ADAPTATION FUND

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

Title:	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
Category:	Regular project/Programme
Country:	Ecuador
Type of Implementing Entity:	Regional Implementing Entity (RIE)
Implementing Entity:	CAF Latin America Development Bank
Executing Entities:	Ministry of Environment (MAE)
Amount of Financing Requested:	2.489.373,00 (in U.S Dollars Equivalent)

Project / Programme Background and Context:

1. The present project concept focus on the Toachi – Pilatón water system. This is a 2,154.42 km^2 drainage basin, were about 74,000 people live (Table 1). Toachi - Pilatón 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. The Toachi – Pilatón is the southernmost subbasin of the Esmeraldas river watershed (Ecuador ´s fourth largest watershed); it covers 10% of the Esmeraldas drainage basin.
2. The Toachi drainage unit has four subbasins (Map 1 in Annex 3). The Toachi river is formed by several tributaries, most of them originating in the paramos (> 3,000 metres above sea level) within the Ilinizas Ecological Reserve[1] (e.g., río Las Juntas, río Negro, río Zarapullo). 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 Iliniza reserve (e.g., río 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.
3. 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).

[1] Created in 1996, it covers 149,900 ha.

Table 1. Population in the Toachi – Pilatón system.

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
Source: Ecuador Population and Housing Census 2010.

Table 2. Precipitation in five meteorological stations of the Toachi – Pilatón system.

Station	Data series (years)	Annual precipitation (mm/year)	Monthly minimum (mm/month)	Monthly maximum (mm/month)
Alluriquin	1980-1993	2288.3	43.2	398.5
Toachi AJ Pilatón	1967-1985	2745.8	64.8	451.7
Palo Quemado	1965-1995	2126.8	55.5	326.4
Las Pampas	1985-2006	2126.8	33.9	353.0
Sigchos	2012	1130.4	5.2	247.60

Source: INAMHI meteorological yearbooks.

4. Three provinces and five cantons share the elements of the Toachi – Pilatón water system. Local communities depend mostly on extensive farming. On the Toachi side, the main activities are subsistence agriculture and extensive cattle 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). Panela is more profitable than other cultivars, 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. On the Pilatón side, extensive cattle farming and subsistence agriculture is common. 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.

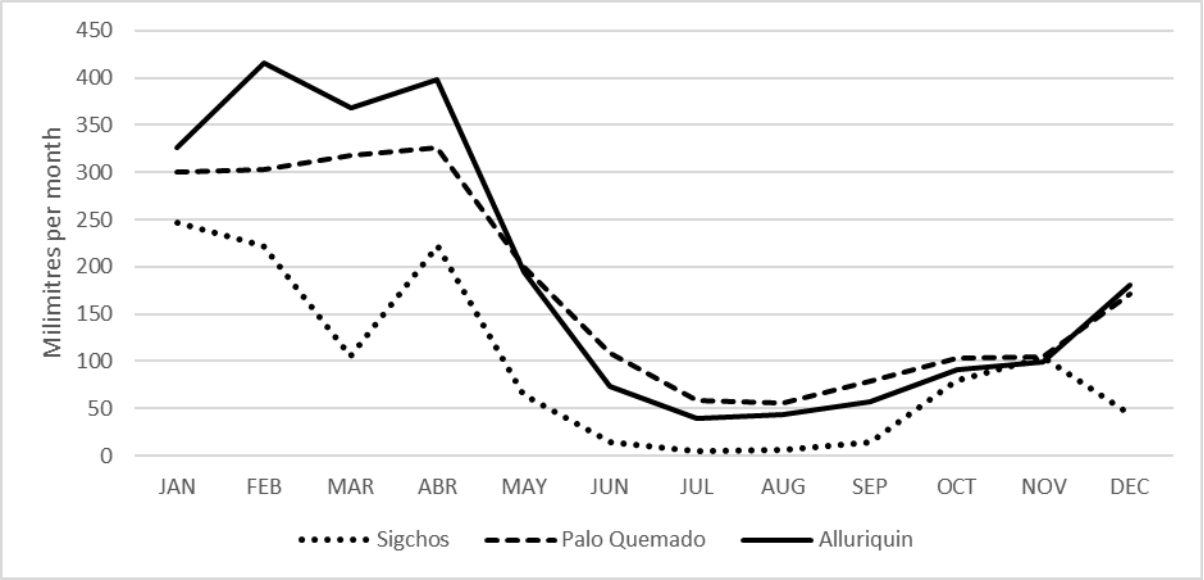

Figure 1. Monthly precipitation in three stations of the Toachi – Pilatón system. Sigchos is located in the upper part of the Toachi unit (2,880 masl) (precipitation data from 2012). Palo Quemado is in the lower part of the Toachi unit (ca., 1,100 masl) (average 1965-1995). Alluriquin is in the lower part of Pilatón unit (ca., 739 masl) (average 1980-1993).

5. The population has very high levels of poverty by unsatisfied basic needs. In 2010, four parishes located in the upper part of the Toachi unit had poverty levels above 98% (Figure 2). Even parishes with more developed economic activities like Palo Quemado, Alluriquin, Manuel Cornejo Astorga and Aloag had poverty levels well above the national average. In the same line, the levels of illiteracy are above the national level (Figure 3). The highest levels of illiteracy are also concentrated in the upper part of the Toachi unit.
6. 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[2]. 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. In addition, on 26 April 2016, the Damas river flooded the locality of Alluriquin (739 masl), as a consequence four people were killed and 80 houses were damaged (15 destroyed).

[2] El Niño is the warm phase of El Niño Southern Oscillation (ENSO), recurrent planetary climate phenomenon. El Niño produces an extreme increase in rain and floods in Ecuador. In contrast, La Niña (cold phase of ENSO) produce very dry conditions and drought in Ecuador.

