ADAPTATION FUND

GOBIERNO NACIONAL DE
LA REPÚBLICA DEL ECUADOR

Letter of Endorsement by Government
Government of Ecuador
Ministry of Environment

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

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

Subject:

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

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

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

Sincerely,

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

Calle Madrid 1159 y Andalucía
Quito – Ecuador
Código Postal: 170109
Teléfonos: (593 2) 3 987600
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PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government[1]

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

Full Proposal project: Endorsement for the National Project Proposal "Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management"	
TARSICIO GRANIZO *National Designated Authority* *Ministry of Environment of Ecuador*	Date: *January 15th , 2018* 

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

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

<table>
<tr><td colspan="2">I certify that the "National Project Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management- Ecuador" proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans of Ecuador and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.</td></tr>
<tr><td colspan="2"> 

Ligia Castro de Doens
Implementing Entity Coordinator</td></tr>
<tr><td>Date: January 15 2018</td><td>Tel. and email: +5717449444
lcastro@caf.com</td></tr>
<tr><td colspan="2">Project Contact Person: Carolina Cortés</td></tr>
<tr><td colspan="2">Tel. And Email: +59323988437 – acortes@caf.com</td></tr>
</table>

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

ANNEX 2
Abbreviations and Bibliography

República del Ecuador

January of 2018

Annex 2-A. Abbreviations

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

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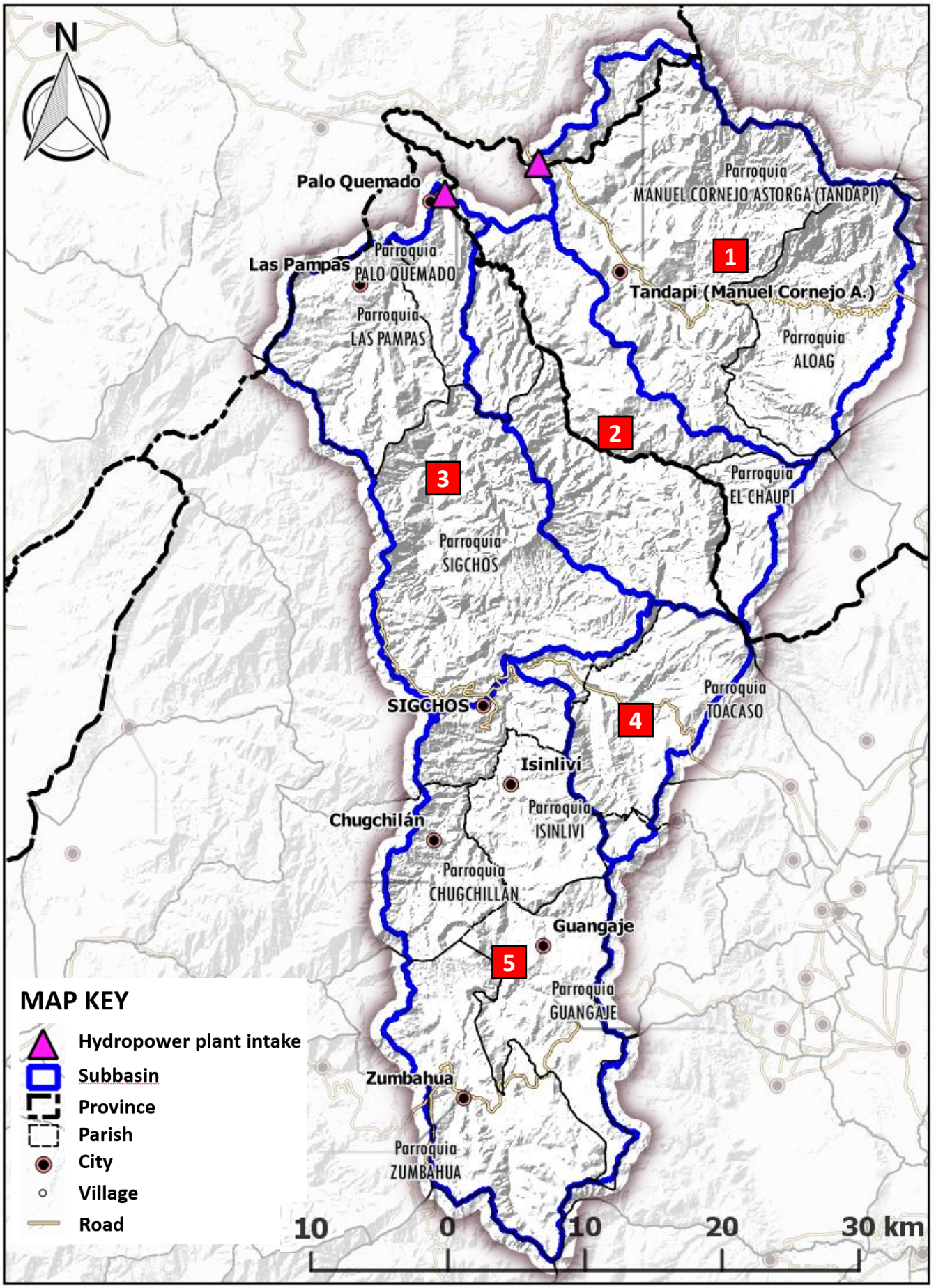
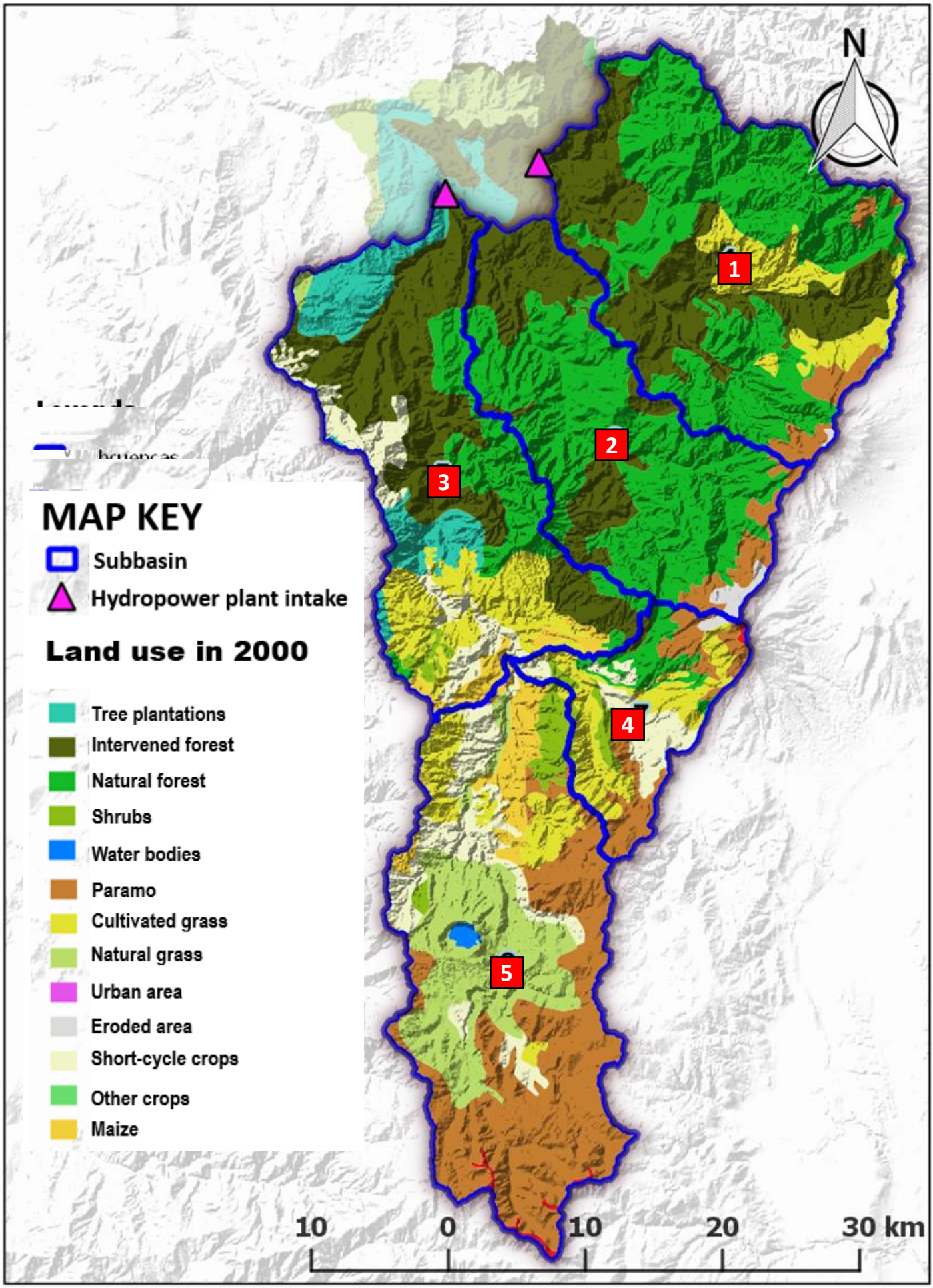
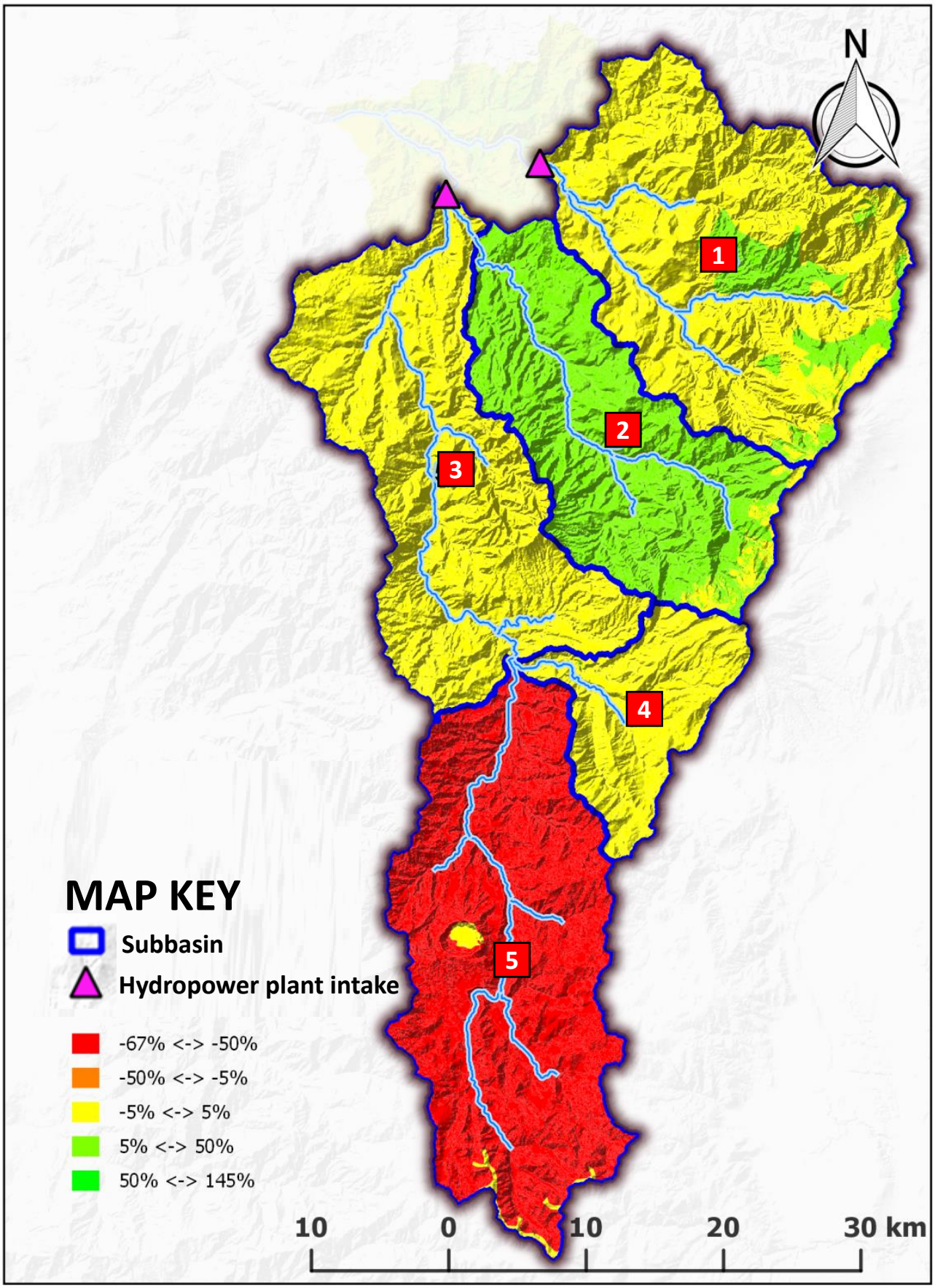
Annex 3. Maps.



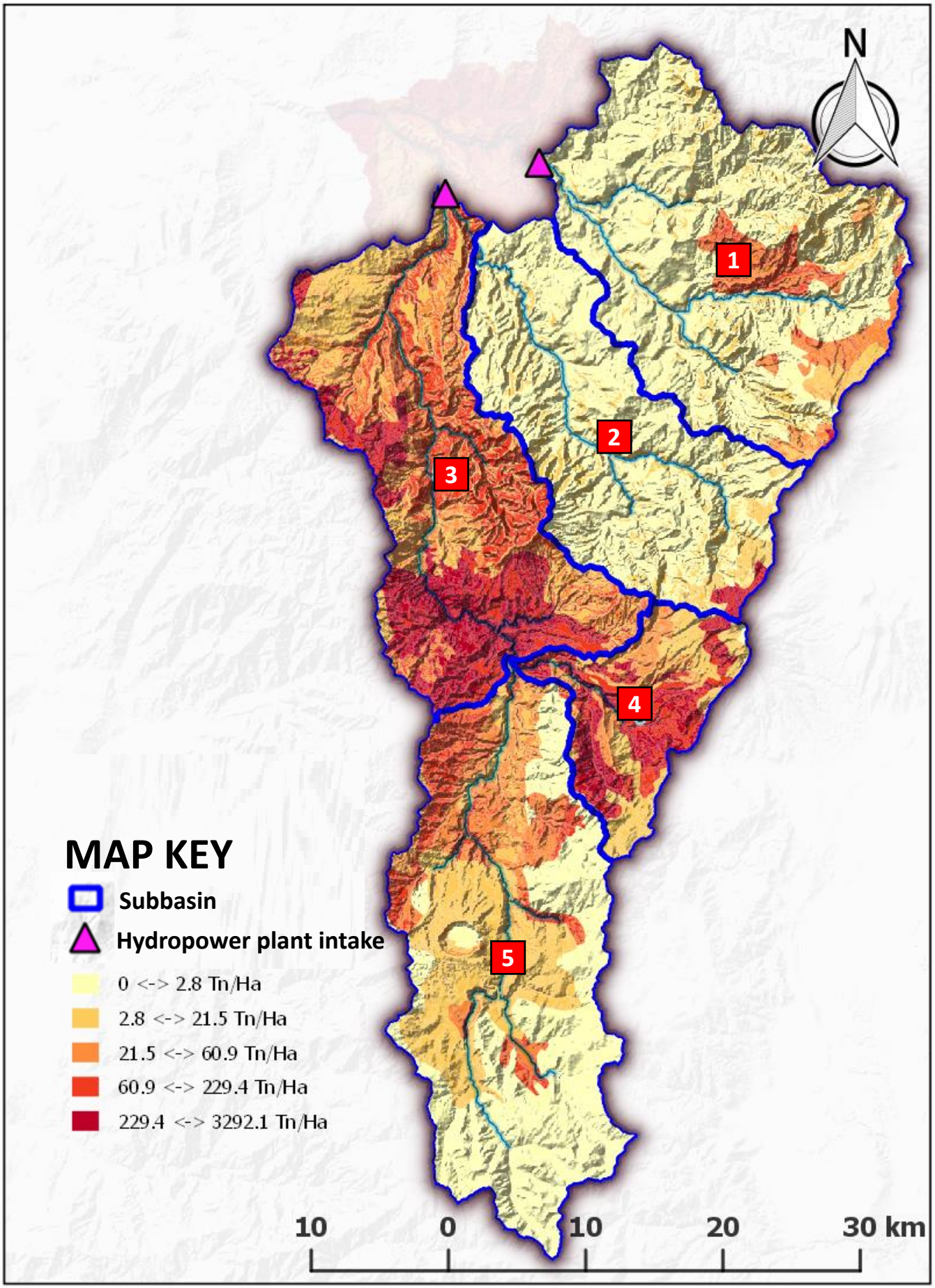
Map 1. Parishes and main localities in the Toachi - Pilatón water system.



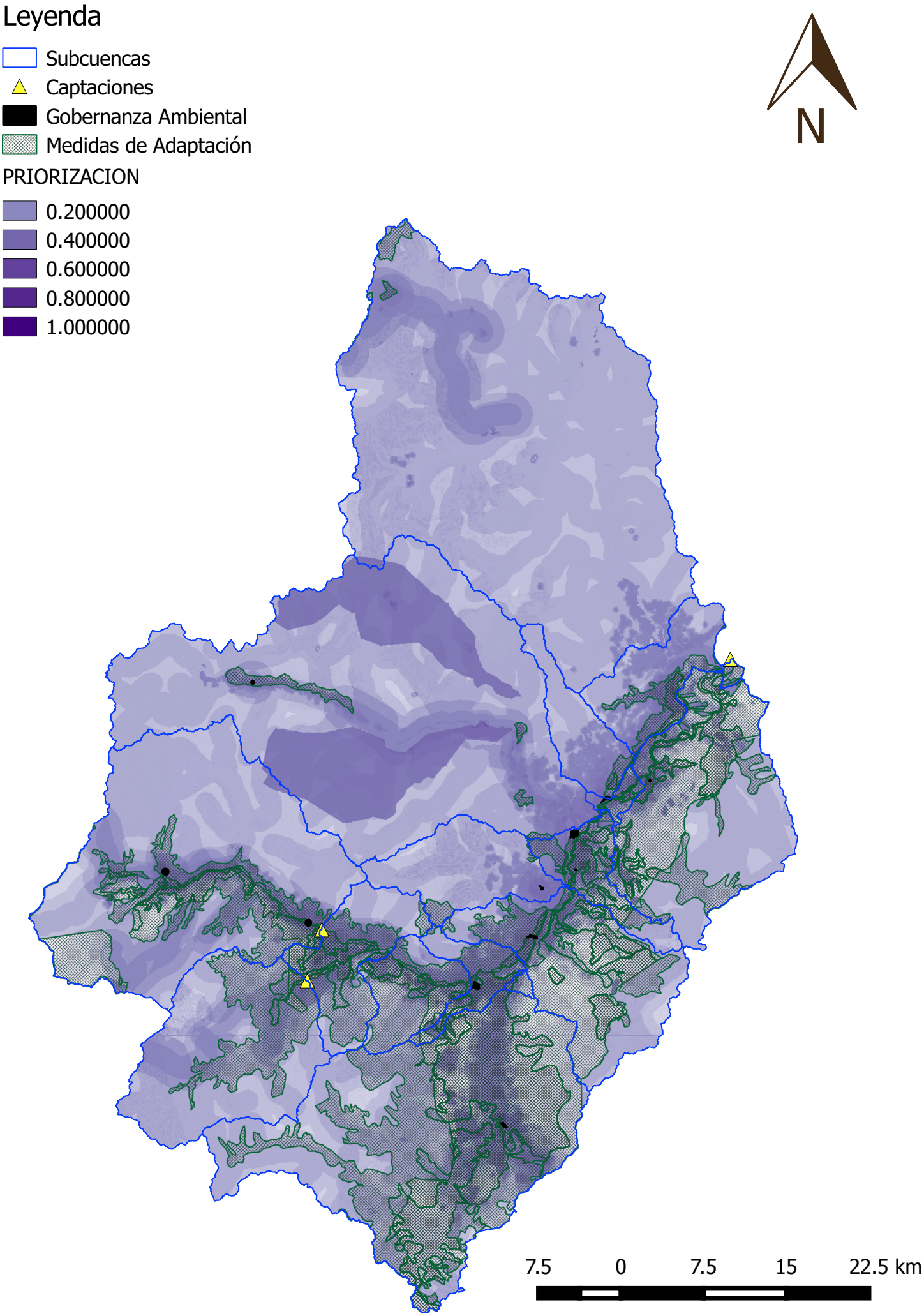
Map 2. Land use in 2000 in the Toachi - Pilatón water system.



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



Map 4. Predicted sediment contribution (metric tonnes per hectare) during 2016 - 2035 in the Toachi - Pilatón water system.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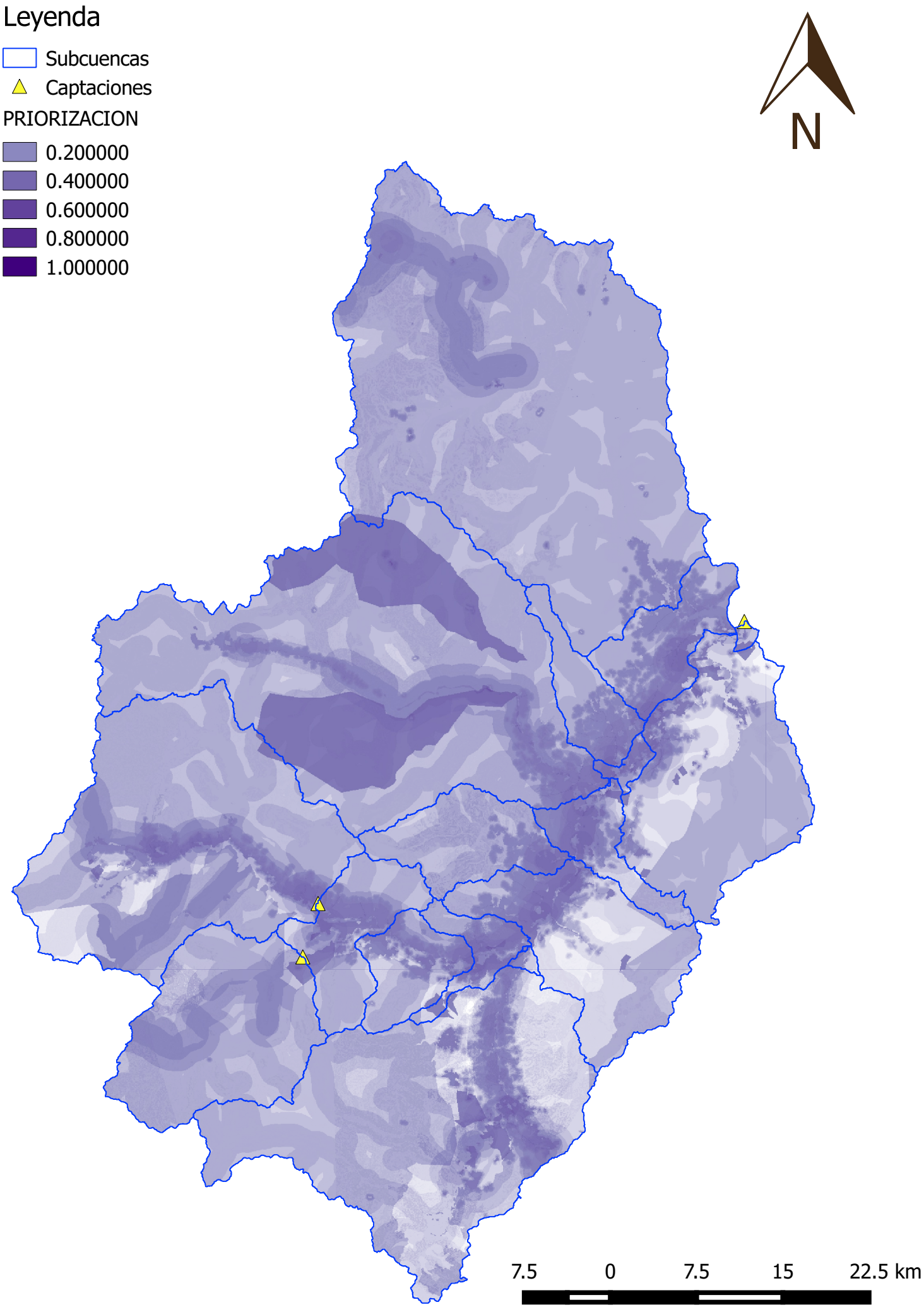
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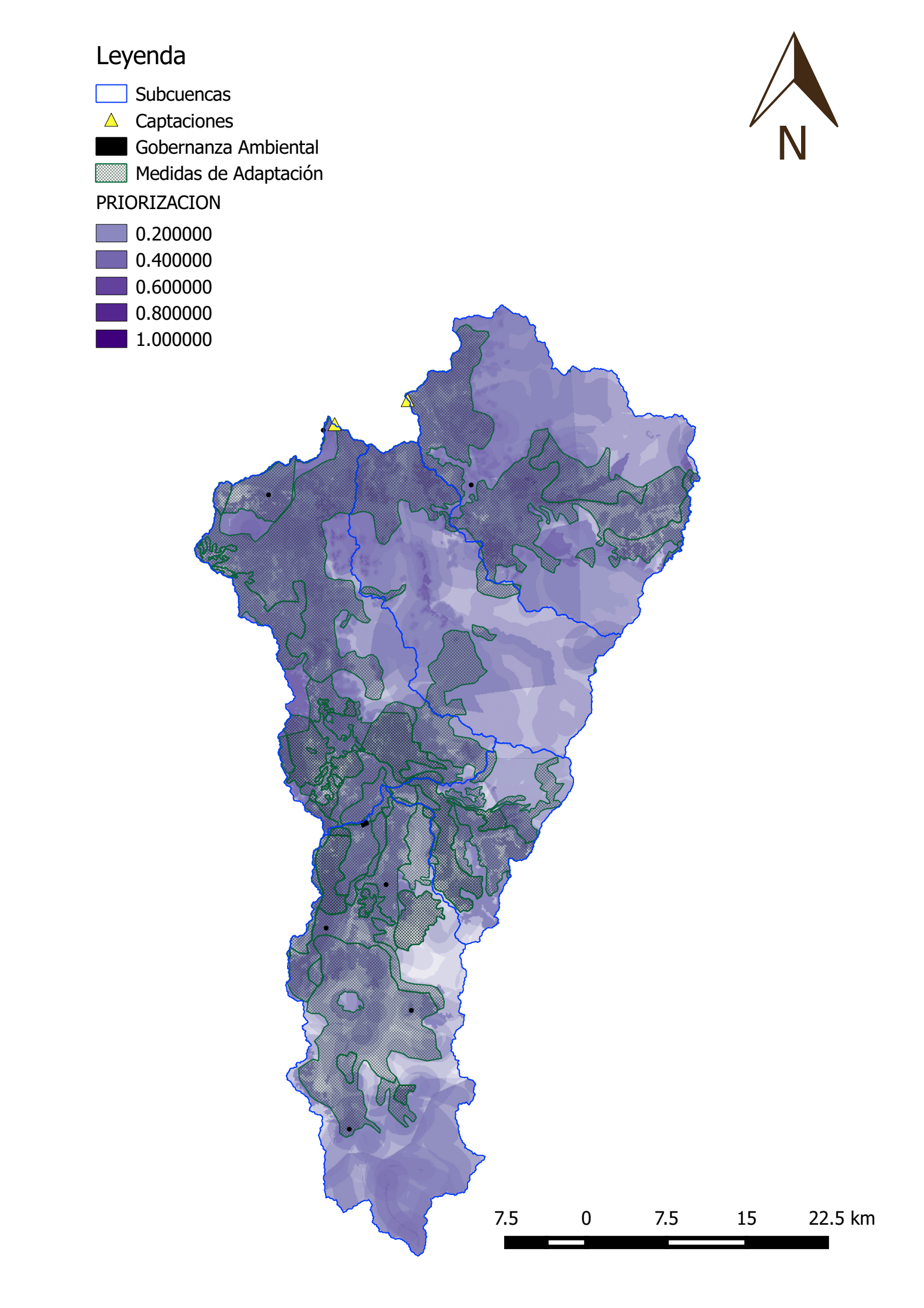
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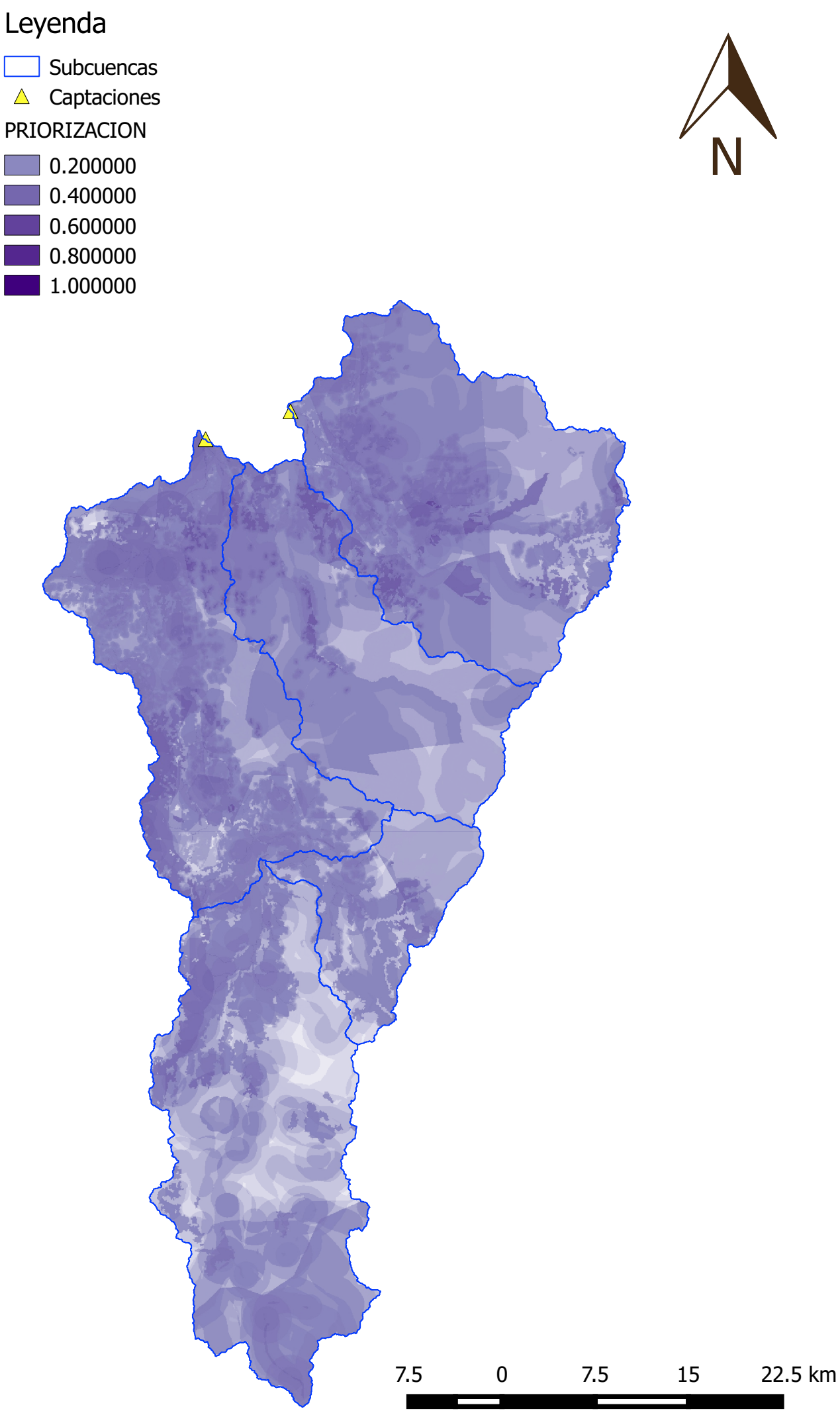
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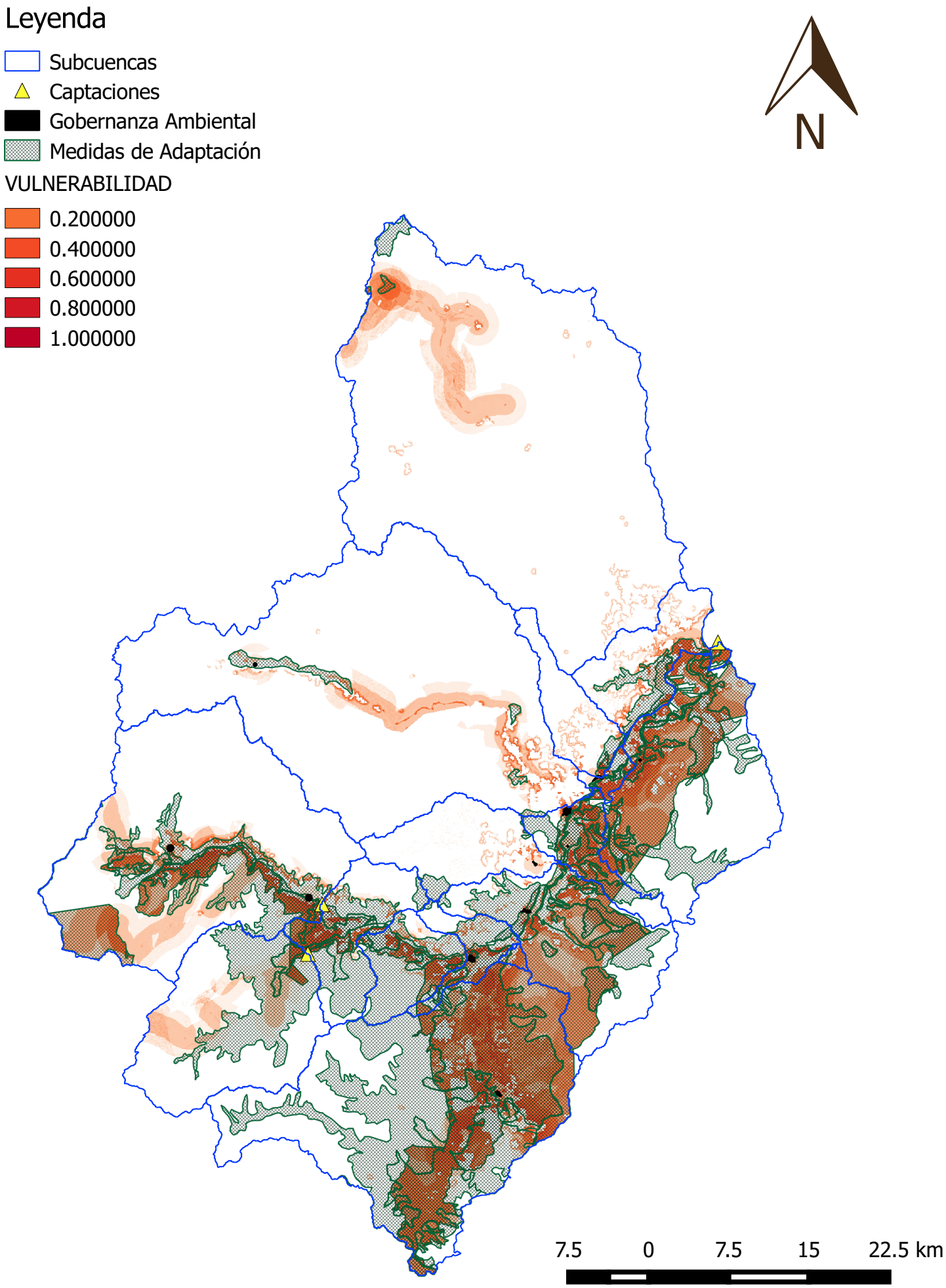
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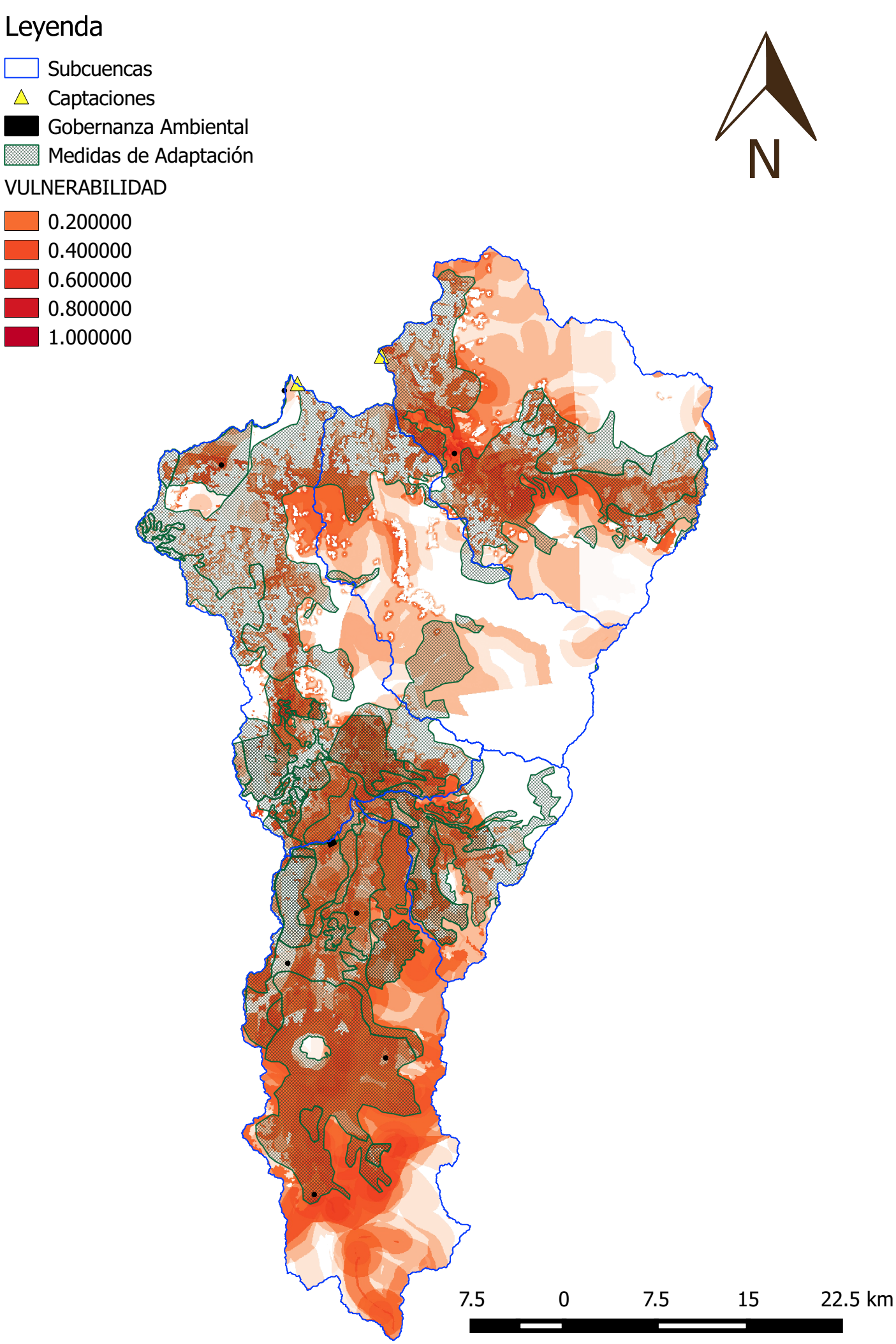
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Proyecto para potenciar la resiliencia al cambio climático en la cuenca hídrica Toachi - Pilatón

Memoria

Taller inicial de formulación

Unión del Toachi

República del Ecuador

15 de julio de 2016

Tabla de contenido

Anexos

Introducción

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

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

Se prevé presentar el concepto de proyecto al Fondo de Adaptación a finales de julio de 2016 con miras a que sea aprobado en la 28 reunión de la junta directiva del Fondo de Adaptación que se realizará el 4 de octubre de 2016 en Bonn (Alemania). A efectos de avanzar en la preparación del concepto, se requiere analizar las ideas iniciales con los actores claves públicos y privados. Consecuentemente, se organizó el taller inicial en la localidad Unión del Toachi con el objetivo de presentar las ideas del concepto a los posibles socios clave, recibir retroalimentación e iniciar el proceso de preparar la propuesta de concepto para ser presentado hasta el 01 de agosto de 2016[1].

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

Agenda

La reunión tuvo los siguientes elementos:

08:30 h Registro de participantes

09:00 h Bienvenida

09:15 h Presentación de participantes

09:30 h Revisión de la agenda

09:45 h Introducción al cambio climático

10:00 h El Fondo de Adaptación

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

10:30 h Concepto de proyecto

11:00 h Trabajo en grupo. Análisis de situación

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

12:00 h Presentación de los grupos

13:00 h Almuerzo

14:00 h Trabajo en grupo. Acciones del proyecto

15:00 h Presentación de los grupos

16:00 h Próximos pasos

16:30 h Cierre

Bienvenida

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

Introducción al cambio climático

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

El Fondo de Adaptación

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

Cambio climático en la cuenca Toachi – Pilatón

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

Concepto de proyecto

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

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

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

Mesas de trabajo

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

Primera sesión de trabajo en grupo. Análisis de situación

Cuenca del río Toachi

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

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

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

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

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

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

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

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

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

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

Cuenca del río Pilatón

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

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

Segunda sesión de trabajo en grupo. Acciones del proyecto

Cuenca del río Toachi

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

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

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

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

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

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

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

Cuenca del río Pilatón

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

Próximos pasos

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

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

Cierre

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

Figuras

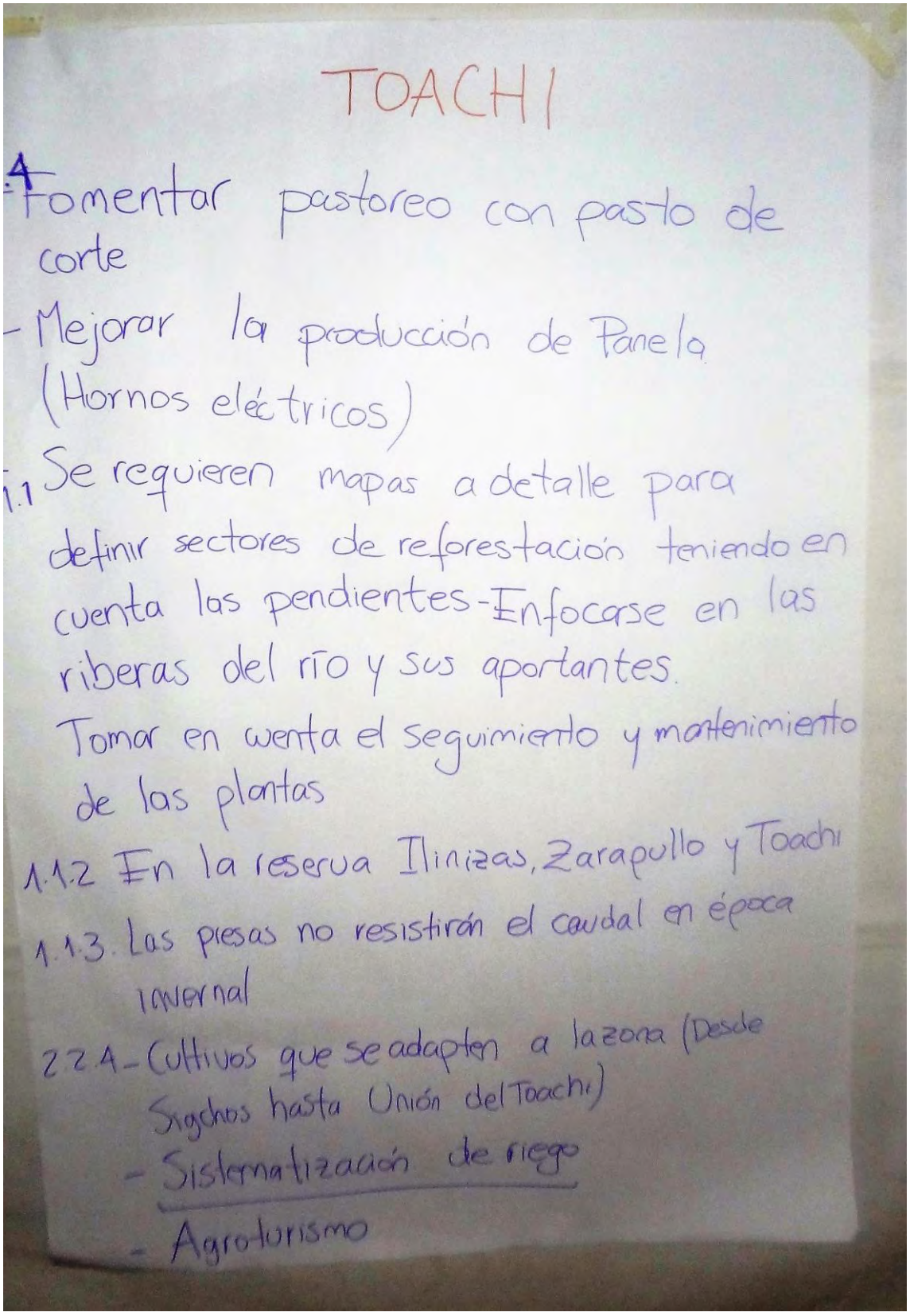

Figura 1. Resultados del trabajo del grupo 1 (cuenca del río Toachi) en la primera sesión de trabajo grupal.

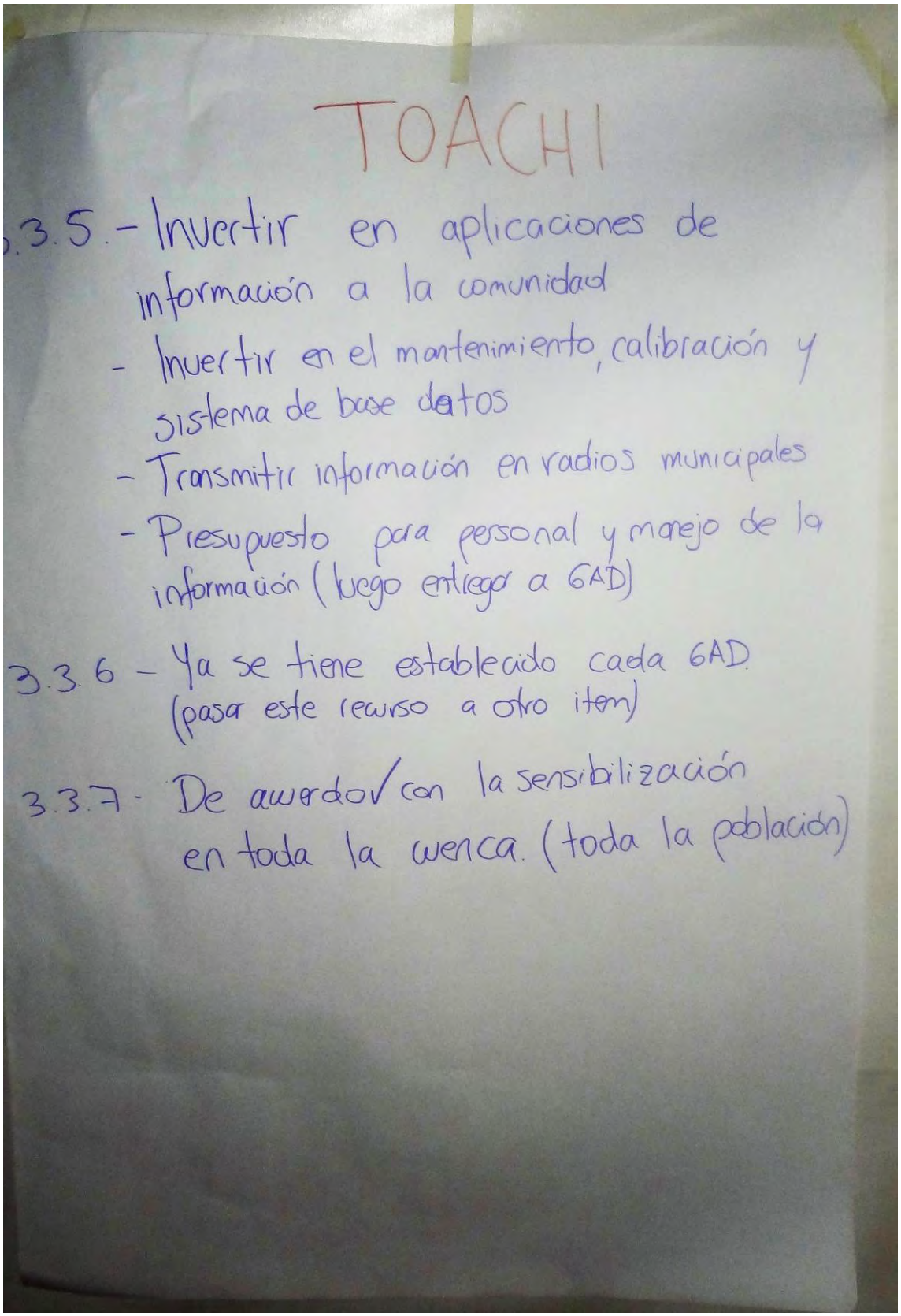

Figura 1. Continuación.

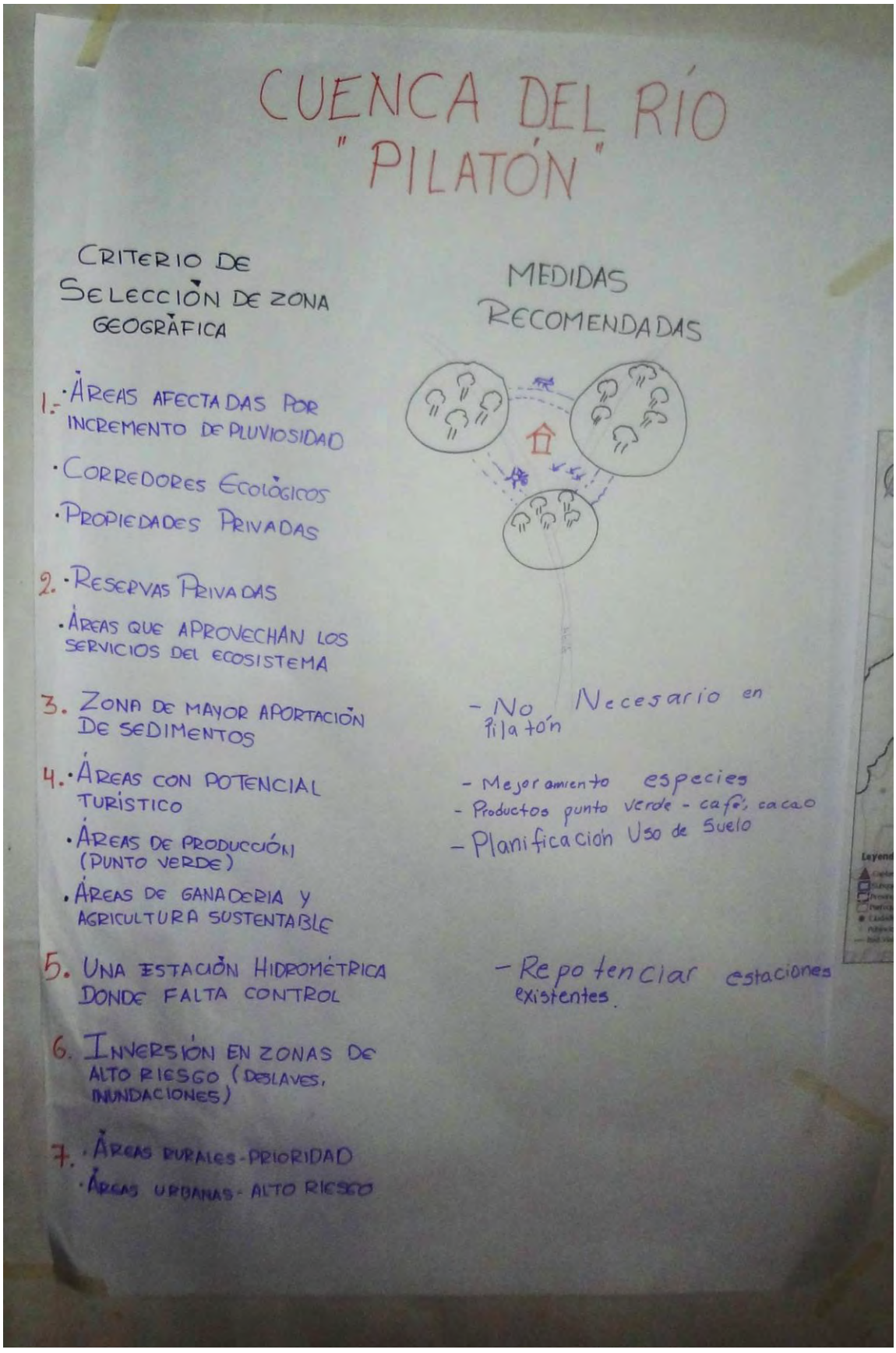

Figura 2. Resultados del trabajo del grupo 2 (cuenca del río Pilatón) en la primera sesión de trabajo grupal.

