This information per EbA adaptation measure will be obtained from the MEbA project or developed by the proposed project.
5. **Avoided costs (%):** corresponds to the costs that are no longer generated due

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to the implementation of an adaptation measure, for example there could be a reduction in the use of inputs, water and even agricultural machinery. This information per EbA adaptation measure will be obtained from the MEbA project or developed by the proposed project.

Following the proposed methodology, the different cost and benefit items are being displayed over time, discounted according to standard investment analysis and result in the final value of the investment into EbA to be carried out over a given time period of typically three or five years.