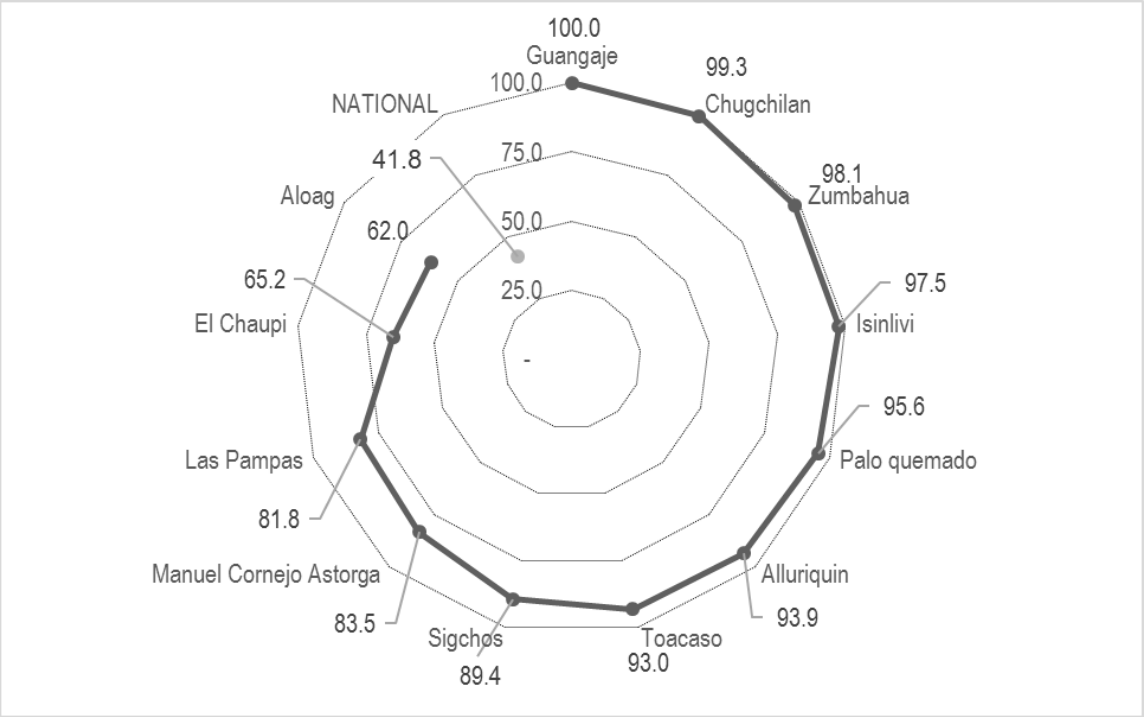

Figure 2. Poverty by unsatisfied basic needs in the parishes of the Toachi – Pilatón water system (2010 census).

7. 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 (Map 2). The rest of the system is mostly used for agriculture and extensive cattle farming. The forest cover is mostly included in two Protected Forests[3]: (1) Toachi – Pilatón (BP156) and (2) Zarapullo (BP165). The Toachi – Pilatón Protected Forest was created in 1987, and is a large area of about 212,000 ha. The Zarapullo 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 Area[4] (IBA).

[3] 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.

[4] 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.

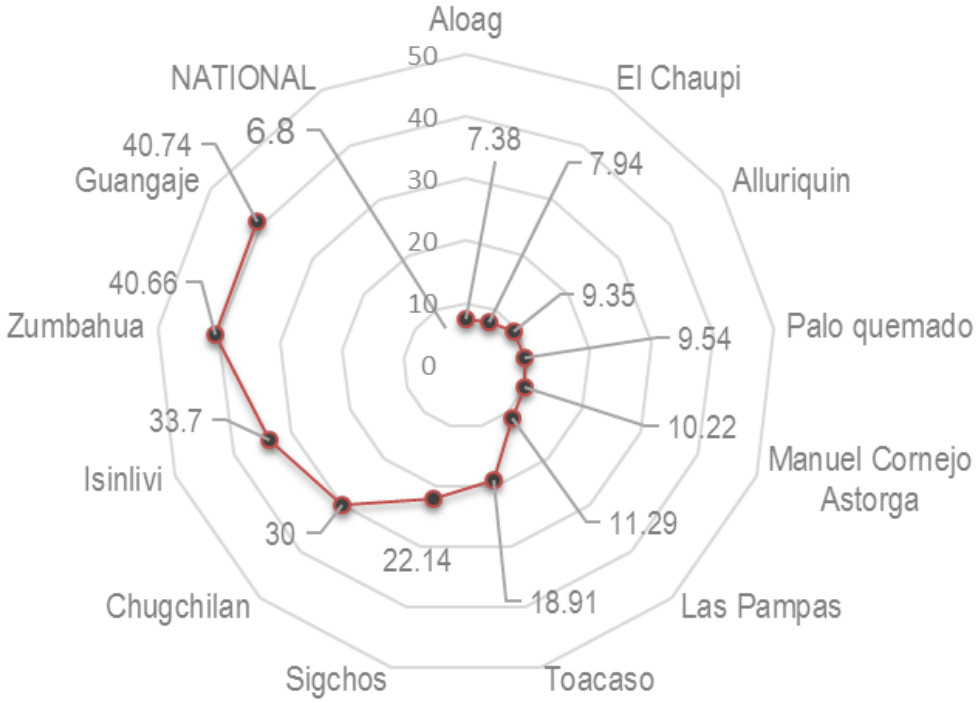

Figure 3. Percentage of illiteracy in the parishes of the Toachi – Pilatón water system (2010 census).

8. 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 2017. 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.
9. In 2014, the Ministry of Environment (MAE) analysed the climate change risk in the watersheds where major hydroelectric plants are based[5]. In the Toachi – Pilatón 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).
    II. 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). Today, the main drivers of deforestation and

[5] 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).

degradation in the basin are the expansion of pastures for livestock and small-scale agriculture.

10. 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.
11. 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.
12. 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.
13. 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.

The adaptation challenge and barriers

14. Climate change will affect local communities in the Toachi – Pilaton water system by reducing water provision for human consumption, farming production and hydroelectric energy production. Figure 4 summarise the situation and the interaction with human pressures.
15. MAE has found that the Toachi – Pilatón 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. In addition, it is anticipated that climate change will produce stronger and more frequent ENSO 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 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.
16. In the lower part of the water system, deforestation is caused by expansion of extensive agriculture and cattle farming. Farmers invade the forests and riversides[6] mainly to expand grazing areas for cattle and subsistence agriculture. Another factor which contributes to deforestation is that sugarcane farmers depend on firewood for artisanal panela production.
17. 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.