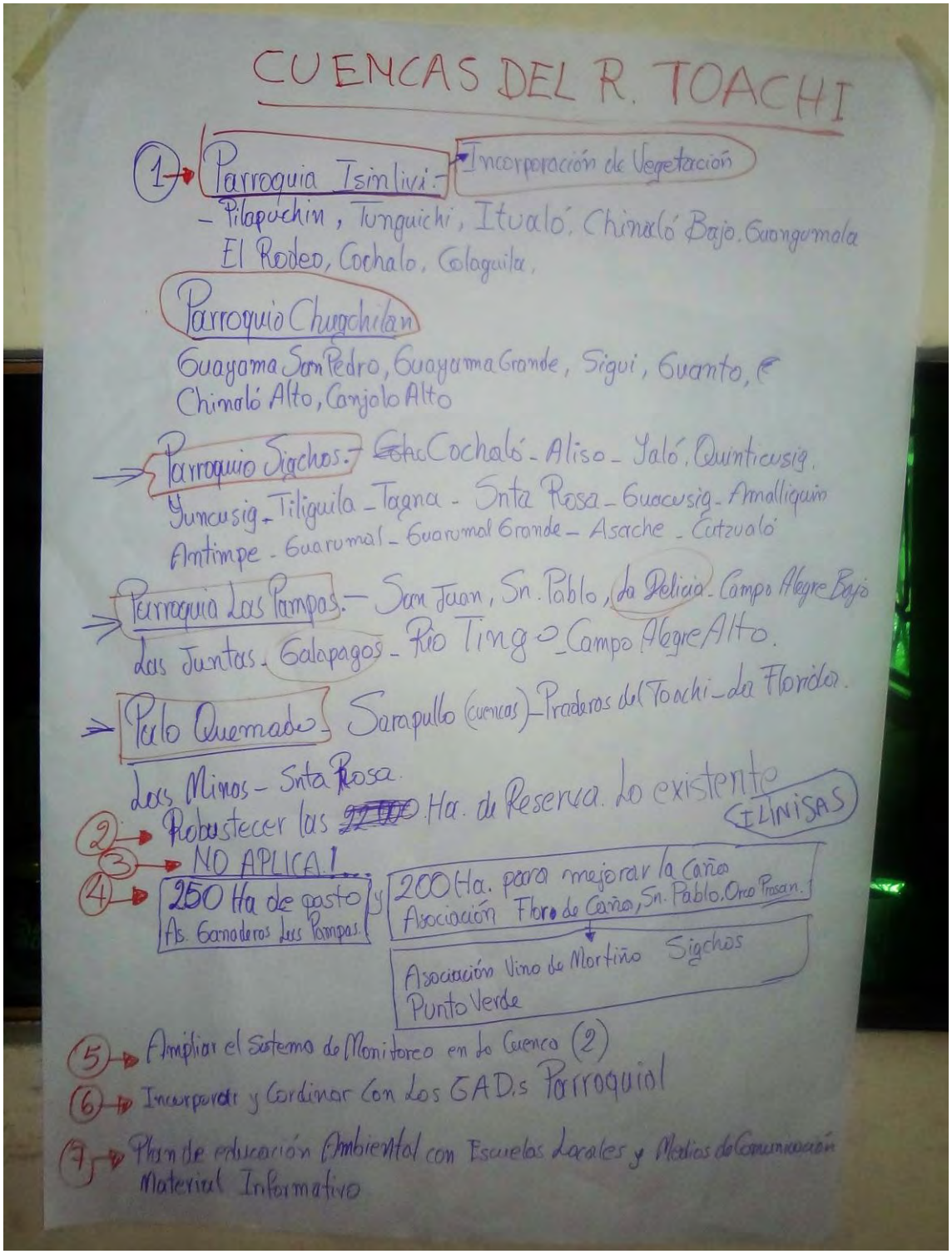

Figura 3. Resultados del trabajo del grupo 1 (cuenca del río Toachi) en la segunda sesión de trabajo grupal.

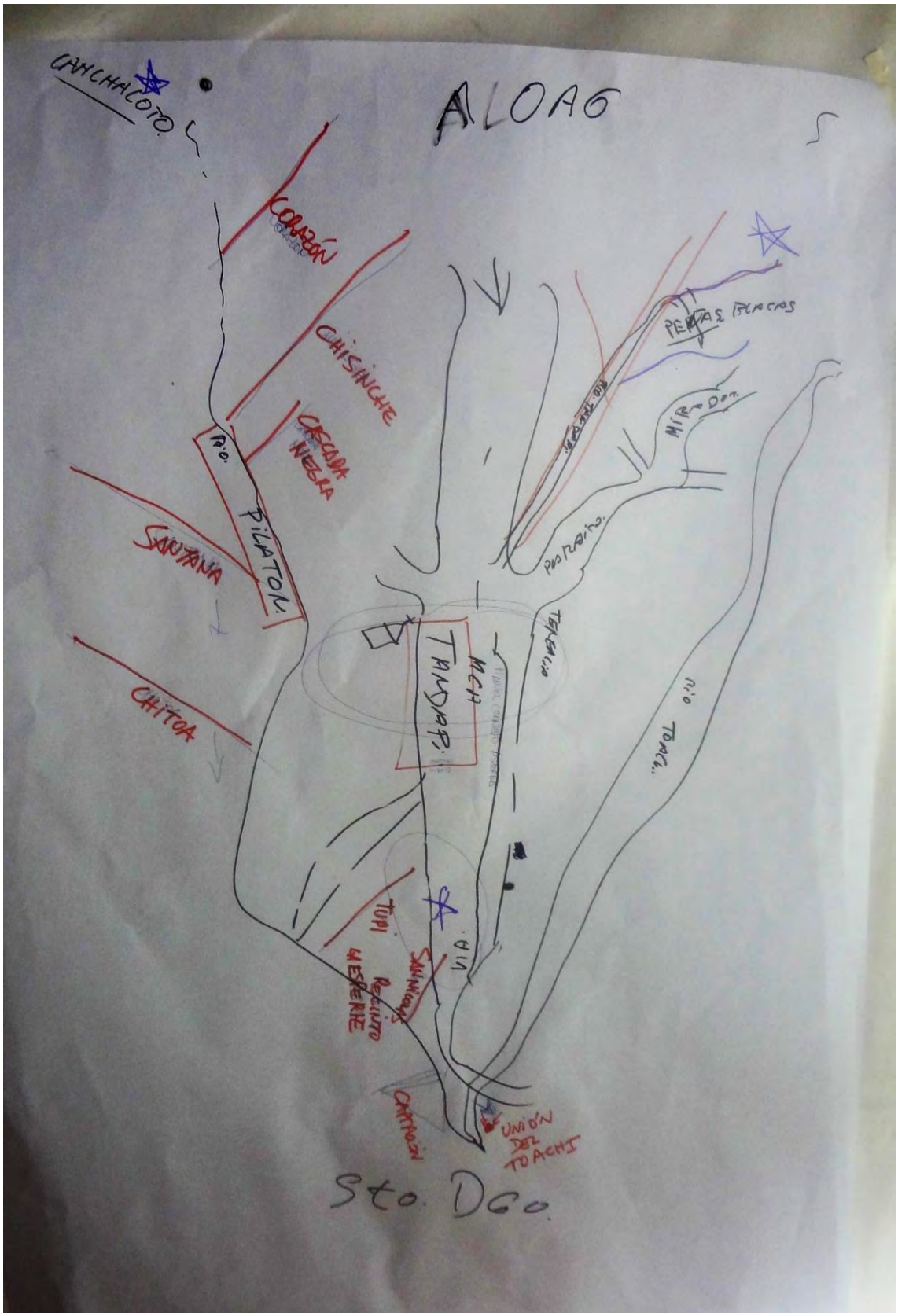

Figura 4. Resultados del trabajo del grupo 2 (cuenca del río Pilatón) en la segunda sesión de trabajo grupal.

Fotos

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

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

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

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

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

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

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

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

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

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

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

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

Anexo 1. Registro de participantes

Ministerio del Ambiente

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

Unión del Toachi, 15 de julio de 2016

CAF BANCO DE DESARROLLO DE AMÉRICA LATINA

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1/5

Ministerio del Ambiente

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

Unión del Toachi, 15 de julio de 2016

CAF BANCO DE DESARROLLO DE AMÉRICA LATINA

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2/5

Ministerio del Ambiente

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

Unión del Toachi, 15 de julio de 2016

CAF BANCO DE DESARROLLO DE AMÉRICA LATINA

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3/5

Ministerio del Ambiente

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

Unión del Toachi, 15 de julio de 2016

CAF BANCO DE DESARROLLO DE AMÉRICA LATINA

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4/5

Ministerio del Ambiente

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

Unión del Toachi, 15 de julio de 2016

CAF BANCO DE DESARROLLO DE AMÉRICA LATINA

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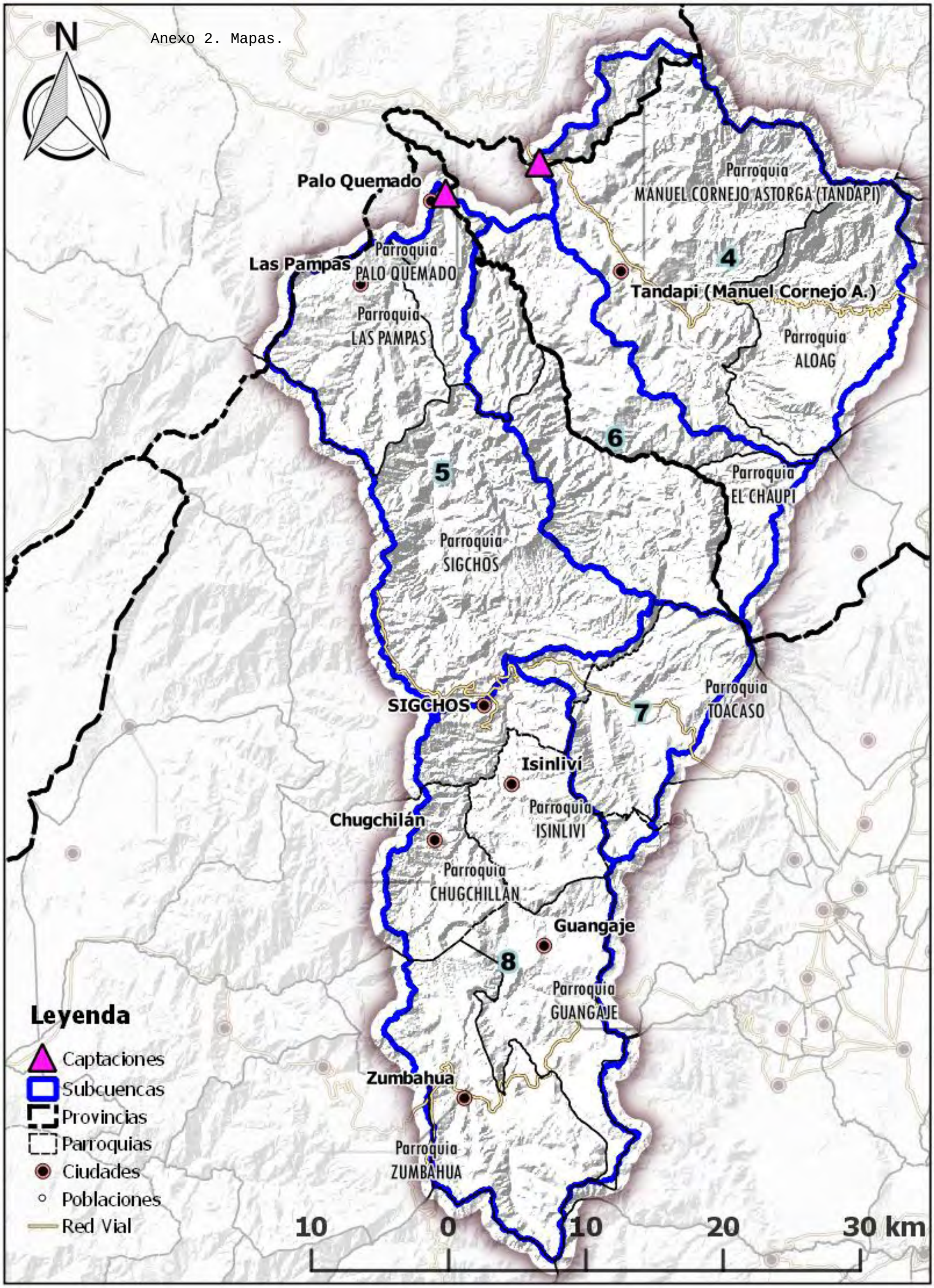
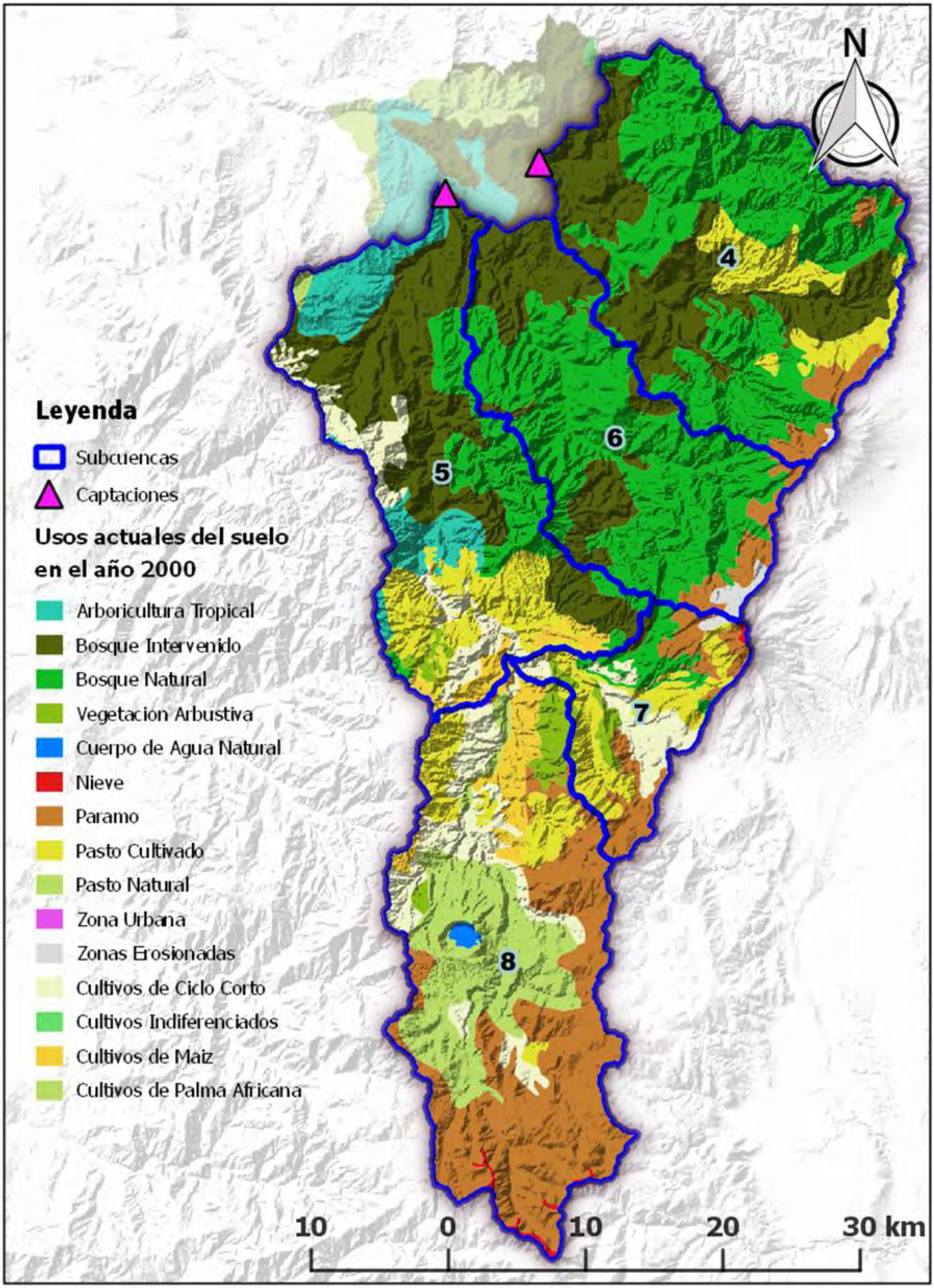
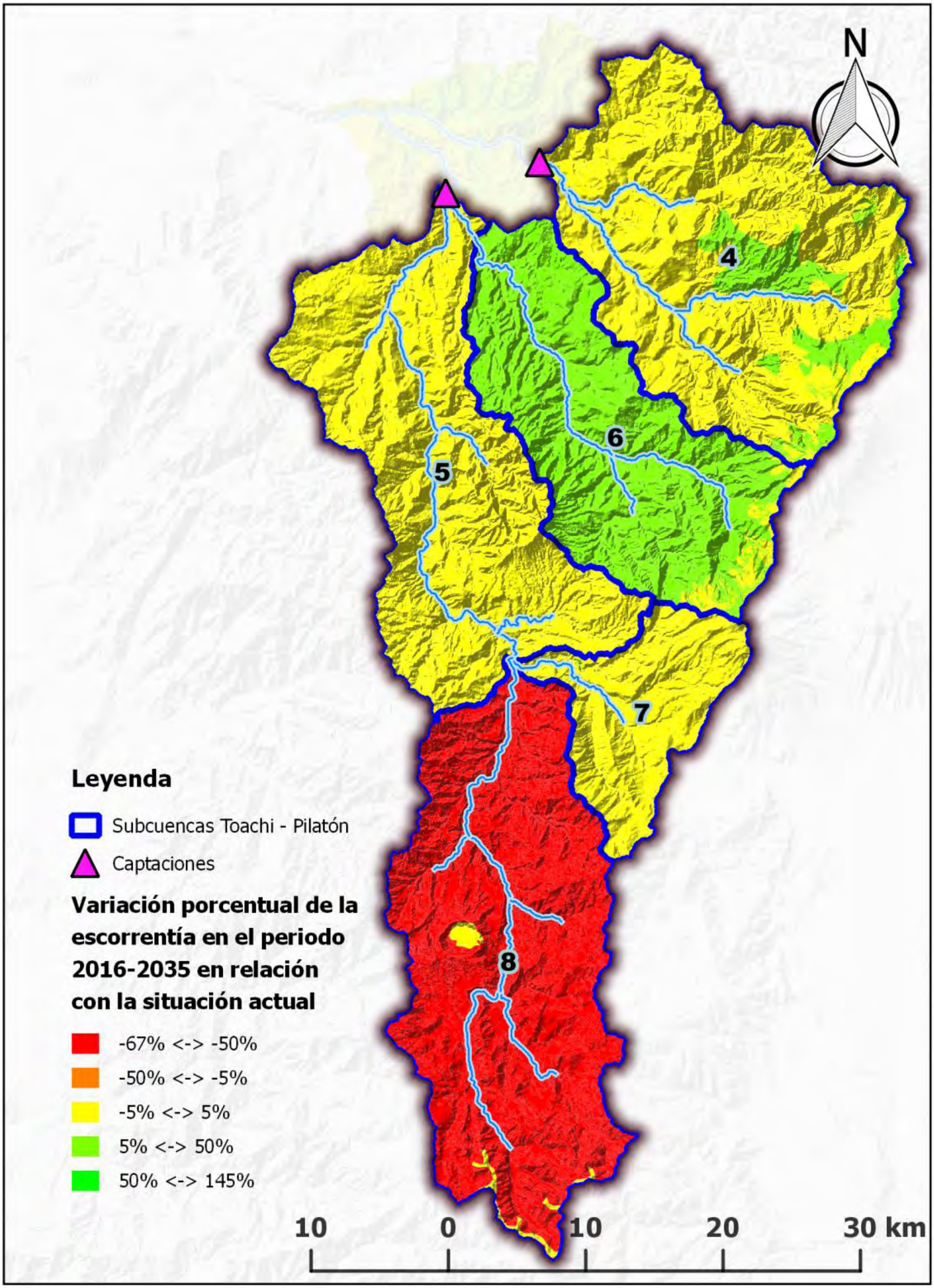
S/S



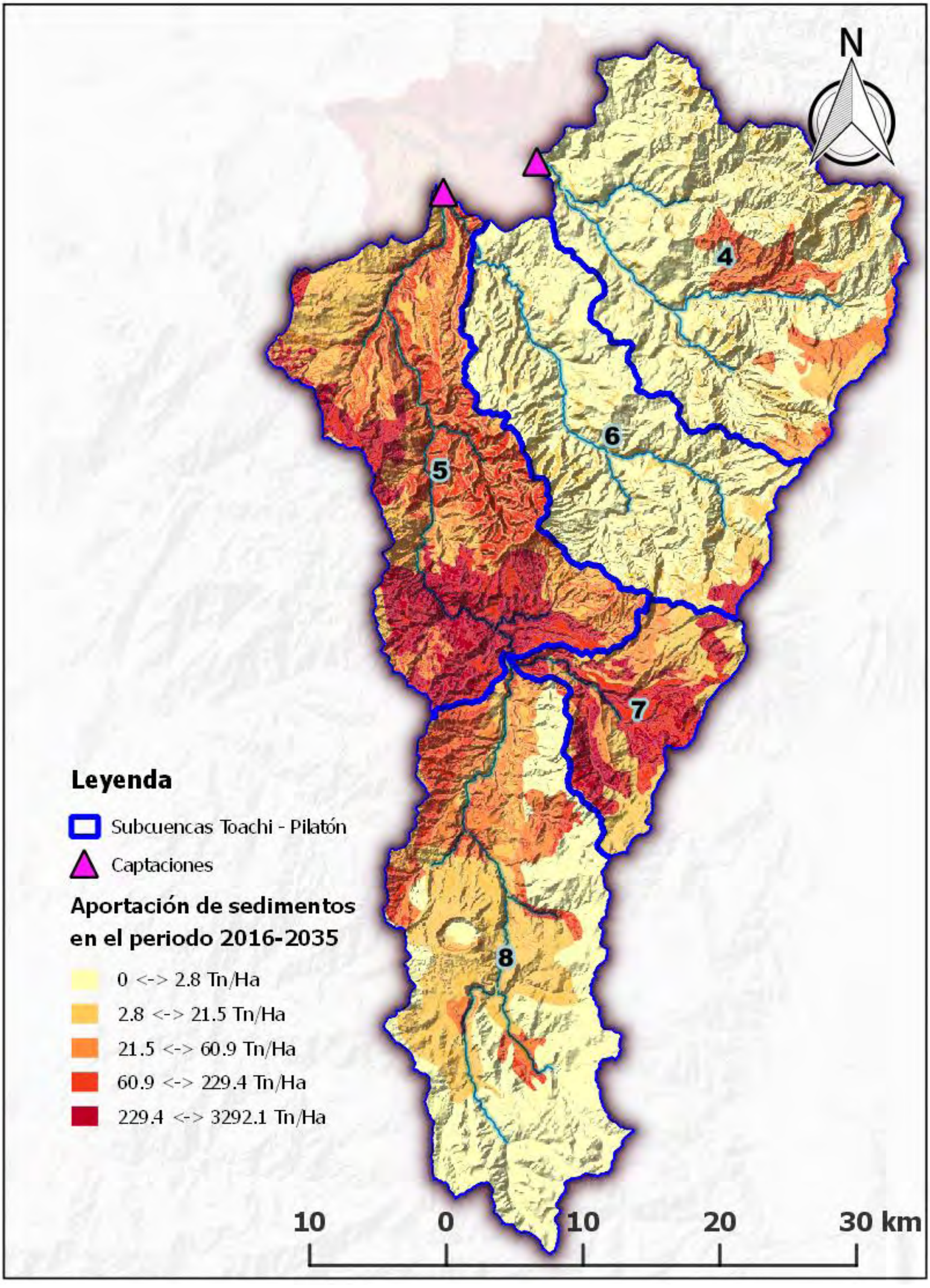
Mapa división político administrativo, con la red vial y con la ubicación de los núcleos urbanos dentro de las subcuencas aportantes de la Central Hidroeléctrica Toachi Pilatón



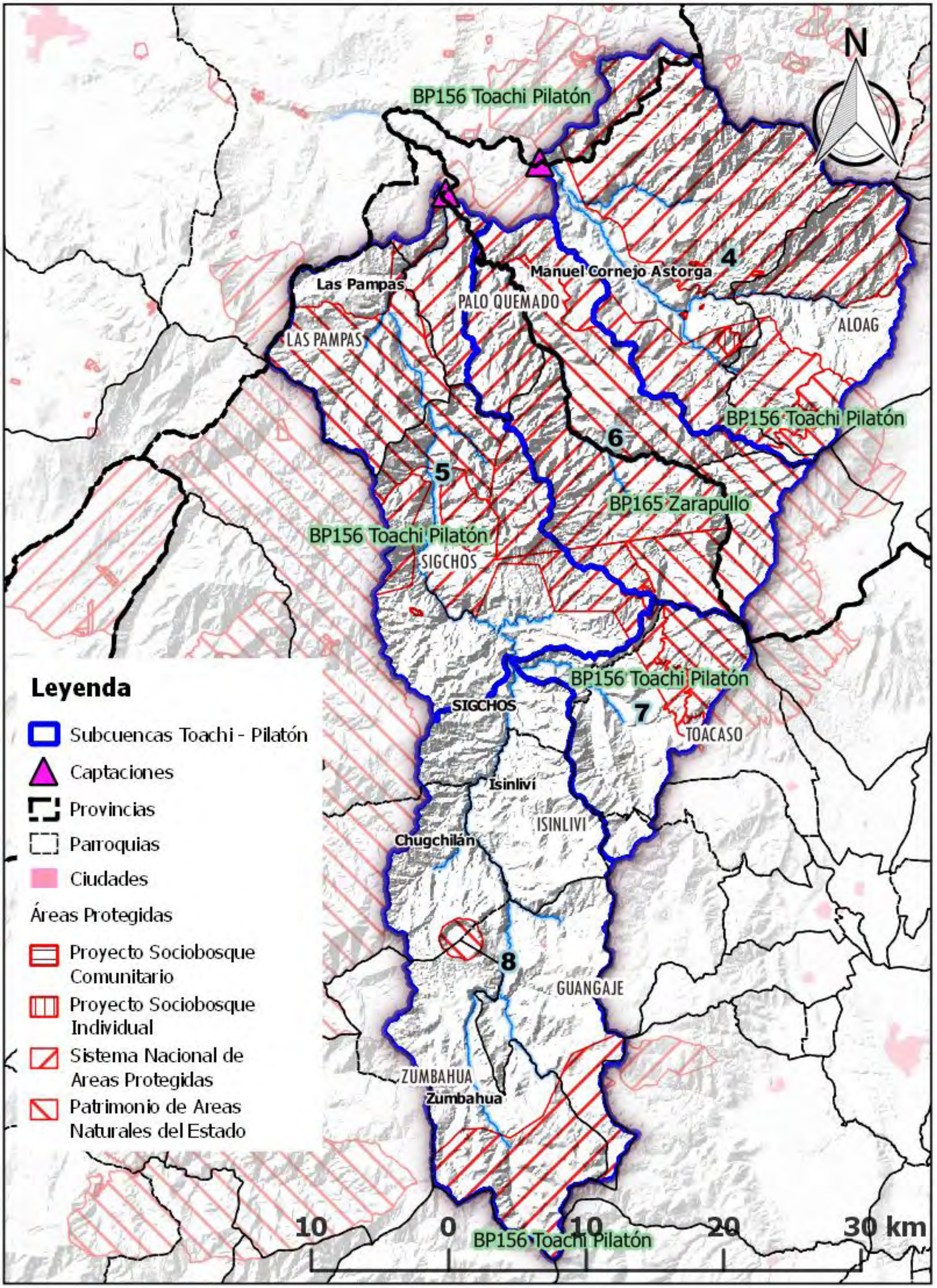
Usos actuales del suelo al año 2000 dentro de las subcuencas de los ríos Toachi y Pilatóns de la CH Toachi Pilatón.



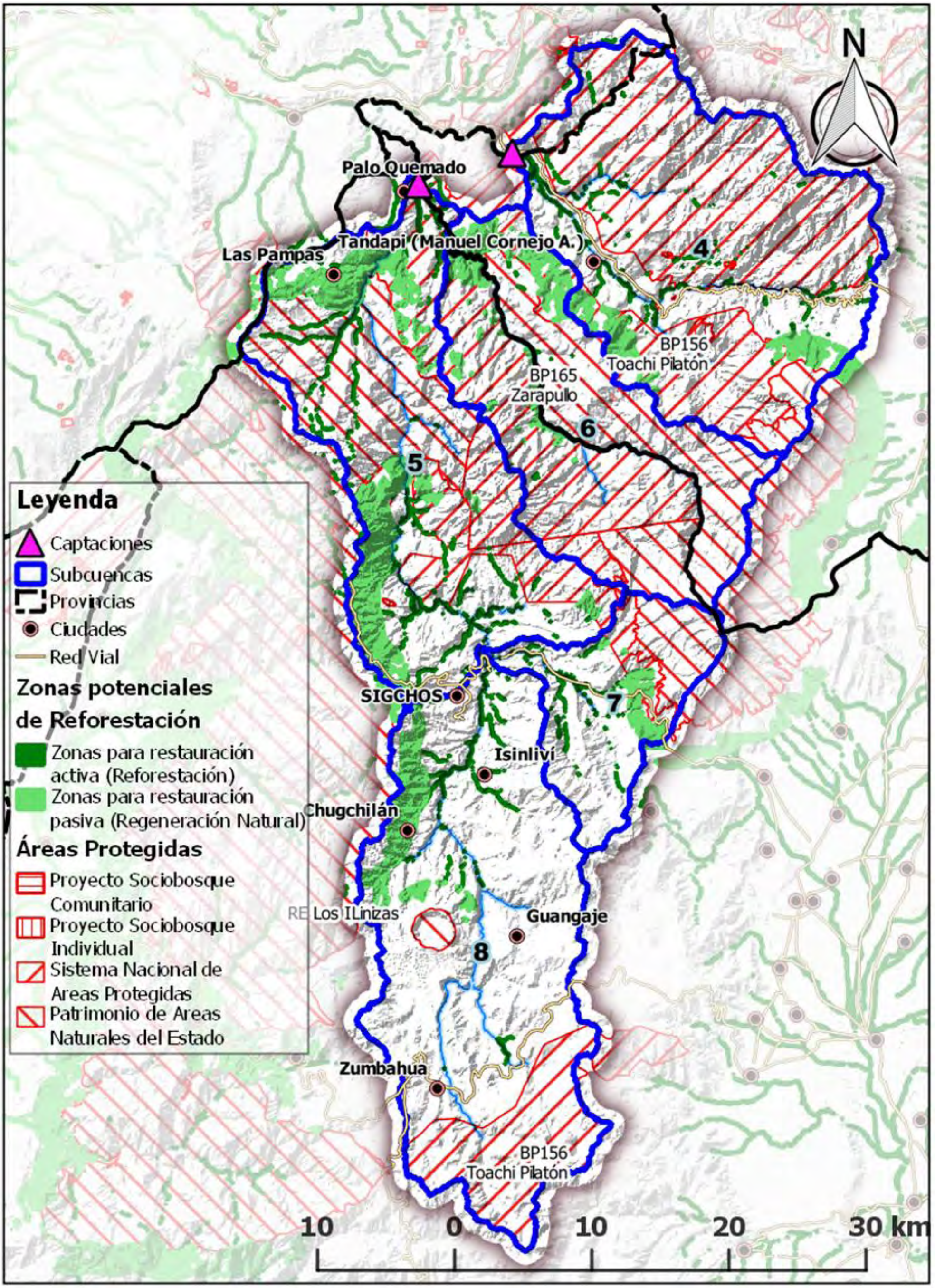
Variación porcentual de la escorrentía en el periodo 2016-2035 en relación con la situación actual, la unidad es en %.



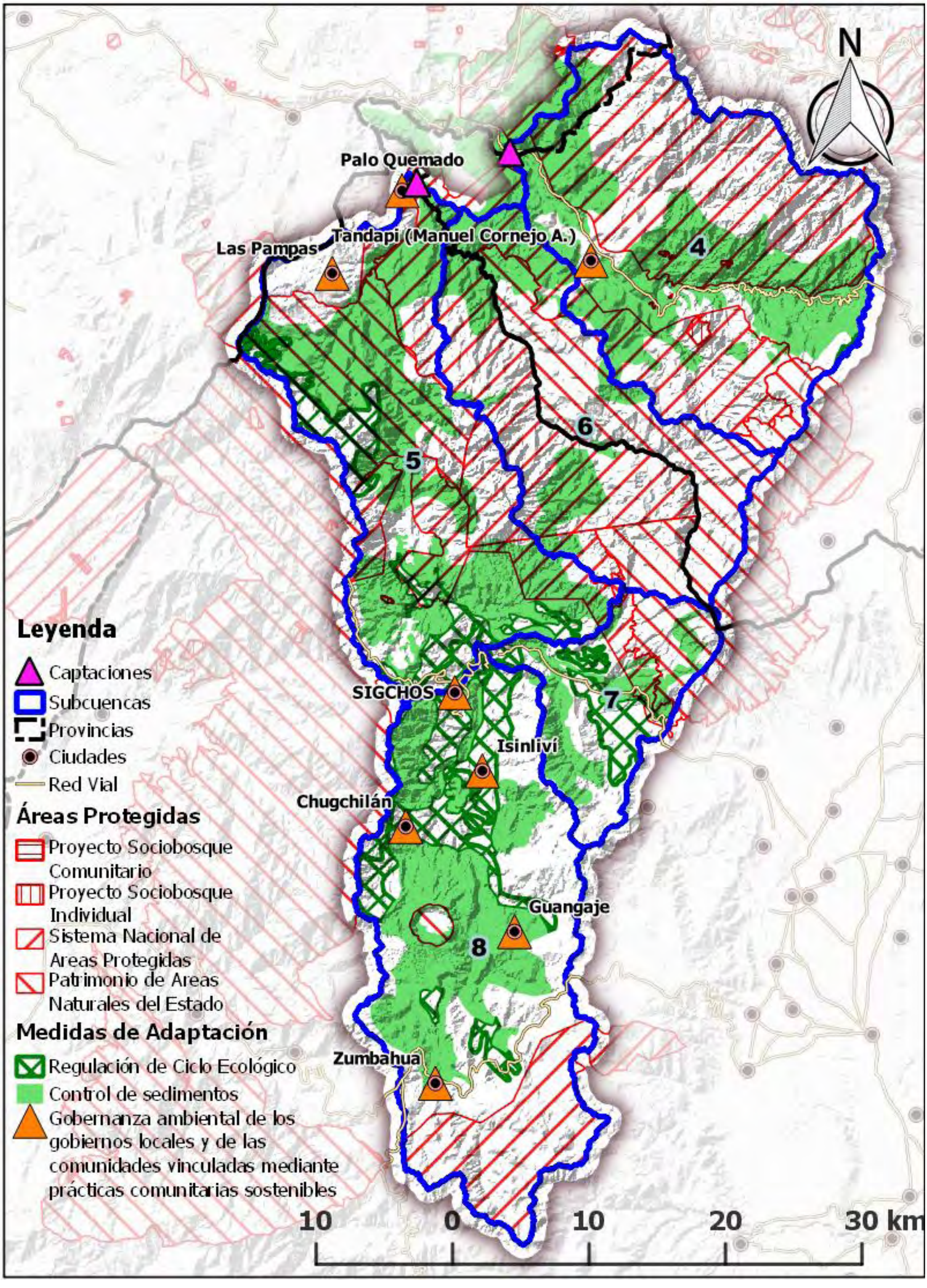
Aportación de sedimentos en el periodo 2016-2035, la unidad es ton/ha



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



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



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

Anexo 3. Marco de resultados propuesto.

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

Presupuesto solicitado USD2.400.000 / cuatro años

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

Agenda

08:30 h Registro de participantes

09:00 h Bienvenida

09:15 h Presentación de participantes

09:30 h Revisión de la agenda

09:45 h Introducción al cambio climático

10:00 h El Fondo de Adaptación

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

10:30 h Concepto de proyecto

11:00 h Trabajo en grupo. Análisis de situación

12:00 h Presentación de los grupos

13:00 h Almuerzo

14:00 h Trabajo en grupo. Acciones del proyecto

15:00 h Presentación de los grupos

16:00 h Próximos pasos

16:30 h Cierre

Notas

Dentro de subcuenca del río Blanco

Cantones Santo Domingo (Santo Domingo) Sigchos y Pujilí (Cotopaxi), Mejía (Pichincha)

Parroquias Aloag, Manuel Cornejo Astorga (Tandapi) [Pichincha], Alluriquin [Santo Domingo], Las Pampas, Palo quemado Sigchos [Cotopaxi]

Acelerada deforestación y cambio de uso de suelo

Incremento de sedimentos en los ríos

Pronóstico reducción 25% de pluviosidad

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

700000 725000 750000 775000 800000

9950000 9925000 9900000

Santo Domingo de los Colorados
Alluriquin
Luz de America
Palo Quemado
Las Pampas
Manuel Cornejo
Lloa
Quito
Guangopolo
Conocoto
La Merced
Alangasi
Sangolqui
Cutuglahua
Amaguana
Cotogchoa
Pintag
Uyumbicho
Tambillo
Rumipamba
Aloag
Machachi
Aloasi
El Chaupi
San Juan de Pastocalle
Toacaso
Tanicuchi
Mulalo
Canchagua
Guaitacama
Jose Guango Bajo
Saquisili
Chantlin
Alaques
Poalo
11 de Noviembre
La Victoria
Latacunga
Pujili
Belisario Quevedo
Mulliquindil
San Miguel
Cochapamba
Guangaje
Isinlivi
Chugchillan
Guasaganda
Pucayacu
Sigchos
Tingo
Pilalo
La Mana
Zumbahua

H0188 H0155 H0160 H0166 H0164

M717 M362 M683 M719 M350 M718 M363 M529

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

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

Leyenda

- ESTACIONES METEOROLÓGICAS
- ESTACIONES HIDROLÍGICAS OPERATIVAS 2016
- ESTACIONES HIDROLÓGICAS NO OPERATIVAS 2016
- VIAS_MOP_WGS84
- RIOS
- RÍOS
- SUBCUENCA TOACHI
- SUBCUENCA PILATÓN

N W E S

Ubicación en el Ecuador

REPÚBLICA DEL ECUADOR

Secretaría Nacional de Gestión de Riesgos
Instituto Nacional de Meteorología e Hidrología

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

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

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

1:373.121

0 2,75 5,5 11 16,5 22 Km

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

STAKEHOLDERS, INTERESTS AND SOCIOECONOMIC SITUATION IN THE TOACHI-PILATÒN WATERSHEDS

CONTENT

LIST OF TABLES

LIST OF MAPS

LIST OF FIGURES

STAKEHOLDERS, INTERESTS AND SOCIOECONOMIC SITUATION IN THE TOACHI-PILATÒN WATERSHEDS

Byron Real[1]

Introduction

A watershed is an "area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel" (USGS 2016). Besides of being such natural framework watersheds are also areas of intense socioeconomic exchange where people and organizations of diverse type and range (state, natural resources extractors, traders, farmers and so on) exert their agency in order to get and influence management of the existent resources in the area.

Because of the diversity of existing geographic areas, the often difficult access to them, and the social competition for its natural resources, watershed s are of complex management and then prone to be ecologically neglected and significantly altered by socioeconomic activities. Since whatever natural and human-induced issues happening in upper areas can affect the rest of the basin until the river-outflow point, watersheds are extremely vulnerable to socioeconomic activities. For that it is important to apply integrated water management strategies where all stakeholders can coordinate and exchange experiences, and be regulated and controlled in a comprehensive plan intended to protect the hydric resources.

The ecological vulnerability of the watershed supposes also a socioeconomic vulnerability of the societies living in these areas especially those already vulnerable like women, children and indigenous people. By historical and socioeconomic issues these groups are the most vulnerable in any society and particularly in those of frontier where social life depends of direct natural resource extraction. In this understanding the climate change phenomenon and the expected impacts on nature and society will particularly affect watersheds and women and indigenous people as the most vulnerable in natural and social environments. Therefore in the efforts to promote adaptation measures to address the problem of climate change especial attention must be devoted to watersheds, its societies, and the women, children and indigenous peoples existing in these environments.

Considering the issues of social and natural vulnerability and the expected effects of climate change, this document presents a quick ecological and socioeconomic overview of the Toachi and Pilaton watersheds pointing the situation of the three rural jurisdictions in which lie the critical part of this area and identifying stakeholders and their perceptions regarding weather and climate change issues. As part of this analysis this document also points the situation of women and issues of gender inequality in this area.

The Toachi and Pilaton watersheds located in the North-Central area of Ecuador, in the so-called Cordillera Occidental de los Andes, in the provinces of Cotopaxi, Pichincha

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and Santo Domingo de los Tsachilas. Starting both watersheds in different volcano systems at more than 14,000 feet over the sea level in the Cotopaxi province; they joint at 2,000 feet altitude in the Santo Domingo de los Tsachilas province and then under the name of Blanco River run northbound to then be part of the Esmeraldas basin, which finally drains its waters in the Pacific Ocean. Besides, because of the elevated altitude and topographic steepness of ridges and hills of the cordillera where the basin starts, the Toachi and Pilaton rivers are the outflow point of several smaller watersheds which increase the ecological complexity of this area.

The analysis and conclusions of this document intend to put in perspective the ecological and social complexity of the Toachi-Pilaton watershed and the imperative to address both in the efforts to promote adaptation measures to deal with the expected issues related with climate change events.

NATURAL SCENE OF THE AREA

The Toachi river starts in the foothills of the Chugchilán mountains, a branch of the Western Cordillera, in territories of the Chugchilán and Isinliví parishes, in the county of Sigchos, province of Cotopaxi. The river begins at an altitude of 4500 m and descends to 1000 m altitude to join the Pilaton River. The Toachi basin is flanked to the east by the Corazon hill (4,788 m s.n.m) and the volcanoes Illiniza Sur (5 248 m s.n.m.) and Illiniza Norte (5,126 m s.m.). To the South by the Era Urco hill (4,473 ms s.n.m.). These elevations contain several smaller water courses that end in the river Toachi. The basin of this river has a length of 104 km, and a contribution area of 1,478 km2.The average slope is of 34.7%.

The Pilatón river is formed by the thawing of the volcanoes glaciers of the Corazón (4,790 msnm) and Atacazo (4,455 feet altitude) creating a watershed that has an east - west direction and is formed on the western slopes of the Cordillera Occidental, El Corazón and Atacazo hills, has an contribution area of 514 km2, the main channel length is 42.5 Km, the average slope represents 42.7%. This river join with the Toachi and then form the Blanco river which in turn join the Quinindé river and then flow into the Esmeraldas hydrographic system which drains in the Pacific Ocean.

As shown in Table 1 the hydrologic complex that conform the area of interest of this document lies in a territorial mosaic of three provinces, three counties and three rural parishes. There more than 10,000 people live in more than 35 communities.

Table 1.- Territorial jurisdicctions of the Toachi-Pilaton watershed

PROVINCE	COUNTY	PARISH	MAIN COMMUNITIES
Pichincha	Mejía	Manuel Cornejo Astorga	La Esperie
			La Palma
			Mirabad
			Pampas Argentinas
Cotopaxi	Sigchos	Palo Quemado	Praderas Del Toachi
			Palo Quemado
			Santa Rosa
Santo Domingo de los Tsachilas	Santo Domingo	Alluriquin	Unión Del Toachi
			Alluriquín

Because of the altitudinal variability this territory is biologically rich. It contains from the paramo ecosystem at more than 9,000 feet altitude to tropical and cloud forest at about 1,000 feet altitude. This natural configuration of the area explains the existence of several ecosystems and watershed, and then of a rich biological diversity. The most important watersheds of this hydro-geologic system are those of the Toachi and Pilatón rivers. Smaller watersheds in this ecological reserve are of the Zarapullo river, which drains to the Toachi and the Corazon and Santa Ana rivers which drains to the Pilaton.

In the Toachi river basin, the largest area corresponds to natural forest (22.8%), followed by páramo (18%) and forest intervened plus cultivated grass 70-30 with 15.4%, the remaining area (43.8%) corresponds to others Types of land use mainly

crops In the Pilatón river basin; The largest occupation corresponds to natural forest (52.8%) and forest intervened plus cultivated grass 70-30 (31%), the remaining 16.2% is destined for other uses.

The natural richness of this natural compound has guided the human interventions in the area, which is still basically a frontier. Practically all the socioeconomic activities in the region rely in the extraction of primary natural resources. One of the major problems in the upper part of both basins is the transformation of the natural ecosystems of paramo and forest due to agricultural activities. This change in vegetation cover affects the surface runoff.

This ecological complex is important for hydric resources and because of its biodiversity, for the reproduction of both the flora and fauna of the region and then, important for ensuring water and food security of the local communities. Then the importance of the Toachi-Pilaton watershed must be understood under the complex natural mechanisms of biodiversity and hydric natural resource availability in which the local communities have built their culture and food and water security.

Areas under conservation status

Because of its natural landscape and biological importance the area of study have several public and private protected areas. The public areas under conservation statuses are Sarapullo and Toachi Pilaton Protected Forests and the Ilinizas Ecologic Reserve. The private protected areas have been created under the category of "protected forests" that was the first category for conservation of natural areas allowed in private lands before 2008 when the national constitution established the creation of private and public decentralized[2] ecological reserves. The protected forest is an administrative figure for conserving soil and hydric resources and in function of these primary goals is considered that forests and natural or introduced vegetation must be maintained undisturbed in critical areas of the watersheds. By creating protected forests the state promoted the protection of the steepest areas of the watersheds and then avoiding landslides, land erosion and drainage alterations.

Ilinizas Ecologic Reserve and Sarapullo Protected Forest

The llinizas Ecological Reserve is a public protected area consisting of 149,900 has of paramo and Andean Humid and Subtropical Forests. It is located in the provinces of Cotopaxi and Pichincha. This area encompasses the twin peaks of the Illinizas as well as the extinct volcano Quilotoa best known by its crater lake. The reserve lie in the Cordillera Occidental de los Andes its territotry contains also several hillas and ranges like the Lelia Cordillera, the El Corazón, Jaligua Alto and Tenefuerte hills. This mountain system barrier the evaporations from the costal forcing its condensation in the west side of the Cordillera Occidental and therefore increasing the hydric resources of the watersheds or even favoring the creation of micro-watersheds in the entire area.

[2] Before the National Constitution of 2008, protected areas of any kind were created only under the central government control, With the new legal framework of 2008 municipalities and rural parishes can create their own protected areas and rural communities, indigenous people and private owners can also legally create areas for conservation in the lands under their control. See: article xxx of the National Constitution.

The Sarapullo Protected Forest was created in 1986 before the Ilinizas Ecological Reserve which creation was in XXX and with less territory. Then when the Ilinizas was declared as a reserve the entire territory of the Sarapullo forest was incorporated in such new protected area. So now in practice all the policies and management measures regarding this area are made considering the main area that is the Ilinizas Ecological Reserve.

Toachi – Pilatón Protected Forest

This protected forest was created in 1987 as a means to maintain unchanged the forest other vegetation of the Toachi and Pilatón river basins. This forest has an area of 212,000 has and is under the control of the state forest districts of Cotopaxi and Pichincha. Although the status of protected forest is lesser than the national parks and ecological reserves it is still prohibited logging and the use of the area for any socioeconomic activity. Activities in this type of areas must be compatible with conservation purposes only. The main goals of this area are the protection of soil, water resources and biodiversity. About 20% of the Palo Quemado territory lies in this protected forest and the Las Pampas parish is also next to this area. Most of the problems of the Toachi Pilaton protected forest become from the socioeconomic activities of the mentioned parishes.

The international environmental organizations *Birdlife Internacional* and Conservación Internacional have stated that the lower area of the Toachi Pilaton protected forest is a place of high importance for protecting birds because about 420 bird species has been found here. However insufficient control has promoted illegal logging and even the invasion of parts of the area for cattle ranching are damaging the habitats of these and other species existent here. Moreover, several land tenure issues have not yet solved in this ecological area.

Private protected forest

Protected forests and reserve have been created in private lands in the Toachi-Pilaton watershed. These areas combine conservations goals with scientific research, environmental education, organic agriculture, and eco-tourism activities so that are source of income generation for their owners. The creation of protected areas in private lands in this zone is a very important form to show the neighbors that other socioeconomic uses can be applied to the lands. As a frontier area, the Toachi Pilaton watershed system has been traditionally seen as a wilder or an area to mine any existent natural resource. Such mentality is still present and private owner who devote their lands to conservation purposes are helping to change such extractive view.

Typically private conservation areas are composed by temperate, cloudy and subtropical forests. Significant parts of these areas are secondary and highly degraded forest for which programs of ecological recovery has been established. Reforestation activities in areas previously used for agriculture are also in process. In addition by creating this type of conservation areas many steep zones of the hills and ridges are being protected otherwise they would be subject of forest fires, illegal logging and unsustainable agriculture.

The private areas that have been legally declared as reserves or protected forests are the following:

1. Reserva Biológica La Esperanza
2. Hesperia Biological station and reserve
3. Otongachi biológical reserve
4. Río Guajalito Scientific Station
5. Tanti protected forest
6. Rio Lelia watershed protected forest
7. La Favorita Scientific Station

In practical terms these private areas for conservation provide patches of ecological security for birds, mammals and other migratory species that need of scattered habitats to survive. They are also creating biological corridors and then allowing genetic variability in areas that otherwise would be isolated and prone to genetic erosion.

Notwithstanding the importance of private protected areas it is worth to mention that a significant flaw of them is the lack of sufficient resources for ensuring adequate control and the application of technically standardized management practices. This observation is also valid for the public protected forests for which the state has not established a particular administrative mechanism for control and management. However, new legal frameworks and technical regulations for this type of areas are under preparation by the Ministerio del Ambiente.