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

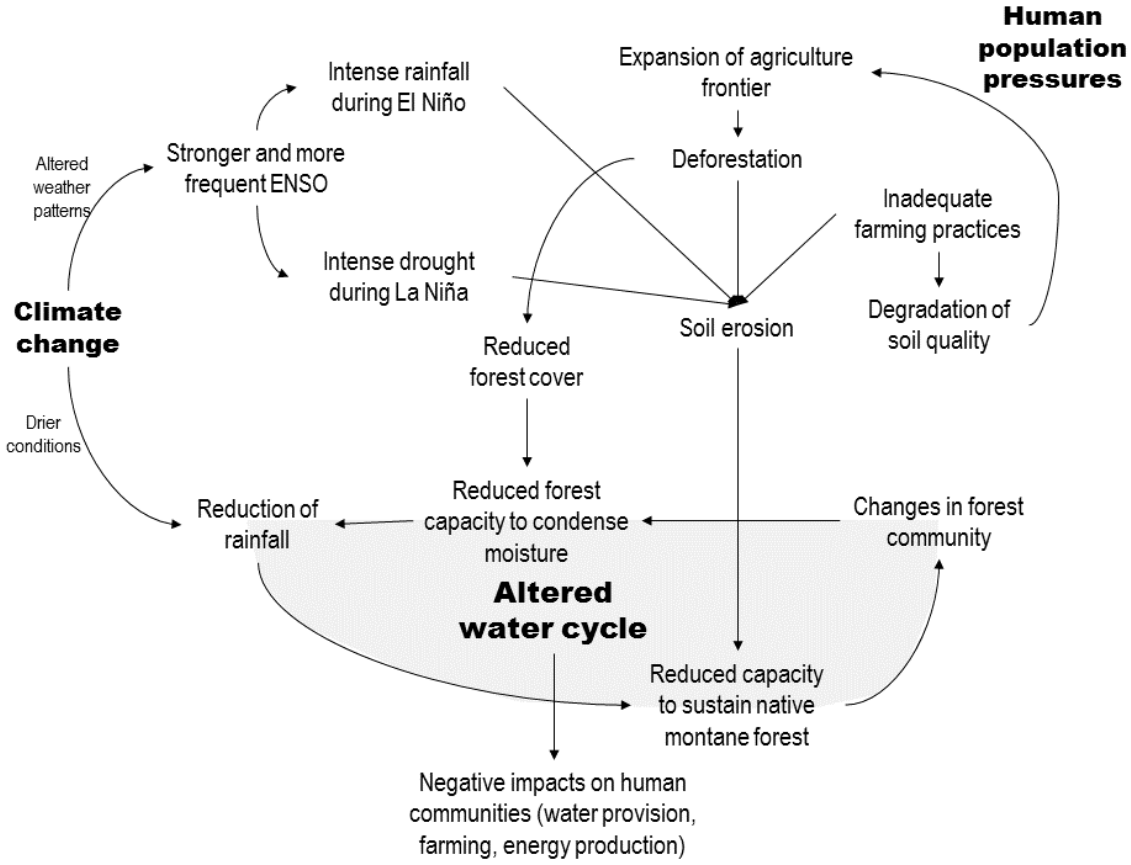

Figure 4. Conceptual diagram of climate change impacts on the water cycle of the Toachi – Pilaton water system.

18. 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 flow and increased sediments.

19. Adaptation to climate change is a major challenge for local communities. The main barriers that limit adaptation in the lower basin of the Toachi – Pilatón water system are:

    a. Local population 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.

    b. 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.

    c. Local production is based on extensive farming practices. Most farmers have small plots (≤20 ha per plot) with very low yields and, in general, use inadequate agriculture practices. In Palo Quemado ca., 50% of the farmers only have subsistence production.

Cattle farmers use extensive grazing; cattle 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 to produce panela. They indicate that firewood is every time more scarce and difficult to obtain.

d. 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.

e. 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 behaviour of water flows and sediments in the basin. The National Meteorological and Hydrological Institute (INAMHI) has eight meteorological stations in the Toachi - Pilatón water system (Map 5), but only two (i.e., M0362 Las Pampas, M0363 Sigchos) are operational.

20. The present project will contribute to address these barriers by developing practical adaptation actions to strengthen the resilience of local communities in the lower part of the Toachi – Pilatón water system (i.e., subbasins 1, 2 and 3 indicated in Annex 3). Key lines of action will be:

    a. 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.

    b. To introduce sustainable farming practices to increase the yield per hectare, concentrate production in less space and therefore reduce the expansion of the agriculture frontier, soil erosion and deforestation.

    c. To mainstream adaptation into local development plans and engage the local population by increasing awareness of the impacts derived from climate change.

Table 3 summarise specific actions to address the key barriers that have been identified (paragraph 19).

Table 3. Proposed actions to address the key barriers that limit adaptation in the lower basin of the Toachi – Pilaton water system.

Main barriers that limit adaptation in the lower basin of the Toachi – Pilaton water system	Project actions to address the main barriers
Local population not fully aware of climate-related impacts.	To implement a public communication and education plan on the five parishes of the lower basin of the Toachi – Pilaton water systems (output 7).
Local development plans do not incorporate adaptation measures.	To work with parish councils to mainstream climate change adaptation into the parish development plans of the five parishes of the lower basin of the Toachi – Pilaton water systems (output 6). The five parishes are: (1) Manuel Cornejo Astorga, (2) Aloag, (3) El Chaupi, (4) Palo Quemado, and

Main barriers that limit adaptation in the lower basin of the Toachi – Pilaton water system	Project actions to address the main barriers
	(5) Las Pampas.
Local production is based on extensive farming practices.	To work with local farmers to introduce best practices to reduce deforestation and land degradation. Implement together with local farmers demonstration pilots to show the practical application of best farming practices (output 4). The key groups to work with are cattle and sugarcane producers. In addition, to build with local farmers small artisanal sediment traps (output 3) to capture eroded or disturbed soil that is washed off during rainfall, and prevent that the sediment enter the rivers.
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 such as Socio Bosque; the idea of establishing a water fund needs to be thoroughly assessed. 2. To strengthen the means to conserve the vegetation of the two existing protected forests (Toachi – Pilatón and Zarapullo, 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.

Project / Programme Objectives:

21. 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.
22. The project is organised into three components;
    a. Component 1 will focus on the conservation of forests. Three outputs will be generated by (i) expanding protection of existing forests under mechanisms of conservation and sustainable forest management[7] (output 1), (ii) strengthening the management of the

[7] The United Nations describe sustainable forest management as a dynamic and evolving concept that aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations (United Nations forest instrument, formally known as Non-Legally Binding Instrument on All Types of Forests, adopted by the United Nations General Assembly on 17 December 2007).

existing protected forests and private reserves (output 2), and (iii) to build artisanal sediment retention dams[8] in key risk areas (output 3).

b. Component 2 will focus on introducing sustainable farming practices to reduce the impact on the local water cycle and to adapt to probable conditions of reduced rainfall. One output will be generated by introducing best practices in about 250 ha of pasture land and 250 ha of crops (including sugarcane) (output 4).

c. Component 3 will focus on strengthening private and public local capacities to implement adaptation measures. Three outputs will be generated by (i) strengthening climate-monitoring (output 5), (ii) introducing adaptation to climate change into parish development and land use plans[9] (output 6), and (iii) implementing public communication and education plans (output 7). It is foreseen that this component will facilitate dialogue and collaboration among stakeholders to strengthen social capital.

23. The basis of the project strategy is to conserve the forest cover by strengthening the conservation of native vegetation (component 1), and reducing the expansion of the agriculture frontier and farming related deforestation (component 2). The introduction of best farming practices will also contribute to reduce soil erosion and degradation. The proposed artisanal sediment traps (output 3 of component 1) will be a complementary measure to reduce the sediment load to the rivers.

    Component 3 will support the other two components:

    a. The public communication and education actions (output 7) will contribute to sensitise and inform local stakeholders. This will in turn, back the work with farmers, landowners and local authorities, and will contribute to build basin-wide management.

    b. Mainstreaming climate change adaptation into the parish development plans (output 6) will contribute to sustain forest conservation and improved farming practices (components 1 and 2). It is expected that these, and other improved measures, will become mandatory in the parishes.

    c. The generation and dissemination of hydro-meteorological information will contribute to awareness raising of stakeholders, as well as to better manage the farm operations.

Project / Programme Components and Financing:

24. The preliminary estimate of funds allocation is presented in the following matrix. During project preparation, the allocation to the various outputs might need to be adjusted.

Components	Outcomes	Outputs	Amount (USD)
1. Conserve vegetation cover	1. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate	1. 1,000 ha of native vegetation is conserved by sustainable forest management and	500,000

[8] During stakeholder consultation, it was proposed that this element is further analysed during the preparation of the full project proposal.

[9] Parishes have a local government elected by public vote formed by a President and a council. The parish government has a set of competences established by law, those relevant to the present project are: (i) to plan local development and land use in coordination with the municipal and provincial governments, (ii) to promote productive activities, biodiversity conservation and environment protection, and (iii) to promote the organization of rural communities.

Components	Outcomes	Outputs	Amount (USD)
	change on the watershed´s hydrological cycle.	conservation mechanisms.	
		2. Improved management of existing protected forests and private conservation areas (ca., 230,000 ha)	270,000
		3. Five artisanal sediment retention dams.	180,000
2. Adapt farming practices to new climate change conditions	2. At least 500 ha of agriculture land apply sustainable farming practices appropriate to the foreseen impacts of climate change	4. 250 ha of pasture and 250 ha of crops apply sustainable farming practices[10].	900,000
3. Strengthen local capacities and share lessons	3. Local population and parish governments with increased capacity to implement climate change adaptation measures.	5. Improved monitoring stations (3 meteorological and 4 hydrometric) provide prompt and reliable information to the local population and relevant authorities	150,000
		6. Six development plans[11] incorporate measures for climate change adaptation with a watershed perspective.	70,000
		7. Public communication and education plan implemented in the lower basin (ca., 13,000 people)	120,000
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**

[10] The surface to be intervened will be decided with local stakeholders during preparation of the full proposal. The current figures were proposed by local farmers during the inception workshop in July 2016.

[11] Parishes Manuel Cornejo Astorga, Aloag, El Chaupi, Palo Quemado, and Las Pampas, and the rural area of Sigchos. These parishes are located in the lower basin of the Toachi – Pilatón water system.

Projected Calendar

Milestones	Expected Dates
Start of Project/Programme Implementation	August 2017
Mid-term Review (if planned)	September 2019
Project/Programme Closing	August 2021
Terminal Evaluation	May 2021

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

25. The project strategy focusses on implementing actions that will minimize, as much as possible, the foreseen impacts of climate change in the Toachi – Pilatón water system. The main conceptual frameworks will be a sustainable livelihoods approach (Chambers & Conway, 1991; Scoones, 1998), ecosystem-based adaptation[12] (EbA), and watershed management approach for climate change adaptation.

26. The project is organized into three components and three outcomes. Seven outputs will be produced. The multiyear workplan will be developed during project preparation.

Component 1. Conserve vegetation cover

27. This component will generate one outcome to be built from three outputs. It concentrates 40% of the total project cost.

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

28. The purpose of this outcome is to encourage conservation of the existing forest cover by introducing strengthening the management of the existing protected forests (ca., 230,000 ha) (output 1) and expanding the area under conservation with local stakeholders (output 2). In addition, artisanal sediment retention dams will be built to reduce the flow of material to the rivers (output 3).

[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).

29. Output 1 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. Incentives will be provided to rural populations that voluntarily commit to the conservation and protection of their native forests and vegetation. The Socio Bosque[13] approach will be used, but including long-term contributions of key stakeholders like HIDROTOAPI and water companies.

30. A water fund might be a useful mechanism to integrate contributions from public and private stakeholders and ensure long-term management. Ecuador has strong experience developing and using water funds. An interesting experience is the Fondo de agua para la conservación de la cuenca del río Paute (FONAPA). This fund is related to 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).

31. The feasibility of establishing a water fund in the Toachi – Pilaton watershed will be assessed during the preparation of the full proposal.

32. Output 2 will strengthen the institutional and legal frameworks to manage the Toachi – Pilatón (ca., 212,000 ha) and Zarapullo (ca., 21,000 ha) protected forests, as well as existing private reserves[14]. Currently these areas do not have management strategies and are under pressure to be converted in extensive farming grounds.

33. 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, probably through a water fund. Possible partners may include parish governments, municipalities, provincial governments, HIDROTOAPI, water companies, and the Ministry of Public Works (MOP). As mentioned before, the feasibility of establishing a water fund will be analysed during project preparation.

34. From the perspective of ecosystem-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 climatic and hydrological regulation services, such as sediment retention, infiltration and interception of horizontal rain, very important in these mountainous areas.