The Socio Bosque and the conservation initiatives in the area

In addition to the public and private system for protecting the natural areas of the watershed the Ministerio del Ambiente has established the nationwide Socio Bosque program which main goal is to help private owners and parishes to protect the existent natural forests presents in their lands or to carry out reforestation plans. The Manuel Cornejo Astorga, Palo Quemado and Alluriquin rural parishes are beneficiaries of the Socio Bosque program and about 692 hectares of public and private forests areas are under this scheme of protection, distributed in 22 plots and 15 private owners.

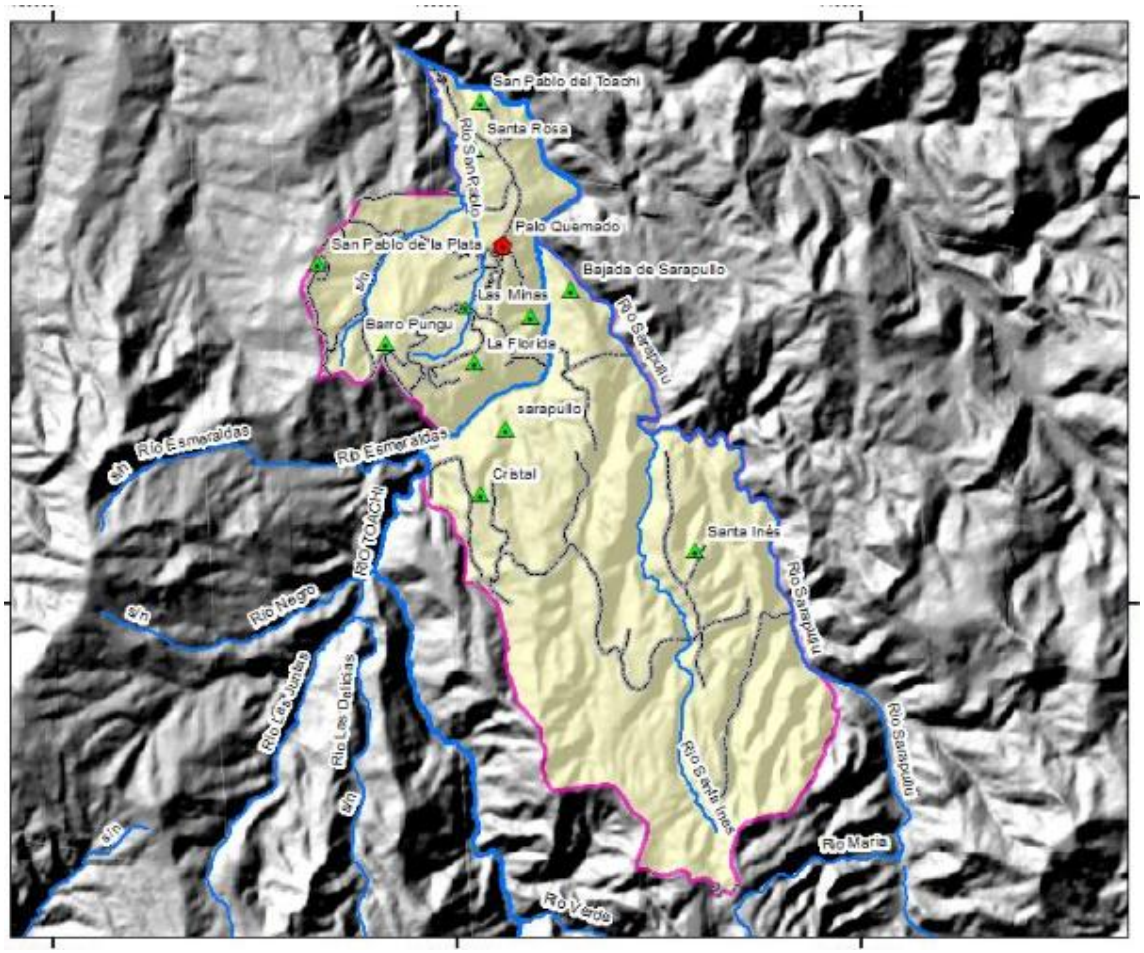
LOCAL JURISDICTIONS IN THE TOACHI PILATON WATERSHED

The Toachi Pilaton watershed lies in the territories of three provinces, three counties and six rural parishes. However, only three rural parishes are directly involved in the socioeconomic issues evolving and affecting this area. For that in this section wil be presented a general socioeconomic overview of the Palo Quemado, Manuel Cornejo Astorga and Alluriquin rural parishes.

Palo Quemado Rural Parish:

Palo Quemado is a rural parish depending of the Sigchos county and Cotopaxi province. It is located at 4,500 feet altitude right next to the flanks of the Toachi river watershed (Map 1). In terms of road connectivity, this jurisdiction is served by a second order road, which connects Sigchos and the rural town of La Union.

Map 1.- Palo Quemado Rural Parish

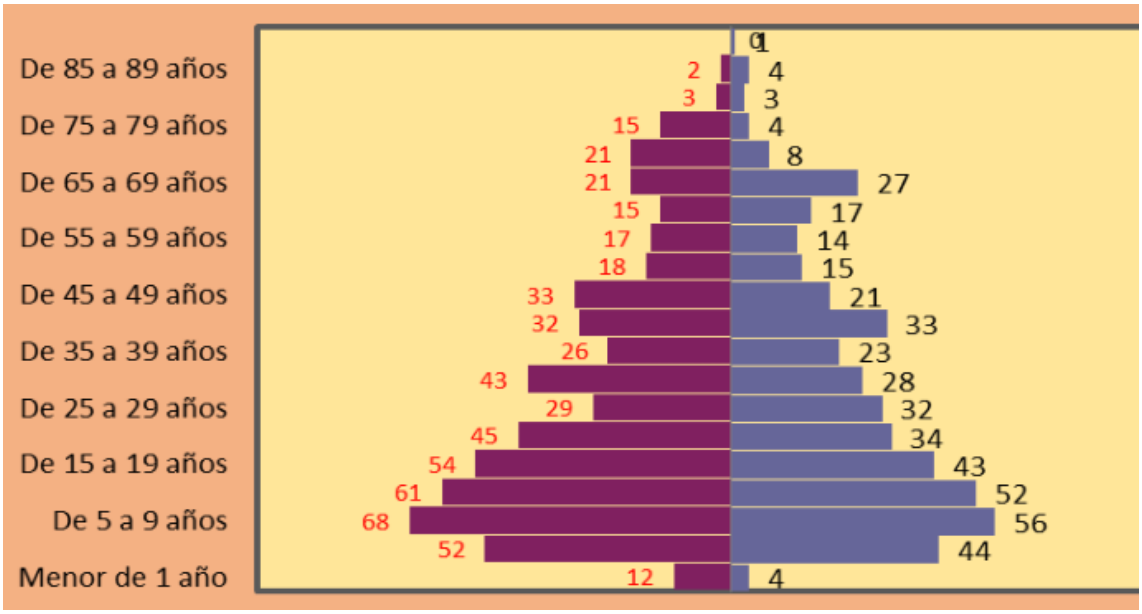


Source: GAD-PQ 2015.

According the last census (INEC 2010) the total population of this parish is of 1,030 inhabitants (55% men and 45% women) who live in eight townships or communities as follows: Palo Quemado Centro, San Pablo de la Plata, Las Praderas, Santa Rosa de Lima, Las Minas de la Plata, El Cristal, Zarapullo, and La Florida.

According to the national census (INEC 2010) the women-men correlation in Palo Quemado is 55-45%. The 57% of the population is under 30 years old and 30% are in the age range of 15-30 years old. (Figure 1)

Figure 1.- Age distribution in the Palo Quemado Rural Parish



Source GAD-PQ 2015

Ethnic self-representation in this parish is basically the "mestizo" accounting the 80% of the population. "Montubios" with 11% of the people is the second form of ethnic identity, and white 5%. There are no other forms of ethnic self-identification. (GAD-PQ 2015)

The subsistence of this population comes from small scale agriculture and cattle ranching. Sugar cane and raw milk are the most important products providing about the 75% of the work opportunities in this jurisdiction. While the cane is processed in the locality the milk is sold in the cities of Latacunga and Santo Domingo. The workforce of Palo Quemado is composed of 504 people.

According to the national last census (INEC 2010), 234 people of this parish work in agriculture and cattle ranching activities and 141 in manufacture activities, which is basically the production of panela, the most important product of this locality. Other relevant activities are related with services: local trade, transportation and education.

Palo Quemado is an important regional producer of "panela"[3] which is the main source of local income. The panela made in this parish is sold practically in all the central Andean area. In the last few years the sugar cane producers have started producing granulated brown sugar, which is being well accepted in urban regional markets as an healthy alternative to the centrifuged white sugar.

[3] Panela is basically the unrefined whole cane sugar. It is the result of boiling and evaporating raw sugarcane juice and then poured into molds to obtain hard round blocks for easy transportation. Each block has a standard weight of 32 pounds.

Other local socioeconomic activities in Palo Quemado are around local transportation (regular shifts to La Union, Alluriquin and Santo Domingo), local trade of rural utensils, staples, agrichemicals and other products and artifacts required for living in the rural environment of the parish. Modest production of fruits and tuberous like naranjilla, limón, naranja, banana, tree tomato, camote, yuca, papa china, among other is mostly used for family consumption and local exchange.

The most important local organizations are the associations Flor de Caña formed by the sugar cane producers and the Asociación Agroartesanal San Pablo de la Plata created by agriculture and cattle ranching producers. Most of the economically active people in the parish are member of either one of these organizations.

Finally it is important to note that the territory of Palo Quemado has some mine resources, especially gold and copper. Concessions of about 2,347 hectares[4] of the parish territory have been established for mining purposes. Tt the moment three mine sites are in the area (Table 2), however this activity is still not relevant for the local economy and the companies working there have not significant relation neither with local authorities nor with the socioeconomic life of the parish.

Table 2.- Mining places in the Palo Quemado Parish

PLACE	MINE COMPANY	TYPE	AREA
La Florida	Sultana del Còndor Minera Sulcomi SA	Metallic	642
Loma del Tigre	Sultana del Còndor Minera Sulcomi SA	Metallic	1658
Toachi	GADs Sigchos and Pichincha	No-Metallic[5]	47
		TOTAL	2347

The mines operated by the Sigchos Municipality and the Consejo Provincial de Pichincha are natural deposits for temporal extraction of sand, crushed stone and aggregate for construction needed for road construction and maintenance and other public works. According the mining legislation, the nonmetallic mining is under the control of the municipalities while the metallic one is controlled by the central government so that the local governments, Junta Parroquial has nothing to do with this activity and then it has a no relevant role in the local economy.

Based in the national census 2010, Table 3 shows a comprehensive overview of the parish.

Table 3.- Socioeconomic Overview of the Palo Quemado Parish

Sector / Indicator	Measure	Palo Quemado
Illiteracy	% (15 years old or more)	9.54
Functional illiteracy	% (15 years old or more)	15.91

[4] Typically the mine concession areas are higher than the actual place of mine activity. So although a concession can be of hundred or thousand hectares, the place where the mine resource is extracted is significantly smaller.

[5] Nonmetallic mining is for extracting sand, gravel; rock stone and other related mine products.

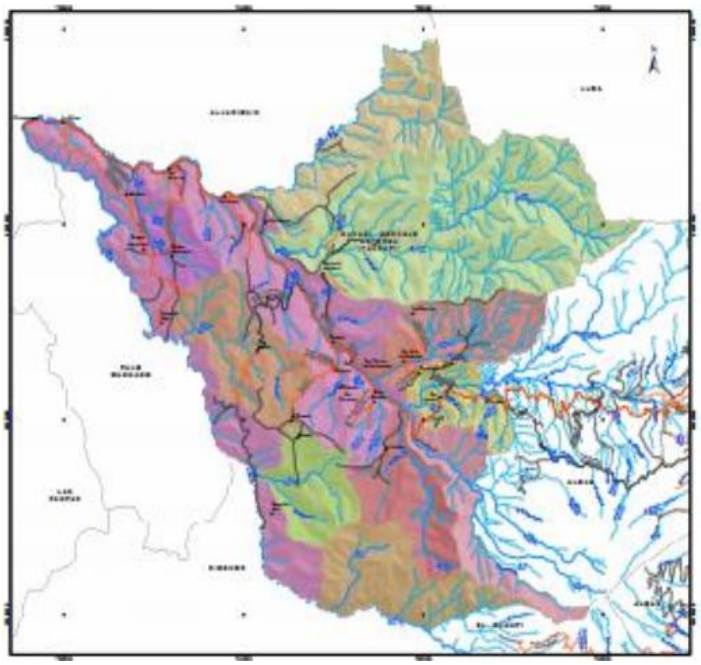
Education	Años de estudio	6.84
Universitary education	% (24 years old or more)	4.77
Complete Elementary School	% (12 years old or more)	81.11
Complete High School	% (18 years old or more)	18.86
Working children 15 - 17 years old	% (children 5-17 years old)	46.15
Working children 5 - 14 years old	% (children 5-14 years old)	6.75
Peoble economically active	Number	504.00
People in working age	Number	794.00
Afroecuadorian population	Number	16.00
White population	Number	47.00
Total population	Number	1,030.00
Men population	Number	567.00
Indigenous people	Number	8.00
Mestizo population	Number	846.00
Women population	Number	463.00
Women proportion	% (total population)	44.95
Extreme poverty for non-satisfied basic needs	% (total population)	33.60
Poverty for non-satisfied basic needs	% (total population)	95.60
Human Development Bonus	Number	314.00
Water service inside home	% (houses)	11.37
Sewage network	% (houses)	9.41
Electric service	% (houses)	85.49
Telephone land line	% (houses)	11.40
Gas use for cooking	% (homes)	83.65
Firewood / charcoal use for cooking	% (homes)	15.20
Own home	% (homes)	79.46

The data shows that this rural parish presents some signs of acute social vulnerability. For example, education, water and sewage services are insufficient,

Manuel Cornejo Astorga (Tandapi) Rural Parish

Although the official name of this rural parish is Manuel Cornejo Astorga, the name of the main town in the territory is known as Tandapi, a traditional name since this side road town was created. It is located in the Pilaton watershed and next to the Aloag-Santo Domingo road, the most important artery to communicate Quito and Guayaquil, the main Ecuadorian cities (Map 2). The area of this parish is of 495,89 km2, with an altitudinal range between the 3,800 feet and 8,000 feet. According the national census of 2010 the population is of 3,661 people of which 60% (2,197) is considered economically active.

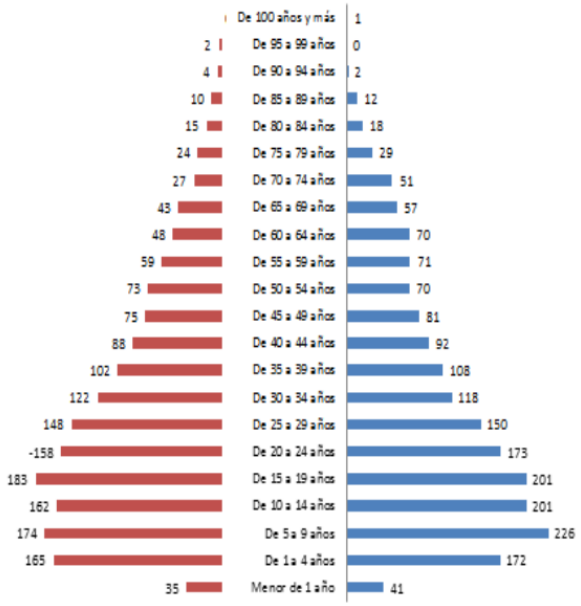
Map 2.- The Manuel Cornejo Astorga – Tandapi Rural Prish



According to the national census (INEC 2010) the women-men correlation is 53-47%. The 68% of the population is under 40 years old and 30% are in the age range of 15-30 years old. (Figure 2)

The most extended ethnic self-representation in this parish is basically that of "mestizo" representing almost the 90% of the local population. Other ethnic self-representation are white (4.5), indigenous (4%), and Afroecuadorian (2.2%).

Figure 2.- Age distribution in the Manuel Cornejo Astorga – Tandapi Rural Parish



Source: GAD-MCA 2012

The main economic activities in this rural parish are related to agriculture, livestock, milk and meat production, flower, tourism, and transportation. Agriculture and livestock are the main sources of income and subsistence for the local population representing the 46% of the entire economic activities in the parish. Trade and small business represent the 11.5% of the economic activities. Food and accommodation represent 7.78 % (Table 4). The most important products are maize, cocoa, cassava, banana, oil palm, potatoes, cereals, maize, beans, quinoa, vegetables,[6] pork and chicken meat, milk, fish.

Table 4.- Economic activities in the Manuel Cornejo Astorga – Tandapi Rural Parish

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	806	46,78
Industrias manufactureras	57	3,31
Suministro de electricidad, gas, vapor y aire acondicionado	9	0,52
Distribución de agua, alcantarillado y gestión de deshechos	7	0,41
Construcción	71	4,12
Comercio al por mayor y menor	199	11,55
Transporte y almacenamiento	78	4,53
Actividades de alojamiento y servicio de comidas	134	7,78
Información y comunicación	5	0,29
Actividades financieras y de seguros	1	0,06
Actividades profesionales, científicas y técnicas	7	0,41
Actividades de servicios administrativos y de apoyo	42	2,44
Administración pública y defensa	14	0,81
Enseñanza	40	2,32
Actividades de la atención de la salud humana	6	0,35
Artes, entretenimiento y recreación	3	0,17
Otras actividades de servicios	12	0,70
Actividades de los hogares como empleadores	56	3,25
No declarado	155	9,00
Trabajador nuevo	21	1,22
	1723	100

Source: GAD-MCA 2012.

Nonmetallic mine is also an important economic activity in the area. According the local authorities 31 mine deposits are in the parish territory, which represent more than the 20% of the national offer of nonmetallic products. Important amounts of rock stone

[6] These are products for warm and cold weather, favored by the location of the parish between the Coast and Sierra regions.

and gravel are extracted from the Pilatón river banks mostly for being used at the Hidrotoapi hydroelectric project the most important public work in this region.

Based in the national census 2010, Table 5 shows a comprehensive overview of the parish.

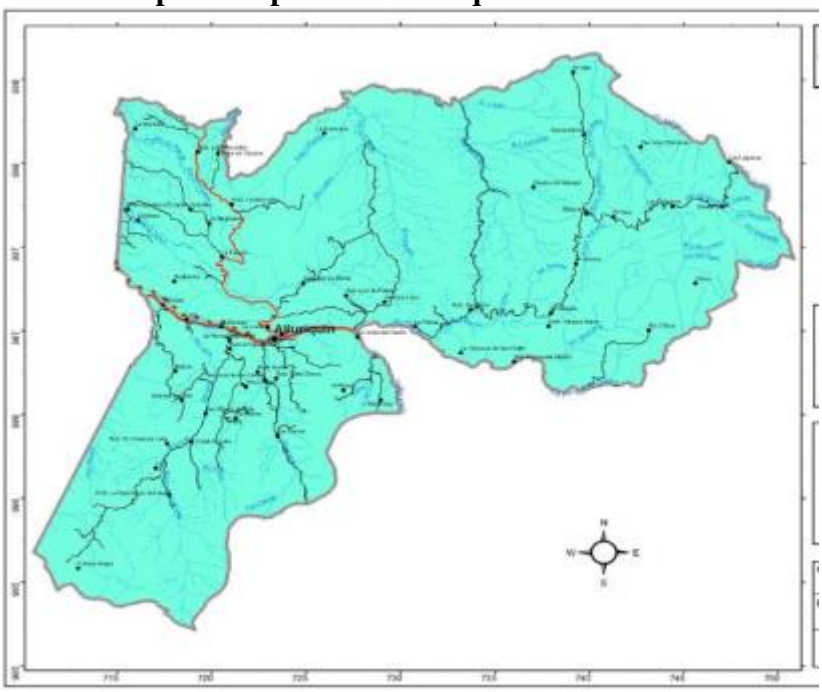
Table 5.- Socioeconomic Overview of the Manuel Cornejo Astorga – Tandapi Parish

Sector / Indicator	Measure	MCA (Tandapi)
Illiteracy	% (15 years old or more)	10.22
Functional illiteracy	% (15 years old or more)	22.95
Education	Años de estudio	6.73
Universitary education	% (24 years old or more)	5.51
Complete Elementary School	% (12 years old or more)	79.52
Complete High School	% (18 years old or more)	19.10
Working children 15 - 17 years old	% (children 5-17 years old)	38.52
Working children 5 - 14 years old	% (children 5-14 years old)	9.96
Peoble economically active	Number	1,708.00
People in working age	Number	2,848.00
Afroecuadorian population	Number	87.00
White population	Number	168.00
Total population	Number	3,661.00
Men population	Number	1,944.00
Indigenous people	Number	149.00
Mestizo population	Number	3,154.00
Women population	Number	1,717.00
Women proportion	% (total population)	46.89
Extreme poverty for non-satisfied basic needs	% (total population)	27.70
Poverty for non-satisfied basic needs	% (total population)	83.50
Human Development Bonus	Number	670.00
Water service inside home	% (houses)	26.05
Sewage network	% (houses)	34.70
Electric service	% (houses)	83.93
Telephone land line	% (houses)	16.03
Gas use for cooking	% (homes)	83.86
Firewood / charcoal use for cooking	% (homes)	14.28
Own home	% (homes)	56.83

Alluriquin Rural Parish

Alluriquin is a rural parish that belongs to the county of the Santo Domingo de los Tsachilas and its homonymous province. It has 9,725 inhabitants (INEC 2010) and an area of 664,8 Km2. (Map 3)

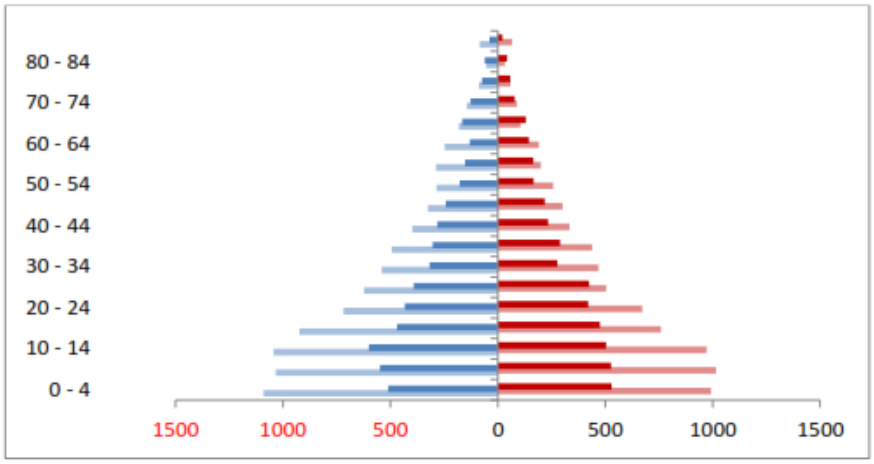
Map 3.- Map of the Alluriquin Rural Parish



Source: GAD-A 2015

According to the national census (INEC 2010) the women-men correlation is 52-48%. The 67% of the population is under 40 years old and 31% are in the age range of 15-30 years old. (Figure 3Figure 2). Like in other parishes of the region, most of the population of Alluriquin is ethnically self-identified with mestizo (90%), being the remaining people identified as white (5%) Afroecuadorian (2%), indigenous (1%), and the rest as "mulato", "negro", and "montubio" ethnicities.

Figure 3.- Age distribution in the Alluriquin ruralParish



Source: GAD-A 2015

The population in working-age (PWE) is defined as all those over 10 years old who are considered to be able to work. The PWE in Alluriquín corresponds to 78.24% of its total population. However, the Economically Active Population (EAP) is another indicator that best describe labor supply. The EAP is any population in age to work who is capable and willing to do so at a given moment. It includes both people who work or have jobs (occupied EAP) and those who do not have work but are willing to do so (unemployed EAP). In Alluriquín the EAP is of 3,792 people, which constitutes 49.84% of PWE and is made up of 73.10% of men and 26.90% of women.

On the other hand, Alluriquin is the third parish in the province with the highest poverty rate with an 89.6% of unsatisfied basic needs. According to INEC (2010) only the 55% of the dwellings in the village receive water from the public network, 44% take this resource from the rivers or springs and wells. Sewage service is also insufficient here. Only the 20% of the homes are connected to the public network, 29% to a septic tank, 19% have direct discharge to rivers and streams, 17% of the homes are connected to a blind well, 12% has no sewage service at all and 3% have latrine.

Land coverage is composed by 32.5 % of natural forests, 61% of introduced grass and the remaining 6.5% is composed of permanent and semi-permanent crops, planted forests and riparian vegetation (SDT 2010; MAGAP-SENPLADES, 2014). These numbers speaks of the importance of livestock for local people. Livestock, agriculture, forestry and fishing cover more than the half of the whole economic activities in the parish. Far below, other relevant activities in this territory are manufacturing industries, construction, transportation and storage, accommodation, and catering services among others (Table 6).

Table 6.- Economic activities in the Alluriquin Rural Parish

Activity	%	Records
Agriculture, livestock, forestry and fishing	57.57%	2,183
Wholesale and retail trade	10.36%	393
Manufacturing industries	7.20%	273
Transportation and storage	4.03%	153

Accommodation and catering services	2.37%	90
Construction	2.22%	84
Government and public administration	1,19 %	45

The topography in Alluriquín characterized by steep slopes provides to this territory abundant water and biological resources, which have determined the main economic activities of the local society based in agriculture and livestock and the extraction of natural resources (Table 6).

Hills, ridges, and micro watersheds have created conditions for biodiversity and scenic views, but these conditions also turn this area vulnerable to landslides, deluges and spates. In fact, Alluriquin undergo a catastrophic spate in April 2016 when record precipitations occurred in a single night. Four people died in that event, which also caused important material damages like the destruction of houses and buildings included the seat of the local government and part of the road Aloag-Santo Domingo cutting then for few days one of the most important routes that connect the Sierra and Costa regions (EC 2016). According to local authorities, more than 75% of the territory has high and medium-high susceptibility to landslides, spate, deluges and flooding. (GAD-A 2015).

Although these issues of territorial vulnerability the parish must also deal with economic activities that would increase the risks to adverse events. According to the Agencia de Regulación y Control Minero, the governmental mining agency, in the Alluriquín territory there are the following concesions: i) M-10 granted to Teegra Ecuador S.A.; ii) La Florida 1 granted to Caselogic, and iii) Loma del Tigre, granted to Sultana del Cóndor Minera (Sulcomi S.A)[7]. The mine resources existing in the territory are basically gold, silver and cooper. Nonmetallic mine activities also exist in the banks of the Toachi, Pilatón, Mulaute and El Tránsito rivers where sand, crushed stone and other similar materials are extracted. As known, the mine industry needs to remove large amounts of rocks, sand and mud in the mine siting process opening pits and quarries. This cause soil instability and then promotes erosion and landslides. Other activities that cause negative impacts in the soil are logging and unsustainable agriculture and cattle ranching, which remove the natural vegetation facilitating the water infiltration in the soil making this less able to maintain its stability during intense rainfall.

Based in the national census 2010, Table 6 shows a comprehensive overview of the parish.

Table 7.- Socioeconomic overview of the Alluriquin Rural Parish

Sector / Indicator	Measure	Alluriquín
Illiteracy	% (15 years old or more)	9.34

[7] This mining company also works in the territory of the Palo Quemado parish. The "Loma del Tigre" hill lie between the territory of the Alluriquin and Palo Quemado parishes.

Functional illiteracy	% (15 years old or more)	20.72
Education	Años de estudio	7.11
Universitary education	% (24 years old or more)	6.11
Complete Elementary School	% (12 years old or more)	84.12
Complete High School	% (18 years old or more)	21.28
Working children 15 - 17 years old	% (children 5-17 years old)	26.62
Working children 5 - 14 years old	% (children 5-14 years old)	4.54
Peoble economically active	Number	3,792.00
People in working age	Number	7,609.00
Afroecuadorian population	Number	319.00
White population	Number	450.00
Total population	Number	9,725.00
Men population	Number	5,023.00
Indigenous people	Number	111.00
Mestizo population	Number	8,715.00
Women population	Number	4,702.00
Women proportion	% (total population)	48.34
Extreme poverty for non-satisfied basic needs	% (total population)	32.50
Poverty for non-satisfied basic needs	% (total population)	93.90
Human Development Bonus	Number	3,651.00
Water service inside home	% (houses)	12.05
Sewage network	% (houses)	19.80
Electric service	% (houses)	87.50
Telephone land line	% (houses)	13.17
Gas use for cooking	% (homes)	87.18
Firewood / charcoal use for cooking	% (homes)	11.55
Own home	% (homes)	53.95

STAKEHOLDERS AND PERCEPTIONS ON CLIMATIC ISSUES

As described above the Toachi-Pilaton watershed is a natural framework of intense socioeconomic exchange where people and organizations of diverse type and range exert their interests in order to get and influence management of the existent natural resources. This approach is helpful for understanding that any measure for promoting sustainable development, water management or adaptation strategies for climate change and vulnerabilities should be the result of the dialogue among the different stakeholders of the area.

This part of the report is based on fieldwork carried out in the three rural counties in June 2016. During the field work was used semistructured questionnaires to interview representatives of the Cotopaxi, Sigchos, Mejia, Alluriquin, Palo Quemado, and Manuel Cornejo Astorga GADs, representatives of the Environmental and Communitarian sections of the Hidrotoachi project, members of productive organizations, and local residents. People interviewed were asked how they perceived climate issues and how they think they affect the daily life of the people.

Questions during the interviews looked for understanding five basic issues:

- What kind of weather issues are occurring in the area of study,
- How they are affecting the local people and socioeconomic activities,
- What are the explanations of local people to these events,
- What is the understanding of climate change phenomenon; and,
- How concerned are local authorities in watershed management and climate issues in the Toachi-Pilatón watershed.

These questions were helpful to know the perception and the level of preparedness for climatic events and issues of vulnerability in the area.

Stakeholders in the area

Stakeholders or Interest Groups are people and entities with a declared or conceivable interest or stake in the management of a given area. Stakeholders are not necessary organized they can be of any form, size and capacity like individuals, organizations, or even unorganized groups. In the Toachi Pilaton watershed stakeholders fall into the following categories:

State actors:

- Administrative agencies: MAE, INAMHI, CELEC
- Regional GADS: Pichincha, Cotopaxi and Santo Domingo de los Tsachilas provinces,
- Suregional GADs: Mejía (Pichincha), Sigchos (Cotopaxi), and Santo Domingo (Santo Domingo de los Tsachilas)
- Local GADS Manuel Cornejo Astorga, Palo Quemado and Alluriquin;
- Junta de Agua de Santa Rosa (Palo Quemado)

Private sector:

- Ranchers and farmers
- Companies and projects:

    - HidroToapi hydroelectrical project
    - Sultana del Còndor Minera Sulcomi SA (Palo Quemado)
    - Toachi GADs Sigchos and Pichincha mining processing sites (Palo Quemado)
    - Teegra Ecuador S.A. (Alluriquin)
    - Caselogic (Alluriquin)
    - Sultana del Cóndor Minera (Sulcomi S.A), Loma del Tigre concession (Alluriquin).

Civil society and foundations

- Fundación Tangaré (Tandapi)
- Reserva Biológica La Esperanza
- Hesperia Biological station and reserve
- Otongachi biológical reserve
- Río Guajalito Scientific Station
- Tanti protected forest
- Rio Lelia watershed protected forest
- La Favorita Scientific Station

Productive organizations

- ORCOPROSAN - Organización comunitaria productiva Santa Rosa Lima. (Palo Quemado)
- Asociación Flor de Caña (Palo Quemado)
- Asociación de Ganaderos de las Pampas (Pampas Agüilla)
- Asociación Agroartesanal San Pablo de la Plata (Pampas Agüilla)
- Pre-Asociación de Cafetaleros (Tandapi)
- Pre-Asociación de Cafetaleros (La Esperie)
- Asociación de Productores Agropecuarios “Pampas Argentinas” (Tandapi)
- Asociación Agropecuaria Mirabad (Tandapi)

Coomunities and local Interest groups

- Unión del Toachi (Alluriquin)
- La Esperanza community (Tandapi)
- El Mirador community (Tandapi)
- Mirabad community (Tandapi)
- El Paraíso community (Tandapi)
- San Francisco community (Tandapi)
- Los Olivos community (Tandapi)
- Peñas Blancas community (Tandapi)
- Ilusión community (Tandapi)

- Canchacoto community (Tandapi)
- Iliolan community (Tandapi)
- Cordilleras del Paraíso community (Tandapi)
- San Antonio community (Tandapi)
- La Esperie community (Tandapi)
- La Palma community (Tandapi)
- Pampas Argentinas community (Tandapi)
- Praderas del Toachi community (Palo Quemado)
- Palo Quemado Centro community (Palo Quemado)
- San Pablo de la Plata community (Palo Quemado)
- Las Praderas community (Palo Quemado)
- Santa Rosa de Lima community (Palo Quemado)
- Las Minas de la Plata community (Palo Quemado)
- El Cristal community (Palo Quemado)
- Zarapullo community (Palo Quemado)
- La Florida community (Palo Quemado)
- Unidad Educativa Juan Salinas (Palo Quemado)

First of all it is important to consider that there is not any encompassing process that calls the attention of all the listed stakeholders in the context of the context of watershed management. This does not mean that they do not have interest and/or exert influence in the watershed issues but that there is not coordination or dialogues in terms of management initiatives. This is largely due to the fact that according the national Constitution the regional descentralized governments are invested with the exclusive competence for watershed planning and for creating watershed council to carry out its management. [8] Besides the conservation, recuperation and integrated management of water resources are also under the state responsibility through the regional governments[9] This competence bestow these governments to regulate all activities that can affect the water quality and quantity and the ecosystemic equilibrium especially y water recharge areas[10].

Although the importance of the legal framework regarding watersheds, the regional governments have not been created yet, so their competences are not fully executed by any public organization. As a result there are not administrative councils for watershed managements and no control agency that can assure an overview of all the watershed of the country. Some control activities regarding these areas are carried out by the Ministerio del Ambiente and Ministerio de Agricultura Ganadería, Acuacultura y Pesca. MAGAP but in any case an integrated policy of management and control can be applied by several and dispersed organizations.

Provincial governments have the competence for promoting public works in watershed of all type in their territories and to carry out the environmental management. However these competences can be conflictive since the promoting of public works means the construction of roads, irrigation channels, bridges and other infrastructure that can impact watershed if environmental issues are not considered. In addition, not all

[8] See articles 262 and 263 of national Constitution.
[9] See article 411 of national Constitution.
[10] Idem.

provincial governments have still authorization for environmental management[11] so in practice no competences over watershed can be applied.

Another issue regarding one of the productive stakeholders in the watershed is the mining activity. As known mining is among the most nature transformation activities and typically they are executed in very difficult to access areas where rural governments are more efficient to reach. However according the national law, metallic mining activities are under the control of the central government and non-metallic mining under the municipal governments. In the area of study there are six metallic mining concessions and a number of non-metallic extracting places. Since rock, sand, stone and other non-metallic mine resources are abundant in the area it is virtually impossible for the local municipalities to control all of them. Companies granted with metallic mine concessions report to ARCOM (Agencia de Regulaciòn and Control Minero) and not to local rural parishes in whose territories the environmental impacts occur. As a result, mining companies work in the area but have not relationship with local organizations.

The effect of the above explained situation is that there is not any organization in the Toachi-Pilaton watershed that can carry out a comprehensive management of the existing hydric resources and to coordinate activities of the local public organizations in order to establish management activities for the control and conservation of the area.

Two institutions only are carrying some type of activities in coordination with local authorities, and other stakeholders. They are the MAE in the framework of Plan Bosque, in which coordination at different levels is performed with rural parishes, communitarian organizations and forest private owners. The other organization is the Hidrotoapi Hydroelectric Project, a large infrastructure construction executed by a private company under the order of the central government. As a part of the environmental requirements Hidrotoapi must execute communitarian consultation in the area of direct and indirect impact of such project. In order to fulfill such need this project has organized a comprehensive plan to inform local communities about potential environmental and socioeconomic impacts that can affect local livelihoods.

In the above mentioned scenario, the local stakeholders has few opportunities for communication, coordination and exchange strategies for organizing their activities in a sustainable way or at least to make them more efficient. On the other hand, the absence of a management straggles leave the stakeholders to perform their activities at large with a minimum of considerations for the security and sustainable use of the watershed.

Climate issues in the Toachi Pilaton watershed

Four climatic issues were mentioned consistently during the interviews: drought, rainfalls, temperature increase and strong winds. The local people are now aware of the weather events and negative impacts since it is fresh in the memory the catastrophic spate in the Alluriquin parish occurred a couple months before the field work for this report and caused by record precipitations. Most of the communities of the parishes involved in this study have also experienced landslides in their lands in the last two years due to sudden and excessive rains. So for most of the interviewed people it is evident that changes in weather patterns have occurred over the last years and they are

[11] According the MAE legal framework only provincial and municipal governments that fulfil some requirements are bestowed for environmental management in their jurisdictions.

interconnected. Then awareness regarding climatic issues in the area has been triggered by the experience with such disasters which have affected practically all the region.[12]

Drought was considered an important issue especially in the Toachi watershed area. Communities of the upper basin like Palo Quemado and even of Sigchos referred that most of the year 2015 the entire area has suffered an extreme dry season. For communities of the lower basin it was not an issue because of the alternatives to offset the problem through the use of the river water, but for those of the higher and middle watershed it was more problematic because the river is far from the communities. However after several months of dryness there was a sudden rainy season including deluges that caused spate, mass movements and flooding in different communities of the lower and middle areas in the watershed.

Strong winds have also been reported during the interviews. These events occurred especially in Palo Quemado where the winds were so intense that several trees were uprooted. This weather condition is also pointed as part of the climate pattern change that is experiencing this region.

Effects of the weather issues on local socioeconomic activities,

Local people have been concerned of threats to the communities caused by changes in the climate patterns especially in terms of human and economic security (i.e. landslides, flooding and crops quality). Ongoing changes in weather patterns are seen acutely since the Lamas river spate occurred in April 2016 and the string of landslides and avalanches occurred in the last months of 2015 and first trimester of 2016 in different areas of the three involved counties.

The related weather events have affected negatively the local people in several ways. First, long periods of dryness and short but intense periods of rains are pointed as the cause of the decreasing of sugar cane quantity and quality. Sugar producers said that the panela production has significantly decreased in the last year because of the lack of the cane quality. Now they need more canes to produce the same amount of panela that is the standard for commercialization.[13] Other sectors like the cattle ranchers and agriculture producers have also experienced problems derived from extreme weather events. Low productivity, fungus and pest[14] increase, and plant destruction by intense rains are the most common problems the farmers attribute to weather problems. For that they need to use more agrichemicals and devote more time for caring the crops.

On the other hand extreme rains soften the soils of deforested areas or steep hills and produce landslides or mass movements and flooding. During the last months of 2015 and the early 2016 several landslides occurred in the entire region and in most of the cases closing paths and roads and then causing transportation problems sometimes for

[12] The spate occurred in the Damas River in Alluriquin have had an economic impact beyond the micro-region of the lower Toachi-Pilatón watershed. Since the Aloag Santo Domingo road was closed during few days it affected the transportation between Quito, Santo Domingo and Guayaquil. Some landslide occurred in the same period near to Tandapi also forced to close the Aloag Santo Domingo road.

[13] Each piece of panela or "banco" for commercialization weight 32 pounds.

[14] Pests can appear during dry or wet season, but now with the intense weather conditions have appeared others previously unknown. For example in the naranjilla crops were common the "lancha negra" and "lancha blanca" pest, but now have appeared two more the "ojo de pollo" and "muerte lenta", to control which farmers must apply more and stronger agrichemicals. This make costly some crops.

several days. In the Manuel Cornejo Astorga rural parish more than 200 small and medium scale landslides occurred in the last year. Practically all the 26 communities of the parish have had landslides in their territory. The worst landslide occurred in May 2016 at the point in the kilometer 32 of the Aloag - Santo Domingo road forcing to close it for a couple days.

As already explained the spate in the Damas River that caused avalanche and flooding in Alluriquin was the most extreme effect of the concentrated rains occurred in April 2016. Besides the actual damage that can cause a landslide if it occur over towns, houses or roads, it affect the transportation of products to the markets and some of them like milk and other perishable can be ruined at all causing significant economic damage to the producers.

Strong winds have less impact in the farmers however some crops can be affected and accidents can occur when trees are uprooted. However any of the interviewed has reported accidents due to this type of event. On the other hand, the combination of winds, drought and high temperature sparked some wildfires in the area, especially in Sigchos.

Finally considering the sharp contrasts of the dry and wet periods local people realize that during the drought there was also a significant increment of temperature. However it may be a subjective observation. In any case cases of skin irritation especially in children have been experienced in the communities of Palo Quemado and Pampas de Agüilla in the middle and upper part of the Toachi watershed.

Perceptions of local people regarding weather events

Experience has provided rural communities a knowledge about the local environment and climatic issues. Based in such knowledge these communities have designed a yearlong calendar determining periods for planting, cropping, applying agrichemicals for caring the crops, and even for festivities and other celebrations. However, when sudden changes in local conditions occur, the people tend to fall in fabrications and attributions in order to make an understanding of the new or extreme events.

Pyhälä et al (2016) has studied how people can easily astray when issues go beyond of what is considered normal in terms of their experimental knowledge. He calls it memory illusions in which facts from previous knowledge and new imaginations can be mixed to get sense of new realities. However this may affect the experiential knowledge of the communities acquired through daily observation of their environment. Precisely this has happened in the Toachi – Pilaton areas.

Common explanation of why the creeks of the lower basin area have become dry during 2015 is that the waters were sank through the cracks opened in the soil because of the dynamite explosions carried out to build the Hidrotoapi hydroelectric project. In the upper part of the basin there are also communitarian explanations based in the imagination. For example the drought that has affected most of the year during 2015 and 2016 becoming an overwhelming problem and even a political issue. Since this weather condition affected five counties of the Cotopaxi province included Sigchos in the upper part of the Toachi River, there was a public petition for creating “veedurias” or commissions in charge to investigate the cause of such abnormal drought (GAD-C

2016). In the communities sparked the idea that a program of "cloud seeding"[15] was being carried out by flower cultivators in order to produce rain in specific areas to favor their agribusiness (GAD-C 2016). The popular explanations to new or unknown events may have been caused by influential or fantastic memories of extreme events mixed with new situations observed in the area.

However people also retain some indicators of recurrent local problems and provide more scientific explanation for new events. For example the drought problem and the landslides occurred in the upper basin, has been explained by the productive associations as a direct result of the constant deforestation in the area. The association of panela producers, Flor de Caña has explained that farmers use now more trees every week to produce panela, so the nearest forest in Palo Quemado are being significantly degraded. This means also that logs for firing the cauldrons should be brought from more distant places which make more expensive the production.[16]

The above explanations show how stakeholders are eager to determine whether situations and to establish them in terms of what is their interest. Beyond of what true or false can be the explanations, this situation also show that local are prone to know about climate issues and that information, capacitation and measures implementation on climate change adaptation are needed.

Understanding on climate change and awareness of local authorities

There is not a clear understanding regarding climate change in the communities in the three counties. Climate change is still a far reality and then there is not a conception on how to take actions to response it. However the adverse events of rainfall, spate and landslides have suddenly forced the people to take a position regarding the recurrent and catastrophic events that occurred in the area.

The Alluriquin disaster made people aware that climate has changed and some collective actions should be adopted. It is obvious that local communities are now more favorable to protect forest especially in the steep areas of the river bank and hills. In addition private reserves are more popular and seen as something positive for the community.

Notwithstanding the increase in public awareness it is not easily translated to local authorities in terms to move them devise plans for bettering the watershed management or coordinating among the different institutions to take common measures. This situation is due to normative and practical issues. From the point of view of the national legislation, the responsibility for watershed management corresponds to the regional GADs which as has already said are still inexistent. These institutions are bestowed by the National Constitution and COOTAD[17] to carry out the management of the hydrographic systems. This means that parish GADs cannot take initiative in promoting

[15] This process consists in "seeding the heavy clouds with tiny particles of silver iodide whose electrical charge would pull together the cloud's water droplets. Once enough droplets had gathered together, their weight would make them fall from the sky as rain." See: http://www.dailymail.co.uk/sciencetech/article-1351437/Can-scientists-REALLY-make-rain-useless-shower.html#ixzz4V92o0FR7

[16] To address this problem, the Association Flor de Caña of Palo Quemado is working with Maquita Cushunchic, a fair trade organization based in Quito, to introduce more efficient technologies and improve the production.

[17] Código Orgánico de Ordenación Territorial y Administración Descentralizada.

watershed management activities. So in this case while local authorities (the parish GADs) may understand the climate change issues and the potential impacts that can produce in their territories, they do not feel that can take actions or decisions in response to such global event.

Another issue that conspire against the adoption of local measures for watershed management is that some activities that cause severe impacts in the hydrographic basin are not under the control of local governments (the parish GADs). For example metallic and nonmetallic mine activities are under the control of the central government and of the municipal GADs. As a result these activities are not reported to the local parish authorities –the most idoneous to locally verify any situation- and then the control of the problems caused by mine companies not always are known by the control agencies.

The related issues and perceptions in the Toachi-Pilaton watershed show that capacity-building and community-based education are important activities for raising awareness on climate change impacts and promoting adaptation measures. These approaches are important to promote sustainable livelihoods, food security and finally sustainable development.

Gender issues and vulnerable people

As in most of rural areas in Ecuador, gender is a complex issue. It is difficult to evaluate women issues mot only because there is an evident level of "machismo" but also because women have types of agency that do not necessarily have been analyzed by feminist studies and then may not fit in what gender inequality stands for.

The first aspect of gender inequality in the area is the invisibilization of the female work. Despite the current interest of the government for promoting women visibilization, most of the productive female activity is still not socially recognized, and in that sense it is not statistically reflected either. The division between labor for the market and domestic work is often diffused and part of the productive work ends up being counted as unrecognized domestic labor. In other words, female work counts only when it is sold in the market economy (as waged worker or as independent entrepreneur) but not when women work at home. Two factors contribute to this statistical invisibility: on the one hand the fact that all of the female home work has a high use value but it is of null exchange value. For example, cooking for the family, caring children, making the room and so on are activities that cannot be sold in the free market and then it is not worth or practical accounting them. On the other hand, the home female activities are seen as part of the gender work division so it is the task that women must contribute for family and social reproduction.

Beyond the above theoretical considerations since many men in the Toachi Pilaton area are increasingly incorporated in waged work activities, rural women have taken on bigger roles in agricultural production and community labour. The resulting effect of this fact is that the women must assume the place that men have left vacant and then must work an average of 14-16 hours daily. The personal impact of this social phenomenon can be devastating in terms of women health and of physical abuse from

husbands.[18] Here also is affected the right of women to have time for leisure, which in turn men enjoy in any case working in family subsistence activities or in waged work outside the town.

Notwithstanding evident gender inequality issues in the area of study it is also important to consider the women agency for creating income opportunities for their families. In practically all the areas women control most of the formal and informal food business. This provides them great economic independence counterbalancing home male-women asymmetries. In this case women are visibilized through a work inserted in the market economy.

Regarding other vulnerable people beyond women and children, there are no other particular groups that can be identified as vulnerable. Since the area of study of the Toachi Pilaton watershed is a frontier territory, there are no indigenous people nor Afroecuadorians.

[18] In rural areas women have reported health problems like of the spine, of respiratory and reproductive organs, hernias, bruises, and wounds (MacMillan 1995) and gender violence (Camacho 2014).

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Annex 5. Stakeholders, interests and socioeconomic situation in the project: "Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management"

ANNEX 5 - B

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

August of 2017

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Contents

GLOSSARY OF TERMS

ARCOM	Agencia de Regulación and Control Minero
CELEC	Corporación Eléctrica del Ecuador
ESPE	Escuela Politécnica del Ejército
ELEPCO	Empresa Eléctrica Cotopaxi
GAD	Gobierno Autónomo Descentralizado
INEC	Instituto Nacional de Estadísticas y Censos
MAE	Ministerio del Ambiente
MAGAP	Ministerio de Agricultura Ganadería, Acuacultura y Pesca
MEER	Ministerio de Electricidad y Energía Renovable
MINTUR	Ministerio de Turismo
SENAGUA	Secretaria Nacional del Agua
SEPS	Superintendencia de Economía Popular y Solidaria

FIGURES

TABLES

MAPS

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

INTRODUCTION

The hydrographic watershed of the Toachi Pilatón hydroelectric power plant is formed by the Toachi and Pilatón rivers, and receives contributions from the Verde, Siguí, Pashillin, Zumbahua, Santa Ana and Zarapullo rivers, on the western slope of the Andes. (TECNALIA) Toachi river originates in the badlands of the Ecological Reserve of the Ilinizas around Quilotoa lagoon, between Ilinizas volcanoes north and south in the province of Cotopaxi. Pilaton River born from bandlands of the slopes of volcanoes Atacazo and Guagua Pichincha and the hill Corazón. (TECNALIA)

A watershed is an "area of land that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel" (USGS 2016). Besides of being such natural framework watersheds are also areas of intense socioeconomic exchange where people and organizations of diverse type and range (state, natural resources extractors, traders, farmers and so on) exert their agency in order to get and influence management of the existent resources in the area.

Because of the diversity of existing geographic areas, the often difficult access to them, and the social competition for its natural resources, watershed s are of complex management and then prone to be ecologically neglected and significantly altered by socioeconomic activities. Since whatever natural and human-induced issues happening in upper areas can affect the rest of the basin until the river-outflow point, watersheds are extremely vulnerable to socioeconomic activities. For that it is important to apply integrated water management strategies where all stakeholders can coordinate and exchange experiences, and be regulated and controlled in a comprehensive plan intended to protect the hydric resources.

The ecological vulnerability of the watershed supposes also a socioeconomic vulnerability of the societies living in these areas especially those already vulnerable like women, children and indigenous people. By historical and socioeconomic issues these groups are the most vulnerable in any society and particularly in those of frontier where social life depends of direct natural resource extraction. In this understanding the climate change phenomenon and the expected impacts on nature and society will particularly affect watersheds and women and indigenous people as the most vulnerable in natural and social environments. Therefore in the efforts to promote adaptation measures to address the problem of climate change especial attention must be devoted to watersheds, its societies, and the women, children and indigenous peoples existing in these environments.

Considering the issues of social and natural vulnerability and the expected effects of climate change, this document presents an ecological and socioeconomic overview of the Toachi and Pilaton watersheds pointing the situation of the three rural jurisdictions in which lie the critical part of this area and identifying stakeholders and their perceptions regarding weather and climate change issues. As part of this analysis this document also points the situation of women and issues of gender inequality in this area.

The Toachi and Pilaton watersheds located in the North-Central area of Ecuador, in the so-called Cordillera Occidental de los Andes, in the provinces of Cotopaxi, Pichincha and Santo Domingo de los Tsachilas. Starting both watersheds in different volcano systems at more than 14,000 feet over the sea level in the Cotopaxi province; they joint at 2,000 feet altitude in the Santo Domingo de los Tsachilas province and then under the name of Blanco River run northbound to then be part of the Esmeraldas basin, which finally drains its waters in the Pacific Ocean. Besides, because of the elevated altitude and topographic steepness of ridges

and hills of the cordillera where the basin starts, the Toachi and Pilaton rivers are the outflow point of several smaller watersheds which increase the ecological complexity of this area.