35. Output 3 takes into account that EbA also includes the construction of low-impact local infrastructure to improve the availability of water for productive activities, human consumption and flood control in ravines exhibiting levels of soil degradation and deforestation. The previous experiences of the Project for Adaptation to Climate Change through an Effective Water Governance in Ecuador (PACC) will be applied in the areas of intervention. With local groups,

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[13] Socio Bosque is an initiative, started in 2008, of the Ministry of the Environment that offers economic incentives to owners of land with native forests to guarantee its protection over the medium to long-term. The programme provides direct payments for each hectare of native vegetation conserved per year; payments are made annually for a period of 20 years once a conservation agreement is signed between the owner and MAE.

[14] On the first screening three private reserves were identified: [1] Reserva de Bosque Integral Otonga (1000 ha), [2] La Hesperia Reserva Natural (814 ha), and [3] Reserva Florística Río Guajalito (1000 ha). During project preparation an in-depth analysis will be done, because it is very likely that more private protected areas exist.

small-scale dams for sediment retention and the reduction of flow rate will be constructed in small ravines. The feasibility, location and scope of these structures will be decided during preparation of the full proposal.

Component 2. Adapt farming practices to new climate change conditions

36. This component will generate one outcome based on one output. This is the largest component of the project, it concentrates about 38% of the total project cost

Outcome 2. At least 500 ha of agriculture land apply sustainable farming practices appropriate to the foreseen impacts of climate change.

37. The purpose of this outcome is to encourage local farmers to use sustainable farming practices that improve their harvest, while (i) reducing pressure on the standing forests, and (ii) preventing land degradation.

38. Output 4 focus on introducing best practices in at least 500 h of farmland, to reduce the impacts of farming and cattle raising on native forests and land degradation. Working with farmers´ organizations, best practices will be introduced to increase production using a smaller area. 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, yuca, tomato).

39. So far there is interest to participate from three local organizations:

    a. Las Pampas cattle ranchers´ association to introduce improved cattle and pasture management practices in 250 ha.

    b. 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.

    c. The association of producers from Quinticusig who grow and process mortiño (*Vaccinium meridionale* Swartz).

Component 3. Strengthen local capacities and share lessons

40. This component has one outcome and three outputs. Outcome 3 will aim at empowering local stakeholders and institutions to drive basin-wide adaptation to the effects of climate change and watershed management.

41. Output 5 will potentiate and expand INAMHI's hydro-meteorological network to have information of the water system. INAMHI will identify the most suitable sites for which there is no information. In this way, existing information gaps on the basin can be filled. Various meteorological and hydrological stations will be installed; they will be linked to INAMHI´s national network and the corresponding early warning systems[15]. Also, sediment samplers will be installed in key sites to monitor the sediment load. It is anticipated that this information will support informed decisions about watershed management by local stakeholders and pertinent authorities. The number and location of meteorological stations and sediment samplers will be decided during project preparation.

[15] The Risk Management Secretariat (SGR) administer the early warning systems. There is a decentralised national system for risks management in which includes, at the municipal level, a Risk Management Committee and an Emergency Operations Committee.

42. Output 6 will support mainstreaming climate change adaptation into parish development plans using MAE´s guidelines[16]. It is foreseen to work with five parishes: (1) Manuel Cornejo Astorga, (2) Aloag, (3) El Chaupi, (4) Palo Quemado, and (5) Las Pampas. The combined population of these parishes is about 17,000 people. It is also foreseen to work with the central urban parish of Sigchos, which in fact has mostly rural population[17]. These parishes are located in the lower basin of the Toachi – Pilatón water system.

43. There will be emphasis in articulating collaboration and dialogue among local authorities in support of integrated watershed management and EbA. Actions will include training on climate change adaptation. All this will promote engagement and empowerment of local governments.

44. Output 7 will be the backbone of the project´s learning process. A Public communication and education plan, grounded on the parish governments, will promote (i) understanding of probable climate change impacts, (ii) knowledge about appropriate adaptation measures, (iii) sound water management with a watershed perspective, (iv) biodiversity conservation, and (v) multi-level dialogue and collaboration among stakeholders. The purpose will be to foster improved long-term collaborative action and management of the basin which includes implementation of effective measures to confront climate change.

45. The project will systematically document experiences and lessons and disseminate them to stakeholders and interest groups. The mid-term Review and Terminal Evaluation will be a key part of the project´s learning process. It is foreseen that the project´ lessons and best practice will be useful to other part of the country.

46. Annex 9 summarise the alternative approaches that were analysed but not adopted.

B. Describe how the project / programme would provide 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 would avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

Beneficiaries

47. Direct beneficiaries 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:

    a. Parish governments of Las Pampas, Palo Quemado, El Chaupi, Aloag and Manuel Cornejo Astorga that will mainstream the climate change variable and adaptation measures in their planning and land use zoning. It is also expected to mainstream adaptation into the plans for the rural area of Sigchos[18]. These parishes will also have improved forest conservation, better agriculture production, access to hydro-

[16] MAE issued guidelines for climate change plans, programmes and strategies of decentralized autonomous governments by Ministerial Agreement 137 of 19 May 2014. A manual was published by MAE (2014).

[17] The central urban parish of Sigchos has a population of 7,933 people, but only 25% of them live in the urban area. The other are scattered rural population.

[18] 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.

meteorological information, and enabling conditions for multi-level dialogue and collaboration. The population in these areas is about 14,000 people (Table 1).

b. At least 25 technical staff from the parish governments and municipalities (i.e., Sigchos and Mejía) will benefit from training on adaptation to climate change.

c. At least 200 stakeholders will benefit from the exchange of experiences.

d. At least 60 farmer families will benefit sustainable farming practices.

48. 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:

a. Water users from the Toachi – Pilatón drainage basin.

b. About 22,000 people who live in the lower part of the drainage basin.

c. HIDROTOAPI hydroelectric plant and the users of the electricity it will generate.

Economic benefits

49. Farmers that apply sustainable farming practices will benefit from an increased yield and income. It is expected that these farmers will catalyse the use of improved practices by a larger number of producers.

50. Better hydro-meteorological information will support the early warning systems. This will contribute to reduce damages and losses caused by landslides and flooding on the Aloag – Santo Domingo road and the local villages.

51. 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.

Environmental Benefits

52. 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.

53. 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.

54. Conserving the vegetation cover of the Toachi – Pilaton 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.

55. 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).

56. 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).

Social Benefits

57. 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.