Analysis and conclusions of this document are intended to put in perspective the ecological and social complexity of the Toachi-Pilaton watershed, to address both in the efforts to promote adaptation measures to deal with the expected issues related with climate change events. In addition, introduce to Adaptation Fund a final document with a map of stakeholders in Toachi-Pilaton watershed.

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

NATURAL SCENE OF THE AREA

The Toachi river starts in the foothills of the Chugchilán mountains, a branch of the Western Cordillera, in territories of the Chugchilán and Isinliví parishes, in the county of Sigchos, province of Cotopaxi. The river begins at an altitude of 4500 m and descends to 1000 m altitude to join the Pilaton River. The Toachi basin is flanked to the east by the Corazon hill (4,788 m s.n.m) and the volcanoes Illiniza Sur (5 248 m s.n.m.) and Illiniza Norte (5,126 m s.m.). To the South by the Era Urco hill (4,473 ms s.n.m.). These elevations contain several smaller water courses that end in the river Toachi. The basin of this river has a length of 104 km, and a contribution area of 1,478 km2.The average slope is of 34.7%.

The Pilatón river is formed by the thawing of the volcanoes glaciers of the Corazón (4,790 msnm) and Atacazo (4,455 feet altitude) creating a watershed that has an east - west direction and is formed on the western slopes of the Cordillera Occidental, El Corazón and Atacazo hills, has an contribution area of 514 km2, the main channel length is 42.5 Km, the average slope represents 42.7%. This river join with the Toachi and then form the Blanco river which in turn join the Quinindé river and then flow into the Esmeraldas hydrographic system which drains in the Pacific Ocean.

As shown in Table 1 the hydrologic complex that conform the area of interest of this document lies in a territorial mosaic of three provinces, three counties and three rural parishes. There more than 10,000 people live in more than 35 communities.

Drainage unit	**Province**	**Canton**	**Parrish**	**Total population in the Parrish**	**Population within the drainage unit**
Toachi	Cotopaxi	Latacunga	Toacaso	7,685	7,685
		Pujili	Guangaje	8,026	8,026
			Zumbahua	12,643	12,643
		Sigchos	Chugchilan	7,811	7,811
			Isinlivi	3,227	3,227
			Las Pampas	1,943	1,943
			Palo Quemado	1,030	1,030
			Sigchos	7,933	7,933
	Pichincha	Mejía	El Chaupi	1,456	NA
Pilatón	Pichincha	Mejia	Aloag	9,237	NA
			Manuel Cornejo Astorga (Tandapi)	3,661	3,661
	Santo Domingo de los Tsachilas	Santo Domingo	Alluriquin	9,725	9,725
Total population in 2010				**74.377**	**53.959**
NA = Not available, but it is known to be very small					

Table 1 Population in the Toachi – Pilatón system

Because of the altitudinal variability this territory is biologically rich. It contains from the paramo ecosystem at more than 9,000 feet altitude to tropical and cloud forest at about 1,000 feet altitude. This natural configuration of the area explains the existence of several ecosystems

and watershed, and then of a rich biological diversity. The most important watersheds of this hydro-geologic system are those of the Toachi and Pilatón rivers. Smaller watersheds in this ecological reserve are of the Zarapullo river, which drains to the Toachi and the Corazon and Santa Ana rivers which drains to the Pilaton.

In the Toachi river basin, the largest area corresponds to natural forest (22.8%), followed by páramo (18%) and forest intervened plus cultivated grass 70-30 with 15.4%, the remaining area (43.8%) corresponds to others Types of land use mainly crops In the Pilatón river basin; The largest occupation corresponds to natural forest (52.8%) and forest intervened plus cultivated grass 70-30 (31%), the remaining 16.2% is destined for other uses. The natural richness of this natural compound has guided the human interventions in the area, which is still basically a frontier. Practically all the socioeconomic activities in the region rely in the extraction of primary natural resources. One of the major problems in the upper part of both basins is the transformation of the natural ecosystems of paramo and forest due to agricultural activities. This change in vegetation cover affects the surface runoff.

This ecological complex is important for hydric resources and because of its biodiversity, for the reproduction of both the flora and fauna of the region and then, important for ensuring water and food security of the local communities. Then the importance of the Toachi-Pilaton watershed must be understood under the complex natural mechanisms of biodiversity and hydric natural resource availability in which the local communities have built their culture and food and water security.

Areas under conservation status

Because of its natural landscape and biological importance the area of study have several public and private protected areas. The public areas under conservation statuses are Sarapullo and Toachi Pilaton Protected Forests and the Ilinizas Ecologic Reserve. The private protected areas have been created under the category of “protected forests” that was the first category for conservation of natural areas allowed in private lands before 2008 when the national constitution established the creation of private and public decentralized[1] ecological reserves. The protected forest is an administrative figure for conserving soil and hydric resources and in function of these primary goals is considered that forests and natural or introduced vegetation must be maintained undisturbed in critical areas of the watersheds. By creating protected forests the state promoted the protection of the steepest areas of the watersheds and then avoiding landslides, land erosion and drainage alterations.

Ilinizas Ecologic Reserve and Sarapullo Protected Forest

The llinizas Ecological Reserve is a public protected area consisting of 149,900 has of paramo and Andean Humid and Subtropical Forests. It is located in the provinces of Cotopaxi and Pichincha. This area encompasses the twin peaks of the Illinizas as well as the extinct volcano Quilotoa best known by its crater lake. The reserve lie in the Cordillera Occidental de los Andes its territotry contains also several hillas and ranges like the Lelia Cordillera, the El Corazón, Jaligua Alto and Tenefuerte hills. This mountain system barrier the evaporations from the costal forcing its condensation in the west side of the Cordillera Occidental and

[1] Before the National Constitution of 2008, protected areas of any kind were created only under the central government control, with the new legal framework of 2008 municipalities and rural parishes can create their own protected areas and rural communities, indigenous people and private owners can also legally create areas for conservation in the lands under their control.

therefore increasing the hydric resources of the watersheds or even favoring the creation of micro-watersheds in the entire area.

The Sarapullo Protected Forest was created in 1986 before the Ilinizas Ecological Reserve. Then when the Ilinizas was declared as a reserve the entire territory of the Sarapullo forest was incorporated in such new protected area. So now in practice all the policies and management measures regarding this area are made considering the main area that is the Ilinizas Ecological Reserve.

Toachi – Pilatón Protected Forest

This protected forest was created in 1987 as a means to maintain unchanged the forest other vegetation of the Toachi and Pilatón river basins. This forest has an area of 212,000 has and is under the control of the state forest districts of Cotopaxi and Pichincha. Although the status of protected forest is lesser than the national parks and ecological reserves it is still prohibited logging and the use of the area for any socioeconomic activity. Activities in this type of areas must be compatible with conservation purposes only. The main goals of this area are the protection of soil, water resources and biodiversity. About 20% of the Palo Quemado territory lies in this protected forest and the Las Pampas parish is also next to this area. Most of the problems of the Toachi Pilaton protected forest become from the socioeconomic activities of the mentioned parishes.

The international environmental organizations Birdlife Internacional and Conservación Internacional have stated that the lower area of the Toachi Pilaton protected forest is a place of high importance for protecting birds because about 420 bird species has been found here. However insufficient control has promoted illegal logging and even the invasion of parts of the area for cattle ranching are damaging the habitats of these and other species existent here. Moreover, several land tenure issues have not yet solved in this ecological area.

Private protected forest

Protected forests and reserve have been created in private lands in the Toachi-Pilaton watershed. These areas combine conservations goals with scientific research, environmental education, organic agriculture, and eco-tourism activities so that are source of income generation for their owners. The creation of protected areas in private lands in this zone is a very important form to show the neighbors that other socioeconomic uses can be applied to the lands. As a frontier area, the Toachi Pilaton watershed system has been traditionally seen as a wilder or an area to mine any existent natural resource. Such mentality is still present and private owner who devote their lands to conservation purposes are helping to change such extractive view.

Typically private conservation areas are composed by temperate, cloudy and subtropical forests. Significant parts of these areas are secondary and highly degraded forest for which programs of ecological recovery has been established. Reforestation activities in areas previously used for agriculture are also in process. In addition by creating this type of conservation areas many steep zones of the hills and ridges are being protected otherwise they would be subject of forest fires, illegal logging and unsustainable agriculture.

The private areas that have been legally declared as reserves or protected forests are the following:

1. Reserva Biológica La Esperanza
2. Hesperia Biological station and reserve
3. Otongachi biológical reserve

4. Río Guajalito Scientific Station
5. Tanti protected forest
6. Rio Lelia watershed protected forest
7. La Favorita Scientific Station

In practical terms these private areas for conservation provide patches of ecological security for birds, mammals and other migratory species that need of scattered habitats to survive. They are also creating biological corridors and then allowing genetic variability in areas that otherwise would be isolated and prone to genetic erosion.

Notwithstanding the importance of private protected areas it is worth to mention that a significant flaw of them is the lack of sufficient resources for ensuring adequate control and the application of technically standardized management practices. This observation is also valid for the public protected forests for which the state has not established a particular administrative mechanism for control and management. However, new legal frameworks and technical regulations for this type of areas are under preparation by the Ministerio del Ambiente.

The Socio Bosque and the conservation initiatives in the area

In addition to the public and private system for protecting the natural areas of the watershed the Ministerio del Ambiente has established the nationwide Socio Bosque program which main goal is to help private owners and parishes to protect the existent natural forests presents in their lands or to carry out reforestation plans. The Manuel Cornejo Astorga, Palo Quemado and Alluriquin rural parishes are beneficiaries of the Socio Bosque program and about 692 hectares of public and private forests areas are under this scheme of protection, distributed in 22 plots and 15 private owners.

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

LOCAL JURISDICTIONS IN THE TOACHI PILATON WATERSHED

The Toachi Pilaton watershed intersect in the territories of three provinces, three counties and six rural parishes. Three of them are in the influence area of the project. Below you fill find a description of each parish:

Sigchos:

Sigchos is located in the province of Cotopaxi, northwest of Latacunga city. It was created on July 21, 1992. Sigchos is situated on the sub-watershed of the Toachi River and has an area of 1,266.6 km2. The population is composed of approximately 23,236 habitants.(GAD Cotopaxi, 2014)

Sigchos has an urban parish, it's also called Sigchos, and four rural parishes, that two are located in the Toachi River watershed into the project area. These rural parishes are: Las Pampas and Palo Quemado. Map below shows where Sigchos is located and its parishes: (GAD Cotopaxi, 2014)

Map 1 Parishes located in Sigchos

In Sigchos, annual average temperature is 13 ° C and annual precipitation reach values between 500 to 1000mm. (GAD Cotopaxi, 2014). Table below shows the temperature chart with maximum, minimum values:

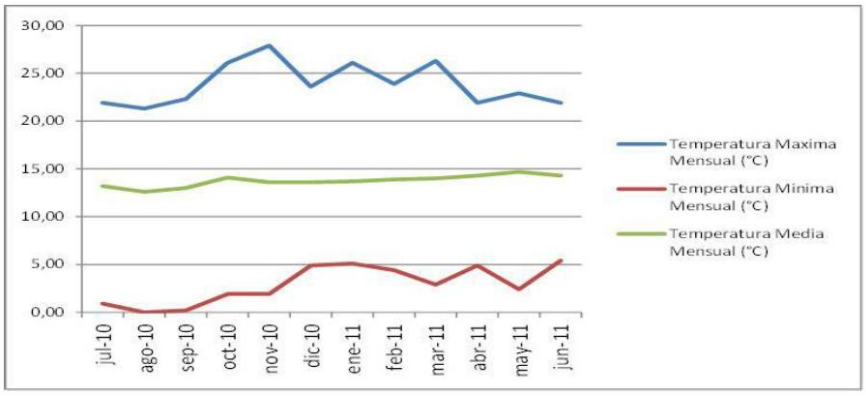


Figure 1 Sigchos Annual Average Temperature

According to PDOT document, Sigchos has been experimented changes of temperature, which produce prolonged droughts between July and December, with very strong winds, and very strong and prolonged rainfall, between January and June. (GAD Sigchos, 2012)

As a consequence of changes in temperature, crops have been destroyed, human and animal health has been affected, and also roads network has been damaged, and of course economic losses are produced in the project area.

Most of settlements are located in areas of slopes, which means a high risk due landslides, and it makes difficult communication between villages.

In the Sigchos parish, the population is engaged in the following economic activities: (GAD Sigchos, 2012)

Economic Activities	Percentage (%)	Description
Agriculture	20	Local consumption or familiar economic subsistence. Main products: panela, beans, maize, zambo, squash, mackerel, mora, mortiño.
Cattle range	70	Cattle for meat production
Tourism	5	Community tourism
Others	5	Dairy production

Table 2 Sigchos Economic Activities Source

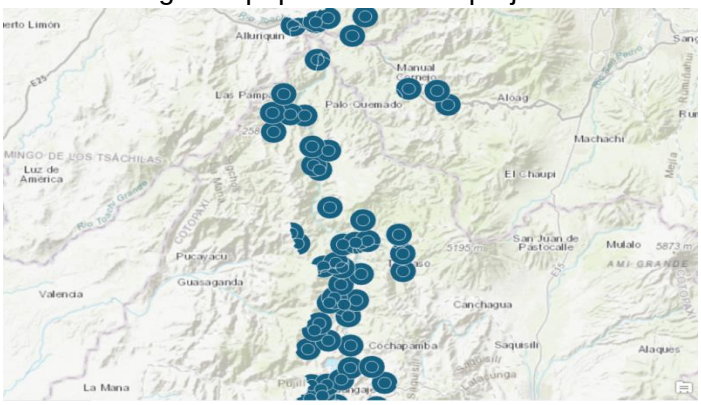
According to census of population and housing carried out in 2010, population economically active is composed as follows: (GAD Sigchos, 2012)

	Population economically active (PEA)	Population economically inactive (PEI)	Total Economic Population (PET)
Men	2.077	992	3.069
Women	1.295	1.759	3.054
Total	3.372	2.751	6.123

Table 3 Sigchos Population Economically Active

Likewise, census of population and housing carried out 2010, shows that all Sigchos urban and rural parishes, represent economically active population (EAP) with a value of 42.50%, that its equals a total number of 9,327 habitants, while a percentage 57.49% represent elderly, children and adolescents population, which is equivalent to 12,617 people.(GAD Sigchos, 2012)

Map below shows location of Sigchos population in the project area:

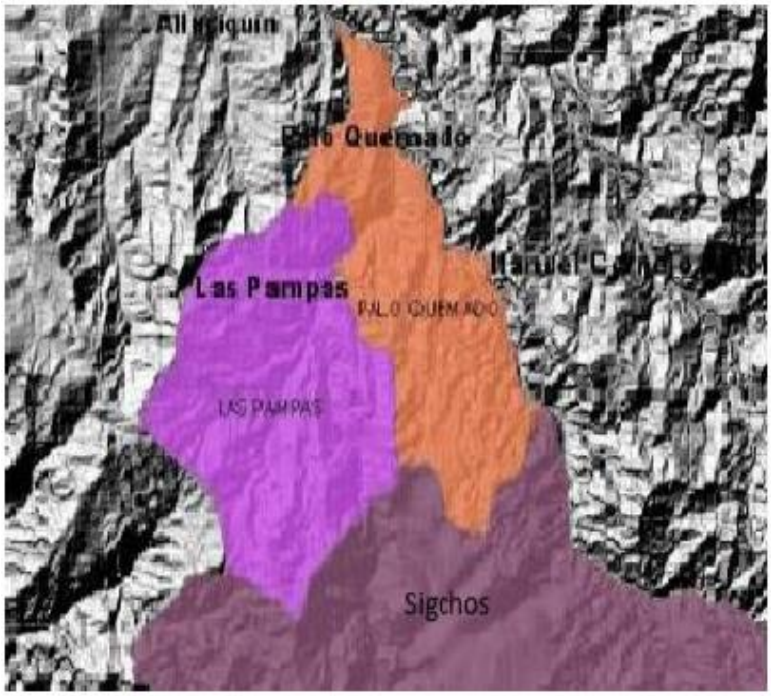


Map 2 Sigchos population located in the project area Source

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Las Pampas:
Parish Las Pampas is located at northern end of Sigchos canton, which it's belong to Cotopaxi province. Las Pampas is located 53.6 km from cantonal head. This parish has 2 extremes of territorial height levels, one as lowest part from 1,200 msnm, and other as highest part of 2,481 msnm.(GAD Las Pampas, 2015)

This parish has an area of 13,178.27 m2, and it's located in the upper and middle part of the hole of the Toachi River. Below is the map showing the area delimitation for Las Pampas parish:(GAD Las Pampas, 2015)



Map 3 Territorial map Las Pampas

According to the field study carried out in 2015, for development of the Territorial Planning document (PDOT), Las Pampas parish consists of 15 precincts and they reach a population of 2,405 habitants.

According to INEC, data related to Las Pampas parish population in 2010, it's ranged between 14 and 44 years as shown in chart below:

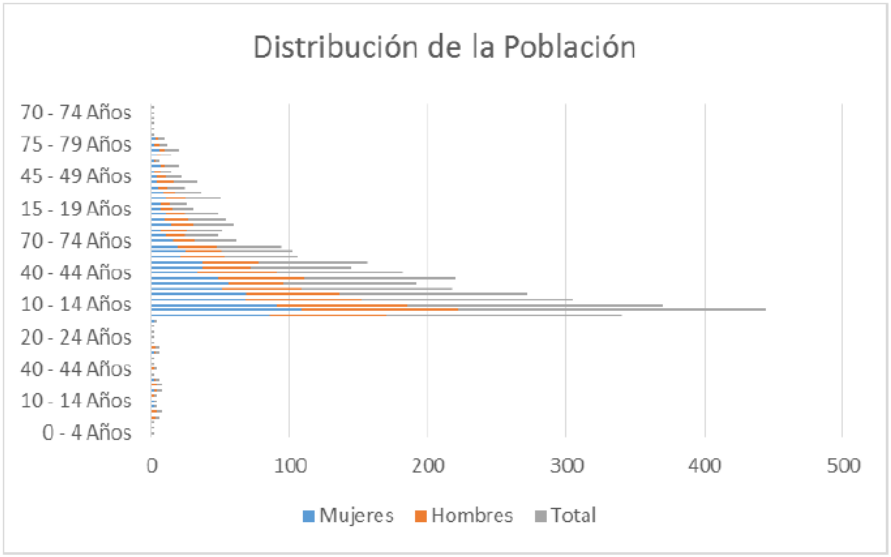


Figure 2 Las Pampas population in 2010 Source

In the year 2015, a field study was carried out to determine more accurately the distribution of population in the Las Pampas parish. A summary of results are shown below: (GAD Las Pampas, 2015)

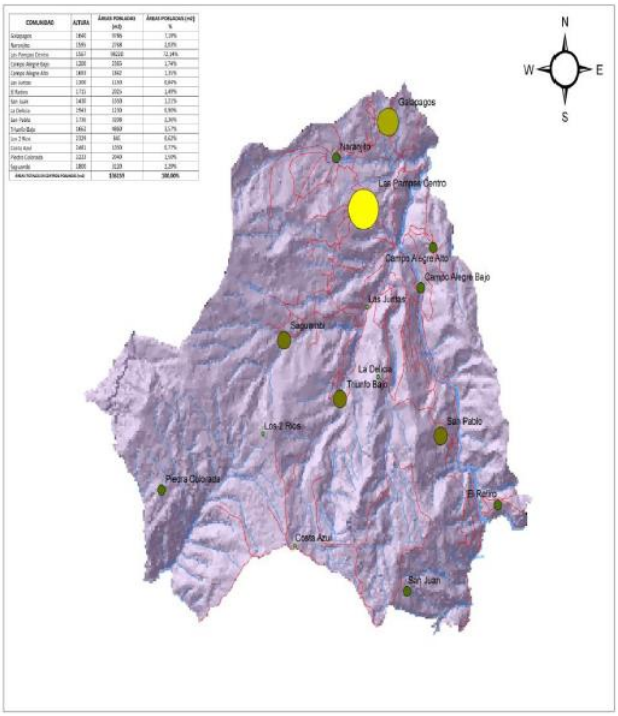
LAS PAMPAS POBLACIÓN

COMUNIDAD	X	Y	ALTURA	POBLACION	Poblacion %
Galapagos	727460	9954701	1640	250	9,69%
Naranjito	725297	9953582	1595	100	3,88%
Las Pampas Centro	726437	9951953	1567	780	30,23%
Campo Alegre Bajo	728825	9949479	1200	160	6,20%
Campo Alegre Alto	729339	9950738	1693	70	2,71%
Las Juntas	726584	9948873	1300	60	2,33%
La Delicia	727041	9946674	1943	45	1,74%
San Pablo	729645	9944814	1736	280	10,85%
Triunfo Bajo	725461	9945979	1662	150	5,81%
Los 2 Ríos	722254	9944881	2329	35	1,36%
Ana María	723573	9941357	2481	40	1,55%
Piedra Colorada	718021	9943112	2223	185	7,17%
Saguambi	723121	9947826	1800	250	9,69%
				2405	**100,00%**

Table 4 Las Pampas Population distribution by community in 2015

The most population in Las Pampas parish is mestizo, around 97%, while remaining 3% is divided into indigenous population and other ethnic groups. (GAD Las Pampas, 2015)

Below a map shows populated areas of the parish of Las Pampas: (GAD Las Pampas, 2015)



Map 4 Las Pampas populated areas in the map

In the parish Las Pampas the population is dedicated to the following economic activities: (GAD Sigchos, 2012)

Economic Activities	Percentage (%)	Description
Agriculture	15	Panela
Cattle range	80	Cattle for meat production
Tourism	0	
Others	5	Various activities

Table 5 Las Pampas Economic Activities

In Las Pampas unemployment rate reach 0.5%. Table below shows employment rates in the parish and sources of employment:

Percentage	Sources of Employment
75%	Own work in their lands
25%	Trade and service provision

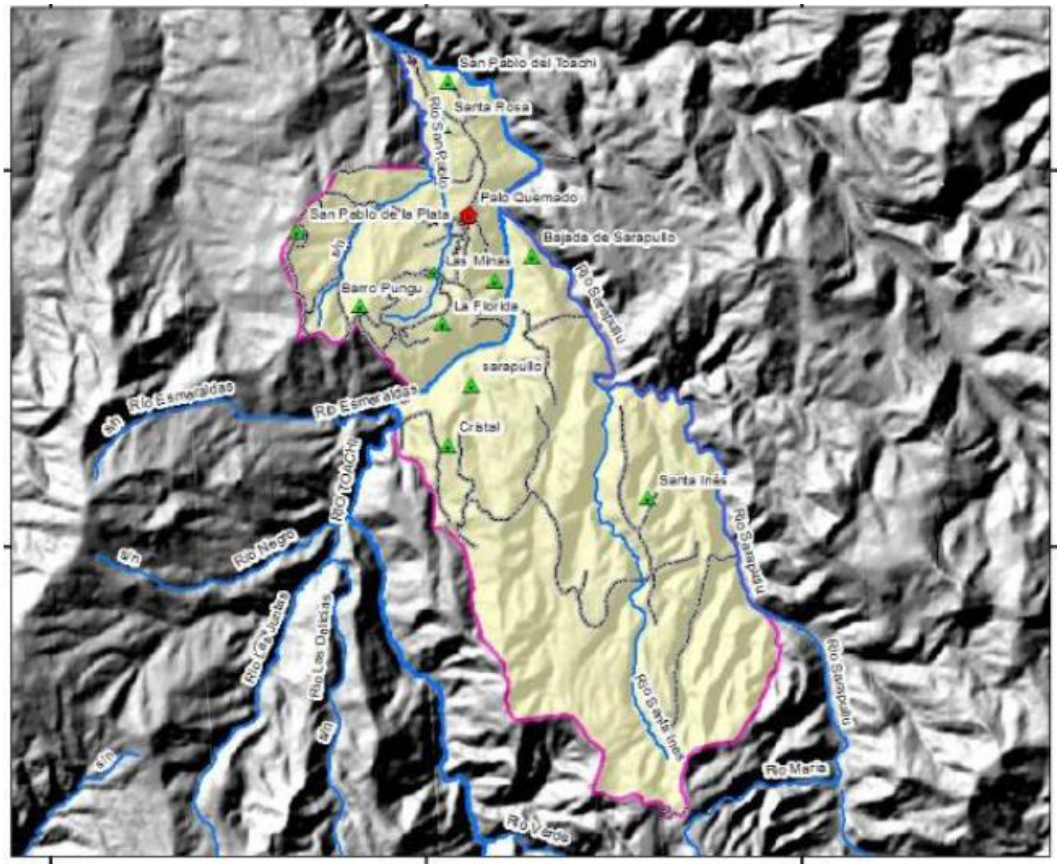
Table 6 Las Pampas Employment Rates

The population of Las Pampas has 90% coverage of electric power, which is obtained from the national electric interconnection network and service is delivered by the Cotopaxi Electric Company (ELEPCO). However, several communities in the parish do not have these service due to dispersal. (GAD Las Pampas, 2015)

Access for Las Pampas has deteriorated road conditions but there are 3 access roads. The main access is from Alluriquín (Santo Domingo) and the others from Sigchos cantonal road network; Union Toachi (Santo Domingo) / Palo Quemado.

In Las Pampas, it is also observed that contamination rate by solid wastes (garbage) is a high value, due to the inefficiency in the service of garbage collection, and in some cases by the non-existent culture of recycling. So, it is necessary to build garbage dumps.

Palo Quemado:
Palo Quemado is a rural parish depending of the Sigchos county and Cotopaxi province. It is located at 4,500 feet altitude right next to the flanks of the Toachi river watershed (Map 1). In terms of road connectivity, this jurisdiction is served by a second order road, which connects Sigchos and the rural town of La Union.



Map 5 Palo Quemado populated areas

According the last census (INEC 2010) the total population of this parish is of 1,030 inhabitants (55% men and 45% women) who live in eight townships or communities as follows: Palo Quemado Centro, San Pablo de la Plata, Las Praderas, Santa Rosa de Lima, Las Minas de la Plata, El Cristal, Zarapullo, and La Florida.

According to the national census (INEC 2010) the women-men correlation in Palo Quemado is 55-45%. The 57% of the population is under 30 years old and 30% are in the age range of 15-30 years old.

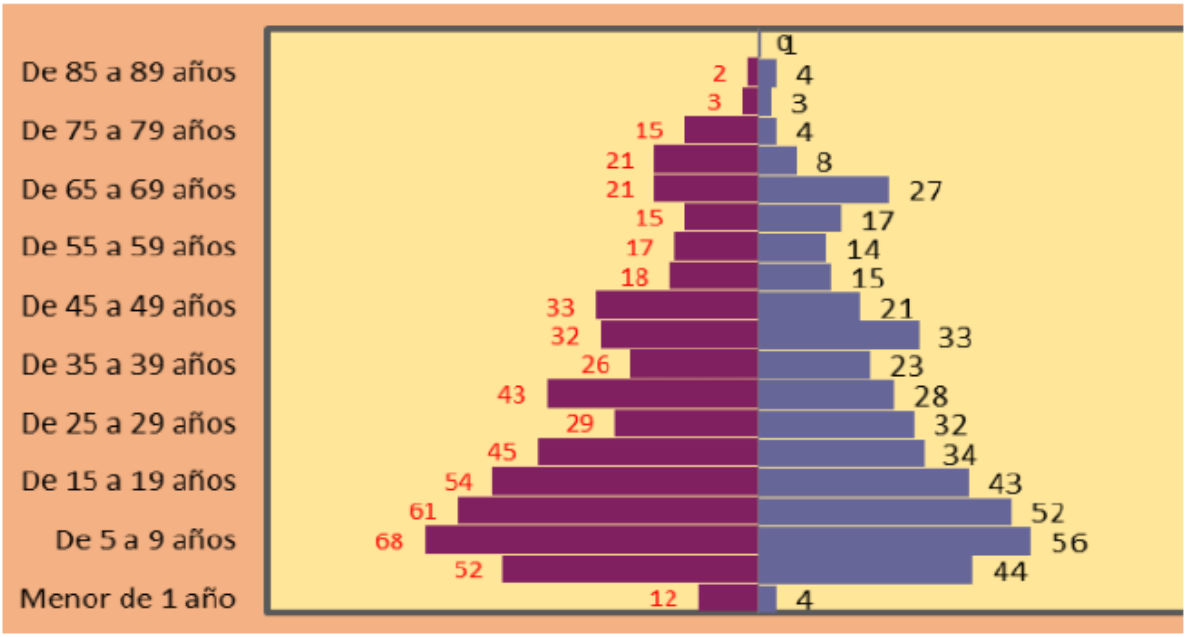


Figure 3 Palo Quemado population

Ethnic self-representation in this parish is basically the "mestizo" accounting the 80% of the population. "Montubios" with 11% of the people is the second form of ethnic identity, and white 5%. There are no other forms of ethnic self-identification. (GAD-PQ 2015) The subsistence of this population comes from small scale agriculture and cattle ranching. Sugar cane and raw milk are the most important products providing about the 75% of the work opportunities in this jurisdiction. While the cane is processed in the locality the milk is sold in the cities of Latacunga and Santo Domingo. The workforce of Palo Quemado is composed of 504 people. According to the national last census (INEC 2010), 234 people of this parish work in agriculture and cattle ranching activities and 141 in manufacture activities, which is basically the production of panela, the most important product of this locality. Other relevant activities are related with services: local trade, transportation and education.

Palo Quemado is an important regional producer of "panela"[2] which is the main source of local income. The panela made in this parish is sold practically in all the central Andean area. In the last few years the sugar cane producers have started producing granulated brown sugar, which is being well accepted in urban regional markets as a healthy alternative to the centrifuged white sugar.

Other local socioeconomic activities in Palo Quemado are around local transportation (regular shifts to La Union, Alluriquin and Santo Domingo), local trade of rural utensils, staples, agrichemicals and other products and artifacts required for living in the rural environment of the parish. Modest production of fruits and tuberous like naranjilla, limón, naranja, banana, tree tomato, camote, yuca, papa china, among other is mostly used for family consumption and local exchange.

The most important local organizations are the associations Flor de Caña formed by the sugar cane producers and the Asociación Agroartesanal San Pablo de la Plata created by agriculture

[2] Panela is basically the unrefined whole cane sugar. It is the result of boiling and evaporating raw sugarcane juice and then poured into molds to obtain hard round blocks for easy transportation. Each block has a standard weight of 32 pounds.

and cattle ranching producers. Most of the economically active people in the parish are member of either one of these organizations. Finally it is important to note that the territory of Palo Quemado has some mine resources, especially gold and copper. Concessions of about 2,347 hectares[3] of the parish territory have been established for mining purposes. At the moment three mine sites are in the area (Table 7), however this activity is still not relevant for the local economy and the companies working there have not significant relation neither with local authorities nor with the socioeconomic life of the parish.

PLACE	MINE COMPANY	TYPE	AREA
La Florida	Sultana del Còndor Minera Sulcomi SA	Metallic	642
Loma del Tigre	Sultana del Còndor Minera Sulcomi SA	Metallic	1658
Toachi	GADs Sigchos and Pichincha	No-Metallic[5]	47
		TOTAL	2347

Table 7 Mining places in Palo Quemado parish[4]

The mines operated by the Sigchos Municipality and the Consejo Provincial de Pichincha are natural deposits for temporal extraction of sand, crushed stone and aggregate for construction needed for road construction and maintenance and other public works. According the mining legislation, the nonmetallic mining is under the control of the municipalities while the metallic one is controlled by the central government so that the local governments, Junta Parroquial has nothing to do with this activity and then it has a no relevant role in the local economy.

Based in the national census 2010, Table 8 shows a comprehensive overview of the parish.

Sector / Indicator	Measure	Palo Quemado
Illiteracy	% (15 years old or more)	9.54
Functional illiteracy	% (15 years old or more)	15.91

[3] Typically the mine concession areas are higher than the actual place of mine activity. So although a concession can be of hundred or thousand hectares, the place where the mine resource is extracted is significantly smaller.

[4] Nonmetallic mining is for extracting sand, gravel; rock stone and other related mine products.

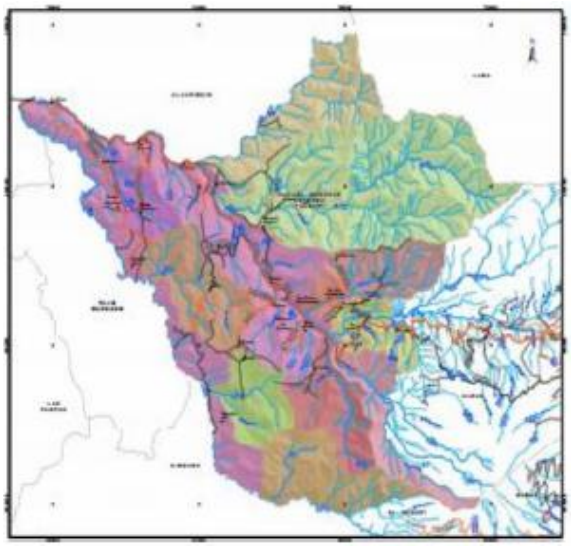
Education	Años de estudio	6.84
Universitary education	% (24 years old or more)	4.77
Complete Elementary School	% (12 years old or more)	81.11
Complete High School	% (18 years old or more)	18.86
Working children 15 - 17 years old	% (children 5-17 years old)	46.15
Working children 5 - 14 years old	% (children 5-14 years old)	6.75
Peoble economically active	Number	504.00
People in working age	Number	794.00
Afroecuadorian population	Number	16.00
White population	Number	47.00
Total population	Number	1,030.00
Men population	Number	567.00
Indigenous people	Number	8.00
Mestizo population	Number	846.00
Women population	Number	463.00
Women proportion	% (total population)	44.95
Extreme poverty for non-satisfied basic needs	% (total population)	33.60
Poverty for non-satisfied basic needs	% (total population)	95.60
Human Development Bonus	Number	314.00
Water service inside home	% (houses)	11.37
Sewage network	% (houses)	9.41
Electric service	% (houses)	85.49
Telephone land line	% (houses)	11.40
Gas use for cooking	% (homes)	83.65
Firewood / charcoal use for cooking	% (homes)	15.20
Own home	% (homes)	79.46

Table 8 Socioeconomic Overview of the Palo Quemado Parish

The data shows that this rural parish presents some signs of acute social vulnerability. For example, education, water and sewage services are insufficient,

Manuel Cornejo Astorga (Tandapi)

Although the official name of this rural parish is Manuel Cornejo Astorga, the name of the main town in the territory is known as Tandapi, a traditional name since this side road town was created. It is located in the Pilaton watershed and next to the Aloag-Santo Domingo road, the most important artery to communicate Quito and Guayaquil, the main Ecuadorian cities (Map 2). The area of this parish is of 495,89 km2, with an altitudinal range between the 3,800 feet and 8,000 feet. According the national census of 2010 the population is of 3,661 people of which 60% (2,197) is considered economically active.



Map 6 The Manuel Cornejo Astorga – Tandapi Rural Prish

According to the national census (INEC 2010) the women-men correlation is 53-47%. The 68% of the population is under 40 years old and 30% are in the age range of 15-30 years old. (Figure 9) The most extended ethnic self-representation in this parish is basically that of "mestizo" representing almost the 90% of the local population. Other ethnic self-representation are white (4.5), indigenous (4%), and Afroecuadorian (2.2%).

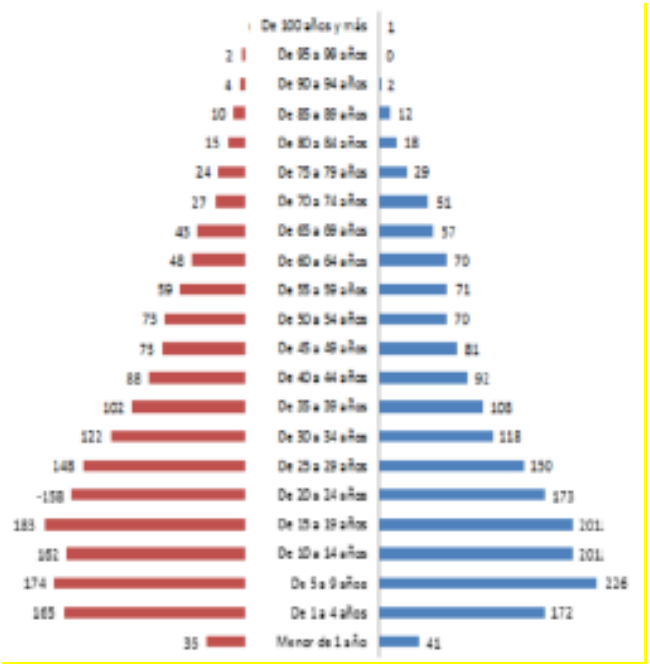


Figure 4 Age distribution in the Manuel Cornejo Astorga – Tandapi Rural Parish

The main economic activities in this rural parish are related to agriculture, livestock, milk and meat production, flower, tourism, and transportation. Agriculture and livestock are the main sources of income and subsistence for the local population representing the 46% of the entire economic activities in the parish. Trade and small business represent the 11.5% of the economic activities. Food and accommodation represent 7.78 % (Table 9). The most important products are maize, cocoa, cassava, banana, oil palm, potatoes, cereals, maize, beans, quinoa, vegetables[5], pork and chicken meat, milk, fish.

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	806	46,78
Industrias manufactureras	57	3,31
Suministro de electricidad, gas, vapor y aire acondicionado	9	0,52
Distribución de agua, alcantarillado y gestión de deshechos	7	0,41
Construcción	71	4,12
Comercio al por mayor y menor	199	11,55
Transporte y almacenamiento	78	4,53
Actividades de alojamiento y servicio de comidas	134	7,78
Información y comunicación	5	0,29
Actividades financieras y de seguros	1	0,06
Actividades profesionales, científicas y técnicas	7	0,41
Actividades de servicios administrativos y de apoyo	42	2,44
Administración pública y defensa	14	0,81
Enseñanza	40	2,32
Actividades de la atención de la salud humana	6	0,35
Artes, entretenimiento y recreación	3	0,17
Otras actividades de servicios	12	0,70
Actividades de los hogares como empleadores	56	3,25
No declarado	155	9,00
Trabajador nuevo	21	1,22
	1723	100

Table 9 Economic activities in the Manuel Cornejo Astorga – Tandapi Rural Parish

[5] These are products for warm and cold weather, favored by the location of the parish between the Coast and Sierra regions.

Alóag

Alóag is a rural parish of Mejía canton, which is near road highway, and its located in the connection between the north and south mountains and country's coast region, this is 33 kilometers from Quito, near the El Corazón volcano, which its 4,786 meters of height. Alóag has an area of 255.56 square kilometers and its altitude reaches 3040 meters above sea level. In 2014, population reaches 10,602 habitants, which is estimated in 3% of population density of habitants per kilometer considering total of the canton.(GAD Mejía, 2014)

Map 7 Aloag location

In 2010, the population of Alóag was estimated in 9237 habitants, which value is calculating a population density of 36.14 habitants per square kilometer. The population density estimates for the year 2020 in 37.99 habitants per square kilometer and for 2025 in 38.95 habitants per square kilometer. According to PDOT, in this parish the total amount of houses reaches 2353. Below is a chart with a projection of population for canton Mejía by parishes:

TABLA CAH 62	Población de las parroquias, Cantón Mejía							
Parroquias	Población total		Tasa de crecimiento	Proyección de la población				
	1990	2001	Año 2001	2005	2010	2015	2020	2025
Machachi	18402	22492	2,02	24309	26581	28853	31124	33396
Cutuglagua	3593	9987	16,17	16447	24521	32596	40670	48745
Aloag	6301	8850	3,67	10149	11773	13397	15021	21019
Aloasi	5175	6855	2,95	7664	8675	9686	10697	11708
Tambillo	5960	6571	0,93	68,13	7115	7417	7720	8022
Uyumbicho	3217	3679	1,3	3870	4109	4349	4588	4827
Manuel Cornejo Astorga	2776	3132	1,16	3279	3462	3645	3828	4011
El Chaupi	1263	1322	0,42	1345	1373	1402	1430	1458

Fuente: INEC; PD y OT 2002-2012; POT PICHINCHA; P.D.L. UCE 2009; Cálculo proyección Población: Consultoría se tomó los datos del INEC-2001
Año: 2001 Proyección al 2025
Elaboración: EQUIPO PDOT GAD. MEJÍA 2014

Table 10 Population project for Mejía parishes

Regarding basic services for Alóag population, it is estimated in the following table:

TABLA CAH 69	Servicios básicos por parroquia					
Parroquia	Vivienda con agua potable	Vivienda con servicio de alcantarillado	Vivienda con servicio de recolección de basura	Vivienda con servicio de electricidad	Vivienda con servicio higiénico exclusivo	Vivienda con características adecuadas de piso
Machachi	46,15	56,14	61,41	92,75	47,93	90
Alóag	33,67	45,03	46,15	79,75	39,41	85,24
Aloasí	34,19	37,11	32,9	90,36	44,48	89,17
Cutuglagua	8,81	22,02	27,13	71,05	30,24	84,62
El Chaupi	13,88	8,47	19,18	77,55	18,95	86,94
Manuel Cornejo Astorga	17,64	16,9	19,75	43,03	20,03	96,12
Tambillo	38,83	56,93	54,78	94,48	50,13	89,31
Uyumbicho	61,95	62,93	56,37	95,71	59,66	87,98

Fuente: GPP-DPLA
Elaboración: SISE

Table 11 Basic Services for Mejía parishes

In 2014, the urban and rural population of Mejía canton was distributed according to the table below:

TABLA CSC 1	Población Urbana y Rural del Cantón Mejía		
Población	**Hombres**	**Mujeres**	**Total**
Rural	7301	3187	43,65
Urbana	2331	952	40,84
Total	2525	876	34,69
TOTAL	**21127**	**9059**	**42,88**

Fuente INEC: 2010
Elaborado: EQUIPO PDOT GAD MEJÍA 2014

Table 12 Urban and Rural population for Mejía Canton

In Aloag, the weather is considered as equatorial meso thermal semi-humid, with the following temperatures: minimum of 3.6 ° C, maximum of 12.4 ° C, average 12.4 ° C.
Mainly, canton Mejía is characterized by the richness of volcanic soils and presence of water resources. It has highly agricultural areas, small and medium owners. In the last two decades extensive export agriculture was carried out, principally of flowers and vegetables. Livestock activity is developed and large farms and dairy companies.(GAD Mejía, 2014) Chart below shows land use in canton Mejía:

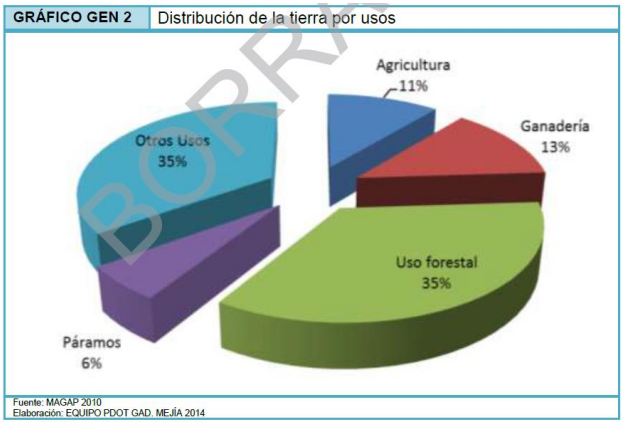


Figure 5 Land use for Mejía canton

In 2010, according to data from MAGAP, in Mejía canton, was estimated that 59,962 hectares were destined to cattle range for milk production, while 5,420 hectares for traditional agriculture and 1,408 hectares to export crops. The high moors cover the ecological reserve and 28,017 hectares are part of water sources generation.

Agricultural production of small producers is based on the following main crops: maize, vegetables, beans and potatoes, with a production of 2,300 hectares per year.
In Alóag are located industries, which 52% are dedicated to the processing and elaboration of food products and 48% diversified activities.

El Chaupi:
The Chaupi Parish is located to the southwest of Mejía, near the Ilinizas Ecological Reserve, and it is located at altitude of 2900 meters above sea level. The area of this parish reaches 136, 91 square kilometers.

The weather for this parish is humid, sub-tempered, with an average temperature of 9.11° C. El Chaulpi parish uses 30% of tropical humid forest. El Chaulpi GAD has been carried out several reforestation projects for the massive planting of native trees, such as: quishuar, puma maqui, arrayan.

In 2010, a population of 1,373 was estimated. In 2014, studies were carried out to estimate a density population per parish, those results are shown in chart below:

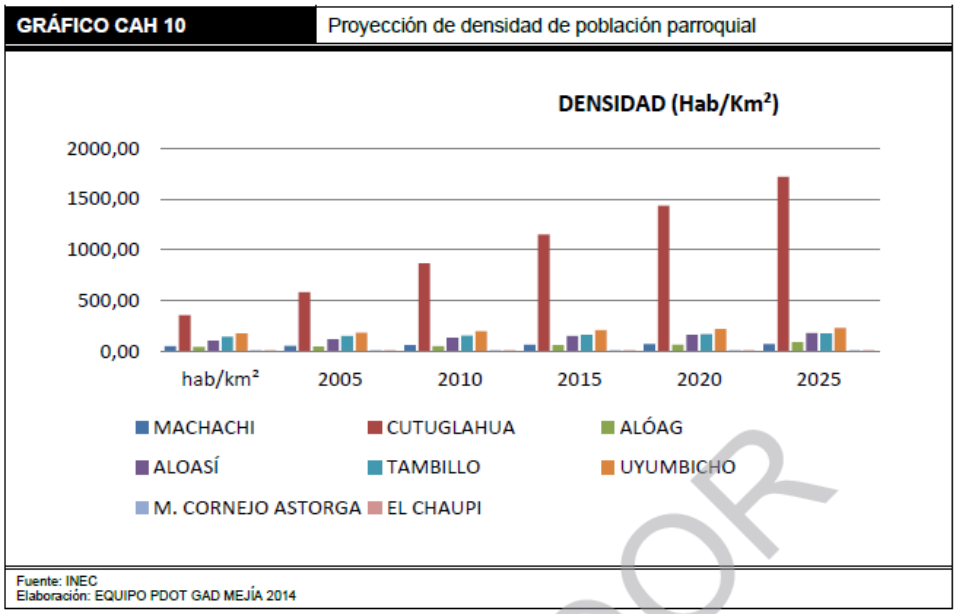


Figure 6 Projection of density of parish population

El Chaulpi is characterized by being a productive parish, and it has several access roads, which allows villagers to mobilize between farms to transport their products.
Tables below show historical milestones of El Chaupi parish, in the following aspects: Economic, Social and Environmental:

- **ECONÓMICO**

AÑO	HITO	IMPACTO POSITIVO	IMPACTO NEGATIVO	OBSERVACIONES
1930 1940	Producción de los campos	Aumento de las fuentes de ingreso	Contaminación ambiental	
1908	El pase del tren	Mejora la economía, Movilidad y conectividad		
2009	Asentamiento de la empresa agroquímica Quimirosburg S.A.			Requerir estudio de impacto ambiental para el correcto funcionamiento de la empresa.
2008	Floricolas Ilinizas Big Roses CIA. LTDA.	Positivo (Mano de obra local)	Utilización de Químicos. Personal afectado en su salud y desatención de la empresa.	Requerir estudio de impacto ambiental para el correcto funcionamiento de la floricola

Table 13 Economic Historical Milestones for El Chaulpi

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

- **SOCIAL**

AÑO	HITO	IMPACTO POSITIVO	IMPACTO NEGATIVO	OBSERVACIONES
1930-1940	Fraccionamiento De los terrenos		Aumento de necesidades de infraestructura Destrucción de bosque Daño al suelo	Propiedad de la Sra. Doña Manuela Carcelén (Marquesa de Solanda)
1949	Se presenta la propuesta ante el Concejo para la parroquializacion de El Chaupi	Organización Social		
1996	Creación del salón de usos múltiples y sede del Gobierno Parroquial.	Espacios físicos para desarrollo de actividades sociales		
	Estadio parroquial El Chaupi	Disfrute de actividades deportivas de la población		
2009	Grupo Club Adulto Mayor	Atención a personas de tercera edad		
2009	Biblioteca Municipal	Servicio a la comunidad como fuente de consulta		
2000	Destacamento Policial - UPC	Seguridad a la ciudadanía		Organización ciudadana.
1912	Primer ascenso de los hermanos Martínez y Rafael Villavicencio a los Illinizas. Inicio de actividades turísticas hacia los Ilinizas y demás atractivos naturales.	Asentamiento De Hosterías Y Hospedajes Para Turistas		Débil promoción turística y capacitación a dueños de hosterías de la parroquia sobre promoción turística y atención a clientes.

Table 14 Social Historical Milestones for El Chaulpi

- **AMBIENTAL**

AÑO	HITO	IMPACTO POSITIVO	IMPACTO NEGATIVO	OBSERVACIONES
1996	Se establece la Resolución 066 publicada en el Registro Oficial No. 92 Como Reserva ecológica los Illinizas	Promueve la conservación del medio ambiente y el turismo		Ejercer cumplimiento de la Ley sobre las reservas ecológicas.
1886	Erupción del Cotopaxi		Contaminación del aire , agua, suelo	Afecto a todo el país.
2011	Incendio Forestal		Contaminación de las aguas del Rio Nieves toma El Corazón. Destrucción forestal en la reserva ecológica Ilinizas.	Descuido de autoridades competentes.
	Empresa Novopan		Daños a la esponja natural de gua (páramo)	Daño permanente al medio ambiente.
2007	Empresa ACOSA		Siembra de árboles de Pino causando daño y erosión al suelo	Cultivos y talas permanentes
1995	Helada natural que terminó con la especie Batracio (Jambato)		Desaparición de la especie.	
	Contaminación de quebradas y ríos de la parroquia por descargas de aguas servidas.		Contaminación de ríos y daño de animales y cultivos.	

Table 15 Environment Historical Milestones for El Chaulpi

In the El Chaulpi parish, one of the most important environmental problems is the inappropriate handling of solid waste, which is a threat for human and animal health located close this parish, especially in areas without garbage collection.

The El Chaulpi parish has suffered from the exploitation and deterioration of the forests in El Chaulpi hill, which has caused losses in biodiversity, and it's generating a decrease in water sources and pollution. The main threats of the area are: deforestation, forest fires, grazing and clearing activities.

This parish has experienced economic and population growth, because there is soil fertility in to carry out productive activities, such as floriculture and livestock. So, there has been considerable pollution and environmental degradation which has resulted in a decline in natural resources.

Deforestation, is the main cause for the destruction of the habitat of the species and its disappearance. However, presence of forests and ecological reserves, promote the tourist activity in the parish. Table below shows information about reforestation projects in El Chaulpi parish:

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Ubicación/ Sector	PROYECTOS		
	Acciones o Estrategias	Avance	Actores Involucrados
Barrio Pucará	Reforestación	10%	Junta Parroquial, Consejo Provincial de Pichincha, Ministerio de Ambiente y Comunidad
Vertientes de San Marcos	Reforestación	10 %	Junta Parroquial, Consejo Provincial de Pichincha

Table 16 Reforestation Projects in El Chaulpi

Agriculture and livestock are main sources of income and subsistence for population, these activities are complemented with other family incomes. Table below shows results of studies carried out about economically active population and data obtained are sorter by activity, group and occupation category.

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	369	59,23
Explotación de minas y canteras	2	0,32
Industrias manufactureras	44	7,06
Suministro de electricidad, gas, vapor y aire acondicionado	5	0,80
Distribución de agua, alcantarillado y gestión de deshechos	1	0,16
Construcción	25	4,01
Comercio al por mayor y menor	41	6,58
Transporte y almacenamiento	23	3,69
Actividades de alojamiento y servicio de comidas	8	1,28
Actividades financieras y de seguros	3	0,48
Actividades profesionales, científicas y técnicas	5	0,80
Actividades de servicios administrativos y de apoyo	10	1,61
Administración pública y defensa	7	1,12
Enseñanza	10	1,61
Actividades de la atención de la salud humana	7	1,12
Artes, entretenimiento y recreación	3	0,48
Actividades de los hogares como empleadores	12	1,93
No declarado	28	4,49
Trabajador nuevo	20	3,21
Total	623	100,00

CUADRO 17

RAMA DE ACTIVIDAD
Fuente: Censo INEC, 2010
Elaboración: ETP-GADPP

GRUPO DE OCUPACIÓN	CASOS	%
Directores y gerentes	18	2,89
Profesionales científicos e intelectuales	6	0,96
Técnicos y profesionales del nivel medio	7	1,12
Personal de apoyo administrativo	18	2,89
Trabajadores de los servicios y vendedores	58	9,31
Agricultores y trabajadores calificados	201	32,26
Oficiales, operarios y artesanos	47	7,54
Operadores de instalaciones y maquinaria	58	9,31
Ocupaciónes elementales	161	25,84
Ocupaciónes militares	1	0,16
no declarado	28	4,49
Trabajador nuevo	20	3,21
Total	623	100,00

CUADRO 18

GRUPO DE OCUPACIÓN
Fuente: GPP - DIPLA
Elaboración: ETP-GADPP

CATEGORIA DE OCUPACION	CASOS	%
Empleado/a u obrero/a del Estado, Gobierno, Municipio, Consejo Provincial, Juntas Parroquiales	33	5,47
Empleado/a u obrero/a privado	170	28,19
Jornalero/a o peón	153	25,37
Patrono/a	12	1,99
Socio/a	2	0,33
Cuenta propia	193	32,01
Trabajador/a no remunerado	9	1,49
Empleado/a doméstico/a	17	2,82
Se ignora	14	2,32
Total	603	100,00

CUADRO 19

CATEGORIA DE OCUPACION
Fuente: Censo INEC, 2010
Elaboración: ETP-GADPP

Table 17 Economically Active Population in El Chaulpi

Table below shows a summary of productive activities in El Chaulpi parish:

ACTIVIDADES PRODUCTIVAS	TIPO DE PRODUCCIÓN O CULTIVOS	PRINCIPALES MERCADOS DE COMERCIALIZACIÓN
Agrícola	Papas, Haba, Melloco, Hortalizas	Quito, Guayaquil, Latacunga, Saquisilí
Ganadería	Leche Y Derivados	
Floricola	Rosas	

Table 18 Productive Activities in El Chaulpi

Regarding to gender projects, those have been executed in this parish; one in La Llovizna farm, which employs 20 women to dehydrate fruits and produce tea. Other projects developed were focus on involving women to work in agriculture activities in small family gardens for planting and harvesting organic vegetables.

In 2010, a study of vulnerable groups was carried out, which results are show in the table below:

TIPO DE VULNERABILIDAD	POBLACIÓN APROXIMADA
En qué sector de vulnerabilidad se ubica	Número aproximado de personas que sufren esta vulnerabilidad
Adultos/as mayores	40
Discapacitados	35

Table 19 Vulnerable Groups in El Chaulpi 2010

STAKEHOLDERS AND PERCEPTIONS ON CLIMATIC ISSUES

As described above the Toachi-Pilaton watershed is a natural framework of intense socioeconomic exchange where people and organizations of diverse type and range exert their interests in order to get and influence management of the existent natural resources.

This approach is helpful for understanding that any measure for promoting sustainable development, water management or adaptation strategies for climate change and vulnerabilities should be the result of the dialogue among the different stakeholders of the area. This part of the report is based on fieldwork carried out in the three rural counties in June 2016. During the field work was used semistructured questionnaires to interview representatives of the Cotopaxi, Sigchos, Las Pampas, Alóag, Palo Quemado, and Manuel Cornejo Astorga GADs, representatives of the Environmental and Communitarian sections of the Hidrotoachi project, members of productive organizations, and local residents. People interviewed were asked how they perceived climate issues and how they think they affect the daily life of the people.

Questions during the interviews looked for understanding five basic issues:

- What kind of weather issues are occurring in the area of study,
- How they are affecting the local people and socioeconomic activities,
- What are the explanations of local people to these events,
- What is the understanding of climate change phenomenon; and,
- How concerned are local authorities in watershed management and climate issues in the Toachi-Pilatón watershed.

These questions were helpful to know the perception and the level of preparedness for climatic events and issues of vulnerability in the area.

Stakeholders in the area

Stakeholders or Interest Groups are people and entities with a declared or conceivable interest or stake in the management of a given area. Stakeholders are not necessary organized they can be of any form, size and capacity like individuals, organizations, or even unorganized groups.

To carry out a detailed analysis of stakeholders or interest groups in the area, a categorization was required as follow:

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Figure 7 Stakeholders by category

Below a description of each category:

Government Sector: Organizations that are part of the state apparatus and have their functions determined according to national legislation.
Private Sector: Heterogeneous organizations that know the problem in the Toachi-Pilatón watershed including financial institutions.
Productive Organizations: Organizations that carry out their productive economic activities within the project area.
Civil Society and foundations: Individuals or foundations part of civil society in the project area.
Communities and Local Interest Groups: Communities and local groups that live in the Project area.
Academy: Organizations that have technical knowledge and collaborate in projects with the GAD.

For development of the final proposal, working meetings and consultations were held with Toachi Pilaton watershed stakeholders. As a result a list of stakeholders is shown in the following table:

Category	Represented Organizations	Roles
Government Organizations	MAE	Administrative agency for providing climate change and environmental guidelines
	INAMHI	Implementing meteorological stations
	CELEC-HIDROTAPI	Administrative agency for implementing the project
	MEER	Administrative agency for providing energy technical knowledge
	MAGAP	Administrative agency for providing agriculture technical knowledge
	MINTUR	Promoting tourism in the project area
	Regional GAD: Pichincha	Administrative agency - province
	Regional GAD: Cotopaxi	Administrative agency – province
	Regional GAD: Santo Domingo de los Tsachilas	Administrative agency - province

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

	Subregional GAD: Mejía	Administrative agency - municipality
	Subregional GAD: Sigchos	Administrative agency - municipality
	Subregional GAD: Santo Domingo	Administrative agency - municipality
	Local GAD: Manuel Cornejo Astorja	Administrative agency - local
	Local GAD: Palo Quemado	Administrative agency - local
	Local GAD: Alluriquin	Administrative agency - local
	Local GAD: Las Pampas	Administrative agency - local
	SENAGUA	Reporting and monitoring water quality
	Water Board Santa Rosa (Palo Quemado)	Water providing and administration
	BanEcuador	Providing financial services
Private Sector	Ranchers and farmers	
	Sultana del Còndor Minera Sulcomi SA (Palo Quemado)	Mining
	Toachi GADs Sigchos and Pichincha mining processing sites (Palo Quemado)	Mining
	Teegra Ecuador S.A. (Alluriquin)	
	Caselogic (Alluriquin)	
	Sultana del Cóndor Minera (Sulcomi S.A), Loma del Tigre concession (Alluriquin)	Mining
	Coop “San Miguel de Sigchos” (Segment 4)	Providing financial services
	Coop “Unión y Progreso” (Segment 3)	Providing financial services
	Coop “CACPECO” (Segment 1)	Providing financial services
	Majinta Cusunchi	Providing financial services
	Credi Fé Banco Pichincha	Providing financial services
	Manantial de Oro	Providing financial services
	Mining Company “Mina de la Plata	Mining production
Civil Society and foundations	Fundación Tangaré (Tandapi)	
	Reserva Biológica La Esperanza	
	Hesperia Biological station and reserve	
	Otongachi biológical reserve	
	Río Guajalito Scientific Station	
	Tanti protected forest	
	Rio Lelia watershed protected forest	
	La Favorita Scientific Station	
	ORCOPROSAN	Productive community organization Santa Rosa Lima. (Paloquemado)
	Association of agricultural producers and dealers “Quinticusig”	Production of mulberry wine
	Association women’s “Marianita de Jesús” Las Pampas	Working in cattle and agriculture
	Association of Cattle Rancher “Las Pampas”	Working in cattle raising
	Association “Flor de Caña”	Production of panela

Stakeholders, interests and socioeconomic situation in the Río Blanco upper watersheds.

Productive Organizations	Agroartesanal Association "San Pablo de la Plata"	Working in agriculture and cattle ranching
	Pre-Asociación de Cafetaleros (Tandapi)	
	Pre-Asociación de Cafetaleros (La Esperie)	
	Asociación de Productores Agropecuarios "Pampas Argentinas" (Tandapi)	
	Asociación Agropecuaria Mirabad (Tandapi)	
	Asociación de Trabajadores El Progreso	
Local interest groups	Juan Játiva	
	Unión del Toachi (Alluriquin)	Community
	La Esperanza community (Tandapi)	Community
	El Mirador community (Tandapi)	Community
	Mirabad community (Tandapi)	Community
	El Paraíso community (Tandapi)	Community
	San Francisco community (Tandapi)	Community
	Los Olivos community (Tandapi)	Community
	Peñas Blancas community (Tandapi)	Community
	Ilusión community (Tandapi)	Community
	Canchacoto community (Tandapi)	Community
	Iliolan community (Tandapi)	Community
	Cordilleras del Paraíso community (Tandapi)	Community
	San Antonio community (Tandapi)	Community
	La Esperie community (Tandapi)	Community
	La Palma community (Tandapi)	Community
	Pampas Argentinas community (Tandapi)	Community
	Praderas del Toachi community (Palo Quemado)	Community
	Palo Quemado Centro community (Palo Quemado)	Community
	San Pablo de la Plata community (Palo Quemado)	Community
	Las Praderas community (Palo Quemado)	Community
	Santa Rosa de Lima community (Palo Quemado)	Community
	Las Minas de la Plata community (Palo Quemado)	Community
	El Cristal community (Palo Quemado)	Community
	Zarapullo community (Palo Quemado)	Community
	La Florida community (Palo Quemado)	Community
	Unidad Educativa Juan Salinas (Palo Quemado)	Community

Academy	ESPE University	Providing technical knowledge and training
	Católica University	Providing technical knowledge and training

Table 20 Stakeholders in the project area

During consultations, all stakeholders agreed on relevant importance of climate change adaptation project in the Toachi Pilatón watershed because they have evidenced a remarkable change in the climate over at least 5 years. This change is affecting the community's way life and their subsistence.

Using meetings each stakeholder presented their opinions and recommendations for the project and also they share information of projects in connection with adaptation climate change project. Parallel, according to National Constitution the regional decentralized governments are invested with the exclusive competence for watershed planning and for creating watershed council to carry out its management.[6] Besides the conservation, recuperation and integrated management of water resources are also under the state responsibility through the regional governments.[7] This competence bestow these governments to regulate all activities that can affect the water quality and quantity and the ecosystemic equilibrium especially and water recharge areas.[8]

As a summary stakeholders did focus in the following main aspects:

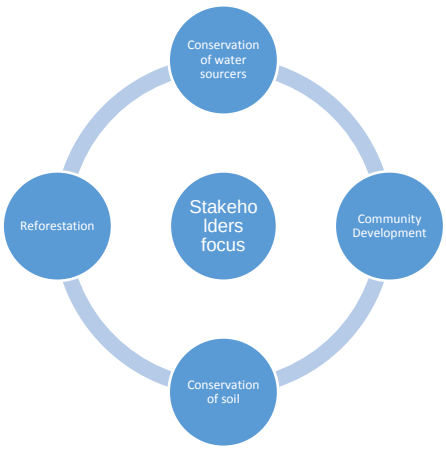


Table 21 Stakeholders aspects

Although the importance of the legal framework regarding watersheds, the regional governments have not been created yet, so their competences are not fully executed by any public organization. As a result there are not administrative councils for watershed managements and no control agency that can assure an overview of all the watershed of the country. Some control activities regarding these areas are carried out by the Ministry of Environment (MAE) and Ministry of Agriculture, livestock, aquaculture and fisheries. (MAGAP) but in any case an integrated policy of management and control can be applied by several and dispersed organizations.

[6] See articles 262 and 263 of National Constitution
[7] See article 411 of National Constitution
[8] Idem

Provincial governments have the competence for promoting public works in watershed of all type in their territories and to carry out the environmental management. However these competences can be conflictive since the promoting of public works means the construction of roads, irrigation channels, bridges and other infrastructure that can impact watershed if environmental issues are not considered. In addition, not all provincial governments have still authorization for environmental management[9] so in practice no competences over watershed can be applied.

Another issue regarding one of the productive stakeholders in the watershed is the mining activity. As known mining is among the most nature transformation activities and typically they are executed in very difficult to access areas where rural governments are more efficient to reach. However according the national law, metallic mining activities are under the control of the central government and non-metallic mining under the municipal governments. In the area of study there are six metallic mining concessions and a number of non-metallic extracting places. Since rock, sand, stone and other non-metallic mine resources are abundant in the area it is virtually impossible for the local municipalities to control all of them. Companies granted with metallic mine concessions report to ARCOM (Agencia de Regulaciòn and Control Minero) and not to local rural parishes in whose territories the environmental impacts occur. As a result, mining companies work in the area but have not relationship with local organizations.

The effect of the above explained situation is that there is not any organization in the Toachi-Pilaton watershed that can carry out a comprehensive management of the existing hydric resources and to coordinate activities of the local public organizations in order to establish management activities for the control and conservation of the area.

Two institutions only are carrying some type of activities in coordination with local authorities, and other stakeholders. They are the MAE in the framework of Plan Bosque, in which coordination at different levels is performed with rural parishes, communitarian organizations and forest private owners. The other organization is the Hidrotoapi Hydroelectric Project, a large infrastructure construction executed by a private company under the order of the central government. As a part of the environmental requirements Hidrotoapi must execute communitarian consultation in the area of direct and indirect impact of such project. In order to fulfill such need this project has organized a comprehensive plan to inform local communities about potential environmental and socioeconomic impacts that can affect local livelihoods.

In the above mentioned scenario, the local stakeholders has few opportunities for communication, coordination and exchange strategies for organizing their activities in a sustainable way or at least to make them more efficient. On the other hand, the absence of a management straggles leave the stakeholders to perform their activities at large with a minimum of considerations for the security and sustainable use of the watershed.

Climate issues in the Toachi Pilaton watershed

Four climatic issues were mentioned consistently during the interviews: drought, rainfalls, temperature increase and strong winds. The local people are now aware of the weather events and negative impacts since it is fresh in the memory the catastrophic spate in the Alluriquin

[9] According the MAE legal framework only provincial and municipal governments that fulfil some requirements are bestowed for environmental management in their jurisdictions.

parish occurred a couple months before the field work for this report and caused by record precipitations. Most of the communities of the parishes involved in this study have also experienced landslides in their lands in the last two years due to sudden and excessive rains.

So for most of the interviewed people it is evident that changes in weather patterns have occurred over the last years and they are interconnected. Then awareness regarding climatic issues in the area has been triggered by the experience with such disasters which have affected practically all the region.[10]

Drought was considered an important issue especially in the Toachi watershed area. Communities of the upper basin like Palo Quemado and even of Sigchos referred that most of the year 2015 the entire area has suffered an extreme dry season. For communities of the lower basin it was not an issue because of the alternatives to offset the problem through the use of the river water, but for those of the higher and middle watershed it was more problematic because the river is far from the communities. However after several months of dryness there was a sudden rainy season including deluges that caused spate, mass movements and flooding in different communities of the lower and middle areas in the watershed.

Strong winds have also been reported during the interviews. These events occurred especially in Palo Quemado where the winds were so intense that several trees were uprooted. This weather condition is also pointed as part of the climate pattern change that is experiencing this region.

Effects of the weather issues on local socioeconomic activities

Local people have been concerned of threats to the communities caused by changes in the climate patterns especially in terms of human and economic security (i.e. landslides, flooding and crops quality). Ongoing changes in weather patterns are seen acutely since the Lamas river spate occurred in April 2016 and the string of landslides and avalanches occurred in the last months of 2015 and first trimester of 2016 in different areas of the three involved counties.

The related weather events have affected negatively the local people in several ways. First, long periods of dryness and short but intense periods of rains are pointed as the cause of the decreasing of sugar cane quantity and quality. Sugar producers said that the panela production has significantly decreased in the last year because of the lack of the cane quality.

Now they need more canes to produce the same amount of panela that is the standard for commercialization.[11] Other sectors like the cattle ranchers and agriculture producers have also experienced problems derived from extreme weather events. Low productivity, fungus and pest[12] increase, and plant destruction by intense rains are the most common problems the

[10] The spate occurred in the Damas River in Alluriquin have had an economic impact beyond the micro-region of the lower Toachi-Pilatón watershed. Since the Aloag Santo Domingo road was closed during few days it affected the transportation between Quito, Santo Domingo and Guayaquil. Some landslide occurred in the same period near to Tandapi also forced to close the Aloag Santo Domingo road.

[11] Each piece of panela or "banco" for commercialization weight 32 pounds.

[12] Pests can appear during dry or wet season, but now with the intense weather conditions have appeared others previously unknown. For example in the naranjilla crops were common the "lancha negra" and "lancha blanca" pest, but now have appeared two more the "ojo de pollo" and "muerte lenta", to control which farmers must apply more and stronger agrichemicals. This make costly some crops.

farmers attribute to weather problems. For that they need to use more agrichemicals and devote more time for caring the crops.

On the other hand extreme rains soften the soils of deforested areas or steep hills and produce landslides or mass movements and flooding. During the last months of 2015 and the early 2016 several landslides occurred in the entire region and in most of the cases closing paths and roads and then causing transportation problems sometimes for several days. In the Manuel Cornejo Astorga rural parish more than 200 small and medium scale landslides occurred in the last year. Practically all the 26 communities of the parish have had landslides in their territory. The worst landslide occurred in May 2016 at the point in the kilometer 32 of the Aloag - Santo Domingo road forcing to close it for a couple days.

As already explained the spate in the Damas River that caused avalanche and flooding in Alluriquin was the most extreme effect of the concentrated rains occurred in April 2016. Besides the actual damage that can cause a landslide if it occur over towns, houses or roads, it affect the transportation of products to the markets and some of them like milk and other perishable can be ruined at all causing significant economic damage to the producers.
Strong winds have less impact in the farmers however some crops can be affected and accidents can occur when trees are uprooted. However any of the interviewed has reported accidents due to this type of event. On the other hand, the combination of winds, drought and high temperature sparked some wildfires in the area, especially in Sigchos.

Finally considering the sharp contrasts of the dry and wet periods local people realize that during the drought there was also a significant increment of temperature. However it may be a subjective observation. In any case cases of skin irritation especially in children have been experienced in the communities of Palo Quemado and Pampas de Agüilla in the middle and upper part of the Toachi watershed.

Perceptions of local people regarding weather events

Experience has provided rural communities a knowledge about the local environment and climatic issues. Based in such knowledge these communities have designed a yearlong calendar determining periods for planting, cropping, applying agrichemicals for caring the crops, and even for festivities and other celebrations. However, when sudden changes in local conditions occur, the people tend to fall in fabrications and attributions in order to make an understanding of the new or extreme events.

Pyhälä et al (2016) has studied how people can easily astray when issues go beyond of what is considered normal in terms of their experimental knowledge. He calls it memory illusions in which facts from previous knowledge and new imaginations can be mixed to get sense of new realities. However this may affect the experiential knowledge of the communities acquired through daily observation of their environment. Precisely this has happened in the Toachi – Pilaton areas.
Common explanation of why the creeks of the lower basin area have become dry during 2015 is that the waters were sank through the cracks opened in the soil because of the dynamite explosions carried out to build the Hidrotoapi hydroelectric project. In the upper part of the basin there are also communitarian explanations based in the imagination. For example the drought that has affected most of the year during 2015 and 2016 becoming an overwhelming problem and even a political issue. Since this weather condition affected five counties of the

Cotopaxi province included Sigchos in the upper part of the Toachi River, there was a public petition for creating "veedurias" or commissions in charge to investigate the cause of such abnormal drought (GAD-C 2016). In the communities sparked the idea that a program of "cloud seeding"[13] was being carried out by flower cultivators in order to produce rain in specific areas to favor their agribusiness (GAD-C 2016). The popular explanations to new or unknown events may have been caused by influential or fantastic memories of extreme events mixed with new situations observed in the area.

However people also retain some indicators of recurrent local problems and provide more scientific explanation for new events. For example the drought problem and the landslides occurred in the upper basin, has been explained by the productive associations as a direct result of the constant deforestation in the area. The association of panela producers, Flor de Caña has explained that farmers use now more trees every week to produce panela, so the nearest forest in Palo Quemado are being significantly degraded. This means also that logs for firing the cauldrons should be brought from more distant places which make more expensive the production.[14]

The above explanations show how stakeholders are eager to determine whether situations and to establish them in terms of what is their interest. Beyond of what true or false can be the explanations, this situation also show that local are prone to know about climate issues and that information, capacitation and measures implementation on climate change adaptation are needed.

Understanding on climate change and awareness of local authorities

There is not a clear understanding regarding climate change in the communities in the three counties. Climate change is still a far reality and then there is not a conception on how to take actions to response it. However the adverse events of rainfall, spate and landslides have suddenly forced the people to take a position regarding the recurrent and catastrophic events that occurred in the area.

The Alluriquin disaster made people aware that climate has changed and some collective actions should be adopted. It is obvious that local communities are now more favorable to protect forest especially in the steep areas of the river bank and hills. In addition private reserves are more popular and seen as something positive for the community.

Notwithstanding the increase in public awareness it is not easily translated to local authorities in terms to move them devise plans for bettering the watershed management or coordinating among the different institutions to take common measures. This situation is due to normative and practical issues. From the point of view of the national legislation, the responsibility for watershed management corresponds to the regional GADs which as has already said are still inexistent. These institutions are bestowed by the National Constitution and COOTAD[15] to

[13] This process consists in "seeding the heavy clouds with tiny particles of silver iodide whose electrical charge would pull together the cloud's water droplets. Once enough droplets had gathered together, their weight would make them fall from the sky as rain." See: http://www.dailymail.co.uk/sciencetech/article-1351437/Can-scientists-REALLY-make-rain-useless-shower.html#ixzz4V92o0FR7

[14] To address this problem, the Association Flor de Caña of Palo Quemado is working with Maquita Cushunchic, a fair trade organization based in Quito, to introduce more efficient technologies and improve the production.

[15] Código Orgánico de Ordenación Territorial y Administración Descentralizada.

carry out the management of the hydrographic systems. This means that parish GADs cannot take initiative in promoting watershed management activities. So in this case while local authorities (the parish GADs) may understand the climate change issues and the potential impacts that can produce in their territories, they do not feel that can take actions or decisions in response to such global event.

Another issue that conspire against the adoption of local measures for watershed management is that some activities that cause severe impacts in the hydrographic basin are not under the control of local governments (the parish GADs). For example metallic and nonmetallic mine activities are under the control of the central government and of the municipal GADs. As a result these activities are not reported to the local parish authorities –the most idoneous to locally verify any situation- and then the control of the problems caused by mine companies not always are known by the control agencies.

The related issues and perceptions in the Toachi-Pilaton watershed show that capacity-building and community-based education are important activities for raising awareness on climate change impacts and promoting adaptation measures. These approaches are important to promote sustainable livelihoods, food security and finally sustainable development.

Gender Issues and Vulnerable groups:
As in most of rural areas in Ecuador, gender is a complex issue. It is difficult to evaluate women issues mot only because there is an evident level of “machismo” but also because women have types of agency that do not necessarily have been analyzed by feminist studies and then may not fit in what gender inequality stands for.

The first aspect of gender inequality in the area is the invisibilization of the female work. Despite the current interest of the government for promoting women visibilization, most of the productive female activity is still not socially recognized, and in that sense it is not statistically reflected either. The division between labor for the market and domestic work is often diffused and part of the productive work ends up being counted as unrecognized domestic labor. In other words, female work counts only when it is sold in the market economy (as waged worker or as independent entrepreneur) but not when women work at home. Two factors contribute to this statistical invisibility: on the one hand the fact that all of the female home work has a high use value but it is of null exchange value. For example, cooking for the family, caring children, making the room and so on are activities that cannot be sold in the free market and then it is not worth or practical accounting them. On the other hand, the home female activities are seen as part of the gender work division so it is the task that women must contribute for family and social reproduction.

Beyond the above theoretical considerations since many men in the Toachi Pilaton area are increasingly incorporated in waged work activities, rural women have taken on bigger roles in agricultural production and community labour. The resulting effect of this fact is that the women must assume the place that men have left vacant and then must work an average of 14-16 hours daily. The personal impact of this social phenomenon can be devastating in terms of women health and of physical abuse from husbands.[16] Here also is affected the right of women

[16] In rural areas women have reported health problems like of the spine, of respiratory and reproductive organs, hernias, bruises, and wounds (MacMillan 1995) and gender violence (Camacho 2014).

to have time for leisure, which in turn men enjoy in any case working in family subsistence activities or in waged work outside the town.

Notwithstanding evident gender inequality issues in the area of study it is also important to consider the women agency for creating income opportunities for their families. In practically all the areas women control most of the formal and informal food business. This provides them great economic independence counterbalancing home male-women asymmetries. In this case women are visibilized through a work inserted in the market economy.

Regarding other vulnerable people beyond women and children, there are no other particular groups that can be identified as vulnerable. Since the area of study of the Toachi Pilaton watershed is a frontier territory, there are no indigenous people nor Afroecuadorians.
En el cantón Sigchos, para el trabajo de las parcelas se utiliza la mano de obra familiar de las mujeres y sus hijos, los cuales también se encargan de la crianza de aves de corral. (GAD Sigchos, 2012)

During 2008, in the parish of “Las Pampas” was created the women’s association “Marianita de Jesus”, which is supervised by the Superintendence of Popular and Solidarity Economy (SEPS). At present, the association made up of 18 women and they are owns a land for economic activities. Those activities are agriculture and cattle raising. For this association the main objective is generate income for their families.

In Las Pampas parish, there is an important role of women in the economic activities. According to data from INEC in 2010, population distribution in the productive sector is as show table below:

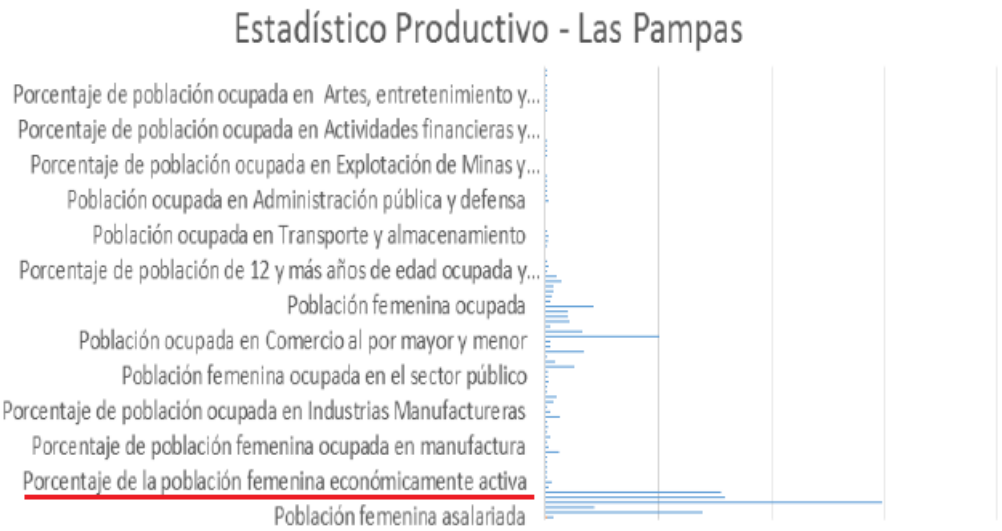


Figure 8 Las Pampas productive sectors

For 2018, according to PDOT, in the main precincts of Las Pampas parish, the goal is to build at least 13 centers of support for community social organization including women's groups, local social groups, among others.
In the parish of “Tandapi”, the municipality promotes entrepreneurship projects where women from the community participate in different activities such as: dance therapy, crafts, beauty, etc.

Finally, another important project is one from Palo Quemado parish, where population is interested in implementing agriculture associations for single mothers and support them to granting land.

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

Annex **7: Compliance with the AF Environmental and Social Policy**

República del Ecuador

April of 2018

Annex 7. Compliance with the AF Environmental and Social Policy

Table of Contents

Project Description

1.1 Description of the proposed operation

The main objective of the project is to strengthen the adaptive capacity of vulnerable populations in the Río Blanco upper watershed and develop a model of adaptation to climate change that can be replicated in similar context in the country and in the region. The project focuses on key drivers that will create adverse impacts from climate change or generate opportunities that concern the most vulnerable populations. The expected mid-term impacts are improved enabling conditions to sustain forest cover and sustainable small-scale farming in the area, with a gender perspective. In the long-term, it is expected that the project's activities will result in improved adaptive capacity of the target farmers, ecosystems and hydroelectric systems. The farmers, as well as their communities, are understood as co-executors of the project and its key target.

The critical aspects in this area, which affect the ecosystems and populations of the parishes of the Municipalities of Sigchos and Mejía, which will have limitations regarding access to water quantity and quality are:

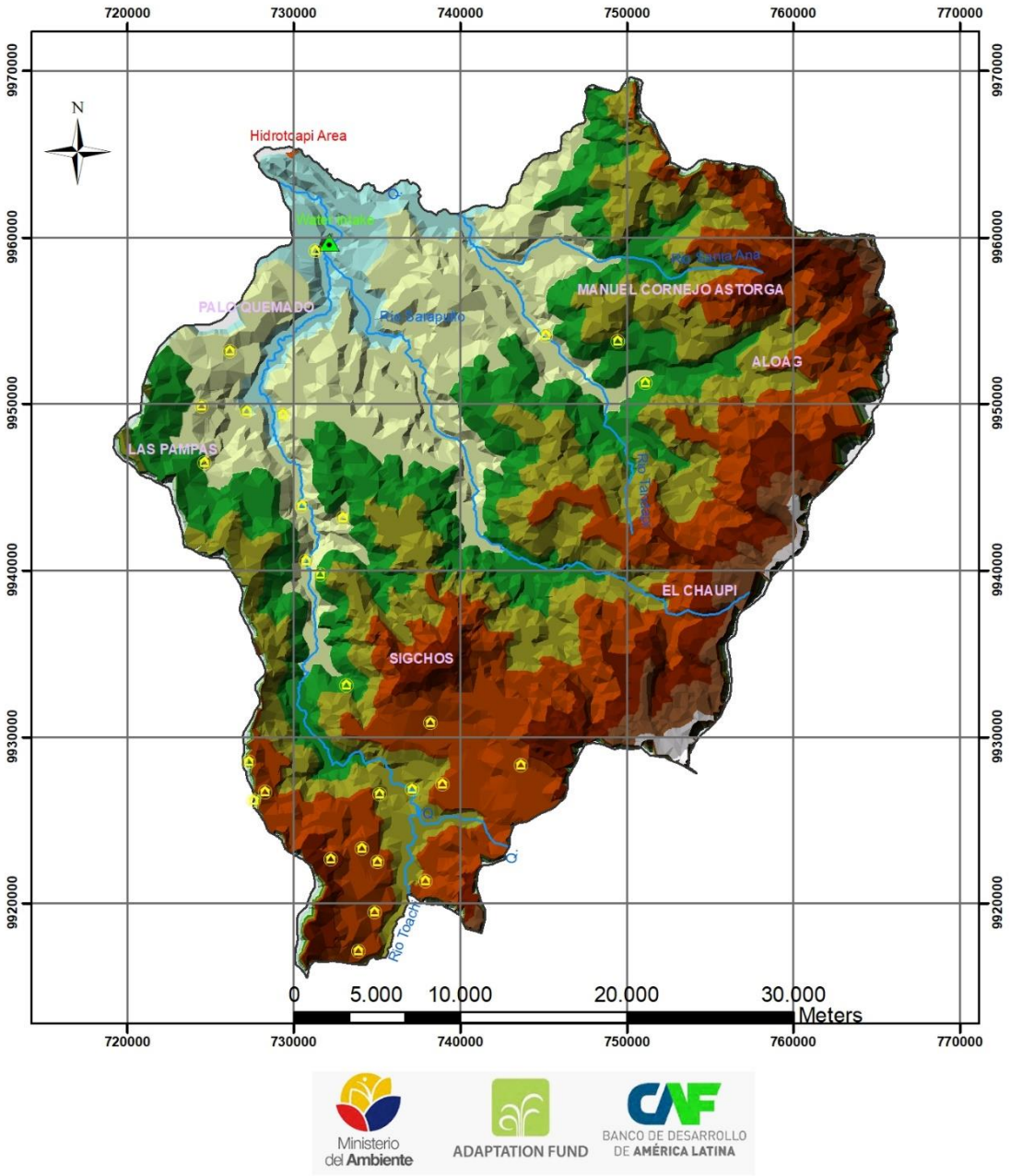
a) Poor monitoring capacity in watersheds. The Toachi watershed has the worst monitoring system (few meteorological stations, minimum gauging stations and no sediment stations). Therefore, it is not possible to track the flow and sediment accurately, much less make a prediction that allows events to be anticipated with certainty.
b) Unsustainable agricultural and livestock practices in the watershed increase deforestation, erosion and degradation of water quality. An example is the extensive use of firewood for panela [raw sugar cake] production. Most farmers have small areas of no more than 20 ha where they apply inappropriate farming practices and obtain very poor yields.
c) Difficulty obtaining credit for sustainable productive activities. Farmers have little access to financing to improve their living conditions and thus carry out unsustainable activities that affect ecosystems and the quantity and quality of water in the watershed, reducing the resilience to climate change.
d) Lack of awareness by the local population of climate-related impacts. Interviews with local stakeholders revealed that there is no clear understanding of the likely impacts of climate change, so communities do not insist that local authorities take adaptation measures as priority issues.
e) Local development plans do not include measures for adapting to climate change. Local development plans (i.e. parishes and municipalities) mention climate change as a matter of concern, but do not have specific actions for mitigating or reducing the agents of deforestation, erosion, invasion of riverbanks, land use changes, and others. Generally, these plans do not have a gender perspective, and leave women more exposed to climate change.

The Project will contribute to breaking down the barriers that limit adaptation capacity in the lower basin of the Toachi and Pilatón rivers by strengthening local communities through the following actions:

a) Conservation of the forest surface to maintain the hydrological cycle and to prevent a reduction of rainfall and avoid erosion on the slopes of the mountains;
b) Introduction of sustainable practices to increase production per hectare, concentrate production in smaller spaces and thus reduce the expansion of the agricultural frontier, soil erosion and deforestation;

Mainstreaming of adaptation to climate change in territorial development plans and involvement of the population by increasing their knowledge of the impacts of climate change.

1.2 Maps and diagrams of the project site



Ministerio del Ambiente — ADAPTATION FUND — BANCO DE DESARROLLO DE AMÉRICA LATINA

LEYEND

- Project Area
- Hidrotoapi Area
- Rivers
- Water intake
- Population

Elevation

- 4590 - 5000 m
- 4180 - 4590 m
- 3770 - 4180 m
- 3360 - 3770 m
- 2950 - 3360 m
- 2540 - 2950 m
- 2130 - 2540 m
- 1720 - 2130 m
- 1310 - 1720 m
- 900 - 1310 m

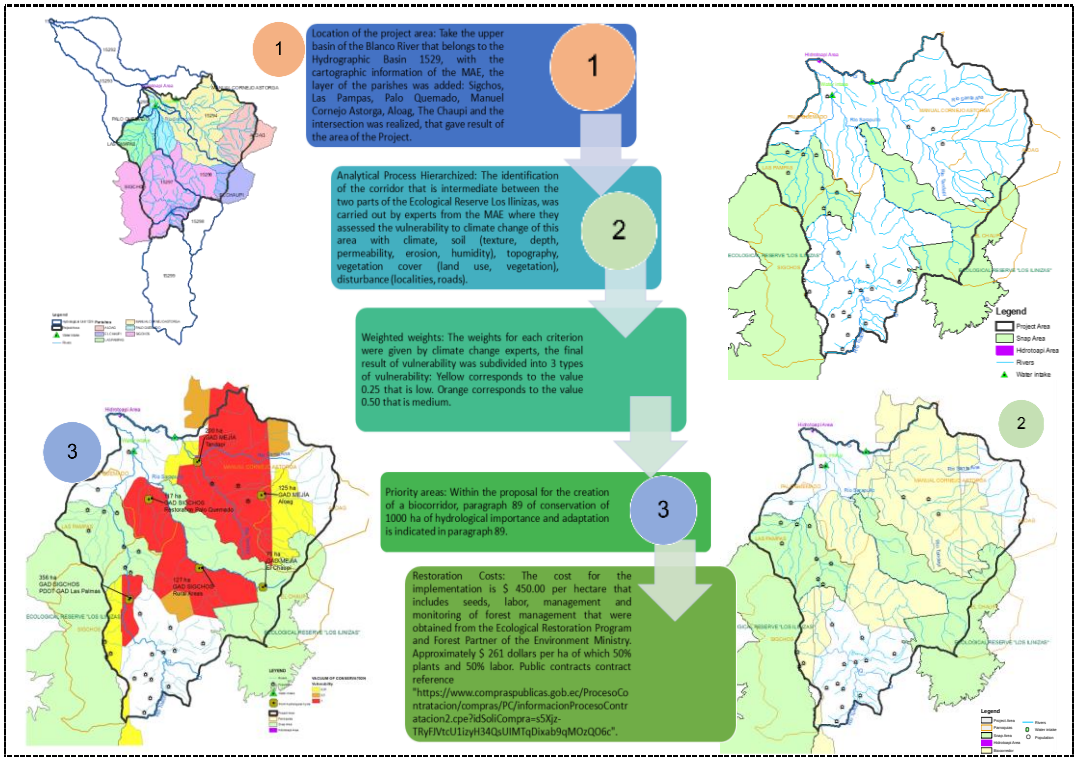
Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management

CONTAINS: **DELIMITATION AREA OF THE ADAPTATION PROJECT**

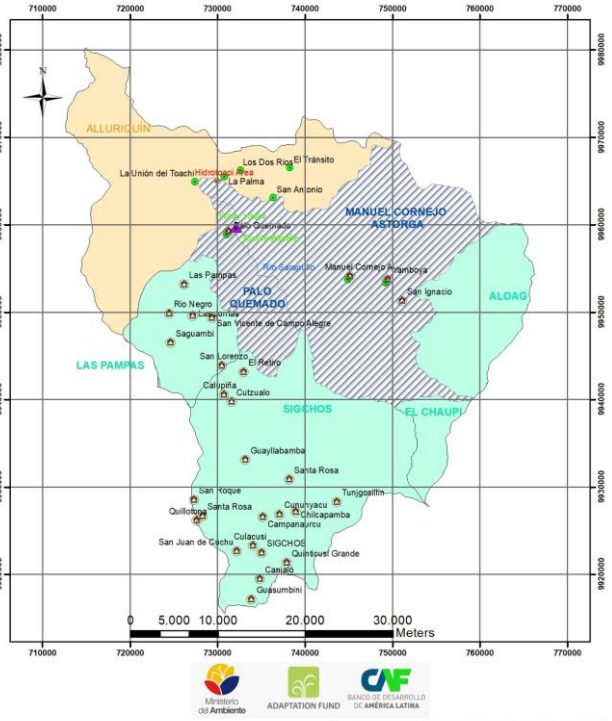
PROVINCE:	CANTÓN:	PARROQUIA:
PICHINCHA COTOPAXI	MEJÍA SIGCHOS	MANUEL CORNEJO ASTORGA, ALOAG, EL CHAUPI, PALO QUEMADO, LAS PAMPAS, SIGCHOS

IMPLEMENTING ENTITY:	EXECUTING ENTITY/IE S:
CAF Latin America Development Bank	Ministry of Environment of Ecuador (MAE)
DATUM: TRANSVERSE UNIVERSAL PROJECTION OF MERCATOR WGS 84 - 17S	**DATE:** FEBRUARY 2018
SOURCE: MINISTRY OF THE ENVIRONMENT OF ECUADOR (MAE) TOPOGRAPHICAL LETTER (IGM)	**MAP NUMBER:** 01

1.3 Area that will be affected and impacted



1.4 Settlements that will be affected



2. BASELINE CONDITION

2.1 Description of existing environmental and social condition

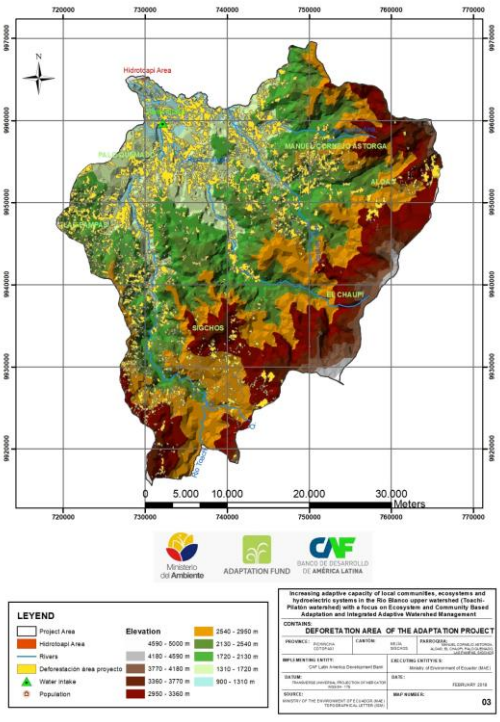
The population has very high levels of poverty in terms of unsatisfied basic needs. Four parishes located in the upper part of the Toachi unit had poverty levels above 98% and highest level of agriculture dependency, according national census 2010:

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

Table 1: Main activities by locality, based upon data from National Census (2010)

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

2.2 Maps environmental and condition



3. SCREENING AND IDENTIFYING PROJECT RISKS

Using the Manual of Basic Environmental and Social Management System procedures and functions at National Implementing Entities – Readiness Programme for Climate Finance, the Social and Environmental Risks Screening Checklist and the Identification and preliminary Management of Social and Environmental Risks were developed.

The process of risk screening for the current project activities developed followed the 15 principles of the ESP. Including Principles 1 (Compliance with the law), 4 (Human rights) and 6 (Basic labour rights) which always apply, the other 12 principles were screened in relation to the project outcomes, outputs and activities were screened. Establishing relevance between these principles and project elements was one of the outcomes of the risk identification process.

It is developed based on the Manual of Basic Environmental and social where environmental and social risks are identified, impacts are assessed and prevention and mitigation used as required, are identified and are required and based on the 15 principles of the adaptation.

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

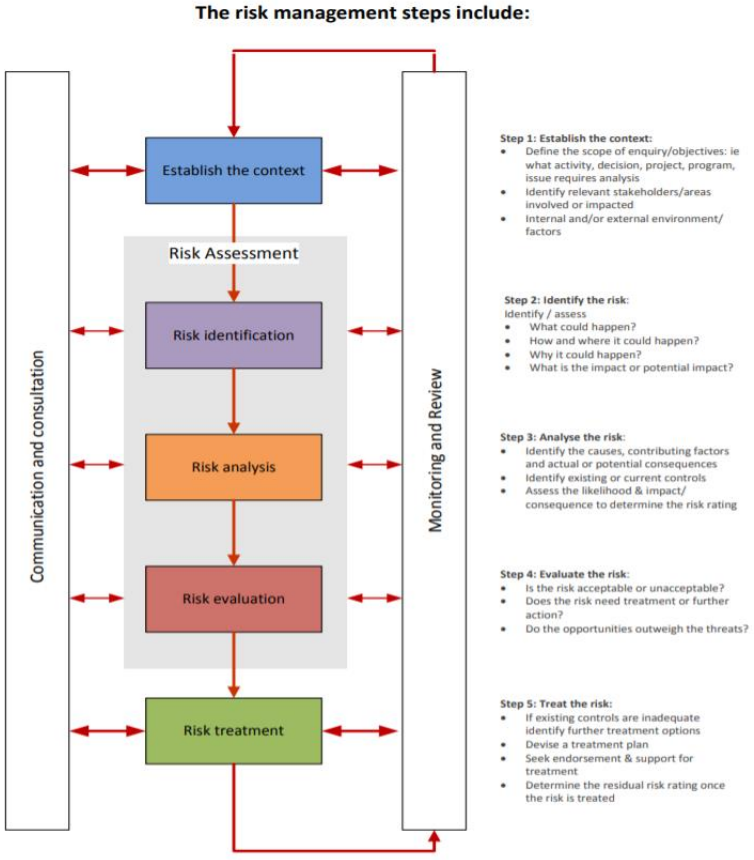


Figure 1: Methodology establish the risk

3.1 Categorization

The following table will define which category corresponds to each component of the Adaptation Project.

Questions	Component Answer YES / NO		
	1	2	3
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are diverse?	NO	NO	NO
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are widespread?	NO	NO	NO
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are irreversible?	NO	NO	NO
Does the Project Outputs / Activities have few adverse environmental or social impacts?	YES	YES	NO
Does the Project Outputs / Activities have in small scale / low widespread adverse environmental or social impacts?	YES	YES	NO
Does the Project Outputs / Activities have reversible or easily mitigated adverse environmental or social impacts?	YES	YES	NO
Does the Project Outputs / Activities have no adverse environmental or social impacts?	NO	NO	YES
Categorization	B	B	B

Table 2. Categorization definition

The project presents a categorization B that requires according to the EIAS risks - projects with potential adverse impacts but less in number, scale or that are easily mitigated. Low risk general, which presents only moderate risks and a potential social and environmental risk with great importance. For the risks identified, a plan of measures for environmental safeguards is presented while all the activities proposed in the Adaptation Project are aligned to comply with the 15 principles, taking into consideration the protection of human rights and environmental sustainability. The implementation of energy-efficient furnaces for the production of panela reduces: the CO2 pollution caused by the deforestation of the wood, the loss of natural habitat and the pressure on the remaining primary forests, also allow to guarantee the participation of women during the activities of capacity building, with the objective of reaching a participation of at least 50% of women during all activities. On the other hand, all activities proposed within the framework of the project take into consideration the protection of human rights and environmental sustainability. The implementation of energy efficient furnaces for panela production reduces: the CO2 pollution caused by the deforestation of the wood, the loss of natural habitat and the pressure on the remaining primary forests. In conclusion, many of the activities proposed under the project are additional benefits for risk managers with low social and environmental risks currently.

3.2 Metodology

The evaluation process will evaluate the general risks of the project and will be carried out with two processes:

1. General project risk that addresses a checklist prepared by UNDP that is aligned with the 15 principles of the adaptation fund and the Ecuadorian environmental regulations.

2. Risk from project activities: The project team will use the current knowledge of the environment and existing social management systems and any detailed environmental and social research studies on each of the project sites, including information on the history of extreme climate impacts.

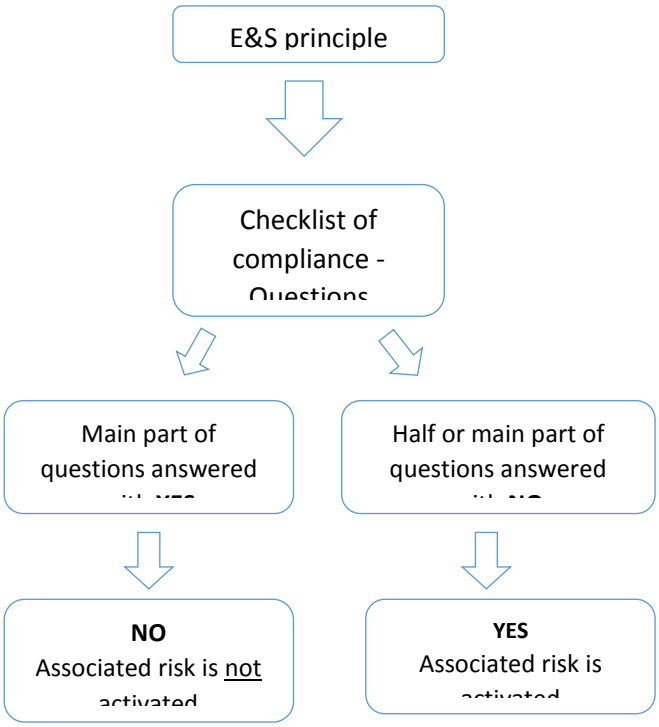
3.3 ESP Risks Identification general project

Based on the checklist of the AF ESMS procedures Manual of basic Environmental and Social Management System procedures and functions at National Implementing Entities (AF Readiness Programme Climate Finance 2016)

Considering the differentiated risks identified above, the Components 1 and 2 go through the following risk identification with all of its planned outputs and activities, the component 3 has relations with the strengthening of local capacities for these reason no includes the first screening.

Risk checklist prepared by UNDP, which helps to identify the risks of the Adaptation Project for Climate Change in the upper basin of the Blanco River.