58. 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 older adults) in local farms to adapt, as much as possible, the new sustainable farming practices to the dynamics of the farming families.

59. 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

60. 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.

61. Better hydro-meteorological information provided to the early warning systems will contribute reduce the risk of impacts from landslides and flooding.

62. In the long-term, HIDROTOAPI´s greater stability in electrical generation is an additional benefit at a national level.

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

63. The AF investment will directly benefit about 14,000 people, and indirectly will benefit the entire population of the lower part of the Toachi – Pilatón water system (ca., 22,000 people). The project will contribute to strengthen the adaptive capacity of local stakeholders reducing the level of future impacts generated by climate change.

64. The project will ensure the cost-effectiveness of resources by allocating AF funds to activities and products with high catalytic potential, such as:

Activity	Target	Investment	Cost per unit target
Improve management of protected forest.	230,000 ha	USD270,000	USD1.17/ha
Increase conservation area	1,000 ha	USD500,000	USD500/ha

Introduce sustainable farming practices.	500 ha ≥60 families (ca., 300 people)	USD900,000	USD1,800/ha USD15,000/family
Mainstream adaptation into local plans	6 parishes ca., 14,000 people	USD70,000	USD11,666/parish USD5/person
Implement a public communication plan focused on specific interests and channels of key stakeholders.	6 parishes ca., 14,000 people	USD120,000	USD20,000/parish USD8.6/person

65. Alternative approaches were analysed to address the key barriers listed in paragraph 19 (Annex 9), the following decisions were made:

    a. To concentrate only on formal education actions was considered, to focus mainly on children and young adults. This kind of communication and education actions were less costly (ca., USD 80,000), but they will not directly access all local groups. The advantage of formal education actions is to build a basis for future change, but the pressing issues need to involve all stakeholders and local groups.

    b. At first, it was considered to concentrate on municipal development plans. In terms of cost, the investment will be about the same as planned. However, it was decided to focus on parish plans, because of political considerations. First, parish governments are closer to the local population. Second, municipal plans involve more complex dynamics, including urban issues. Therefore, conserving vegetation cover and soil to confront climate change may not have a high priority in the political agenda of municipal plans.

    c. To address deforestation and soil degradation, three alternatives were considered: (i) change of crops, (ii) agroforestry and (iii) introduce better practices into existing cultivars.

    The first option was discarded because it will require an enormous amount of investment and effort to yield results. To implement an agricultural extension service and to motivate and implement crop replacement will be far beyond the scope of time and cost of the present project. Such an effort in the Toachi – Pilaton watershed would require a sustained effort of at least 15 years, with an annual investment of at least USD1.0 million.

    The second option was discarded because it will not produce short-term benefits to the local farmers. In terms of cost, it would probably require the same amount of investment, but may not rapidly improve yield and profitability, and there were doubts about the probable adoption rates.

    The third option was selected because it focuses on the existing interests of local farmers. It also takes advantage of the interest of panela producers to seek opportunities in the expanding market for sustainable and organic panela.

    d. To conserve the vegetation cover will require positive incentives to landowners and long-term action in a number of fronts like guarding the areas, and enrichment planting of native vegetation. The use of the Socio Bosque programme was the first option. The proposed project investment (i.e., USD 500,000, output 1) could cover agreements for 1,250 ha[19].

[19] Socio Bosque pays ca., USD20.00 per hectare per year. The standard 20-years agreement will require USD400/ha.

However, it has been considered that a combination of Socio Bosque type incentives and a water fund might be more beneficial. This combination could ensure a financial flow to sustain not only the incentives to landowners, but also additional actions like measures for soil conservation and guarding the state-owned protected forests. The feasibility of using a water fund will be analysed during the following phase of project preparation.

66. A detailed cost-effective analysis will be formulated during project preparation.

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.

67. 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."

68. The national development plan (SENPLADES, 2013) states in its general objective 7 that climate change is a multisector 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.

69. 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. The second, focus on managing water resources with a comprehensive and integrated approach by hydrographic unit, to ensure the availability, quality and sustainable use of water resources for the various human and natural uses. In addition, the National Plan for Climate Change 2015-2018 established the water sector as a national priority and required the analysis of the vulnerability of flagship hydropower plants to the effects of climate change. The results of the analysis for the Toachi -Pilatón hydropower plant have been used to prepare the present project.

70. The project will contribute to implement Ecuador´s national plan for integrated and integral management of water resources of watersheds and micro-watershed, and is in line with the national regulations on water resources management.

71. Finally, the project will contribute to strengthen the development and land use plans of parish governments.

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.

72. 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.

73. 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:

    a. 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.

    b. 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.

    c. 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.

74. 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.

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

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

76. No duplication with other funding sources was found. However, the project will have synergies with a number of initiatives.

77. 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.

78. The project will use the results of the following projects:

    a. 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.

b. 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.

c. Analysis of the vulnerability of flagship hydropower plants to the effects of climate change (CHECC), in particular la results for the Toachi – Pilatón hydropower plant. The present project is using the results of the watershed vulnerability analyses.

d. 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.

79. 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.

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

80. Component 3 of the project focus on learning and knowledge management. It comprises one outcome (i.e., outcome 3) and three outputs (i.e., outputs 5, 6 and 7).
81. 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.
82. 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 maintain a webpage for each project within its main portal. MAE´s communications office will ensure that information will be channelled to local and national media to reach a wider audience.
83. The project team will systematically document and record the advances. A monthly electronic information bulletin will be prepared and disseminate to inform the stakeholders and interest groups. It is envisioned to produce promotional material and documents to be used by local communities and stakeholders.

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

84. During preparation of the present project concept, there was consultation with local groups and relevant government organizations.
85. Local stakeholders were approached during 2015 to discuss the project idea (Annex 4).

86. 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.

87. On 15 July 2016, an inception workshop was held in Unión del Toachi (Annex 5). Participatory rural appraisal techniques were used to gather local perceptions, views and opinions.

88. 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 5.

89. The workshop had the following main elements:

    a. 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 (paragraphs 10 to 13) were handed in printed maps. Participants were motivated to clarify doubts and present their views and experience.

    b. 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.

    c. Two groups were formed, corresponding to the major subbasins (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.

    d. The same groups identified priority actions and probable sites and local partners. 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.

    e. 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).