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



Applicable Standards and Safeguards

Checklist of environmental and social principles	Questions	Yes / No
1. Compliance with the law	1.1. Does the Project / Programme demonstrate any incompliance with any applicable domestic law?	NO
	1.2. Does the Project / Programme demonstrate any incompliance with any applicable international law?	NO
2. Access and Equity	2.1. Could the Project / Programme hold a risk of any group not being adequately informed and engaged to access the range of project benefits?	NO
	2.2. Could the Project / Programme obstruct access of any group to the essential services and rights stipulated in the Principle? (e.g. Health services, clean water and sanitation, energy, education, housing, safe and decent working conditions, and land rights)	NO
	2.3. Could the Project / Programme potentially restrict allocating and distributing project benefits to any groups and particularly with respect to marginalized or vulnerable groups?	NO
	2.4. Could the Project / Programme likelihood lead to discrimination or creating favoritism in accessing project benefits?	NO
3. Marginalized and Vulnerable Groups	3.1. Could the Project / Programme have adverse impacts on enjoyment of lifestyle, livelihood of the affected population and particularly of marginalized and vulnerable groups?	NO
	3.2. Could the Project / Programme potentially restrict availability, quality of and access to resources or basic services, in particular to marginalized individuals or groups?	NO
	3.3. Is there a likelihood that the Project / Programme would have inequitable or discriminatory adverse impacts on affected populations, particularly people living in poverty or marginalized or excluded individuals or groups?	YES

Checklist of environmental and social principles	Questions	Yes / No
	3.4. Is there a likelihood that the Project / Programme would exclude any potentially affected stakeholders, in particular marginalized groups, from fully participating in decisions that may affect them?	YES
4. Human Rights	4.1. Could the Project / Programme lead to adverse impacts on enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalized groups?	NO
	4.2. Is there a risk that rights-holders do not have the capacity to claim their rights?	NO
	4.3. Is there a risk that duty-bearers (local communities or individuals) will not get an opportunity to raise human rights concerns regarding the Project / Programme during the stakeholder engagement process?	NO
	4.4. Is there a risk that the Project / Programme would exacerbate conflicts among and/or the risk of violence to project-affected communities and individuals?	NO
5. Gender Equity and Women's Empowerment	5.1. Is there a likelihood that the Project / Programme would have adverse impacts on gender equality and/or the situation of women and girls?	YES
	5.2. Would the Project / Programme potentially reproduce discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	NO
	5.3. Is there a risk that the Project / Programme do not allow women's groups/leaders to raise gender equality concerns regarding the Project implementation?	NO
	5.4. Would the Project / Programme potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services? (e.g. activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well-being).	NO

Checklist of environmental and social principles	Questions	Yes / No
6. Core Labour Rights	6.1. Is there a risk that the Project / Programme infringe the freedom of association and the effective recognition of the right to collectively bargaining? (ILO 87 and ILO 98)	NO
	6.2. Is there a risk that the Project / Programme develop any forms of forced or compulsory labour? (ILO 29 and ILO 105)	NO
	6.3. Does the Project / Programme, due to its characteristics, have associated risks relative to the presence of child labour? (ILO 138, ILO 182)	NO
	6.4. Does the Project / Programme, due to its characteristics, have associated risks relative to discrimination in respect of employment and occupation? (ILO 100 and ILO 111)	NO
	6.5. Does the Project / Programme have associated occupational risks that are inherent to the activities carried out in the construction and/or operation phases? (e.g. electrical risks, physical risks, mechanical risks, chemical risks, psychosocial risks, biological risks, and/or ergonomic risks).	NO
	6.6. Does the Project / Programme, due to its characteristics, have associated risks such as fire, explosion, flood, leak of toxic, irritant, or corrosive gasses, spills (uncontrolled) of dangerous chemical products?	NO
	6.7. Would the Project / Programme directly or indirectly involve undermining an employment or livelihoods that comply with national and international labor standards? (e.g. principles and standards of ILO fundamental conventions)	NO
7. Indigenous Peoples	7.1. Could the Project / Programme hold a risk of indigenous families or communities not being adequately informed and engaged to access the range of project benefits?	NO

Checklist of environmental and social principles	Questions	Yes / No
	7.2. Could the Project / Programme potentially restrict allocating and distributing project benefits to indigenous communities?	NO
	7.3. Is there a potential for forced eviction or the whole or partial physical or economic displacement of indigenous peoples, including through access restrictions to lands, territories, and resources?	NO
	7.4. Would the Project / Programme potentially affect the Cultural Heritage of indigenous peoples, including through the commercialization or use of their traditional knowledge and practices?	NO
8. Involuntary Resettlement	8.1. Would the Project / Programme potentially involve temporary or permanent and full or partial physical displacement?	NO
	8.2. Would the Project / Programme possibly result in economic displacement (e.g. loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	NO
	8.3. Is there a risk that the Project / Programme would lead to forced evictions?1	NO
	8.4. Would the proposed Project / Programme possibly affect land tenure arrangements and/or community based property rights/customary rights to land, territories and/or resources?	NO
	8.5. Does the Project / Programme require the purchase of land for its implementation? (the answer is yes even if only one property needs to be purchased).	NO
	9.1. Is the Project / Programme implemented in or near natural or critical habitats? (e.g. example, primary forests, coral reefs, mangroves, moors).	NO

[1] Forced evictions include acts and/or omissions involving the coerced or involuntary displacement of individuals, groups, or communities from homes and/or lands and common property resources that were occupied or depended upon, thus eliminating the ability of an individual, group, or community to reside or work in a particular dwelling, residence, or location without the provision of, and access to, appropriate forms of legal or other protections.

Checklist of environmental and social principles	Questions	Yes / No
9. Protection of Natural Habitats	9.2. Would the Project / Programme potentially cause adverse impacts to habitats (e.g. natural, and critical habitats)?	NO
	9.3. Are any Project / Programme activities proposed within or adjacent to environmentally sensitive areas, including legally protected areas, areas proposed for protection, or recognized as such by authoritative sources and/or indigenous peoples or local communities? (e.g. nature reserve, national park).	YES
	9.4. Is the Project / Programme implemented in and affect areas with conservation value designated with international recognition? (e.g. Ramsar site, natural heritage of humanity, biosphere reserve, AICA).	NO
	9.5. Does the Project / Programme involve harvesting of natural habitats, plantation development, or reforestation?	YES
	9.6. Does the Project / Programme include the use of tropical species? (e.g. agricultural crops, animal farming, aquaculture, forestry plantations).	YES
10. Conservation of Biological Diversity	10.1. Does the Project / Programme pose a risk of introducing invasive alien species?	NO
	10.2. Is there a potential of a significant or unjustified reduction or loss of biological diversity?	NO
	10.3. Is the Project / Programme implemented in areas holding a significant value for biodiversity? (e.g. populations of endemic species, species classified as in critical danger, danger, or vulnerable in the red list, or permanent or seasonal aggregations).	NO
	10.4. Does the Project / Programme involve changes to the use of lands and resources that may have adverse impacts on ecosystems and associated biodiversity?	NO
	10.5. Would any of proposed Project / Programme activities pose risks to endangered species?	NO

Checklist of environmental and social principles	Questions	Yes / No
	10.6. Does the Project / Programme include the use of live resources of the native biodiversity? (e.g. fishing, agricultural crops, animal farming, aquaculture, or forestry)	YES
	10.7. Does the Project / Programme involve the production and/or harvesting of fish populations or other aquatic species?	NO
	10.8. Does the Project / Programme involve utilization of genetic resources? (e.g. collection and/or harvesting, commercial development)	NO
11. Climate Change	11.1. Does the Project / Programme emit during its life cycle > 25 000 tons of CO2 equivalent / year? 2	NO
	11.2. Would the proposed Project / Programme be susceptible to or lead to increased vulnerability to earthquakes, subsidence, landslides, erosion, flooding or extreme climatic conditions?	NO
	11.3. Is the proposed Project / Programme likely to directly or indirectly increase social and environmental vulnerability to climate change now or in the future (also known as maladaptive practices)? (e.g. changes to land use planning may encourage further development of floodplains, potentially increasing the population's vulnerability to climate change, specifically flooding).	NO
	11.4. Will the Project / Programme increase vulnerability of the areas that historically have suffered from disaster due to climate variability phenomena such as the cycles of El Niño and La Niña?	NO
	12.1. Does the Project / Programme imply the construction, rehabilitation, operation, or closure of residual water management systems and/or solid residues in populated centers?	NO

[2] In regards to CO_2, 'significant emissions' corresponds generally to more than 25,000 tons per year (from both direct and indirect sources). [The Guidance Note on Climate Change Mitigation and Adaptation provides additional information on GHG emissions.]

Checklist of environmental and social principles	Questions	Yes / No
12. Pollution Prevention and Resource Efficiency	(e.g. sanitary sewage system, treatment plant for residual waters, waste collection and disposal system, sanitary filling).	
	12.2. Does the Project / Programme imply activities related to the extraction and/or transformation of metallic or non-metallic minerals, hydrocarbons, and/or aggregate washing?	NO
	12.3. Will the proposed Project / Programme potentially involve the manufacture, trade, release, and/or use of hazardous chemicals and/or materials? (e.g. DDT, PCBs and other chemicals listed in international conventions such as the Stockholm Conventions on Persistent Organic Pollutants or the Montreal Protocol).	NO
	12.4. Does the Project / Programme imply the production, use, or marketing of dangerous substances? (e.g. pesticides, sulfuric acid). Dangerous substances are those identified as such in the respective national listing, or through the international risk rating established in the Globally Harmonized System of Classification and Labeling for Chemical Products.)	NO
	12.5. Does the Project / Programme include activities that require significant consumption of raw materials, energy, and/or water?	NO
	12.6. Does the Project / Programme imply the generation and management of large quantities of contaminants? (e.g. industrial residual waters, particulate matter, noise, unpleasant odors, garbage).	NO
	12.7. Will the Project / Programme produce and manage dangerous waste? (e.g. hospital waste, mining waste, expired pesticides, heavy metals). Dangerous wastes are those identifies as such in the national listings or in international lists/catalogues (for example, the European waste list)	NO
13. Public Health	13.1. Would elements of Project / Programme construction, operation, or decommissioning pose potential risks to public health safety?	NO

Checklist of environmental and social principles	Questions	Yes / No
	13.2. Would the Project / Programme pose potential risks to public health and safety due to the transport, storage, and use and/or disposal of hazardous or dangerous materials? (e.g. explosives, fuel and other chemicals during construction and operation)?	NO
	13.3. Would failure of structural elements of the Project / Programme pose risks the public health? (e.g. collapse of buildings or infrastructure)	NO
	13.4. Would the Project / Programme result in potential increased health risks? (e.g. from water-borne or other vector-borne diseases or communicable infections such as HIV/AIDS)?	NO
	13.5. Does the Project / Programme pose potential risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during Project / Programme implementation, construction, operation, or decommissioning?	NO
14. Physical and Cultural Heritage	14.1. Is the Project / Programme being implemented in areas with unique natural values recognized at the community, national or international level? (e.g. heritage recognized by 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage)	NO
	14.2. Do the country where Project / Programme will be carried out have not ratified and entered into force of the Convention Concerning the Protection of the World Cultural and Natural Heritage?	NO
	14.3. Will the proposed Project / Programme result in interventions that would potentially adversely affect sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture? (e.g. knowledge, innovations, practices)? (Note: Projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	NO

Checklist of environmental and social principles	Questions	Yes / No
	14.4. Does the Project / Programme propose is using tangible and/or intangible forms of cultural heritage for commercial or other purposes?	NO
15. Lands and Soil Conservation	15.1. Does the Project / Programme foresee the presence of fragile soils? (e.g. soils on the margin of a desert area, coastal soils, soils located on steep slopes, rocky areas with very thin soil) within the project area)	NO
	15.2. Does the Project / Programme activities could result in the loss of non-fragile soil within the project area?	NO
	15.3. Does the Project / Programme imply movement of land with the removal of large volumes of soil?	NO
	15.4. Does the Project / Programme imply construction, expansion, rehabilitation, maintenance, and/or operation of infrastructure, among others, irrigation systems, transfers from basins, dams and reservoirs, hydraulic energy production systems, or systems to capture, treat, and supply water to urban centers?	NO
	15.5. Does the Project / Programme imply large-scale agricultural crops, industrial production, livestock, and/or forestry plantations?	NO
	15.6. Would the Project / Programme exacerbate risk of erosion?	NO

According to the checklist, the experience of the work team and the workshops held with the community benefited from the risks aligned with the 15 social and environmental principles of the Adaptation Fund

3.4 Checklist for environmental and social principles

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	X	
Access and Equity	X	
Marginalized and Vulnerable Groups		X
Human Rights	X	
Gender Equity and Women's Empowerment		X
Core Labour Rights	X	
Indigenous Peoples	X	
Involuntary Resettlement	X	
Protection of Natural Habitats		X
Conservation of Biological Diversity		X
Climate Change	X	
Pollution Prevention and Resource Efficiency	X	
Public Health	X	
Physical and Cultural Heritage	X	
Lands and Soil Conservation	X	

Table 3. Checklist for environmental and social principles.

3.5 Checklist of environmental and social impacts and risks of the project.

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	The project has been designed to comply with current environmental regulations detailed in figure 30	

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Access and Equity	The project ensures that the activities of each component does not reduce or prevent communities in the area from accessing basic health services, drinking water and sanitation, energy, education, housing, safe work and degradation and land rights, by including the names of students in the Project, updating their focused PDOTs in the principles of the adaptation fund and ESMP. The project also guarantees equal access to equipment, infrastructure and services, especially taking into account the marginalized and vulnerable groups, namely women, youth and communities. Gender equity, integration of youth, active participation of women and men in equal rights to achieve environmental sustainability. In the annexes 5 and 6 the participants and social actors that would be involved in the project of the upper basin of Río Blanco are detailed, the participation is of all the communities that are in the study area due to their high social vulnerability	
Marginalized and Vulnerable Groups		The vulnerable and marginalized groups that are in the project area have been identified in the socialization workshops that are in annexes 5 and 6 but there is the possibility that in the meetings held not all those involved have been present, for the Compliance with the principle establishes that they will have priority access to the activities that were developed in the 3 components, such as biocorridors, climate-smart agricultural techniques, EbA and active participation in the generation of knowledge.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Human Rights	The Constitution of the Republic of Ecuador, in the preamble invites us to build: "a society that respects, in all its dimensions, the dignity of people and communities." For this reason, it creates the Sub-secretariat of Democratic Guarantees that contemplates its mission: "to promote and coordinate the design of policies and their implementation that allow the exercise of democratic guarantees". Ecuador has ratified the main international human rights laws. The National Reports of the United States Department of State on Human Rights Practices for 2015 indicate that the main human rights problems in Ecuador are: excessive force and isolated illegitimate homicides by the 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; traffic of people; and persistent child labor. The activities of the program will not participate in any activity that could lead to the violation of the right of any person during the implementation.	
Gender Equity and Women's Empowerment		Ecuador ranks high in the Global Gender Gap Index. Ecuador has almost complete equality in educational attainment and health and survival, and a high level in economic participation and opportunities, but a major gap in political empowerment (WEF, 2015). The stakeholder analysis (Annex 5,6) found that there is strong women leadership in local organizations and parish governments. Also, women have an important role in businesses like commerce and restaurants. The condition of women in the Río Blanco upper watershed is

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		similar to other Ecuadorian rural areas. The project will promote women´s participation in project activities. However, it has to be considered that men are increasingly seeking paid jobs in Santo Domingo, the nearest large city. This, in turn, increases the workload for women to tend for the farm and the animals. In rural areas, women tend to work more average weekly hours than men, 82h and 59h respectively, most of this difference is explained by non-remunerated activities (such as domestic chores and care-taking tasks). Therefore, the project will have to be cautious to implement actions in support of gender equality and women´s empowerment, and to prevent overloading women activities (outputs 1, 2 and 4). Also, it will be needed to ensure that the adaptation actions to be mainstreamed into the local development plans (output 7) and the communication and education actions (output 9) are gender and age sensitive and do consider the needs of persons with disabilities. Further assessment will be required to be a part of each activity of the Programme.
Core Labour Rights	Ecuador has ratified the eight fundamental labor agreements. The intervention of the project has no incidence whatsoever with the four fundamental principles and rights at work. Component 1 and 2 will create jobs that allow vulnerable groups, including unemployed youth and women to increase their income. The relevant national labor laws will be followed, guided by ILO labor standards during the implementation of the project.	

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
	The Project will not involve child labor in any of its activities. The prohibition of child labor will be part of the agreement with the beneficiaries and will be a non-negotiable act.	
Indigenous Peoples	ILO convention 169 is implemented in Ecuador. There is no indigenous population in the project area. As project does not involve any particular indigenous group, this aspect does not seem to be of relevance in terms of further assessment for ESP compliance.	
Involuntary Resettlement	The project will focus on land already used to implement component 1 and 2 activities, they already have Access roads and currently used for agricultural purposes. In component 1, the biocorridors that will unite the 2 protected areas found in the study area were created, the subprojects found in these areas are being carried out with the communities that are in the sector, generating employment with line to sustainability environmental, while component 2 works with the land of the beneficiaries applying organic farming. When the Project was initiated by the social security specialist, due process is respected so that the people who are in the areas of the biocorridor are informed of their rights, consulted about their options, and technically offered activities that can be developed within this area. Component 2 the project will improve sustainable production alternatives that reduce pressure on forests, by elaborating a plan of zoning for productive areas.	
Protection of Natural Habitats		The project in its activities will have a positive impact on principle 9 of the Adaptation Fund AF, the project seeks to improve

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		the mechanism (furnace and mills) for the production of panela in order to reduce the use of wood as combustible material. Technification (modernization) reduces up to 60% of the wood needs for panela production. This measure helps to reduce the pressure on the remaining forests and the emission of greenhouse gases. In component 2 in order to ensure the participation of the population in sustainable agricultural and livestock practices, the project will realize the workshops were at least 375 families engaged in sustainable productive activities. And as a result 250 ha of pasture and 250 ha of crops apply sustainable agriculture practices The poor surveillance capacity in watersheds. The Toachi basin has the worst monitoring system (some meteorological stations, minimum gauging stations and sediment information stations). Therefore, it is not possible to know the occurrence of natural disasters and climate change that can lead to impacts on natural habitats, so it will develop the hydrometeorological monitoring system in the river basin Strengthening of the 7 existing stations located in the area, which at the moment are not working properly.
Conservation of Biological Diversity		With planned activities the impact will be positive. Ecuador has signed and ratified the Convention on Biological Diversity and has a recently updated national biodiversity strategy. The project will not intervene areas with high biodiversity value or introduce invasive species. On the contrary, the actions of the

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
		project will contribute to conserving forests and vegetation cover. The project will strengthen the protected areas with the creation of the biocorridors that will allow connectivity, in addition, it will be important to ensure that the role of natural habitats is integrated into the adaptation measures to be integrated into the local development plans (output 7).
Climate Change	The project does not include activities that involve a significant increase in emissions of greenhouse gases or other climate change stressors. On the contrary the implementation of sustainable agriculture practices will reduce green house gas emission, contributing to climate change mitigation. Moreover, reducing community vulnerability thanks to agriculture best practices, the project will also contribute to support climate change adaptation for the community.	
Pollution Prevention and Resource Efficiency	The project does not include activities that will use large quantities of energy, water or other natural resources. Nor will it 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. The project will contribute to improve the efficient use of energy and natural resources.	
Public Health	The project does not imply negative impacts on public health. Moreover supporting the use of efficient cooking systems for panela, as well as the promotion of family gardens, the project will contribute to reduce negative health impacts. On the other hand, the implementation of the improved ovens for the production of	

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
	panela reduces labor force from 6 to 4 hours for the production of 580 liters of panela, which reduces possible heath impacts over the population.	
Physical and Cultural Heritage	Ecuador is a party of the World Heritage Convention. The project will not affect or intervene physical and cultural heritage.	
Lands and Soil Conservation	The project action will contribute to soil conservation. 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.	

Table 4. Checklist of environmental and social impacts and risks of the project.

3.6 Risk Evaluation

Checklist of environmental and social principles	Potential impacts and risks – further assessment and management required for compliance	Evaluation
Marginalized and Vulnerable Groups	Vulnerable and marginalized groups at project intervention sites will have insufficient access to project activities	Impact Negative(1-5): 3 Probability (1-5): 2 Significance (Low, Moderate, High) Moderate: With measures to mitigate the impact that could be caused to be zero or a percentage lower than 10%
Gender Equity and Women's Empowerment	Women may have more work positions (agriculture and domestic). There could be no gender equality for cultural issues of head of household.	Impact Negative(1-5): 3 Probability (1-5): 3 Significance (Low, Moderate, High) Moderate: With measures to mitigate the impact that could be caused to be zero or a percentage lower than 30%
Protection of Natural Habitats	Sustainable agricultural practices	Impact Positive (1-5): 4 Probability (1-5): 4

		Significance (Low, Moderate, High) High: It will create a positive impact on the adaptation to climate change and generate sustainable economic activity and friendly to the environment.
Conservation of Biological Diversity	Creation of biocorridors	Impact Positive (1-5): 4 Probability (1-5): 4 Significance (Low, Moderate, High) High: It will create a positive impact on the adaptation to climate change and generate sustainable economic activity and friendly to the environment.

3.7 ESP Risks Identification for activity

Activities	FA principles identified			
	Marginalized and Vulnerable Groups	Gender Equity and Women's Empowerment	Protection of Natural Habitats	Conservation of Biological Diversity
Componente 1: Conserve vegetation cover				
1.1. Functional conservation areas as part of the Toachi Pilaton (White River upper basin) basin bio-corridor have been established				Creation of the biocorridor
1.2. Increase in # of Decentralized Autonomous Governments (GAD) with planning, regulatory and normative instruments for ACUS	Participation of vulnerable and marginalized groups	Spaces will be allocated for the empowerment of women		
1.3. Increase sustainable livelihoods alternatives that reduces pressure on forests.			Sustainable agriculture	Creation of the biocorridor and economic activities
1.4 Increase in # of families in communities adjoining conservation areas in target ACUS, participating in productive activities demonstrated to reduce pressures on forest with at least 50% of women participate				Creation of the biocorridor and economic activities
1.5 Strengthening of the hydro-meteorological system of the Río Blanco upper basin.		Active participation of women		
1.6 Reduction in the use of forest for productive activities in the Upper and Middle Basin of the Toachi River (Landscape of Pampas and Palo Quemado), through promoting technology change and improvement	Participation of vulnerable and marginalized groups			

Activities	FA principles identified			
	Marginalized and Vulnerable Groups	Gender Equity and Women's Empowerment	Protection of Natural Habitats	Conservation of Biological Diversity
of the production process of panela production.				
1.7 Priority conservation areas maintenance through the creation of the Toachi Pilaton Bio-corridor.				Creation of the biocorridor
1.8 Increase in the process of planning and zoning of farms in which at least 50% of women participate		Empowerment of women		
1.9 Increases in ratings of Management Effectiveness Tracking Tool and PGOA			Improvement of land use	
1.10 Increases in control capacities in wildlife and forest traffic				Greater control
Component 2: Adapt farming practices to new climate change conditions and enable their sustainable climate smart financing				
2.1 250 ha of pasture and 250 ha of crops apply sustainable farming practices			Sustainable agriculture	
2.2 At least 2 institutions have introduced specific solutions and credit assessments to support the disbursement of credits for adaptation, integrating environmental and climate risks in their operations		Empowerment of women		
2.3 One investment fund to promote sustainable development is set up and operational		Empowerment of women		
Component 3: Strengthen local capacities and share lessons				
3.1 At least 6 parishes being built capacities and prepared to manage and use meteorological information.	Participation of vulnerable and marginalized groups	Empowerment of women		
3.2 Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.	Participation of vulnerable and marginalized groups	Empowerment of women		
3.3 Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms and markets. Plus training on adaptation finance to financial institutions.	Participation of vulnerable and marginalized groups	Empowerment of women		
3.4 Systematization of information gathered during the whole project design and implementation using existing informatics platforms	Participation of vulnerable and marginalized groups	Empowerment of women		

4. Environmental and social management plan (ESMP)

The PMAS describes the risk mitigation measures that will be taken to ensure consistency with the ESGP principles including the laws and regulations of Ecuador, if the risk has been identified and assessed as moderate mitigation is implemented. PMAS will consist of a specific management plan (s) and related activities that have been identified as necessary during the impact evaluation.

4.1 Environmental and social mitigation program

In general terms, for the entire project, there must be elaborated and approved the Environmental and Social Management Plan, that includes specific measures to prevent correct and/or mitigate adverse environmental and social impacts and risks outlined in Table 5.

Table 5. Mitigation measures

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
Compliance with the Law	The project does not contradict the Constitution of the Republic of Ecuador, the laws, regulations and all the regulations that derive from it. One of the main principles of the Constitution is the recognition of the right of the population to live in a healthy and ecologically balanced environment (Constitution of the Republic of Ecuador, 2008), aligned with the objectives of the project. The Ecuadorian Legislation protects this first principle in conservation of natural areas, as well as the right to safe and permanent access to healthy food, which will be achieved through the application of good agricultural practices as indicated in article 281 of the Constitution of Ecuador. The Organic Law of agrodiversity, seeds and promotion of sustainable agriculture, dated June 8, 2017, establishes in article 4 the following principles: sustainability, interculturality, prevention, solidarity, participation, control and transparency, national supply, social equity, gender and generational, efficiency and heritage that assure the relevant cultivated and biological diversity of the genetic resources for food and agriculture and the cultivated and biological diversity of relevance for food and agriculture. It is constituted by: (1) plant, animal, microbial and fungal genetic resources; (2) the organisms necessary to sustain key functions of the agroecosystem, its structure and processes, such as the regulation of pests and diseases, and the cycle of pollination and nutrients; and (3) the interactions between abiotic factors, such as the physical landscapes in which agriculture is developed, and the socio-economic and cultural dimensions, such as local and traditional knowledge.	

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
	Therefore, the project plans to implement biological corridors to help restore interconnectivity in between ecosystems. As port of the financial infrastructure there will be created an investment fund for the creation and maintenance of the biological corridors in the project This fund requires a specific coordination with the national laws about Protected Areas and Watershed Committees. The responsible for public declaratory (GAD still to be defined) will require a participative process according with the Environmental Ministry, on the other hand the water investment fund will be adapted to the national regulations in coordination with SENAGUA. This project is designed to comply with the provisions of the Universal Declaration of Human Rights and all the agreements, protocols, declarations, resolutions and agreements that derive from this declaration, promoting equity and the rights of vulnerable groups.	
Access and Equity	During the execution of the project the existing basic services of health, tap water, energy, education and housing will not be affected. Although the first component of the project proposes the conservation of the forest with a bio-corridor, the land rights of the owners will not be harmed The call to the workshops held in the Toachi and Pilatón basins, allowed the vulnerable groups to be identified. Based on this, it is essential for the project to integrate all the beneficiaries in his activities, due the actual disproportionate access to resources of farmers, mainly of female farmers. Today it is known that the women of each area or village are the ones who will share the knowledge to future generations as they are the main actors of knowledge strengthening in rural areas. Communicative campaigns will be carried out, in order to reach a greater number of beneficiaries and not harm those interested in participating actively in the project. The project seeks to guarantee that every beneficiary has access to clear and precise information through workshops and debates among other activities. These activities will help to provide access to new knowledge and the possibility of	

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
	accessing credits in order to implement adaptation measures and good practices in the rural areas. In addition, the project will provide the necessary guarantees to be implemented under safe conditions for all stakeholders.	
Marginalized and Vulnerable Groups		After a detailed analysis of the socio-economic conditions of the sector and the realization workshops, one of the vulnerable groups identified is the group of women, who are mostly the work force in the sector and provide income for their homes. It is a fact that nowadays the women of this area present an illiteracy rate of 21.6%. One the other hand, the project also seeks to influence other marginalized and vulnerable groups by improving their style and quality of life by employing conservation activities and mechanisms in protected areas such as: conservation of ecological flow, water quality, sustainable agriculture practices and inclusion in processes of participation. The most vulnerable group in the sector of conventional agriculture are the farmers and their families, who are affected by the pesticides or the misuse of them. Guaranteeing access to land through rights to tenure and use of land, as well as equitable and sustainable access to resources (such as water, micro-credit and other agricultural inputs), are essential and a prerequisite for the success of sustainable agricultural practices.
Human Rights	The project will follow a human rights-based approach, ensuring consistency with national and international legislation. Within	

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
	component 2, the concept of Ecological Agriculture combines modern science and innovation with respect for nature and biodiversity. The concept ensures good agriculture and healthy food, protects soil, water and climate, does not pollute the environment with chemical substances or uses genetically modified crops, and focuses on people and farmers (consumers and producers) more than the companies that currently control the food. Greenpeace's vision of Agriculture and Food defines Ecological Agriculture and describes how it can be summarized in seven independent and global principles, based on a growing body of agro ecological scientific evidence (Altieri, 1995). We perceive this mode of agriculture as a key, but not as the only ingredient of a new, more comprehensive Ecological Food System. It is intrinsically linked to the consumption and waste of food in rural and urban communities, to health and human rights, to equality in the distribution of resources and to many other elements of food production and consumption. All these aspects must be integrated. Furthermore, to ensure consistency with the human rights principles of participation and inclusion, the project will support capacity building and the creation of an enabling environment for meaningful participation and inclusion. This consists of the definition of roles and responsibilities of stakeholders, including Indigenous peoples and the principles of co- responsibility during the design and implementation of activities. During these workshops, the project will respect all opinions no matter what race, color, sex, language, nationality or social origin the participants belong to.	
Gender Equity and Women's Empowerment		The project seeks to improve gender equality and its activities encourage women's empowerment. Although there is no specific budget line assigned to gender in the proposal. On the contrary it is being addressed in a cross-cutting way within all the activities of the project, as a basic guideline of conduct. This project will, therefore, place particular emphasis on ensuring that women are well represented

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
		in project implementation and that the impact of project activities on women will be considered. In each of the project components participatory processes and involvement of women will be promoted. In practice this means, amongst others: • Support to livelihoods and access to credit and other financial instruments proposed by the project will consider women (both young and old, indigenous and mixed race) and facilitate access of women's organizations to these incentives; • Further encourage and support participation of women in livelihoods options by selecting them as implementers of pilot projects; • Engage women from women's organizations in monitoring and evaluation of pilot projects, and also in dissemination of good practices; • Include greater participation and involvement of women in the processes of land use planning; • Involve women in capacity building actions by providing conditions consistent to their local realities; • Seek equal representation of men and women in the project's seminars, workshops, training-of-trainers and other educational and awareness raising events of the project; • Promote the equal participation of women and men in access to property

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
		rights and land tenure and natural resources; • Promote an equitable distribution between men and women in economic benefits arising from the project. The project will thus contribute to addressing the inequalities that currently exist between men and women with regard to public decision-making, Their access to natural resources and their vulnerability to environmental degradation. Women's involvement is likely to be high as they are more receptive to new concepts and more willing to shift to ecosystem-friendly practices, provided that they generate enough income for a household. It is important to highlight, that 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).
Core Labour Rights	The project is based on the national labor rights, which protect the interests of the employed. Additionally and more important, the project, being developed under the standards and contracting manuals of CAF and UNDP, will comply with the requirements of the management system established by ISO18001. This project will promote the compliance with labor rights by giving the farmer the tools and knowledge for the implementation of organic farming and the use of local resources, adding value to their products and therefore increasing their sales and income. Also, the project enhances the concept of organic farming throughout its activities.	

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
	Organic farming is an activity that favors the creation of employment at a local level especially in marginal areas, where agricultural activity no longer stands on its own because it is not competitive in the market. Among its impacts are: the use of local resources, less dependence on inputs, greater job creation and greater added value, the generation of new knowledge, new job opportunities in areas like research, new marketing channels controlled by the producers themselves and new rents derived from landscape management and biodiversity conservation or agro- tourism. All this chain of good agro-ecological environmental practices will generate employment under healthy working conditions. This Project does not promote child labor and respects the right of children and adolescents.	
Indigenous Peoples	There is no risk or adverse effects. The intervention will not affect the indigenous groups or territories. Nevertheless, Ecuador in its Constitution of 2008 recognizes both indigenous peoples' land rights and livelihoods and the rights of nature. The Constitution's third part titled Rights, Duties, and Guarantees declares collective rights as they pertain to indigenous peoples. Article 84 states that the State shall recognize and guarantee indigenous peoples rights, in conformity with the Constitution, the law, human rights and collective rights.	
Involuntary Resettlement	There is no resettlement of communities in the project area, the proposal of component 1 is the creation of biocorridors that allow the interaction of ecological connectivity, sustainable productive landscapes, the association of biodiversity and landscape. • Ecological connectivity • Sustainable productive landscapes • Associativity	

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
Protection of Natural Habitats		The project seeks to reduce the main sources of deforestation and degradation, rescuing natural spaces and habitats that previously existed and that are now necessary for the recovery of flora and fauna biodiversity in the sector. It also seeks to protect forests that provide multiple benefits to communities and production sectors. It is recognized that sustainable management, protection, conservation, maintenance and rehabilitation of natural habitats and their biodiversity and associated ecosystem functions are fundamental to UNDP efforts to support developing countries and implement sustainable development pathways. On the other hand, by reducing deforestation and the degradation of the ecosystem, the project additionally provides important actions in order to reduce the main sources of greenhouse gas emissions in the country. Finally, research is increasingly proving that Organic Farming is the most realistic, promising and economically viable alternative to improve the destructive agrarian model currently used. The benefits for small farmers are that they: a) require few or no external agents, and b) use natural materials available in the region to produce high quality products and promote a complete systemic strategy for agriculture that is more diverse and

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
		resistant to adverse weather conditions, pests and diseases (UNEP and UNCTAD, 2008). There is a vast and growing list of examples of agro-ecological systems in developing countries that contributes to the improvement of lifestyle, through food production and natural conservation. Here are some: An exhaustive analysis of 15 examples of organic agriculture in Africa has seen increases in productivity per hectare in food crops, in farmers' incomes, in environmental benefits, in strengthening communities and in improving of human capital. Organic farming can increase their productivity and raise incomes with the appropriate technologies available in the region, at a low cost and without causing environmental damage (UNEP and UNCTAD, 2008). On the other hand, the project seeks to improve the mechanism (oven and mills) for panela production in order to reduce the use of wood as combustible material. The technification (modernization) reduces up to 60% of the wood needs for the panela production.
Conservation of Biological Diversity		The Project will contribute to overcoming the barriers that limit the adaptation capacity of the lower Río Blanco basin by strengthening local communities through: a) Conservation of the forest area to maintain the hydrological cycle, prevent

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
		rainfall reduction and avoid erosion on the slopes of the mountains; b) Introduction of sustainable practices to increase production per hectare, concentrate production in smaller spaces and thus reduce the expansion of the agricultural frontier, soil erosion and deforestation; c) Mainstreaming of adaptation to climate change in territorial development plans and involvement of the population by increasing their knowledge of the impacts of climate change.
Climate Change	Sustainable agricultural practices reduce the emission of greenhouse gases. Small-scale measures include: labor, land use, efficient use of fertilizers, use of deep-rooted crops and conversion of arable land in conservation areas, crop rotation and maintenance of terraces. As affirmed by Smith (Smith, 2007b, SEAE, 2006), organic farming can reduce CO2 emissions significantly as it is a permanent system of sustained production, for the energy saving involved in maintaining soil fertility through inputs internal (rotations, green fertilizers or legume crops), by the absence of the use of phytosanitary and synthetic fertilizers and the low levels of outsourcing in livestock feed due to the intensification and use of local resources. The efficiency of carbon capture in ecological production systems is 4.5 tons of CO2 per hectare, while in conventional production systems it is reduced to 2.3 tons of CO2 per hectare (Smith, 2004). Additionally, the projects aims to strengthen local capacities in climate change by enforcing local capacities in the use of meteorological information provided by hidro-meteorological stations. The understanding of hidrometeorological information is essential for the development of local risk reduction strategies as for example the formulation and implementation of contingency and emergency plans and early warning systems.	

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
	Also, one of the project activities seeks to incorporate climate change into local planning tools (PDOTs) by developing EbA measures, which help to guarantee a sustainable local development. Nowadays local governments face incrementing costs because of natural disasters and climate change, because of delays and failures in the implementations of local programs and activities. The inclusion of EbA measures into local planning will provide a better understanding of the possible impacts of climate hazards on program and project activities, and will help to identify key sectors of intervention.	
Pollution Prevention and Resource Efficiency	The project seeks to improve the mechanism (oven and mills) for panela production in order to reduce the emission of greenhouse gases and other noxious gases for human health and vegetation. Nowadays, as a result of the lack of maintenance of the mills motors, which leads to failures in the combustion system, smoke is produced in the production of panela. Also, in the evaporation process realized in the oven, bagasse is used which contributes to higher levels of pollutions and low resource efficiency. Because of the low efficiency of bagasse, people (producers) are forced to include other combustible materials, such as wood, tires and coal in the production process, which have an additional negative impact on the climate, environment and human health. The production process of panela causes the emissions of CO, SO2, NOx, CO2 and water vapor.	
Public Health	The project does not include affectation to public health. Moreover supporting the use of efficient cooking systems for panela, as well as the promotion of family gardens, the project will contribute to reduce negative health impacts.	
Physical and Cultural Heritage	In the project area there are no sites that have structures with historical, cultural, artistic, or intangible forms of culture that could be affected in the execution of the project.	
Lands and Soil Conservation	The Project will not cause degradation of the soil or reduce its agricultural suitability, indeed, it will have a positive impact on the preservation of soil and forests, in addition to enrichment with	

Checklist of environmental and social principles	No additional management plan is required for compliance	Management plan necessary to minimize negative impact or ensure positive impact
	micronutrients due to reforestation and the following organic techniques for agricultural production: **Tillage**: is based on the consideration that the soil is a living, complex and changing environment. Support activities such as: roots, earthworms, microorganisms, improve the structure, aeration and water retention of the soil; The objective of the tillage is to achieve a soil rich in biological activity with a light and stable structure. **Subscriber, vegetable covers and use of crop residues:** The soil serves as a physical and chemical support for the animals, plants and microorganisms that grow in it, is composed of organic and mineral material, is permeable due to the existence of micro and macropores that allow the existence of an aqueous solution and a gaseous atmosphere (Domínguez et al, 2002). The green fertilizer is intended to increase the microbial activity of the soil so it is little or no lignified materials (the young humus is rapidly evolving). **Rotations and alternatives of crop:** The rotation is the succession in the time of the cultures on a same plot, thus a plant consuming nitrogen, it must happen another that accumulates it; a consumer of humus, another that produces it; those that leave the compact floor, those that leave it soft; and those with superficial roots, they must follow others of deep roots, its immediate effect is the efficient use of soil nutrients, reduction of chemical fertilization. **Association of crops:** Cultures mixed in the same plot, two or more plant species that complement each other, so that the interactions that occur between them exert a stimulating effect on them. Land, space and water are always better used in associated crops than in monocultures. (Greater use of light and improves the microclimate, the risks of a poor harvest are reduced).	

4.2 Mechanism for Identification Environmental and Social Risk of an unidentified activity

An unidentified activity or subproject is one that at the time of submission of the proposal cannot identify ESG risks. This may be due to the time elapsed from the evaluation in the field until the Project was approved and started to develop, and other characteristics that determine the ESG risks have not yet been established and have occurred in the implementation through a participatory approach. In any case, these activities or subprojects require a PMAS that includes a framework for identification and risk management strategies.

At the beginning of the project, analyze the possible implementation of new findings in the ESIA and recognize recognizing the possibility of reformulating a PMAS.

The Process developed is:

Step 1. Design of Activities.

Step 2. Risk screening using a risk identification form

Step 3. Evidence to identify compliance (Impact assessment if required)

Step 4. Mitigation Measures

Step 6. Verification for Approval

Step 7. Monitoring of Compliance

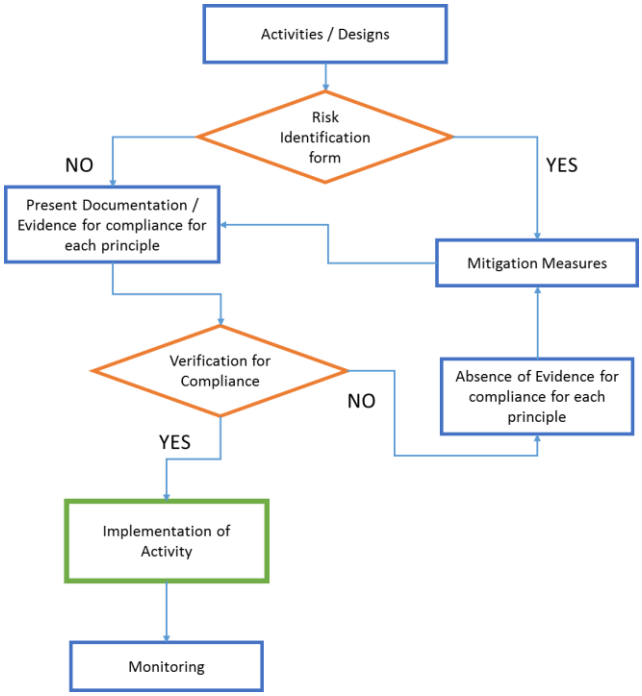


Figure 4. Risk identification – Mitigation Measures – Activity Implementation

Templates

This templates are for risk identification for each adaptation activity technically designed under Component 1 y 2 of the project. After the risk identification and mitigation measures templates are completed and verified by the Project Unit after to socialize the results with the community.

Executive Resume				
NAME OF THE ACTIVITY:				
Area on intervention:	**Responsible of fulfilling the template - Local Technical Coordinator Check:**	**Management Coordinator Check:**	**Project Unit Check:**	**Date:**
Technical General Description of the Activity :				
Fulfillment of the Risk Identification				
Consultation with the community				
Documentation – Evidence Base of Risk Identification				
General / Relevant Mitigation Measures				

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	**Questions**	**YES / NO**
1.Compliance with the law	1.1. Does the Project demonstrate any incompliance with any applicable international law? Has the project identified all the specific, applicable domestic and international laws, regulations, standards, procedures and permits that apply to any of its activities?	
	1.2. Has the project identified activities that may require prior permission (such as planning permission, environmental permits, construction permits, permits for water extraction, emissions, and use or production or storage of harmful substances)	
	1.3. Has the project identified environmental and social safeguarding requirements, other than those of the AF (e.g. national or of co-financing entities). Use the appropriate screening tools, including any threshold lists and sectorial requirements?	
	1.4. Has the project identified technical or industry standards that apply to any of its activities?	
2. Access and Equity	2.1. Has the project identified benefits and its geographical area of effect?	
	2.2. Has the project identified any marginalized or vulnerable groups among potential project beneficiaries? (stakeholder mapping in order to identify the potential beneficiaries, rivals, disputants, marginalized or vulnerable people)	
	2.3. Has the project identified any existing inequities with respect to these marginalized or vulnerable groups?	
	2.4. Has the project identified the existing access to the essential services and rights indicated in the principle?	
	2.5. Has the project described the mechanism of allocating and distributing project benefits, and how this process ensures fair and impartial access to benefits?	
	2.6. Has the project developed stakeholder and local authorities' consultations?	
3. Marginalized and	3.1. In the influence area of the project has there been identified the presence of marginalized or vulnerable groups, including but not limited to children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities and people living with HIV/AIDS?	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	**Questions**	**YES / NO**
Vulnerable Groups	3.2. Has the project quantified all the groups identified using accepted methods based, where possible, on disaggregated data?	
	3.3. Has the project described the characteristics of any marginalized or vulnerable groups, identifying their particular vulnerabilities that would or could make them disproportionately vulnerable to negative environmental or social impacts caused by the implementation of the activities of the project?	
4. Human Rights	4.1. Has the project evidenced if the host country is cited in any Human Rights Council Special Procedures, be they thematic or country mandates?	
	4.2. Has the project provided an overview of the relevant human rights issues that are identified in the Special Procedures?	
	4.3. Has the project include human rights issues in stakeholder consultations during project identification and/or formulation?	
	4.4. Has the project included the findings of the consultations on human rights issues in the project document?	
5. Gender Equity and Women's Empowerment	5.1. Has the project identified activities that are known to exclude or hamper a gender group based on legal, regulatory or customary grounds?	
	5.2. Has the project conduct or consult a gender analysis of the supported sector / area, describing the current situation of the allocation of roles and responsibilities in sector or area?	
	5.3. Has the project identified elements that maintain or exacerbate gender inequality or the consequences of gender inequality?	
	5.4. Has the project identified particular vulnerabilities of men and women that would or could make them disproportionately vulnerable to negative environmental or social impacts caused by the outputs / activities of the project?	
6. Core Labour Rights	6.1. Has the project determined if the host country has ratified the eight ILO core conventions	
	6.2. Has the project reviewed the latest ILO assessments of application of the standards in the country?	
	6.3. Has the project identified any past/present/planned ILO assistance to meet the standards through social dialogue and technical assistance?	
	6.4. Has the project identified information on any ILO Special procedures relevant to the Member nation including details on the triggering representation or complaints	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	**Questions**	**YES / NO**
	6.5. Has the project identified how the ILO core labour standards are incorporated in the design and the implementation of the outputs / activities' project?	
	6.6. Has the project describe the common labour arrangements in the sector(s) in which the project will operate, with particular attention to all forms of child labour and forced labour.	
7. Indigenous Peoples	7.1. Has the project identified if indigenous peoples are present in the area of influence?	
	7.2. Has the project quantify the groups identified of indigenous peoples?	
	7.3. Has the project determined if there are provisions for a realistic and effective Free, Prior, Informed Consent process, giving a community the right to give or withhold its consent to proposed projects that may affect the lands they customarily own, occupy or otherwise use?	
	7.4. Has the project provided a summary of any reports, specific cases, or complaints that have been made with respect to the rights of indigenous peoples by the Special Rapporteur on the rights of indigenous peoples and that are relevant to the project?	
8. Involuntary Resettlement	8.1. Has the project identified if physical or economic displacement is required or will occur as a consequence of its implementation?	
	8.2. Has the project determined if it is voluntary or involuntary resettlement?	
	8.3. Has the project identified stakeholders whose livelihoods may be affected, directly or indirectly, and if this may lead to resettlement?	
	8.4. Has the project identified stakeholders whose assets or access to assets may be affected, directly or indirectly, and if this may lead to resettlement and its consequences including indemnification, compensation, etc.	
9. Protection of Natural Habitats	9.1. Has the project identified all the critical natural habitats in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. noise) and an appreciation of its propagating ability. The habitats to be considered include all those recognized as critical in any way, be it legally (through protection), scientifically or socially.	
	9.2. Has the project identified for each critical natural habitat, the mechanism by which it is particularly vulnerable?	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	**Questions**	**YES / NO**
	9.3. Has the project considered all the activities to identify actual risks for each of the natural habitats identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each habitat identified.	
10. Conservation of Biological Diversity.	10.1. Has the project identified all the elements of biodiversity interest in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent and an appreciation of its propagating ability. It is important in the identification of the elements of biodiversity interests not to limit this to the species level but to include all elements of biodiversity interest, including landscapes, ecosystem processes, habitats, and hydrological cycles, processes of erosion and sedimentation and interactions between taxa. Include all elements enjoying local or international protection	
	10.2. For each identified biodiversity element, has the project identified the mechanism by which it is particularly vulnerable? (Changes in flow regime or water quality for a seasonal wetland or disruption of migration routes).	
	10.3. Has the project identified actual risks for each of the biodiversity elements identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each biodiversity element identified?	
	10.4. Has the project identified the potential of introducing – intentionally or accidentally – known invasive species?	
	10.5. Has the project identified the use of living modified organisms resulting from modern biotechnology?	
11. Climate Change	11.1. Has the project determined if it belongs to a sector mentioned in the Guidance document for which a greenhouse gasses emission calculation is required? • Energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management.	
	11.2. Has the project carry out a qualitative risk identification for each of the following drivers of climate change: • Emission of carbon dioxide gas from the use of fossil fuel and from changes in land use • methane and nitrous oxide emissions from agriculture	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	**Questions**	**YES / NO**
	• emission of hydrofluorocarbons • perfluorocarbons • sulphur hexafluoride • other halocarbons, aerosols, and ozone.	
	11.3. Has the project carry out a qualitative risk identification of any impact on carbon capture and sequestration capacity.	
12. Pollution Prevention and Resource Efficiency	12.1. Has the project identified activities with preventable waste or pollution production?	
	12.2. Has the project determined the nature and quantity of the waste, as well as those of possible pollutants that may be produced?	
	12.3. Has the project determined if the concept of minimization of waste and pollution production has been applied in the design phase and if this will be effective during implementation?	
	12.4. Has the project determined if applicable local, national and international regulations regarding any waste and pollution generation have been applied and will be complied with?	
	12.5. Has the project determined if the concept of minimization of resource use has been applied in the design phase and if this will be effective during implementation?	
	12.6. Has the project determined where international standards for maximizing energy efficiency and minimizing material resource use may apply?	
13. Public Health	13.1. Has the project identified using an appropriate health impact screening tool (check list) potentially significant negative impacts on public health generated?	
14. Physical and Cultural Heritage	14.1. Has the project determined if the host country has ratified the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage?	
	14.2. Has the project identified the national and local legal and regulatory framework for recognition and protection of physical and cultural heritage?	
	14.3. Has the project described in the influence zone all the elements of the cultural heritage, their location and their vulnerabilities? The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. vibrations, landscape elements) and an appreciation of its propagating ability. Include all elements enjoying local or international protection.	

Risk Identification template in Line with the AF's ESP		
Activity		
Checklist of E&S Principles	**Questions**	**YES / NO**
	14.4. Has the project determined if the cultural heritage is being accessed by communities?	
	14.5. Has the project determined if any of the heritage elements included in the List of World Heritage in Danger is in the influence zone?	
	14.6. Has the project considered all the activities to identify actual risks for each of the heritage elements identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each heritage element identified?	
15. Lands and Soil Conservation	15.1. Has the project identified the presence of fragile soils within the influence area?	
	15.2. Has the project identified activities that could result in the loss of otherwise non-fragile soil?	
	15.3. Has the project identified productive lands and/or lands that provide valuable ecosystem services within the influence area?	
	15.4. Has the project identified activities that may lead to land degradation?	

Categorization of the Activity	
Activity	
Questions	**YES / NO**
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are diverse?	
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are widespread?	
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are irreversible?	
Does the Project Outputs / Activities have few adverse environmental or social impacts?	
Does the Project Outputs / Activities have in small scale / low widespread adverse environmental or social impacts?	
Does the Project Outputs / Activities have reversible or easily mitigated adverse environmental or social impacts?	
Does the Project Outputs / Activities have no adverse environmental or social impacts?	
Categorization of the Activity	

Mitigation Measures				
Activity:				
Area on intervention:	**Responsible of fulfilling the template - Local Technical Coordinator Check:**	**Management Coordinator Check:**	**Project Unit Check:**	**Date:**
Environmental or social Principle	**Environmental or social risk**	**Mitigation measure**	**Responsible**	**Verification**
Principle 1. Compliance with the Law	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3.		

Mitigation Measures				
Activity:				
Area on intervention:	**Responsible of fulfilling the template - Local Technical Coordinator Check:**	**Management Coordinator Check:**	**Project Unit Check:**	**Date:**
Environmental or social Principle	**Environmental or social risk**	**Mitigation measure**	**Responsible**	**Verification**
		Mitigation measure 4.		
Principle 2. Access and Equity	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 3. Marginalized and Vulnerable Groups	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 4. Human Rights	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 5. Gender Equality and Women's Empowerment	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 6. Gender Equality and Women's Empowerment	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 7. Indigenous Peoples	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		

Mitigation Measures				
Activity:				
Area on intervention:	**Responsible of fulfilling the template - Local Technical Coordinator Check:**	**Management Coordinator Check:**	**Project Unit Check:**	**Date:**
Environmental or social Principle	**Environmental or social risk**	**Mitigation measure**	**Responsible**	**Verification**
Principle 8. Involuntary Resettlement.	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 9. Protection of Natural Habitats	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 10. Conservation of Biological Diversity	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 11. Climate Change	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 12. Pollution Prevention and Resource Efficiency	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 13. Public Health	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		
Principle 14. Physical and Cultural Heritage	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2.		

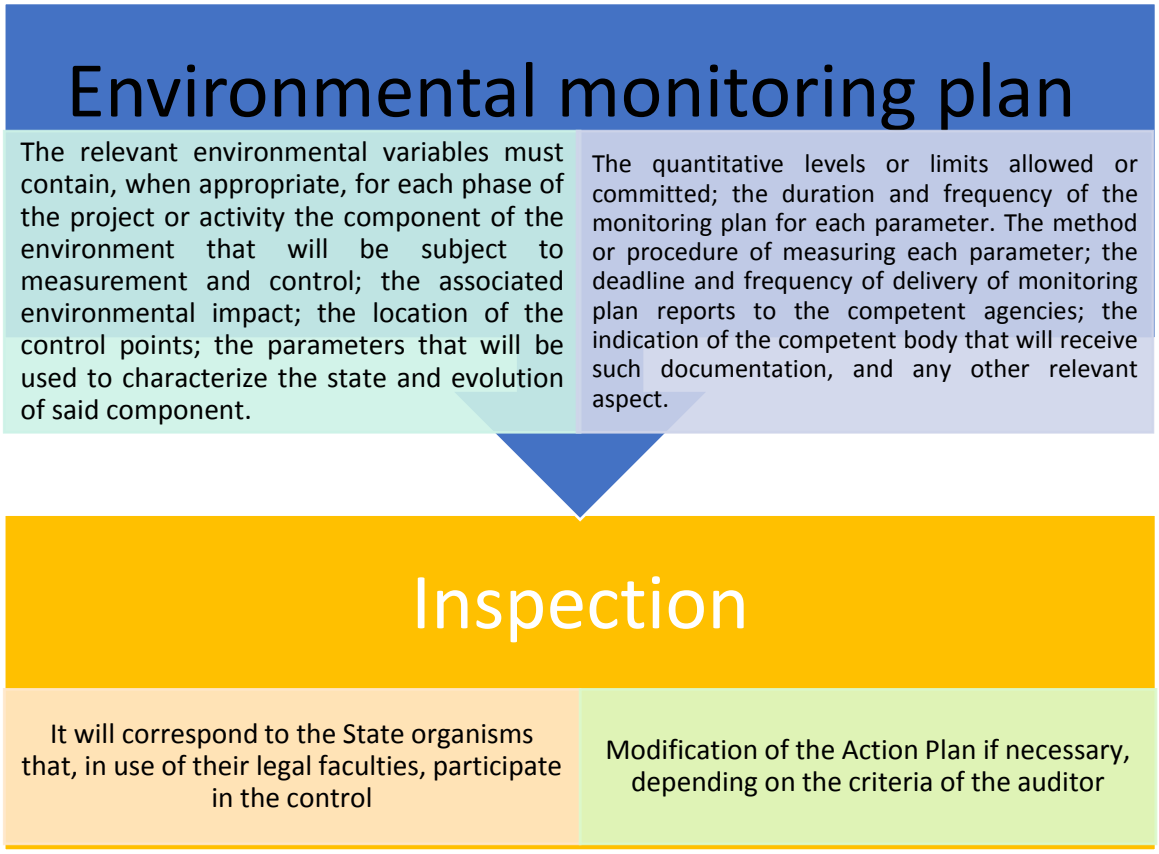
Mitigation Measures				
Activity:				
Area on intervention:	**Responsible of fulfilling the template - Local Technical Coordinator Check:**	**Management Coordinator Check:**	**Project Unit Check:**	**Date:**
Environmental or social Principle	**Environmental or social risk**	**Mitigation measure**	**Responsible**	**Verification**
		Mitigation measure 3. Mitigation measure 4.		
Principle 15. Lands and Soil Conservation	Risk 1. Risk 2.	Mitigation measure 1. Mitigation measure 2. Mitigation measure 3. Mitigation measure 4.		

5. Monitoring, evaluation and oversight program[3]

A surveillance program in accordance with the actions identified in the PMAS will report the results in the reports that can be: intermediate, annual and performance terminals. Supervision will ensure that actions are taken in a timely manner and for the determination of whether the measures are mitigating the risks and impacts or whether it is necessary to modify the expected results.

The annual project execution reports should include a section on the state of execution of the ESG risks, as well as the corrective measures considered necessary.

Interim and final reports also included an evaluation of project performance related to ESG.



[3] Before the implementation of the project, a "Manual of Social and Environmental Safeguards Implementation" will be developed to have protocols with specific indicators, means of verification and responsible for the implementation of the mitigation measures these protocols will be validated with the main partners involved in the project's implementation. Additionally, a training workshop aimed at the members of the project unit and project partners will be carried out for the implementation of this manual. CAF will give technical support for the manual elaboration and the operation of training workshop.

IMPLEMENTATION STAGE

During the implementation, there are several aspects that must be supervised and evaluated, including:

- Application of environmental and social measures
- Preparation of compliance reports at the farm or producer group level
- Preparation of environmental and social monitoring reports for the executive community.

Post-Closing Stage

- Generation of information at the project level on environmental and social compliance
- Evaluation of lessons learned
- Consideration of positive environmental impacts such as carbon sequestration and the benefits of biodiversity
- Calculation of the economic and financial impact of the subprojects

Midterm and final evaluation of the Project

- Prepare an assessment of compliance with environmental and social measures.
- Evaluation of the environmental and social impact (including the economic and financial impact) of the investments, as a whole.

Table 6. Monitoring and Evaluation Plan

Identified risks/impacts	Planned mitigation measure	Means of support	Indicator	Moment of execution	Responsible of monitoring
Principle 3: Marginalized and Vulnerable Groups	1. Encourage the creation of community-based committees. 2. Update the identification and quantification report of marginalized and vulnerable groups and a description of their risk of disproportionate adverse impacts with the help of community-based committees. The steps of the process: a. In the project area, identify the presence of marginalized or vulnerable groups. b. Quantify all groups identified using accepted methods on a base, when possible, in the disaggregated data. c. Describe the characteristics of marginalized or vulnerable groups, the identification of particular vulnerabilities that could make or excessively vulnerable to environmental impacts or negative negatives caused by the project. 3. Update the vulnerability report of the population that is in the project area	Agreements Report Report	# committees / # parishes * 100 # of the steps analyzed / # total steps * 100 # analyzed parishes (vulnerability) # total parishes	First semester	Specialist Management, Monitoring And Evaluation
Principle 5: *Gender Equity and Women's Empowerment* Either women or men have disproportionate opportunities to participate. Both women and men receive incomparable	1. Update the report on the Identification of creation risks or the maintenance of gender inequalities and a description of the risk of disproportionate adverse impacts based on gender. The steps of the process: a. Identify activities or other elements in the project that are known to exclude or hinder a gender group based on	Report	# of the steps analyzed / # total steps * 100	First semester	Specialist Management, Monitoring And Evaluation

Identified risks/impacts	Planned mitigation measure	Means of support	Indicator	Moment of execution	Responsible of monitoring
social and economic benefits Either women or men suffers disproportionate adverse effects during the development process	legal, regulatory or customary characteristics. b. Conduct or consult a gender analysis of the project sector, which describes the actual situation of the assignment of functions and responsibilities in the project area. c. Identify the project elements that persist or exacerbate gender inequality or the consequences of gender inequality. 2. Create a report to implement each activity where gender equality is recorded, without ruling out whether you belong to the vulnerable group. 3. Training on gender equality issues where issues such as: equality, breaking barriers, opportunities for all, sexist culture, stereotypes, decision-making will be addressed.	Report Attendance	# of reports where gender equity is involved / # of Project activities # attendees / # of guests * 100		
Principle 9: Protection of Natural Habitats Project activities cause unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources	The concepts of untouchable conservation that corresponds to literal c), in the Adaptation Project there is a paradigm shift that conserves traditional conservation where the population is involved. 1. Study of alternative activities that can be developed in the proposal of the creation of the Biocorridor with the interaction of the communities. 2. Talks with the beneficiaries of the Biocorridor to disseminate knowledge of the destination of the activities and the benefits of adapting to climate change.	Report Attendance Engagement letters	# viable alternatives / # total alternatives * 100 # attendees / # of guests * 100	First year	Specialist Management, Monitoring And Evaluation Territory Technical

Identified risks/impacts	Planned mitigation measure	Means of support	Indicator	Moment of execution	Responsible of monitoring
for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.	3. Meeting with the beneficiaries that are within the area of Biocorredor, determination of agreements and commitment actions of the conservation of the Biocorredor with sustainable and sustainable activities.		# of signed commitment minutes / # total minutes		Project Manager
*Principle 10: Conservation of Biological Diversity.*The project is avoiding significant or unjustified reduction or loss of biological diversity or the introduction of unknown invasive species	1. Forest technical study of the study area to implement the reforestation activity. 2. Technical study of adaptation measures to be implemented by farms to strengthen organic farming. 3. Training for the beneficiaries of the steps to follow for the areas that are reforested. 4. Training of farmers on farms for the installation of good agricultural practices.	Report Report Attendance Attendance	# local nurseries / # total nursery of the parishes # native species adaptive to the microclimate / # native species # of farms that have adapted adaptability measures to climate change / # total farms * 100 # attendees / # of guests * 100	First year Monitoring annually	Specialist Management, Monitoring And Evaluation

6. Grievance mechanism

The Complaints and Dispute Resolution Mechanism will be adapted to the existing regulations, the options for presenting complaints are: complains and discrepancy, which are enabled to people who are considered to be affected by possible environmental or social impacts resulting from the implementation of measures and actions of the project.

The Ministry of the Environment MAE does not have the functions of solving problems; indeed they do the follow up on the competent institutions to solve the problem efficiently and effectively. The primary objective of the dispute management mechanism is to protect the rights and obligations among all the actors involved in the implementation of the Project, making sure that the means are clear and effective measures are implemented in case of problems. The processes of claims, disputes and conflicts, will be resolved with local support, has been identified the Mediation Centers as key entity, formality created by the Ecuadorian law (2008) that allow to avoid judicial process-cost.

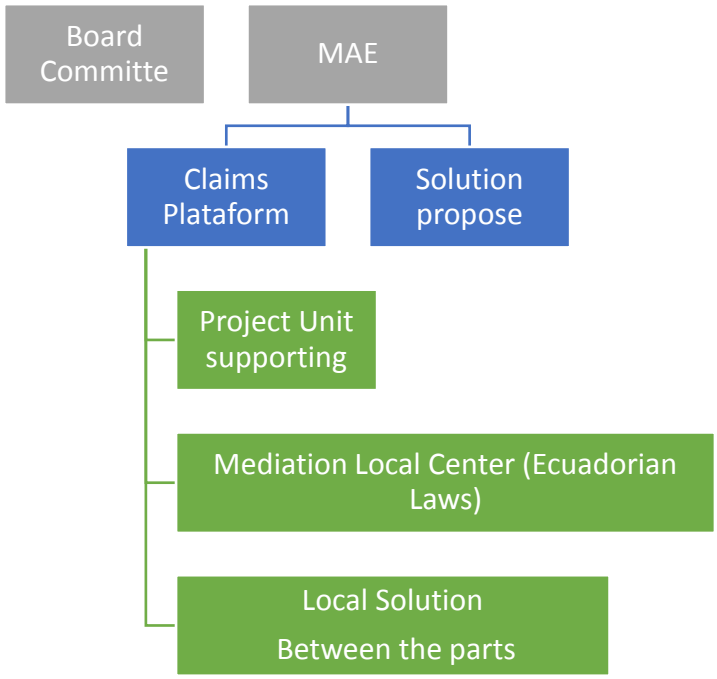
Response to petitions, complaints and claims: To respond adequately and effectively to petitions, complaints or claims that may arise at any stage of the project cycle, a mechanism must be designed that allows an effective and rapid response to the needs. The entire population should be informed of this mechanism regarding how to file a petition, claim or complaint, and about the time and manner in which they will receive a response. The planned mechanism must be presented and communicated among the local population with transparency and privacy, if necessary.

Periodically, the results of the treated cases must be disseminated, and this information will also be used as a commentary to improve the practice of the project.

Main complaints agents: Beneficiaries, organizations affected by project activities can file a complaint. Claimants do not need to be directly affected by the decision, project action and are not required to identify the applicable rule, regulation or policy that may have been violated.

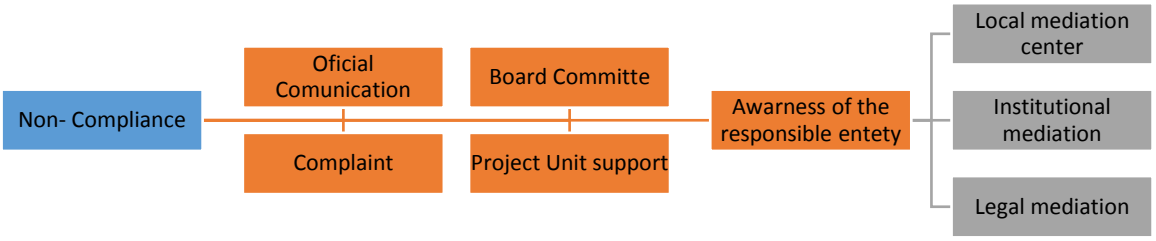
6.1 Procedure for dispute settlement

At the beginning of the project, commitment letters will be signed by the Project's stakeholders. During the project execution, if there is any disagreement or controversy on any issue, the Unit Project will promote a friendly solution, if necessary, the support of the mediation centers will be solicited. Finally, the intervention of the mediation centers.



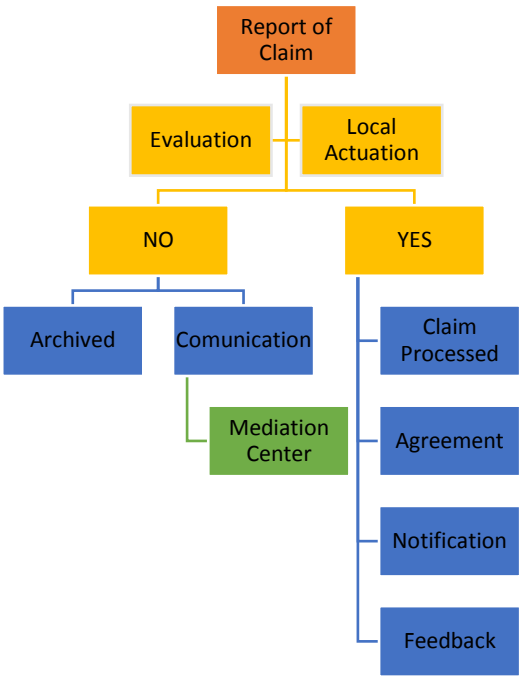
6.2 Procedures for cases of non-compliance

They serve to fulfill the requirements, prevent and address community concerns in order to reduce the risk of social participation and participation of all beneficiaries involved in decision-making. Also, it provides a guarantee of faithful compliance that is a legal backing mechanism intended to protect, compensate or ensure compliance with the obligations assumed by the State.



6.3 Procedure for complaints

A complaints mechanism provides a predictable and clear process and provides results that are considered durable and effective. The objective is to identify the complaint, facilitate corrective actions and a preventive engagement.



The contact information of the Adaptation Fund will also be publicized (i.e. project website, Facebook and mailbox) for the public to directly address concerns regarding the project:

Adaptation Fund Board secretariat
Mail stop: MSN P-4-400
1818 H Street NW
Washington DC
20433 USA
Tel: 001-202-478-7347
afbsec@adaptation-fund.org

6.4 Use of the stakeholders response mechanism

There must be a commitment from the stakeholders throughout the duration of the Project to promote mutually beneficial, transparent, responsible and positive working relationships.

The commitment of the stakeholders the construction of knowledge and the exchange of information

6.5 Involvement of relevant stakeholders and the disclosure of information

By means of its 3 components the Project has to implement the citizen participation

mechanisms established by Law (i.e. public consultations), although the development of these consultations was verified in this evaluation phase; once the Adaptation Fund approves the proposal, CAF will verify during the execution that the levels of citizen participation are respected and that the results are incorporated into the process; in Component 3 and in a cross-cutting manner, the implementers shall inform CAF in a timely manner about the communication strategy used with the community and the results obtained, such that there is full compliance with the obligations stipulated in the Regulations for the Application of Social Participation Mechanisms specified in the Environmental Management Law, promulgated in Executive Decree 1040 of April 22, 2008, and the Instructions for the Regulations for the Application of social participation mechanisms established in Executive Decree 1040.

The citizen participation component should be managed as a system that permits community involvement in the phases of information and incorporation of criteria, precisely in order to dilute potential expressions of discontent or complaints from the inhabitants of the areas of influence of the program who might feel adversely affected by the Projects.

The Strategic Environmental Assessment process of the Project will also serve to improve public participation in assessing the environmental consequences of the project's initiatives, in order to ensure that they are fully included and correctly communicated during the early decision-making stages, and placed at the level of social and economic considerations.

7. Annex

7.1 Applicable Domestic and International Laws That Apply

Laws	Ecuador
2030 Agenda for Sustainable Development	YES
Article 2 of the UN Framework Convention on Climate Change (UNFCCC)	YES
Cartagena protocol on Biosafety	YES
Convention on Biological Diversity (CBD)	YES
Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)	YES
Guidelines for National Greenhouse Gas Inventories (2006)	YES
Human Rights Council Special Procedures thematic mandates	YES
Human Rights Council Special Procedures country mandates	YES
ILO Declaration of Fundamental Principles and Rights at Work	YES
Intergovernmental Panel on Climate Change (IPCC)	YES
IUCN Red List of Threatened Species	YES
List of World Heritage in Danger	YES
Millennium Development Goals (MDGs)	YES
Ramsar sites inventory	YES
Report of the Special Rapporteur on the rights of indigenous peoples, James Anaya (The situation of indigenous peoples in Chile and Ecuador)	YES
Special Rapporteur on the Rights of Indigenous Peoples (UN)	YES
Status of Ratification Interactive Dashboard (See Ecuador and Chile listing)	YES
Sustainable Development Goals (SDGs)	YES
UN Framework Convention on Climate Change (UNFCCC) (Article 2)	YES
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972 – article 1 and 2. See also: http://whc.unesco.org/en/statesparties/na - Namibia accepted the Convention in 2000. See also: List of World Heritage in Danger – article 11(4) of the Convention	YES
UNESCO Convention on Biological Diversity	YES
UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage – article 1 and 2	YES
UNESCO Man and the Biosphere Programme reserves list (Ecuador - Chile)	YES
Universal Declaration of Human Rights (UDHR)	YES
UN Declaration on the Rights of Indigenous Peoples (UNDRIP 2007)	YES
WHO Determinants of Health	YES
Sendai Framework for Disaster Risk Reduction 2015 – 2030. Hyogo Framework for Action 2005-2015	YES
Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts and article 8 of the Paris Agreement under the United Nations Framework Convention on Climate Change.	YES

National *Laws and Regulations*

Principle 1 that corresponds to the Compliance with the law. The identified process is:

Step 1: Identify specific laws, norms, standards, procedures and national and international permits that apply to the project or program, or to any of its activities.

Basel Convention, Stockholm Convention, Rotterdam Convention, Kyoto Protocol on Climate Change, Basel Convention

Constitution of the Republic of Ecuador (Published in the Official Gazette 449 of October 20, 2008)

Law on Environmental Management (Published in the Official Gazette 245 of July 30, 1999), Codification of the Environmental Management Law Codification 19 Official Registry Supplement 418 of September 10, 2004 Status: Effective, Law of Prevention and Control of Environmental Pollution (Published in the Register Official 418 of September 10, 2004), Law of Water Resources, Uses and Use of Water (Published in the Official Gazette 305 of August 6, 2014), Organic Health Law (Published in the Supplement to the Official Register 423 of December 22, 2006), COA Organic Environmental Code that will enter into force after twelve months have elapsed, counted from its publication in the Official Register. Given by Sole Final Provision No. 0, published in Official Register Supplement 983 of April 12, 2017; Forestry, Conservation of Natural Areas and Wildlife Law Standard: Codification # 17 (Published in the Official Gazette Supplement # 418 of September 10, 2004, Forestry Law, Conservation of Natural Areas and Wildlife - Standard: Codification # 17 (Published in the Official Gazette Supplement # 418 of September 10, 2004, Executive Decree No. 1040, (Published in Official Gazette No. 332 of May 8, 2008), Agreement No. 061 of the Unified Text, published in the RO No. 316 of May 4, 2015, Ministerial Agreement No. 097-A of Wednesday, November 4, 2015 - Special Edition No. 387 - Official Registry, Organic Code of Comprehensive Criminal Registry Official, in the supplement No.180 dated Monday 10 February 2014, Labor Code (Published in the Official Gazette 167 of December 16, 2005), Codification of the Fire Defense Law Published in Official Gazette No. 815 of April 19, 1979

Step 2: Identify the activities of the project or the program that allows it (planning permission, environmental permits, construction permits, permits for the extraction of water, emissions and use or storage of harmful substances).

- Creation of the biocorridor: According with ministerial agreement No. 083 of August "Procedures for declaration and management of protected areas in Ecuador ", as first phase the project will develop the Management Plan that includes planning, tenure land and zoning of ACUS-Biocorridors and second phase includes in accordance with the Art.13 (agreement 083 AP), the GADs and project will.

Step 3: Identify environmental and social safeguard requirements, other than AFs (for example, national or co-financing entities). Use the appropriate evaluation tools, including threshold lists and sectoral requirements.

- Agreement Ministerial Agreement 018 - Ministry of the Environment: http://www.ambiente.gob.ec/wp-content/uploads/downloads/2016/02/Acuerdo-Ministerial-N%C2%B0-018.pdf
- Forest and conservation law for natural areas and wildlife: http://www.ambiente.gob.ec/wp-content/uploads/downloads/2012/09/ley-forestal.pdf
- Regulations for land zoning: http://ecuadorforestal.org/wp-content/uploads/2010/05/Normativa-para-la-zonificaci%C3%B3n-de-tierras-para-forestaci%C3%B3n-y-reforestaci%C3%B3n.pdf
- Agreement No. 502 Minister of Agriculture: http://servicios.agricultura.gob.ec/forestacion/wp-content/uploads/downloads/2013/01/SPF-acuerdo-502-con-reformas-incorporadas.pdf
- Acuerdo 211. Restauración Agreement 211. Forest Restoration: http://sociobosque.ambiente.gob.ec/files/images/articulos/archivos/amr211.pdf

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

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

Applicable legal and institutional frameworks

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

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

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

- Objective 3: Guarantee the rights of nature for current and future generations. Policy 3.3: Promote good environmental practices that contribute to the reduction of pollution, to conservation, to mitigation and adaptation to the effects of climate change, and promote them at the global level.
- Proposed Goals for indicator homologation and construction of information: Reduce the Vulnerability Index from high to means, population, livelihoods and ecosystems, in the face of climate change and natural disasters.
- Objective 5: Promoting Productivity and Competitiveness for Sustainable Economic Growth in a Redistributive and Solidarity way indicates that the rural population must strengthen the capacities of social interaction that strengthens cooperation and networks collaborative as well as the resistance capacities, which respond to adverse scenarios caused by natural effects and climate change.
- Territorial guidelines for territorial cohesion with environmental sustainability and risk management. Second. Habitat management for sustainability environmental and integral management risks in b.2. Promote integral and co-responsible management of water heritage to protect its quality, availability and proper use, with recovery actions, conservation and protection of water sources, recharge zones, aquifers and groundwater, considering the equitable access of water for consumption, irrigation and production

The Ministry of the Environment of Ecuador also considers a specific policy for the management of climate change in its "Policy 3: Management of adaptation and mitigation to Climate Change to reduce social, economic and environmental vulnerability".

The Organic Environmental Code (COA) is an advanced law, articulated to our Constitution, which recognizes nature as subject of rights, responds to current needs. He is optimistic, that is, he looks with pleasure on the use of natural rights in an intelligent rational and responsible way. Not the environmentalist look of the 70s or 80s where there was talk of preserving what it was not to touch. Today we say to the communities that live in the paramos, mangroves, fragile ecosystems, that we want them there to be our partners, conserving those beautiful ecosystems that serve all Ecuadorians. The COA deals with the ownership and possession of community lands within the National System of Protected Areas; of the conservation, use and sustainable management of biodiversity and natural resources; of the protection, maintenance and development of collective knowledge associated with biodiversity; and of the practical knowledge, ancestral and cultural traditions contemplated in the 282 articles of the COA.

The National Law on water resources, uses and exploitation 2014 (Water Law), aims to develop the human right to water, as well as regulating the authorization, management, preservation, conservation, use and use of water, included within the national territory in its different phases, forms and physical states, in order to guarantee Sumak Kawsay or good living. In this sense, the management through hydrographic basins is regulated:

- Articles 2, 7 and 17, recognizes the strategic nature of water, the participatory and community nature of its management, as well as the consideration of ecological flows in all forms of use and exploitation to achieve sustainable development.

- Articles 12 and 65, the protection and conservation of sources is the responsibility of the State, the Single Water Authority, the decentralized autonomous governments, users, communes, communities, peoples, nationalities, peasants and property owners where water sources are located, they will be responsible for sustainable and Integrated management, as well as for the protection and conservation of said sources, considering the integrated management approach of resources as cross-cutting.

- Article 64, proposes strategies for the conservation of resources in their sources, catchment areas, regulation, recharge, outcrop and natural water channels, in particular, snow-capped mountains, glaciers, paramos, wetlands and mangroves.

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

The national development plan (SENPLADES, 2013) states in its general objective 7 that climate change is a multi-sector problem of national scope that should be approached with programmatic

actions which generate results in the short and medium term. Specific objective 7.10 focus on implementing measures to mitigate and adapt to climate change to reduce the economic and environmental vulnerability with emphasis on priority groups.

In addition, specific objective 7.6 focus on managing water resources in a sustainable and participatory manner, with a focus on watersheds and ecological flows to ensure the human right to water. The project is in line with the National Climate Change Strategy (MAE, 2012), in particular with specific objectives 2 and 4. The first, focus on initiate action so that the performance levels of productive and strategic sectors and the country's infrastructure are not affected by the effects of change climate. Also 5, 6, and 8 the national strategy covers the period 2012 – 2025. It defines eight priority sectors for climate change adaptation. The present project is in line with the specific objectives of the adaptation line of work:

- Specific objective 2. The performance levels of the productive and strategic sectors and the country's infrastructure are not affected by the effects of climate change:

  Action 1. Strengthen and consolidate the development of projects in the productive, strategic and infrastructure sectors with criteria of adaptation to climate change.

  Action 2. Consolidate the actions that increase the resilience of the infrastructure in the face of extreme climate events attributed to climate change.

- Specific objective 4. To manage the water heritage with a comprehensive and integrated approach by the Hydrographic Unit, to guarantee the availability, sustainable use and quality of the water resource for different human and natural uses, in the face of the impacts of climate change:

  Action 1. Consolidate the integral management of the water heritage, ensuring its availability, sustainable use and quality for the various human and natural uses in the face of the impacts of climate change.

- Specific objective 5. Conserve and sustainably manage the natural heritage and its terrestrial and marine ecosystems in order to contribute with its capacity to respond to the impacts of climate change:

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

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

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

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

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

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

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

Feasibility study for the creation and operation of an Investment Fund within the scope of the project "Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Río Blanco upper watershed (Toachi-Pilatón watershed) with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management"

ANNEX 8

Feasibility of investment fund

July of 2017

Contend

FEASIBILITY STUDY OF THE INVETMENT FUND TO PROMOTE THE SUSTAINABLE DEVELOPMENT OF THE RÍO BLANCO UPPER BASIN

1. ABSTRACT: The investment funds have been set up in the country some years ago to provide financial resources for the implementation of projects that would otherwise not be possible, water funds are the most common figure used to this end.

The recovery of vegetation cover, the preservation of water basins, transfer of knowledge to communities, etc., are actions that, even in the absence of economic yields, generate important environmental and social benefits that are difficult to quantify. Therefore, the Sustainable Development Investment Fund (FONDESA, name suggested) seeks to pool economic resources to ensure its own sustainability and to have resources that boost projects that improve the livelihoods and productive activities of the people.

The degradation conditions of the Toachi and Pilatón rivers basins require coordinated actions between control authorities, surrounding populations, producers associations and direct beneficiaries of the water resource like hydropower plants. The Investment Fund has a well-defined and proven governance structure in the funds fully operating in the country. Strategies of success models will have to be adapted according to the local characteristics (political, social and economic) to the management of this watershed

The contribution of seed capital for the constitution of the fund may trigger the interest of sectional governments, which have among their various concerns, environmental protection within their territories. The addition of local constituent adherents to the Investment Fund will give them a sense of belonging and ownership of the management of this financial instrument. The correct selection of the technical staff - who will support the work of the fund from the very beginning- and the promotion of various projects in favor of the basin will be important reasons to attract and maintain the contributions of the constituents and achieve the adhesion of others.

The creation of suitable means to gather economic resources from the autonomous governments (GADs) trough new bills or taxes is within their competence, as is the case in the city of Quito and in the municipalities of Loja with FORAGUA, without a doubt, this strategy merits political will that can be achieved with a correct and wide dissemination of the Investment Fund performance throughout the basin.

The transparent management of resources and the periodic accountability will be decisive elements to show the benefits generated by the operation of the fund in the area. Adequate management of resources, under criteria of prudence, security and profitability, will allow the equity of this fund to be progressively expanded, even after the Adaptation Fund Project has been completed. Sustainability, understood as the permanence in time of financial resources for the benefit of the basin, will be fully achieved, constituting an illustrative and demonstrative case to promote the emerging of similar initiatives in the country.

2. BACKGROUNDS: As a most remarkable model of functioning is the water fund scheme, as it was mentioned, are financial instruments that can guarantee the sustainability in time of activities related to the protection of the water resources of a defined area and to give support for more ecofriendly productive practices. In Ecuador, there are fully operational water funds with increasing equity. For example, the Water Protection Fund of Quito (FONAG) was constituted in 2000 with an initial contribution of USD 20,000 currently has a net equity of USD 12 million, and is an exemplary model of performance for others Funds. Nevertheless, the rules for the management of public funds have limited the bunch of investments of trust funds can do when obtain public resources in an amount greater than 50% of the contributors, even so these funds continue to strengthen their equity by seeking new investment niches, and at the same time, actively promote the integral management of water basins under their scope.

Another similar example but with different target is CORPEI CAPITAL, this is an investment fund that started operating from 2009, with one million dollars of equity, their main objective is to give support to micro, medium and a small enterprises (MSME) to boost their business models trough: join venture scheme, equity investments, factoring and sometimes conventional lending. Today CORPEI CAPITAL is no longer receiving resources form its constituents because have the capacity to sustain itself with their investment returns. But it's worth remark that CORPEI is able to invest in private sector getting higher interest rates among 10%-12%-15% which is interesting with an equity of around USD 7 million dollars.

Below is a summary of the main features of existing funds.

WATER FUND	CONSTI-TUTION YEAR	MAIN CONSTITUENTS	INICIAL EQUITY	CURRENT EQUITY
Fondo para Protección del Agua (FONAG)	2000	Empresa Municipal de Agua Potable de Quito (EMAP-Q)	USD 20.000	USD 12.000.000
Fondo Regional del Agua (FORAGUA)	2009	Gobierno Autónomo Descentralizado Municipal de Loja	USD 51.961	USD 2.444.141
Fondo Ambiental para la Protección del Agua (FONAPA)	2008	Empresa de agua potable de Cuenca ETAPA y de Azogues EMAPAL	USD 532.000	USD 1.396.000
Fondo de Manejo de Páramos y Lucha	2008	Gobierno Autónomo Descentralizado	USD 460.000	USD 3.300.000

contra la Pobreza (FMPLPT)		Provincial de Tungurahua		
CORPEI CAPITAL	2009	Private investors	USD 1.000.000	USD 7.000.000

3. OBJECTIVE: The current analysis seeks to determine the conditions under which the Sustainable Development Investment Fund (FONDESA) for the protection of the Río Blanco upper basin through the support of innovative production models can become an alternative of sustainability that provides financial support to activities needed to increase the protection of the rivers basin among other environmental benefits. For this end, we are taking into account the successful experiences of water funds and private funds at a national level, in various regions and mechanisms according to the reality of each locality, common and appropriate elements will be assimilated for the formation of the Toachi-Pilatón Sustainable Development Investment Fund, using the resources of the Adaptation Fund as efficiently as possible.

The trust agreement, as with other funds, will be valid for 80 years, after the expiration date, it will be possible to decide on their liquidation or continuation of their operations.

The construction of this fund will be with the contribution of mainly public constituents that are maintained in the time and generate the necessary resources to support the local initiatives oriented to protect the rivers basin Toachi-Pilatón. The organizational structure of the fund will include democratic decision-making criteria, in a representative manner, aligned with the legislation stated at Organic Environmental Code. Water Law, and Stock Market Law, etc.; and whose decision-making process and the establishment of governing bodies include criteria of gender equity and attention to vulnerable groups.

4. MARKET STUDY: The different investment funds that operate in the provinces of Loja, Guayas, Tungurahua, Azuay and the Metropolitan District of Quito (IMQ), have been growing through the returns of their investments and the contributions from constituents, both are the main traditional mechanisms to strength the capital each year. Although there are several models for the management of the resources of the mercantile trust, they generally split by 60% to strengthen the capital and the remaining 40% for operating expenses and investment in watershed protection activities. There is also the possibility of allocating 100% of the initial contribution to the strengthening of the capital, without directing any resources to the investments in projects. However, the absence of visibility of the benefits generated by the existence of the fund can, discourage the incorporation of adherents.

Investments in the last year have been affected by the decrease in the passive interest rate, due to the accumulation of liquidity in the financial system at the end of the last year. To this, must be added the difficulty of finding better financial options, because of the restrictions that oblige funds, which are fed mostly (>

50%) of government resources, to invest in institutions that belong to the same public sector, this fact limits the alternatives of placing resources in financial instruments with better rates, as CORPEI does. In some public financial institutions such as the Pacific Bank, the interest rate has fallen to 2.15% in the last year, while BanEcuador's deposit certificates have kept the interest rate at 5%. Also there is options to buy government bonds with rates that exceed 8%. The search for profitable investment options has led to funds like FONAG to acquire retirement bonds with attractive discount rates that improve the return on these investments to 10%. Handling the alternatives to get a relevant weighted interest rate, is responsibility of the investment manager

5. ADMINISTRATIVE MATTERS: The Investments Funds have a well-defined organizational structure, the constituents are part of the Board of Directors with voice and vote, generating a sense of equality and appropriation of the fund. The manager is in charge of the political, administrative and implementation issues of the annual planning and make decision of investments.

The majority of Investment funds in the country that receives public resources, work with CFN fiduciary businesses, for that reason, we consider its charges as reference for the estimation of the costs of the constitution of the trust.

The hiring of an administrative assistant will complement the start-up staff structure. Likewise, the premises, office equipment and mobilization will be the initial investments that will enable the Investment Fund to function in the first year. Regarding personnel management, it´s important to remark that initially, the recruitment figure of the Investment Manager and the administrative assistant, will be under the figure of professional fees.

Estimation of administrative costs:

ITEM	EXPENCE	MONTHS	TOTAL YEAR
Trust administration expenses	USD 1.500	12	USD 18.000
Payment to the technical secretary	USD 1.800	12	USD 21.600
Payment to the administrative assistant	USD 800	12	USD 9.600
Payment of rent and utilities	USD 300	12	USD 3.600
Petty cash.	USD 300	12	USD 3.600
TOTAL			**USD 56.400**

Cost estimation for creation of the trust:

ITEM	EXPENCE	TOTAL
Expenses for constitution of the trust	USD 3.000	USD 3.000

Fix assets investment:

ASSETS	AMOUNT
IT Equipment	USD 5.000
Vehicle (four wheel drive)	USD 28.000
TOTAL	**USD 33.000**

The fiduciary costs correspond to the payment for the creation of the trust contract, the management of the resources of the fund and the inclusion of adherents. Due to national regulation, the Trust that is most likely to assume the management of this fund, is the Trust Business of the Corporación Financiera Nacional (CFN) or the Pacific Bank.

During the first year of operations, the Investment Manager will have the exclusive responsibility of seeking potential actors to become adherents to the Investment Fund and allocate the equity in profitable investments, for that purpose, the professional profile of the Investment Manager will have to include, among others: Professional knowledge in the areas of Sustainable Development, Environmental Economy, management of financial resources or related; Have at least 3 years of experience in the field of fiduciary business preferably of investments funds either private or public, good public relations skills and being desirable to have business administration knowledge.

The role of the Investment Manager is mainly political-technical, with the ability to interact with relevant political actors and obtain long-term commitments for the allocation of resources on a regular and secured basis.

6. INVESTMENTS: The resources that get in as contribution to the capital will be of USD 327.600 that corresponds to the net amount of investment once extracted the operative expenses of the first year. This contribution will be invested in diversified financial instruments, as far as possible, according to the alternatives available in the market, such as: fixed-term deposits that generate a better interest rate, certificates of deposit, purchases of bonds from public institutions, government bonds or retirement bonds will be, among others, the alternatives to invest. The amount of the investments, the maturity, interest rates agreed, the frequency of interest and the capitalization periods must be clearly agreed as part of the duties of the Investment Manager, who will finally give the Board of Directors the full information for the respective investment decision.

7. CONTRIBUTIONS OF THE CONSTITUENTS: The main actors identified to participate in the constitution of the trust are:

ACTOR	RELATION WITH THE BASIN	POSSIBILITY OF CONTRIBUTION
Gobierno Provincial de Pichincha	Canton Mejía and its parishes Aloag, El Chaupi and Manuel Cornejo Astorga are directly related to the Pilatón river basin.	High
Gobierno Provincial de Cotopaxi	The Sigchos canton and its rural parishes are quite important to provision water into de basin, mainly in the highlands	Medium
Gobierno Municipal de Sigchos	70% of its territory is within the ecological reserve Illinizas. It has "Punto Verde" recognition for good environmental practices.	High
Gobierno Municipal de Mejia	It has an Environmental Management and Risk Management Unit. It has initiated reforestation initiatives in the basins.	High
Gobierno Municipal de Santo Domingo	The populations like Alluriquin, Union del Toachi amomg others are beneficiaries of the water resource	Medium
CELEC-Unidad de Negocios Hidrotoapi	The hydroelectric is the main beneficiary of the Toachi and Pilatón flows, however, at the beginning of operations is expected for 2009	Medium (at least in the short term)
Gobierno Parroquial de Las Pampas	Beneficiaries of the Toachi water resource for crops and livestock mainly	High
Gobierno Parroquial de Palo Quemado	Beneficiaries of the Toachi water resource, mainly for crops and livestock	High
Gobierno Parroquial de Manuel Cornejo Astorga	Beneficiaries of the water resource of Pilatón for crops mainly	High
Gobierno Parroquial de Aloag	Beneficiaries of the water resource of Pilatón for crops mainly	High
Gobierno Parroquial El Chaupi	Some water sources that become the Pilaton River are born in its territory.	Medium

The adhesion to the investment fund, is a political decision mainly, the source of economic contributions can be generated by means of the creation of municipal ordinances that include an item in the water bill. In the case of the IMQ there is the municipal ordinance 213 issued in 2009, in which an economic contribution is created in the water bill which reaches 2% of the total billed, these funds go to FONAG. In the case of Loja the collection comes by means of 10% of the environmental tax applied to the municipalities that are the constituents of FORAGUA.

In the case of decentralized autonomous governments (GADs), adherence may take time, considering that approval must be guaranteed by provincial, municipal or parish councils. Which can generate the support or the rejection according to the political affinity of the councils. The change of authorities by means of popular elections, must be taken into account for the continuity in the process of adhesion the fund. The mentioned processes of formal adherence by the GADs and the approval of the Ministry of Finance for the automatic debit of the contributions must be considered and monitored to solve delays or obstacles to the process of creation and operation of the fund.

8. PROJECTION OF CASH FLOWS: With estimations of acquisition of the public contributors (could be private too), who are more likely to be part of the investment fund, and estimations of operating expenses in the first year, the projection is made of the movement of cash flows including the following assumptions:

1) 60% of the resources are addressed to the strengthening of the capital and the remaining 40% for expenses of operation and investments in conservation projects.
2) The contributions of the constituent adherents will be made effective from the following year to the implementation of this project, considering all the administrative and legal procedures that must be solved for approval and adhesion.
3) Investment Manager and his/her assistant will have as sole responsibility, to ensure the incorporation of adherents to the fund in the first year and the wide diffusion of the Sustainable Development Investment Fund.
4) The items for investment projects will be available from the year following the launching of the fund.

Ordinary annual contributions: These figures are composed by the estimation of the economic contributions that will be made by the adherents, taking as a reference the amount that public and private companies have given in other funds which they participate.

CONSTITUENTS/YEAR	SEED CAPITAL	2018	2019	2020	2021	TOTAL CONTRIBUTION
GAD Provincial Pichincha		$ 20.000,00	$ 20.000,00	$ 20.000,00	$ 20.000,00	$ 80.000,00
GAD Municipal de Sigchos	$ 200.000,00	$ 15.000,00	$ 15.000,00	$ 15.000,00	$ 15.000,00	$ 60.000,00
GAD Municipal de Mejia	$ 127.600,00	$ 15.000,00	$ 15.000,00	$ 15.000,00	$ 15.000,00	$ 60.000,00
GAD Parroquial Las Pampas		$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 12.000,00
GAD Parroquial Palo Quemado		$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 12.000,00
GAD Parroquial Tandapi		$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 12.000,00
GAD Parroquial Aloag		$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 3.000,00	$ 12.000,00
TOTAL	**$ 327.600,00**	**$ 62.000,00**	**$ 62.000,00**	**$ 62.000,00**	**$ 62.000,00**	**$ 248.000,00**

Total contributions

The contributions of CELEC-Hidrotoapi are not considered for two reasons: First, the hydropower plant is expected to start functioning on 2019, so no current incomes at all to Hidrotoapi for the moment, the second reason is the new raw-

water tariff, which began to apply since this year, Hidrotoapi is billed for the use of the Toachi river flow (32,000 liters / second) a payment of USD 86,852.67 and USD 62,425.36 for the use of the Pilatón river flow (23.000 liters / second) , these values meat an increase of 46% compared to 2016

The rest of actors are considered to contribute in a conservative way, in comparison with the current contribution that similar organizations do in other operating investment funds.

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Contributions to the growing capital: The contributions that are obtained from the adherents, 60% will be channeled for the strengthening of the capital through the investment in financial instruments.

CONSTITUENTS/YEAR	2019	2020	2021	TOTAL CONTRIBUTION
GAD Provincial Pichincha	$ 12.000,00	$ 12.000,00	$ 12.000,00	$ 36.000,00
GAD Municipal de Sigchos	$ 9.000,00	$ 9.000,00	$ 9.000,00	$ 27.000,00
GAD Municipal de Mejia	$ 9.000,00	$ 9.000,00	$ 9.000,00	$ 27.000,00
GAD Parroquial Las Pampas	$ 1.800,00	$ 1.800,00	$ 1.800,00	$ 5.400,00
GAD Parroquial Palo Quemado	$ 1.800,00	$ 1.800,00	$ 1.800,00	$ 5.400,00
GAD Parroquial Tandapi	$ 1.800,00	$ 1.800,00	$ 1.800,00	$ 5.400,00
GAD Parroquial Aloag	$ 1.800,00	$ 1.800,00	$ 1.800,00	$ 5.400,00
TOTAL	**$ 37.200,00**	**$ 37.200,00**	**$ 37.200,00**	**$ 111.600,00**

Amount allocated to investments

Since the resources of the constitution of a Trust go to the accounts of the Central Bank and do not generate interest, it is essential that the Investment Manager define the suitable investments to be made from the first year

Contributions to the extinguishing capital: 40% of the contributions of the constituents will be used for the payment of operating expenses and for the financing of priority projects for conservation protects to conserve the ecosystems of the Toachi-Pilatón River basin.
Note: USD 80.000 to pay lending incentives will be keep as liquid asset, not invested.

CONSTITUENTS/YEAR	2019	2020	2021	TOTAL CONTRIBUTION
GAD Provincial Pichincha	$ 8.000,00	$ 8.000,00	$ 8.000,00	$ 24.000,00
GAD Municipal de Sigchos	$ 6.000,00	$ 6.000,00	$ 6.000,00	$ 18.000,00
GAD Municipal de Mejia	$ 6.000,00	$ 6.000,00	$ 6.000,00	$ 18.000,00
GAD Parroquial Las Pampas	$ 1.200,00	$ 1.200,00	$ 1.200,00	$ 3.600,00
GAD Parroquial Palo Quemado	$ 1.200,00	$ 1.200,00	$ 1.200,00	$ 3.600,00
GAD Parroquial Tandapi	$ 1.200,00	$ 1.200,00	$ 1.200,00	$ 3.600,00
GAD Parroquial Aloag	$ 1.200,00	$ 1.200,00	$ 1.200,00	$ 3.600,00
TOTAL	**$ 24.800,00**	**$ 24.800,00**	**$ 24.800,00**	**$ 74.400,00**

Amount to be used for operation and projects investments

9. EXPECTED RETURNS The amount allocated as seed capital for the formation of the Investment Fund is USD 420,000; of which USD 83,000 will be used to cover operating costs (salaries, leasing, etc.) for the full operation of the Fund. The remaining USD 327,600 will be used exclusively for investment in long-term financial instruments that will provide interest rates between 5% and 8%.

For the estimation of income has been considered the yields of financial tools that are currently used by some existing water resources.

Investments year 1

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	$ 327.600,00	0,0776	$ 21.312,49
	$ 327.600,00		$ 21.312,49

The seed capital given by Adaptation Fund will go to investments in State Bonds with a conservative rate of 7.76% per year. Currently, these bonds are paying rates of 8.45% per annum.

The interest generated by this investment is calculated only for the 10 months regarding only the time that have elapsed since the actual investment until the close of the fiscal year. The following years will calculate the interest rate applied for a full year (365 days).

Investment year 2

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	$ 348.912,49	0,0776	$ 27.075,61
Goberment bonds to 20 years	$ 37.200,00	0,0776	$ 2.886,72
	$ 348.912,49		$ 29.962,33

The interest earned in the first year, is added to the capital and constitutes the new amount on which the return is calculated for the following year with the same interest rate. Additionally, USD 37.200 is included as an additional investment of the contributions, provided by the constituents corresponding to 60% under the figure of growing capital.

Investment year 3:

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	$ 378.874,82	0,0776	$ 29.400,69
Goberment bonds to 20 years	$ 37.200,00	0,0776	$ 2.886,72
	$ 378.874,82		**$ 32.287,41**

Just as the year before the invested capital sum the corresponding interest of the year, this amount becomes the new capital. Like the previous year, USD 37.200

is also invested, corresponding to 60% of the contributions for increasing capital delivered by the constituents that year.

Investments year 4

INVESTMENT TOOL	CAPITAL	INTEREST RATE	RETURNS
Goberment bonds to 20 years	$ 411.162,22	0,0776	$ 31.906,19
Goberment bonds to 20 years	$ 37.200,00	0,0776	$ 2.886,72
	$ 411.162,22		**$ 34.792,91**

The capitalization of interest and equity increases for new contributions will maintain this dynamic year after year. This short analysis is done within the scope of the Adaptation Fund project duration, however the same process is foreseen year by year. Interest is capitalized and the new capital and investment are formed and USD 37.200 of contributions for growing equity are added.

10. CASH FLOWS: Once we have projected information expected from the contributions of the founding constituents splitting them towards capital for strengthen the equity and extinguishable capital, and making a projection of operating expenses, we can build the projected flow of cash or the Investment Fund

The basic scenario for the construction of cash flow are modeled like this:

- Scenario 1 (the ideal one): it is assumed that all the constituents contribute amounts considered based on the experiences of water funds existing in other regions of the country. In addition, this model includes a lower interest rate than has been obtained in the market in current times with the same instruments.

In this scenario the equity growth is kept, the adjustment variable to get a better performance of the flows is through the amount of investment for conservation projects, so in this scenario the investment amount available from the second year and on, can reach over USD 30,000 per year or this amount can be take it for new investments, under the premise that, the more increase the equity, the higher returns will be obtained.

The resources coming to be used for lending incentives will be channeled through the Investment Fund, however the dynamic of that activity must be well known prior to decide which part of this resources (USD 75.000 for incentives and USD 5.000 for reporting) will be invested, and which part will remain liquid for incentives payments. For the cash flow exercise we assume that all this resources will be kept out of investments.

Projected cash flow from the Investment Fund 2017-2021

PROYECTION	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	YEAR 1	YEAR 2	YEAR 3	YEAR 4
+INCOMES											**$ 519.225,18**	**$ 88.881,76**	**$ 93.367,49**	**$ 98.167,21**
Seed capital	$ 420.000,00										$ 420.000,00	$ -	$ -	$ -
Contributions to equity											$ -	$ 37.200,00	$ 37.200,00	$ 37.200,00
Extinguishing capital contributions											$ -	$ 24.800,00	$ 24.800,00	$ 24.800,00
Funds to be used for lending incentives	$ 80.000,00										$ 80.000,00			
Returns											$ 19.225,18	$ 26.881,76	$ 31.367,49	$ 36.167,21
Others											$ -	$ -	$ -	
-EXPENSES	**$ 7.400,00**										**$ 110.000,00**	**$ 82.400,00**	**$ 84.092,00**	**$ 60.834,76**
Constitution expenses		$ 3.000,00									$ 3.000,00	$ -	$ -	$ -
Trust administration expenses	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 1.500,00	$ 15.000,00	$ 18.000,00	$ 18.540,00	$ 19.096,20
salaries expenses	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 2.600,00	$ 26.000,00	$ 31.200,00	$ 32.136,00	$ 33.100,08
Leasing and basic services	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 3.000,00	$ 3.600,00	$ 3.708,00	$ 3.819,24
Fix assets aquisition		$ 33.000,00									$ 33.000,00	$ -	$ -	$ -
Projects investments	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Incentives in lending and reporting	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 2.700,00	$ 27.000,00	$ 26.000,00	$ 26.000,00	$ 1.000,00
Others	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 300,00	$ 3.000,00	$ 3.600,00	$ 3.708,00	$ 3.819,24
BALANCE											**$ 409.225,18**	**$ 6.481,76**	**$ 9.275,49**	**$ 37.332,45**
+ INITIAL BALANCE	$ -										$ -	$ 409.225,18	$ 415.706,95	$ 424.982,43
FINAL BALANCE	**$ -**										**$ 409.225,18**	**$ 415.706,95**	**$ 424.982,43**	**$ 462.314,88**
											Increase	2%	2%	9%
											Total increase	13%		

Some considerations that were applied in this projection are:

- The amount received to incentives in lending (Scheme 1) will not be invested because it will needed in the short term, even though the portion that will be used in the next years indeed can be invested at least in short term, but the amount must be assessed once the dynamic of credits is already well known. **In the present analysis is assumed not be invested**
- The management of the adherents and their contributions are effective as of the following year of the constitution of the trust
- It is considered an inflation component of 3% per year in the estimation of expenses
- Interest is capitalized annually

11. REGULATIONS: The Investments funds are complementary with the Basin Councils, not opposed to them. However, the Basin Councils are collegiate consultative bodies of water areas known as Local Hydrographic Planning Units (acronym in Spanish UHPL), which are basin extensions that include several sub-basins and basins. Therefore, the geographical demarcation of the Basin Council will most probably not coincide with the demarcation of the basin on which the fund will work.

The Investment Fund will be used to leverage activities related to the area inside the boundaries of Toachi-Pilatón basin exclusively, which is one part of the jurisdiction of the basin council for the UPHL Esmeraldas.

In order to have a more complete idea of the legal considerations that the constitution of the Investment Fund should have, it would be worthwhile to make a brief review of the pertinent rules:

According to the Organic Law of Water Resources, Uses and Use of Water, Regulation and Instruction, specifies:

> **Art. 26:** Functions of the Basin Council: The Basin Council has the following functions:
>
> 1) To choose among its members or representatives to the Intercultural and Plurinational Council of Water, in accordance with the regulation of this law;
> 2) Participate in the formulation of guidelines and guidelines as well as the monitoring of the management plan by river basin, in the Marc of the National Plan of Water Resources;
> 3) Generate proposals for sectorial public policies related to water resources, which will be presented to the Intercultural and Plurinational Water Council, through their representatives;
> 4) To speak to the sole authority of water, in all matters that are of interest or request;
> 5) Participate in the consultation processes carried out by the single water authority and propose priority issues for the management of the basin or the water units that comprise it;
> 6) Resolve the matters that concern and that could influence the operation of the council;
> 7) Monitor that the decisions of the policies and plans of integral management of the watershed are materialized in budgetary items of the different levels of government that take part in the watershed;
> 8) The others that are established in the regulation of this law.