90. As a result of the consultation process the project concept was adjusted and specific targets were set.

91. After the inception workshop, a stakeholder analysis was prepared (Annex 8). Semi-structured interviews were applied to groups in all locations of the watershed.

92. 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.

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

93. 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

94. The two existing protected forest (Toachi – Pilaton and Zarapullo), 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. The extent of the invaded area is unknown.

95. 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.

96. It is foreseen that climate change will reduce rainfall in the Toachi – Pilatón 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

97. 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.

98. The project will allow to:

    a. 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. This may be a water fund, that consolidate contributions from water users (e.g., HIDROTOAPI, water companies, rural water boards) and invest in forest conservation (e.g., incentives to landowners, protection, reforestation).

    b. 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

99. Local farmers contribute to forest degradation. Their production is based on extensive and subsistence farming and the use inadequate practices that contribute to soil degradation and erosion. The main pressures come from cattle producers and sugarcane farmers. Cattle producers clear forests and invade river margins to establish grazing grounds. Sugarcane farmers, mainly based in Palo Quemado parish, 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

100. 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.

101. Improved farming practices will be introduced in at least 250 ha of cattle production and 250 ha of sugarcane fields. The project will work with farmers´ organizations in Las Pampas and Palo Quemado parishes.

102. Panela production will be analysed and improvements to the furnaces will be introduced to improve efficiency and reduce the consumption of fire wood.

Component 3. Strengthen local capacities and share lessons

Baseline

103. The local population and stakeholders are not fully aware of the climate-related risks, and are not engaged into advance adaptation to climate change. Parish plans mention climate change, but do not incorporate actions to implement adaptation measures.

104. INAMHI has eight meteorological stations in the area, but only two are 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

105. With AF support a public communication and education plan, grounded on the parish governments. It will cover about 14,000 people of the six parishes that are part of the Toachi – Pilaton 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.

106. 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. A 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.

107. 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.

108. Social sustainability will be based on the participatory approach and the integration of key stakeholders. The project will promote multi-level dialogue, networking and collaboration to build social capital in support of watershed conservation.

109. 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.

110. A water fund is being 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 HIDROTOAPI and other water users will be motivated to contribute to the water fund to maintain long-term key actions. The viability of this instrument will be assessed during project preparation.

111. Finally, it is foreseen that parish governments and other project partners will integrate actions into their institutional budgets to ensure post-project sustainability.

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

112. The Adaptation Fund´s Environmental and Social Policy (ESP) (AF, 2013) aim 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.

113. The present project concept was screened and assessed as required by the ESP. The results of the screening process are presented in Annex 7 and summarised in Table 4 and Table 5. The methodology applied to ensure compliance of the present project with the ESP is described in the following sections. The key background documents use are AF (2013), AF (2016) and AF (2016a).

114. As a result of this analysis, potential minor environmental and social impacts and risks associated to the implementation of some activities were identified. The five environmental and social principles that will require attention during project implementation are:

    Principle 1. Compliance with the Law

    Principle 2. Access and equity

    Principle 5. Gender equity and women´s empowerment

    Principle 9. Protection of natural habitats

    Principle 12. Pollution prevention and resource efficiency

115. The principle on gender equity and women´s empowerment has to be considered in five of the seven 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.

116. The construction of five artisanal sediment retention dams (output 3), is the only action that will need a further environmental impact assessment approved by the corresponding environmental authority during the project's implementation. During project preparation, the

feasibility of building the artisanal dams will be assessed[20], and their social and environmental impacts will be analysed.

117. In addition, screening was done using CAF´s preliminary environmental and social risk analysis matrix (instrument FR-086) (Annex 6), 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".

118. 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.

119. 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.

120. The only element of the project that will require a specific permit is the construction of the five artisanal sediment retention dams. The responsible for construction and operation of the dams (still to be defined) will require an Environmental Registry which is issued online after filling a formulary and paying a fee. According to the Ecuadorian environmental regulation, this type of intervention is categorised as having low environmental and social impact.

Principle 2. Access and Equity.

121. An initial stakeholder analysis was prepared (Annex 8). 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.

122. In general, the project actions will not impede 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.

Principle 3. Marginalized and Vulnerable Groups.

123. No vulnerable or marginalized will be affected by the project scope

Principle 4. Human Rights.

124. 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.

[20] There is no consensus on the use of these artisanal dams. During the inception workshop and in-depth interviews with stakeholders, it was clear that a number stakeholders disagree with the use of the artisanal dams. A final decision on their use will be done during project preparation.

125. 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.

126. 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).

127. The stakeholder analysis (Annex 8) 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 Toachi – Pilaton watershed is similar to other Ecuadorian rural areas.

128. The analyses did not find factors that will impede or limit women´s participation in project activities. However, it has to be considered that men are increasingly seeking payed jobs in Santo Domingo, the nearest large city. This in turn, increase the workload for women to tend for the farm and the animals. 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 6) and the communication and education actions (output 7) are gender and age sensitive and do consider the needs of persons with disabilities.

Principle 6. Core Labour Rights.

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

Principle 7. Indigenous Peoples.

130. ILO convention 169[21] is in force in Ecuador. There is no indigenous population in the project area.

Principle 8. Involuntary Resettlement.

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

Principle 9. Protection of Natural Habitats.

132. The project will not intervene in protected areas or high value conservation areas. However, 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 6).

Principle 10. Conservation of Biological Diversity.

133. 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.

[21] i.e., Convention concerning Indigenous and Tribal Peoples in Independent Countries.

Principle 11. Climate Change.

134. The project does not include activities that involve a significant increase in emissions of greenhouse gases or other climate change stressors.

Principle 12. Pollution Prevention and Resource Efficiency.

135. 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).

Principle 13. Public Health.

136. The project does not imply negative impacts on public health.

Principle 14. Physical and Cultural Heritage.

137. 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.

138. The project will not intervene valuable land. On the contrary, the project action will contribute to soil conservation.

139. 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.

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

141. 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 2017.

Table 4. Screening matrix to verify compliance with the Adaptation Fund´s Environmental and Social Policy.

Checklist of environmental and social principles	**No further assessment required for compliance**	**Potential impacts and risks – further assessment and management required for compliance**
Compliance with the Law	No risk or adverse impacts. The project is in compliance with domestic and international law	The artisanal sediment retention dams will have to obtain the corresponding

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		environmental permit[22].
Access and Equity	No risk or adverse impacts. The project intervention will contribute to protect the inhabitants of three coastal cities from climate-related risk. The project will not impede / limit access to essential services and rights. Communication and public awareness activities will be open to everyone.	Ensure that local population and stakeholders are adequately informed and engaged in project actions.
Marginalized and Vulnerable Groups	No risk or adverse impacts to marginalized and vulnerable groups.	
Human Rights	No risk or adverse impacts. Both countries are parties of the core human rights treaties. The project intervention does not imply any sort of violation of human rights.	
Gender Equity and Women's Empowerment	No risk or direct adverse impacts. The project interventions will not impede or limit women´s participation	Ensure that forest conservation and farming actions (outputs 1, 2 and 4) does not negatively increase workload to women and other family members (e.g., children, senior people). Ensure that local development plans and public communication and education actions (outputs 6 and 7) are gender, age and cultural sensitive, and consider special needs of persons with disabilities.
Core Labour Rights	No risk or adverse impacts. The project intervention has no implication with the four	

[22] The responsible for construction and operation of the artisanal sediment retention dams (to be decided during project preparation) will submit information to MAE to obtain and environmental registry.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
	fundamental principles and rights at work[23].	
Indigenous Peoples	No risk or adverse impacts. The project intervention will not affect indigenous groups or territories.	
Involuntary Resettlement	No risk or adverse impacts. The project intervention does not imply involuntary resettlement.	
Protection of Natural Habitats	No risk or adverse impacts. The project will not intervene in protected areas or high value conservation areas.	Ensure that the role of natural habitats is considered while mainstreaming adaptation measures in local development plans (output 6).
Conservation of Biological Diversity	No risk or adverse impacts. The project does not involve unjustified reduction or loss of biological diversity or the introduction of known invasive species. On the contrary, project actions will motivate the conservation of existing vegetation cover and the associated biodiversity and ecological services	
Climate Change	No risk or adverse impacts. The project will not increase greenhouse gas emissions or the main drivers of climate change indicated in principle 11.	
Pollution Prevention and Resource Efficiency	No risk or adverse impacts. The project does not imply major use of energy or the production of wastes and pollutants. Emissions and residues during construction works will be managed.	Ensure that residues and waste from the construction of the artisanal sediment retention are properly managed.

[23] i.e., child labour, discrimination at work, forced or compulsory labour, and freedom of association.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Public Health	No risk or adverse impacts. The project does not imply negative impacts on public health.	
Physical and Cultural Heritage	No risk or adverse impacts. The project will not intervene in cultural / archaeological sites or sites with unique natural values.	
Lands and Soil Conservation	No risk or adverse impacts. The project does not imply soil conversion or degradation. On the contrary, it will contribute to soil conservation.	

Table 5. Summary of the screening of the 15 environmental and social principles by project outcome.

Environmental and social principles	Output						
	1	2	3	4	5	6	7
Compliance with the Law			x				
Access and Equity	x					x	x
Marginalized and Vulnerable Groups							
Human Rights							
Gender Equity and Women's Empowerment	x	x		x		x	x
Core Labour Rights							
Indigenous Peoples							
Involuntary Resettlement							
Protection of Natural Habitats						x	
Conservation of Biological Diversity							
Climate Change							
Pollution Prevention and Resource Efficiency			x				
Public Health							

Environmental and social principles	**Output**						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Physical and Cultural Heritage							
Lands and Soil Conservation							

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

142. 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.

143. The project partners are the parish governments of Manuel Cornejo Astorga, Aloag, El Chaupi, Palo Quemado, and Las Pampas, the municipal governments of Mejía and 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.

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

144. The following key risks have been identified:

Project risks					
Description	**Type[24]**	**Impact & Probability level[25]**	**Mitigation Measures**	**Responsible**	**Status[26]**
Change of central government in Ecuador. The new president and will take office in 2017[27]	Political	P = 5 I = 3	Present the project to new authorities in MAE	CAF	No change
Change of municipal government in Ecuador. The new authorities will take office in 2019[28].	Political	P = 5 I = 3	Present the project to new authorities	MAE and CAF	No change
Effect of La Niña in precipitation and local weather conditions[29].	Environmental	P = 3 I = 3	Monitor information and alerts in national meteorological entities, NOAA, and World Meteorological Organization	CAF	Increasing

[24] Environmental, Financial, Operational, Organizational, Political, Regulatory, Strategic, Other

[25] 1 = low / 5 = high.

[26] Over, reducing, increasing, no change.

[27] During the first year of project implementation.

[28] In the mid-term of Project execution.

[29] 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).

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

145. This section will be developed during preparation of the full proposal.

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

146. 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.

147. There will be an independent mid-term review and a terminal evaluation to assess progress and lessons.

148. The budgeted monitoring and evaluation plan will be drafted during preparation of the full proposal.

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

149. This section will be developed during preparation of the full proposal.

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

Project Objective(s)[30]	Project Objective Indicator	Fund Outcome	Fund Outcome Indicator	Grant Amount[31] (USD)
To strengthen the adaptive capacity of the local population in the Toachi – Pilatón water system	Number of people (men and women) with improved adaptive capacity [target 14,000 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	70,000
		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	120,000
		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)	770,000

[30] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

[31] The allocations listed below do not sum the total project Budget. Component 3 (i.e., outputs 7.1 and 7.2) deal with knowledge management and dissemination of lessons and best practice. The AF´s results framework does not have a specific outcome or output dealing with knowledge management.

		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	900,000
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
Outcome 1. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the watershed´s hydrological cycle.	Surface (ha) under improved management. [target 230,000 ha]	Output 5: Vulnerable ecosystem services and natural resource assets strengthened in response to climate change impacts, including variability	5.1. Number of natural resource assets created, maintained or improved to withstand conditions resulting from climate variability and change (by type and scale)	770,000
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	900,000
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)	220,000
		Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1 Number of news outlets in the local press and media that have covered the topic	120,000

G. Include a detailed budget with budget notes, broken down by country as applicable, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

150. This section will be developed during preparation of the full proposal.

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

151. This section will be developed during preparation of the full proposal.

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List of Annexes

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

A. Record of endorsement on behalf of the government[32]

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 an annex to the project/programme proposal. Please attach the endorsement letters with this template; add as many participating governments if a regional project/programme:

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

6. 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 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, 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.	
Name & Signature Implementing Entity Coordinator	
Date: *(Month, Day, Year)*	Tel. and email:
Project Contact Person:	
Tel. And Email:	