In the framework of the Nuevo Código Orgánico del Ambiente, the following rules are identify regarding creation of water funds:

> **Article 86.-** Financing of environmental services. In order to finance the mechanisms for remuneration for conservation activities, sustainable management and recovery of ecosystems and their subsequent flow of environmental services, public and private contributions will be promoted, as

well as funds from donations, loans or international contributions , Taxes or fees and any other source that is identified for these purposes.

Article 20.- Of the funds for environmental management. The National Environmental Authority shall issue standards and guidelines for the operation of public, private or mixed funds, based on the National Development Plan, national environmental policy and other priorities defined by said authority. The funds will be regulated in accordance with the law and will be subject to the control activities of the competent entities. The Decentralized Autonomous Governments may create environmental funds that contribute to the environmental management of their competencies, under the guidelines of the National Environmental Authority and the provisions of this Code. Private funds will contribute to the financing of environmental management on the basis of the principles of internalization of costs and environmental responsibility, without prejudice to other actions that may be undertaken in the framework of social responsibility, as well as other contributions free of charge.

In the Código Orgánico Organización Territorial Autonomía Descentralización (COOTAD), is stated:

Article 135: ... It is the responsibility of the autonomous decentralized provincial governments to govern, direct, order, arrange, or organize environmental management, environmental and nature advocacy, within their territory; These actions will be carried out within the framework of the decentralized national environmental management system and in accordance with the policies issued by the national environmental authority. For the granting of environmental licenses must be compulsorily accredited as an environmental authority with responsible application in its circumscription.

12. LESSONS LEARNED: The experience of fully operational investment fund (mainly of water funds) in the country can be considered as a positive example of the capacity of these structures to mature and be strengthened over time. As this happens the benefits for its constituents and for the ecosystems and, communities inside its jurisdiction will also increase. However, it is worth to recognize that there was also an unsuccessful case of FOOPAD, this water fund constitution was attempted to be implemented in Riobamba but currently is running out of business. The lessons of success and failure, leave us with the following lessons to take into account for the construction of the Investment Fund of the Toachi-Pilatón basin:

1) Sponsor or godfather: There must be a person or company dedicated to promoting the construction of the water, agglutinate intentions and monitor progress. This first interested in the achievement of this project must be the initial actor involved in the project. In this case the Mayors of municipal GAD of Sigchos and Mejia are pretended to assume this roll.

2) The Investment Manager must be hired from the very beginning and inform the promoter / sponsor of the progress made, especially in the identification of potential adherents and their commercial and political progress. The Investment Manager must have a safe and agreed remuneration since the beginning because the lack of payments can discourage him/her and spread doubt about the investment fund

3) It is important that initial "seed" resources start investing with profitability criteria, since stagnation in the trust accounts will cause a periodic reduction of the fund's resources.

4) The return on investments as a function of the interest rate must be higher between the smaller the funds are, and can be gradually decreasing as the capital grows. For example: FONAG that has a capital of USF 12 million has an average return of 5% a year, while the FMPLPT with a capital of USD 3.3 million requires to invest in financial tools with a rate of 7% or 8%.

5) Only those actors who have a regular contribution to the mechanism will have a vote in the structure of decisions and decisions.

6) Having the political leadership in the creation of a fund is a determining factor when initiating this initiative. If there is no political will to create a mechanism to conserve water resources in the long term, it will be difficult to carry out this process[1].

7) Ensure that the mechanism is inclusive of different actors and users that can be part of the fund and of the decision making process [2].

13. ORGANIZATIONAL STRUCTURE: The organizational structure of the Investment Funds is homogeneous and has proven to be useful for the proper functioning of the fund.

From the experiences observed we have the following:

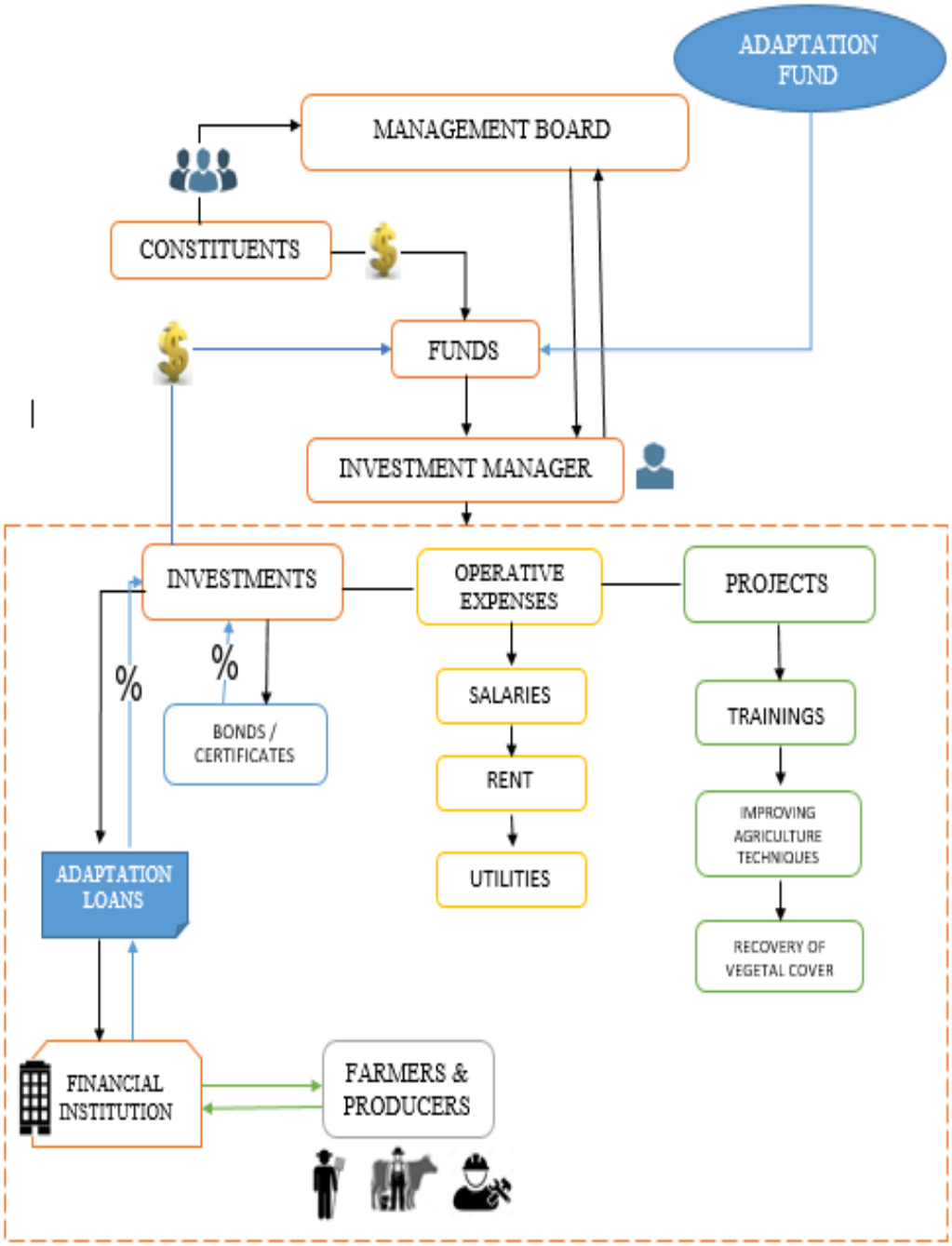
Board of Directors: Conformed by a representative of the constituents, this is responsible for approving the planning and investment proposals submitted by the technical secretariat. It is desirable to have, among their representatives, different actors or users of water to have a broad vision.

Investment Manager: who under the waters fund structure is named Technical Secretary in the case of water funds and Investment Manager in the case of investment funds, he/she is in charge of the execution of the planning, of the investments to be made, of the dissemination of the

[1] Mecanismos financieros: Elementos para la creación y consolidación de un fondo de agua. Cooperación alemana, p 67.
[2] Ibid

programs and projects that are carried out and of attracting new adherents. The Investment Manager is the person responsible for its management and representation. He/she must report to the Board of Directors

14. DIAGRAM: Illustration of the functioning of Investment Fund



Annex 9 Gender and vulnerability groups analysis for the project "Increasing adaptive capacity of local communities, ecosystems and hydroelectric systems in the Toachi-Pilatón watershed with a focus on Ecosystem and Community Based Adaptation and Integrated Adaptive Watershed Management."

ANNEX 9

Concept note: Stakeholders, interests and socioeconomic situation in the Toachi - Pilaton watersheds, February 2017

Full size project preparation: Gender and vulnerability groups analysis, August 2017 – January 2018

Contents

Glossary of terms:

FAO	Food and Agriculture Organization of the United Nations
INEC	National Institute of Statistics and Censuses
PDOT	Development and Territorial Planning

Tables:

Figures

Introduction

In Article 11 of the Constitution of the Republic of Ecuador recognizes the principle of equality and non-discrimination, which states: "All persons are equal and shall enjoy the same rights and opportunities." The Ecuadorian state is working on incorporating and translating this gender approach into public policies. In Ecuador, the Commission on Gender Statistics was created to promote and produce statistics and indicators based on the information obtained in the Population and Economic Census 2010.

Ecuador presents a high Gender Gap Index[1], however, gender inequalities still persist, particularly in political participation and access to decision-making processes. Given that illiteracy rates (also functional and digital) in Ecuador are higher for women, communication and education strategies will need to be gender-sensitive and convey appropriate and understandable messages for both sexes. This disadvantage should also be taken into account when designing project outputs such as capacity building, training and creation of new financial products, so women are enabled to effectively participate in these activities. Women are more vulnerable to climate change and disasters than men, because of gender roles and responsibilities, project design takes into consideration gender differences and finds ways to promote women's participation.

The World Conference on Women held in Beijing in 1995 marked an important milestone in the development of gender statistics. They propose to collect, compile, analyze and periodically present data disaggregated by age, sex, socio-economic and other relevant indicators, including the number of dependents, for use in the planning and implementation of policies and programs. Promote further development of statistical methods to improve data related to women in economic, social, cultural and political development. (Mujeres y Hombres del Ecuador en cifras III)

The Brasilia consensus held in July 2010 recommends states to "Strengthen the production of necessary statistical information disaggregated to make feasible the problems of gender inequality in the area of physical and economic autonomy and decision-making", in agreement with the observatory of equal gender.

Climate change is a global phenomenon that will affect natural and managed ecosystems and systems, such as water resources, agriculture, food production systems, forest ecosystems, coastal-marine areas, and society in general (Género y Adaptación al Cambio Climático, 2014)

In particular, women and men in rural areas have different roles, tasks, responsibilities, and rights assigned in relation to natural resources. According to the FAO, "women make key contributions in the rural economy of all regions of developing countries as farmers, laborers and entrepreneurs." Women in rural areas play an important role in food production. Women are the ones who guarantee feeding of their families, through subsistence farming and cattle breeding, in their orchards. For their part, men tend to work in producing organizations in different places of their home. Women, in their role of providing food, rely heavily on natural resources and a healthy environment, which is why they are the first to be affected by the impacts of climate change. (Stock, 2012)

Vulnerability to climate change is linked to people's current capabilities to deal with or adapt to the environmental changes induced by global warming. The effects of climate change

[1] WEO, Global Gender Gap Index

have potential to aggravate gender inequalities. In this sense, existing gender inequality shows that some women are less likely to access and control production such as: use of land, finance, training or information, and therefore will be more vulnerable to the effects of climate change than men. This means that they will lose their livelihoods more easily and it will be less easy for women to find alternative means to meet their needs and that of their families. (Género y Adaptación al Cambio Climático, 2014)

Another task for women is motherhood, childcare and housekeeping. This includes provision of health services and hygiene measures, using energy and water supplies. In several societies women and girls are the ones that provide water for domestic use.[2]

Women and men face problems of climate change, such as: heat waves, floods, storms and drought, which can lead to increased morbidity and mortality.[3]

In 2007, according to the United Nations Development Program Human Development Report, climate change is likely to increase the disadvantages currently affecting women. [4]

In 2010, at the sixteenth Conference of the Parties in Cancun, it was identified for first time, the needs of designing climate change adaptation actions that took gender dimensions into account.

If gender is not mainstreamed into climate change adaptation programs, women will continue to be more vulnerable because their role depends more on access to natural resources and land, compares to men, for their livelihoods and for their families. In rural areas, women have a broad knowledge of the environment. This knowledge about how to manage and protect households is extremely valuable when seeking solutions for adaptation to climate change.

[2] Dankelman, I., Gender and Climate Change, 2010, p. 28.
[3] UN WomenWatch, Fact Sheet: Women, Gender Equality and Climate Change ver en http://www.un.org/womenwatch/feature/climate_change/
[4] PNUD, Human Development Report 2007/2008, p. 24.

Conceptual Framework

Climate change is not a neutral issue for gender dimensions. The impacts of climate change affect women and men differently, so it is necessary to address these differences in the design of responses to these challenges. From this context, micro and small producers are generally most disadvantaged in the face of climate change, because their livelihoods depend directly on the climate. Therefore, climate change adaptation measures have the potential to promote the role of women in the socio-economic activities of the parishes located in the Toachi-Pilaton watershed and address following basic elements:

- Access to land and resources
- Access to financial services
- Access to education and professionalization
- Access to information
- Access to public participation
- Access to justice

From a gender perspective, the word gender does not refer to men or women, but masculine and feminine, that is, to the qualities or characteristics that society attributes to each sex. Gender is a central factor in the organization of societies and can affect the processes of production, consumption and distribution.

The influence of gender on the rural population is important and it determines that "with any indicator of human development, women's power and resources are lower in rural areas of the developing world. Rural women's are part of majority of the world's poor. Despite recent improvements in their status, they have the lowest levels of schooling in the world and the highest illiteracy rates. In all developing regions, female-headed households are among the poorest." (FAO, 2009)

One way to reduce gender inequalities is to achieve gender equity, which means justice and fairness in the treatment of women and men in terms of rights, benefits, obligations and opportunities. By establishing social relations in which neither sex suffers discrimination, gender equity aims to improve gender relations and functions and achieve gender equality. The essence of equity does not lie in equal treatment (treatment can be the same or different), but should always be considered equivalent in terms of rights, benefits, obligations and opportunities

The index or relation of femininity reflects composition by sex of the population and is the result of the demographic dynamics of a population. After birth, the ratio between number of women and men varies due to different patterns of mortality and migration of the sexes.

Definition of Femininity Index. - Relationship between number of women and number of men that make up a population. It is expressed as the number of women of all ages in a given year relative to every 100 men of all ages in that year.

The following table shows the femininity index obtained in the 2010 population census.

Etnia	Mujeres		Hombres		Índice de feminidad
	Número	%	Número	%	
Indígena	517.797	7,1%	500.379	7,0%	103,5
Afroecuatoriano/a	513.112	7,0%	528.447	7,4%	97,1
Montubio/a	500.115	6,8%	570.613	7,9%	87,6
Mestizo/a	5.301.654	72,6%	5.115.645	71,3%	103,6
Blanco/a	448.740	6,1%	433.643	6,0%	103,5
Otro/a	24.398	0,3%	28.956	0,4%	84,3
Total	**7.305.816**	**100,0%**	**7.177.683**	**100,0%**	**101,8**

Table 1 The feminity index calculated in 2010 for Ecuador

With results of the population census carried out in 2010, it was concluded that the income of the economically active population is lower in rural areas, especially for women. This information is a basis for estimating women's income in parishes located in the project area. The following table summarizes the information on the average income of the employed population.

Área	Ingreso promedio en USD		Nacional	Desigualdad
	Mujeres	Hombres		
Urbana	$ 421	$ 524	$ 483	80,3%
Rural	$ 219	$ 293	$ 273	74,8%
Nacional	$ 374	$ 445	$ 419	84,0%

Fuente: INEC - Encuesta Nacional de Empleo, Desempleo y Subempleo - ENEMDU - Diciembre 2012
Población de 10 años y más

Table 2 Income of economically active population

The population composition in the Project area is as follows:

Área	**Men**	**Women**	**Total**
Watershed	21188	22012	43200
Intervention Area	5567	4975	10542

Table 3 Population in the Project Area

The most of population is located near main populations in the watershed and near the main roads.

Área	**0-14 años**	**15-64 años**	**64 o más**	**Total**
Watershed	17504	22296	3400	43200
Intervention Area	3498	5996	1048	10542

Table 4 Disaggregated data of Population in the Project Area

Gender Analysis: Description of Social, Economic and cultural characteristics

In 2010, Ecuador had 14.306.876 inhabitants (INEC, 2011), 62,8% of those lived in urban areas, while 50% lived in the coast. The country has a high Global Gender Gap Index[5] (0.738), there is almost complete equality in educational attainment and health and survival, and a high level in economic participation and opportunities, but a major gap in political empowerment (WEF, 2015). Also, the country has a low OECD´s Social Institutions and Gender Index (i.e., 0.0422), which indicates low level of gender discrimination in social institutions.

a. Health

Prenatal control increased from 80% in 1999 to 96,1% in 2012[6] , also 96,3% of births were attended by skilled health personnel in 2014[7] . This has led to a reduction in neonatal mortality rates, from 16,1 deaths per 1.000 live births in 2002 to 10,8 deaths per 1.000 live births in 2015[8].

However, maternal mortality rate[9] presents a different trend: between 1990 and 2006 it decreased to its lowest level, with 48,46 deaths per 100.000 live births; from 2007 onwards this rate picked up and increased up until 2012, when registered 87,15 deaths per 100.000 live births. Public Health Ministry identified these factors among the reasons that could have led to this increase: medical centers infrastructure; medical equipment; health care services model; poverty; gender violence; other. According to the World Health Organization, in 2015 this rate was 64 deaths per 100.000 live births.

Adolescent pregnancy rates[10] descended in rural areas, between 2003 and 2013, however, they have increased slightly in urban:

	Girls aged 12 to 19		Girls aged 15 to 19	
	2003	2013	2003	2013
Urban	4,9%	5,0%	8,7%	8,2%
Rural	6,5%	5,3%	11,2%	8,8%

b. Education

According to the Women and Gender Equality National Agenda 2014 – 2017 (WGENA), and based upon data from INEC (2013), women present higher illiteracy rates than men, especially in rural areas:

	Illiteracy rates		Functional illiteracy rates		Digital illiteracy rates	
	Urban	Rural	Urban	Rural	Urban	Rural
Men	3,2%	4,6%	7,0%	20,2%	18,6%	34,4%
Women	10,7%	15,2 %	8,9%	25,6%	24,7%	43,2%

[5] World Economic Forum

[6] Data from Public Health Ministry, found in Logros de la revolución ciudadana en clave de género, Consejo Nacional para la Igualdad de Género.

[7] World Health Organization.

[8] World Health Organization

[9] Public Health Ministry.

[10] Women and Gender Equality National Agenda 2014 – 2017.

Digital illiteracy refers to access and use of information and telecommunication technologies, while functional illiterates refers to people with 3 years or less of education[11].

In 2015, primary and secondary education enrolment rates and attainment rates[12] were close to parity, however, women tend to outnumber men in tertiary studies:

	Enrolment			Attainment		
	Female	Male	F/M ratio	Female	Male	F/M ratio
Primary	96%	94%	1,02	80%	82%	0,97
Secondary	84%	81%	1,04	38%	39%	0,96
Tertiary	45%	35%	1,31	11%	10%	1,06

Also, there is horizontal segregation in tertiary[13] studies, with 7% of female graduates against 26% of male graduates in STEM[14]. Women have reduced access to credit and scholarships, receiving 28% of grants awarded by the Science, Technology and Innovation Superior Education National Secretary's Office in 2011. According to WGENA, reasons behind this gap may refer to the lower participation of female students in STEM fields.

Finally, 73% of professors in tertiary education were male. This gap further increases in dean's and rector's offices[15].

c. Income

In 2014, 28,7% of 3,8 million homes are led by women[16] , 70% of those are located in urban areas, and also 70% of those are single-parent households, with 2 to 4 family members. Within afro Ecuadorian community, the rate of female-led households increases, up to 32,2%, while the montubio community has the lowest proportion: 21,4%.

In Ecuador poverty affects more women than men[17] . More than one out of every woman (35,% from age 15 and above) do not have any sort of income of their own (and are not studying), more than tripling the amount of men in the same situation (9,1% of men in 2014). This lack of personal income correlates with the feminity index in poor households in 2013, of 117,6, which proves that more women than men, from the age of 20 to 59 years, lived in poor households.

d. Labour markets

In March 2017, according to the latest Employment, Unemployment and Underemployment National Survey[18] , 69% of total working-age population constitute labor force: 81% men, 57% women. Out of the 8 million people, 3,1 million people are fully employed (38,5%), 7,1

[11] Sistemas de indicadores sociales del Ecuador.
[12] World Economic Forum, Gender Gap Index, Ecuador 2016.
[13] Bachelor's or equivalent level, Master's or equivalent level, Doctoral or equivalent level, according to the International Standard Classification of Education (ISCED) by UNESCO 2011.
[14] Science, Technology, Engineering and Mathematics.
[15] WGENA
[16] Agenda Nacional para las Mujeres y la Igualdad de Género, 2014 – 2017
[17] CEPALSTAT, Gender Indicators
[18] Instituto Nacional de Estadísticas y Censos (INEC), Ecuador

million people are underemployed (21,4%), 0,9 million people have a non-remunerated employment (10,9%), and 1,9 million people have a non-full-time job (24,7%). Public servants constitute 18,7% of all wage-earning people and informal sector accounts for 45,6% of total employment.

Only 31% of females have an adequate job[19], while 47% of working men do. This category includes people who either: (i) earn, at least, the minimum salary; (ii) work, at least, 40h a week; (iii) earn, at least, the minimum salary, work less than 40h, but they do not wish to work more than those hours.

Also, women tend to concentrate in low-productivity jobs, more than men do[20]:

Productivity level	Low	Medium	High
Women	81,1%	13,1%	4,1%
Men	57,5%	34,2%	6,7%

However, underemployment[21] is greater for men 24% vs 21% women. This is consistent with (1) gender differences in average number of working hours: women work 32h/week, while men do around 40h/week; and (2) gender roles: more women than men are employed in non-remunerated jobs[22] : 19% of women vs 6% of men.

Unemployment rate is higher for women (5,5%) than for men (3,6%), even though women earn less: average monthly earnings are 277,08 US$, 78% of male average monthly earnings (US$ 354,69).

Regarding balance between professional life and personal life[23], women spend more hours in domestic chores and care-taking activities than men. In 2012, women dedicated more than 31 hours per week to non-remunerated work, comparted to 9h spent by men doing same tasks. Gender gap in rural areas is even larger, reaching a 25h difference in disfavor of women. However, hours dedicated to remunerated jobs show little gender differences in rural areas: men work 50h per week, on average, while women work 47h. Subsequently, female's average total workload per week is greater than male´s, with 82h and 59h, respectively.

e. Political participation

In general terms, women held about 23% of public elected offices in 2009[24]. In 2013, 38,7% of legislative seats were occupied by women, ratio that had been increasing since 1990 from a 6,9% and after having passed a quota law in 1998. At the local level, female participation in city councils was 28,61% in 2009, while only 6,3% of elected mayors and 8,7% of prefects were women.

[19] CAF Calculations based on tabulations from Encuesta Nacional de Empleo, Desempleo y Subempleo, 2017.
[20] CEPALSTAT, Gender Indicators.
[21] Underemployment considers two situations: (i) working less than 40 hours a week but wanting to work more; and (ii) earning less than the minimum salary.
[22] This category includes: (i) people who work at their own homes and receive no salary; (ii) people who work at somebody else's own home and receive no salary; and (iii) non-remunerated assistants and/or temporary workers.
[23] Encuesta de uso del tiempo, INEC 2012.
[24] Women and Gender Equality National Agenda 2014 – 2017, based upon data from INEC, CONAMU and Electoral National Council

f. Gender-based violence

According to data[25] from Gender violence and family relationships survey (2011), 61% of women has suffered, at least, an episode of any type of gender violence perpetrated by any person in their life's. When discriminating by type of aggression, psychological violence appears to be the most common (54%), followed by physical aggression (38%), sexual violence (26%) and economic violence (17%). Regardless of violence typology, in most of the cases perpetrator is victim's (former) partner. This is true for 87% of physical aggression cases, on one end of the scope, and 54% of sexual aggression cases, at the other end. Prevalence of intimate partner violence is 25%, understood as the percentage of women who have suffered more than one episode of violence ("many times" or "sometimes") in the last 12 months.

The study[26] analyses some socio-economic factors that may be linked to gender violence, revealing:

(a) Income: gender violence levels are similar for the first four income quintiles, but descend on the fifth, specially psychological and physical aggressions (differences between 1st and 5th quintile are 10 percentage points and 9 percentage points, respectively);

(b) Ethnicity: prevalence of intimate-partner gender violence varies with ethnicity: indigenous women (59,3%), afro Ecuadorian women (55,3%), montubian women (48,0%), mestizo women (47,5%), and white women (43,2%);

(c) Education: women with no education (57,4%) or basic education (54,5%) suffer more from psychological and physical violence than women with tertiary studies (36,3%);

(d) Disabilities: women with some type of permanent[27] disability[28] suffer more gender violence than women without disabilities, especially sexual aggressions (more than 7 percentage points), followed by physical aggressions (with 6 percentages points of difference).

According to CEPAL, Ecuador's femicides rate in 2014 was 1,2 deaths per 100.000 women.

Gender issues and vulnerable people

As in most of rural areas in Ecuador, gender is a complex issue. It is difficult to evaluate women issues mot only because there is an evident level of "machismo" but also because women have types of agency that do not necessarily have been analyzed by feminist studies and then may not fit in what gender inequality stands for.

[25] La violencia de género contra las mujeres en el Ecuador: Análisis de los resultados de la encuesta nacional sobre relaciones familiares y de violencia de género contra las mujeres, 2014.
[26] La violencia de género contra las mujeres en el Ecuador: Análisis de los resultados de la encuesta nacional sobre relaciones familiares y de violencia de género contra las mujeres, 2014.
[27] Permanent disability refers to disabilities suffered for at least a year, or longer.
[28] It includes the following types: cognitive, developmental, physical, mental, and deafness.

The first aspect of gender inequality in the area is the invisibilization of the female work. Despite the current interest of the government for promoting women visibilization, most of the productive female activity is still not socially recognized, and in that sense it is not statistically reflected either. The division between labor for the market and domestic work is often diffused and part of the productive work ends up being counted as unrecognized domestic labor. In other words, female work counts only when it is sold in the market economy (as waged worker or as independent entrepreneur) but not when women work at home. Two factors contribute to this statistical invisibility: on the one hand the fact that all of the female home work has a high use value but it is of null exchange value. For example, cooking for the family, caring children, making the room and so on are activities that cannot be sold in the free market and then it is not worth or practical accounting them. On the other hand, the home female activities are seen as part of the gender work division so it is the task that women must contribute for family and social reproduction.

Beyond the above theoretical considerations since many men in the Toachi Pilaton area are increasingly incorporated in waged work activities, rural women have taken on bigger roles in agricultural production and community labour. The resulting effect of this fact is that the women must assume the place that men have left vacant and then must work an average of 14-16 hours daily. The personal impact of this social phenomenon can be devastating in terms of women health and of physical abuse from

Project issues

The proposed project aims at strengthening the adaptive capacity of vulnerable populations in the Río Blanco upper watershed and develop a model of adaptation to climate change that can be replicated in similar context in the country and in the region, The project is organized into three components and four outcomes. 9 concrete outputs will be produced. The multiyear work plan will be developed during project preparation:

Table 5. Project components and key gender indicator

Project/Programme Components	Expected Outcomes	Expected Concrete Outputs	Key gender [29]indicator in the project
1.Conserve vegetation cover	1. At least 230,000 ha of native vegetation is conserved to reduce the impact of climate change on the hydrological cycle under integrated watershed management	1. 1,000 ha of native vegetation is conserved by sustainable forest management and conservation mechanisms.	1.1.4 # of families in communities adjoining areas de conservation in target ACUS, participating in livelihood/productive activities demonstrated to reduce pressures on forest which at least 50% of women participate. Disaggregated beneficiaries information: specifying number of men and women.

[29] The component and indicator are describe y the part III, section E in the Project Document full design

		2. Improved management of existing protected forests and private conservation areas (ca. 230,000 ha)	2.1.3 # of families with adaptation plans in their farms and % of women participation. Disaggregated beneficiaries information: specifying number of men and women
2. Adapt farming practices to new climate change conditions and enable their sustainable climate smart financing	2. Sustainable farming practices and livestock adjusted to local realities are being introduced and implemented with assistance of financing mechanisms for adaptation measures	3. 250 ha of pasture and 250 ha of crops apply sustainable farming practices	% of women included in vulnerable groups
		4. At least 2 institutions have introduced specific solutions and credit assessments to support the disbursement of credits for adaptation, integrating environmental and climate risks in their operations.	2.1.4. # of institutions have introduced specific solutions and risk assessment methodology to support the disbursement of credits for adaptation, integrate sustainable and climate smart criteria in their whole operations
	3. At least 1 long term financing mechanisms has been piloted or introduced	5. One investment fund to promote sustainable development is set up and operational	2.2.1 # of investment funds to promote sustainable development set up and fully operational
3. Strengthen local capacities and share lessons	4. Local population and parish governments with increased capacity to implement climate change adaptation measures.	6. At least 6 parishes being built capacities and prepared to manage and use meteorological information.	3.1.2 # of farmers, women and vulnerable groups trained in climate information
		7. Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.	3.2.1. # of development plans (PDOT) incorporate measures for ecosystem-based adaptation to climate change (document and promote the participation of women in decision-making processes)
		8. Strategic plan of communication, education, knowledge transference and scheme of replica, including demonstration farms and markets. Plus training on adaptation finance to financial institutions.	3.1.5. # of established information system established in the project # of documented practices where the role of women and vulnerable groups is highlighted.
		9. Systematization of information gathered during the whole project design and implementation using existing informatics platforms	3.1.5. # of established information system established in the project

Gender Action Plan

Climate Change Gender Action Plans (ccGAPs) build on a country's national climate change policy, plan or strategy, delving into gender-specific issues by priority sector and creating innovative action plans to enhance mitigation, adaptation and resilience-building efforts for women and men in every community. In the project context, the National Climate Change Strategy (MAE, 2012) establish the gender and vulnerable groups as a priority sector.

As a result of this Gender Analysis, gender entry points for project Log Frame have been identified(table 5). To monitor project implementation, some gender-sensitive indicators and criteria has been suggested to be incorporated in the matrix. The following actions (figure 1) and the activities are described in the following paragraphs.

Figure 1. Gender action plan for the project

-Initial Gender Assessment: to be presented before first disbursement. It should contain the following: (i) gender analysis of farming and agricultural value chains, including an assessment of gender division of labor in local farming and agricultural practices (land preparation, ploughing, manuring, seed purchase, sowing, weeding, harvesting, processing, grain storage, folder collection, water collection, feeding, cleaning/bathing, milking cows, milk processing, dung collection, marketing). Include assessment in terms of use, access and control of natural resources differentiated by gender; (ii) gender assessment of existing differentiated needs and demands of farmers and local producers to benefit from project, this part should also mention how existing risks and problems affect differently to men, women and vulnerable groups. To stablish the needs and demands the day-to-day activities of men and women should be clearly stated. Include the dynamic and use of time from children or

other vulnerable groups, which will be usefull to asses time availability of women for future planned training; (iii) identification of existence of gender-specific crops and products.

- Sex-disaggregated project baseline: containing, at least: heads of households; land owners; farm owners; farm workers.

- Gender-responsive participatory processes, as part of the project communications plan with communities, should recognize women as primary users of forest resources in project design, implementation and evaluation. These mechanisms should effectively engage both men and women in decision making processes, additional training targeted to women may be needed in order to ensure their full and effective contribution. Also, gender-responsive processes may include the use of women-only interviews and gender-specific focus groups and group consultations (UNREDD 2013).

- Training and capacity building activities to be implemented under project components, with either local farmers, general population, parishes and other public officers, should promote women's participation and be gender-sensitive, taking into consideration specific demands (location, adequate schedules, childcare facilities and/or other special arrangements that may encourage women's assistance).

- Land titling processes: if such mechanisms are to be established through project implementation, joint tenure of land should be promoted. Also, it should be assessed whether widowers and single women face additional restrictions to own land, and introduce corrective measures to lift these barriers.

- Financing products: if new financing products, such as credit schemes and guarantees, are to be implemented as project outputs, they should be designed taking into consideration differentiated gender needs. Women tend to have less access to credit, usually due to lack of collateral, but also to lesser understanding of finance concepts, and may prefer collective credit schemes. These special needs should be taken into account when designing these products, to ease access for women to participate.

- Institutional governance mechanisms to be created under project implementation, such as committees for a Water Fund and/or for a Seed Fund, should incorporate a female quota (i.e. 20%) in their structure. Also, gender-sensitive hiring procedures should be taken into account. The participation of women in decision-making processes should be promoted and documented.

- When sourcing staff and consultants, gender equality will be a guiding principle. Using gender-sensitive language in hiring procedures; determining a quota (i.e. 30%) or facilitating training for women so as they can access traditionally male-dominated positions, are some of the measures that could be implemented. Also, these procedures can be included as requirements for contractors to be hired to do the works.

- It would be advisable to design and implement local development plans (for the parishes) to be gender-sensitive.

- Also, if other studies and assessments need to be made, it is recommended that they incorporate a gender perspective.

The following figure 2 illustrates the key gender indicators that will be considered throughout the whole project process as it will be a transversal approach that will be present among the different project activities:

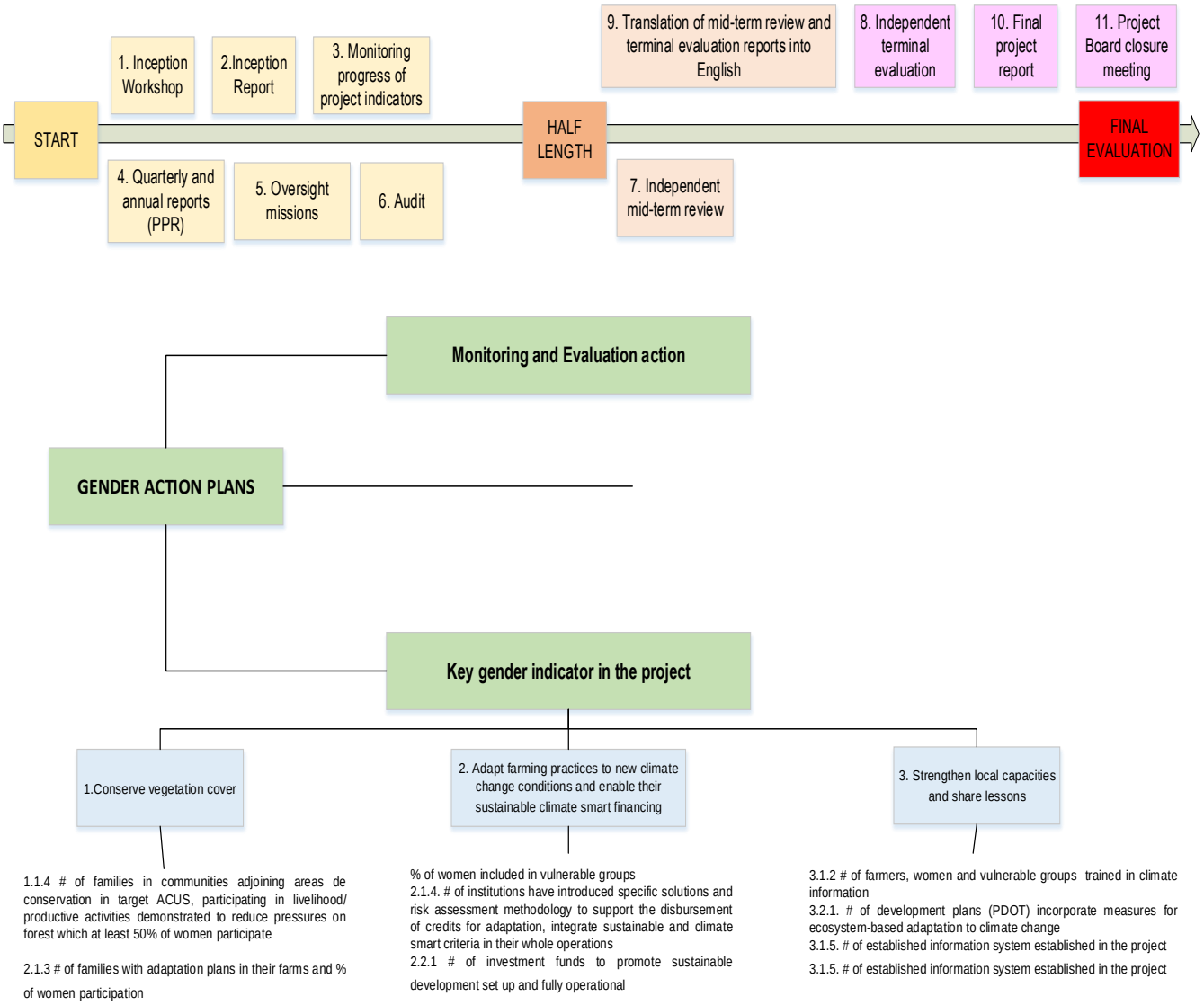


Figure 2: Gender processes and monitoring cycle

Gathering and Collecting Gender-Disaggregated Data

Below is an analysis of gender data from the parishes located in the Toachi Pilatón River watershed.

a. Sigchos

According to the Population and Housing Census conducted by INEC in 2010, the population is divided into: 50.08% men and 49.91% women. Following table shows a comparison of data obtained in 2001 and 2010 Population Censuses.

		CENSO 2001			CENSO 2010		
	PARROQUIAS	**Hombre**	**Mujer**	Total	**Hombre**	**Mujer**	Total
SIGCHOS	CHUGCHILAN	3.059	3.297	6.356	3.797	4.014	7.811
	ISINLIVI	1.591	1.719	3310	1.625	1.602	3.227
	LAS PAMPAS	1.053	1.001	2.054	1.024	919	1.943
	PALO QUEMADO	562	498	1.060	567	463	1.030
	SIGCHOS	3.969	3.973	7.942	3.978	3.955	7.933
	Total Cantón	10234	10488	20.722	10.991	10.953	21.944
Cotopaxi	Total Provincia	169303	180237	409.205	198.625	210.580	409.205

Fuente: INEC. 2010. Elaboración: Equipo Técnico GAD Municipal de Sigchos

Table 6 Comparison of the Population Censuses 2001 – 2010 in the Sigchos Parish

Considering the information of the Sigchos canton, and with results from Population Census carried out in 2010, the information in the PDOT was established that illiteracy is greater in the rural area. The illiteracy rate of women is 12.68%, out of a universe of 9,604 women older than five years, and is higher than that of men, which reaches 8.88% of a universe of 9570 men. The main reasons are: low economic, social and cultural conditions.

Parishes that have more illiterates are Sigchos and Las Pampas, but in the parish of Palo Quemado living conditions are better. Below is a summary of illiterates by gender, area and parish:

PARROQUIA	Sexo	Sabe leer y escribir	Área Urbana o Rural		
			Área Urbana	Área Rural	Total
SIGCHOS	HOMBRE	Si	761	2.197	2.958
		No	81	498	579
		Total	842	2.695	3.537
	MUJER	Si	779	1.931	2.710
		No	102	720	822
		Total	881	2.651	3.532
CHUGCHILAN	HOMBRE	Si	-	2.530	2.530
		No	-	633	633
		Total	-	3.163	3.163
	MUJER	Si	-	2.395	2.395
		No	-	991	991

		Total	-	3.386	3.386
ISINLIVI	HOMBRE	Si	-	1.108	1.108
		No	-	338	338
		Total	-	1.446	1.446
	MUJER	Si	-	993	993
		No	-	461	461
		Total	-	1.454	1.454
LAS PAMPAS	HOMBRE	Si	-	811	811
		No	-	110	110
		Total	-	921	921
	MUJER	Si	-	700	700
		No	-	117	117
		Total	-	817	817
PALO QUEMADO	HOMBRE	Si	-	460	460
		No	-	43	43
		Total	-	503	503
	MUJER	Si	-	374	374
		No	-	41	41
		Total	-	415	415
TOTAL CANTON			1.723	17.451	19.174

Table 7 illiterates by parish

The Ecuadorian state is working to incorporate and translate the gender approach into public policies under the principle of equality and non-discrimination established in the Constitution. Below is the statistical information obtained in the population census of the year 2010 for the canton of Sigchos.

Código	Cantón	Indígena		Afroecuatoriano/a		Montubio/a		Mestizo/a		Blanco/a		Otro/a	
		Mujer	Hombre	Mujer	Hombre	Mujer	Hombre	Mujer	Hombre	Mujer	Hombre	Mujer	Hombre
0507	Sigchos	41,4%	40,1%	0,7%	0,9%	3,1%	4,2%	52,8%	52,5%	1,9%	2,1%	0,1%	0,1%
1703	Mejía	7,2%	7,8%	2,4%	2,6%	0,8%	0,9%	86,8%	85,7%	2,8%	2,9%	0,1%	0,2%

Table 8 Ethnic self-identification by cantons

Código	Cantón	Tasa de analfabetismo		Escolaridad		*T.neta asist. Primaria		*T.neta asist. Secundaria		*T.neta asist. Superior		*T.neta asist. Básica		*T.neta asist. Educa. Media	
		Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.	Muj.	Hom.
0507	Sigchos	29,7%	19,3%	4,5	5,5	92,4%	92,8%	55,7%	59,0%	6,5%	5,9%	89,2%	88,8%	37,8%	42,7%
1703	Mejía	9,6%	4,2%	8,6	9,4	94,5%	94,1%	71,6%	73,8%	23,7%	22,1%	91,0%	91,0%	58,4%	56,8%

Table 9 Education by cantons

Código	Cantón	Tasa global de participación laboral		Población en edad de trabajar (10 años y más)		Población Económicamente activa PEA (10 años y más)	
		Mujeres	Hombres	Mujeres	Hombres	Mujeres	Hombres
0507	Sigchos	49,4%	66,9%	8.079	7.978	3.989	5.338
1703	Mejía	44,3%	68,3%	33.180	31.320	14.688	21.393

Table 10 Labour Market

Código	Cantón	% de las Mujeres Pobres por NBI	% de los Hombres Pobres por NBI	% de las Mujeres en viviendas INADECUADAS	% de los Hombres en viviendas INADECUADAS
0507	Sigchos	93,8%	93,7%	38,0%	38,0%
1703	Mejía	57,9%	58,7%	3,5%	3,4%

Table 11 Poverty for unsatisfied basic needs by Canton

According to Population Census carried out in 2010, vulnerable groups are located in the project area, including female heads of household or single mothers. Data results are list in the following table:

PARROQUIA	MADRES SOLTERAS
SIGCHOS	119
CHUGCHILAN	67
ISINLIVI	52
LAS PAMPAS	10
PALO QUEMADO	6
TOTAL CANTON	254
TOTAL PROVINCIA	4.577

- **Fuente: INEC. 2010.** Elaboración: Equipo Técnico GAD Municipal de Sigchos

Table 12 Single Mothers

In the canton of Sigchos, 90.89% of the population is located in rural communities and 9.11% is located in the urban part of the canton. Economically active population accounts for 58%, and 42% of the population is inactive. Following figure shows a distribution of the population by gender:

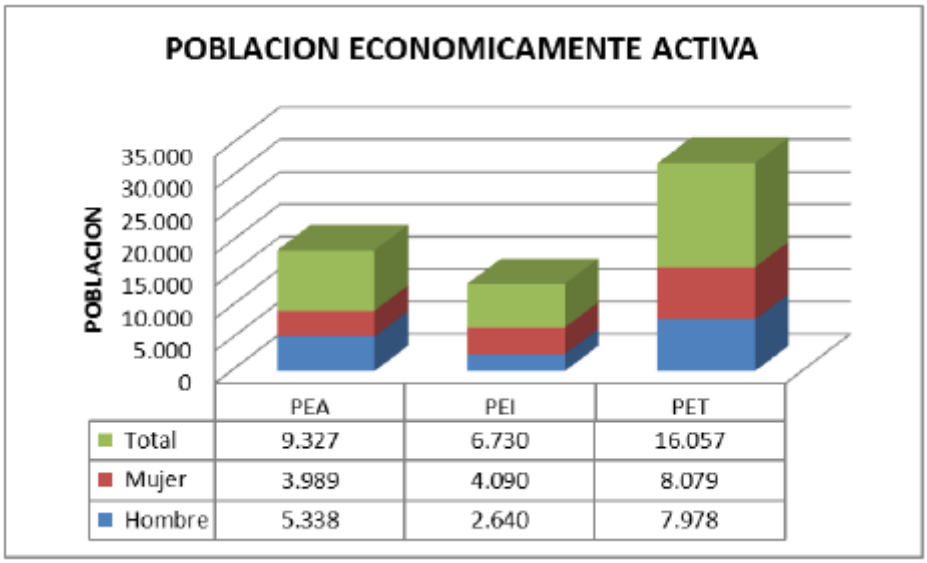


Figure 3 Distribution of the population by gender

According to the information presented in the PDOT, it is observed the distribution of the population by each parish that forms the canton of Sigchos. Following table shows disaggregated data by gender and population economically active and inactive.

CHUGCHILAN		PEA	PEI	PET
	Hombre	1.678	824	2.502
	Mujer	1.642	1.076	2.718
	Total	3.320	1.900	5.220
ISINLIVI		PEA	PEI	PET
	Hombre	689	493	1.182
	Mujer	649	603	1.252
	Total	1.338	1.096	2.434
LAS PAMPAS		PEA	PEI	PET
	Hombre	576	214	790
	Mujer	217	479	696
	Total	793	693	1.486
PALO QUEMADO		PEA	PEI	PET
	Hombre	318	117	435
	Mujer	186	173	359
	Total	504	290	794
SIGCHOS		PEA	PEI	PET
	Hombre	2.077	992	3.069
	Mujer	1.295	1.759	3.054
	Total	3.372	2.751	6.123
Total		PEA	PEI	PET
	Hombre	5.338	2.640	7.978
	Mujer	3.989	4.090	8.079
	Total	9.327	6.730	16.057

Table 13 Disaggregated data by gender and population economically active by parishes

In the Sigchos parish, 20% of the population is engaged in agriculture as a local consumption activity, 70% of the population is engaged in livestock, and 5% in community tourism. In the Sigchos parish, 20% of the population is engaged in agriculture as a local consumption activity. 70% of the population is engaged in livestock, and 5% in community tourism. The surplus agricultural products are for sale, among these include: the production of panela, beans, maize, zampo, pumpkin, mackerel, potatoes and the natural production of mortiño. On the other hand, traditionally livestock activity is often seen as a male activity and 70% of the population is engaged in this activity. The following table shows the distribution of the economic activities carried out in each of the parishes that make up the canton of Sigchos.

ACTIVIDADES PRODUCTIVAS CANTONALES						
ACTIVIDAD	Sigchos	Las Pampas	Palo Quemado	Chugchilán	Isinliví	Promedios Cantón
Ganadería	70	80	85	15	30	56%
Agricultura	20	15	10	40	55	28%
Turismo	5	0	0	40	10	11%
Otros	5	5	5	5	5	5%

Table 14 Cantonal productive activities

Above information shows that livestock is economic predominant activity in parishes located in the project area and the Sigchos canton.

In the socialization workshops of the project, data and information were collected from members of associations, organizations or groups of women's existing in the parishes located in the project area. These data collect helps to analyze gender situation in the project area. In the meetings, participate 27 people, which 20 were women's and 7 men. Below a list of data collected:

- Name of association, organization or group
- Number of women's participants
- Main economic activities of association, organization or group
- Type products produced by association, organization of group
- Land ownership

With these disaggregated data obtained, an approach of gender analysis could be made to know the gender issues in the project area, conclusions are below:

- active role of women in the socioeconomic activities including agriculture and livestock
- Women's are more sensitive to the changes in the ecosystems bordering the project area
- Women's work to support and ensure family feeding
- Women's lead their homes with special advise and expertise
- Women's learn from elderly people
- Women's want to be listen
- Women's want to participate in all projects located in the watershed

Following table summarizes results for Sigchos, Las Pampas and Palo Quemado:

Table 15 Gender Dissagregate data

Parish	Association, Organization or Group Name	Number of Women's	Main economic activity of the Association, Organization or Group	Type of products produced by Association, Organization or Group	Do you own any property? (At level of the Association or Individually?
Sigchos, Las Pampas y Palo Quemado	Asojander	20	Organic farming Cleaning and Gardening	crops	individually
	Marianitas de Jesús	19	Silage Beef cattle	Pastures	Association and Individually
	De Naranjito	7	Beef cattle	Sugarcane Pastures	individually
	Asociación de Ganaderos	12	Beef cattle	Sugarcane Pastures Naranjilla	individually
	Asoapam	15	Beef cattle	Sugarcane Pastures	individually
	Sembrando un futuro	5	Beef cattle	Sugarcane Pastures Naranjilla	individually
	Campo Verde	6	Beef cattle	Sugarcane Pastures Naranjilla	individually
	Flor de Caña	47	Panela production	Sugarcane	Association and individually
	San Pablo	6	Panela production	Sugarcane	Association and individually

b. Las Pampas

As seen in the table 4 of illiteracy, the parish Las Pampas is a rural parish whose index is high, due to the poor economic and social situation of this parish.

Land use in the Las Pampas parish is used for livestock and agricultural activities. In the parish of Las Pampas its main activity is cattle raising with 80%, compared to 15% of the population that is engaged in agriculture with sugarcane, naranjilla, tomato, corn and beans.

According to the Population Census conducted in 2010, following indicators were obtained on the economically active female population and the number of women who receive income in this parish. Below a summary:

Análisis Estadístico del Sistema Económico de Las Pampas	
Año	2010
Indicador	Total
Población femenina asalariada	41,00
Población femenina de 10 y más años de edad	696,00
Población femenina económicamente activa	217,00
Población de 10 y más años de edad	1.486,00
Población económicamente activa	793,00
Población ocupada	778,00
Porcentaje de la población femenina asalariada	19,16
Porcentaje de la población femenina económicamente activa	27,36
Porcentaje de la población femenina asalariada en comercio al por mayor y menor	0,47
Porcentaje de la población femenina asalariada en manufactura	2,34
Porcentaje de la población femenina ocupada en el sector público	5,14
Porcentaje de la población femenina asalariada en agricultura, silvicultura, caza y pesca	9,35
Porcentaje de la población femenina ocupada en comercio al por mayor y menor	6,07
Porcentaje de la población femenina ocupada en agricultura, silvicultura, caza y pesca	60,75
Porcentaje de población femenina ocupada en manufactura	20,56

Table 16 Economically active female in Las Pampas parish

In 2008, in the parish of "Las Pampas" was created the women's association "Marianita de Jesus", which is supervised by the Superintendence of Popular and Solidarity Economy (SEPS). At present, the association made up of 18 women and they are owns of land for economic activities. Those activities are agriculture and livestock. For this association the main objective is to generate income for their families.

In Las Pampas parish, there is an important role of women in the economic activities. In 2010, according to data from INEC, population distribution in the productive sector were as shown in the table below:

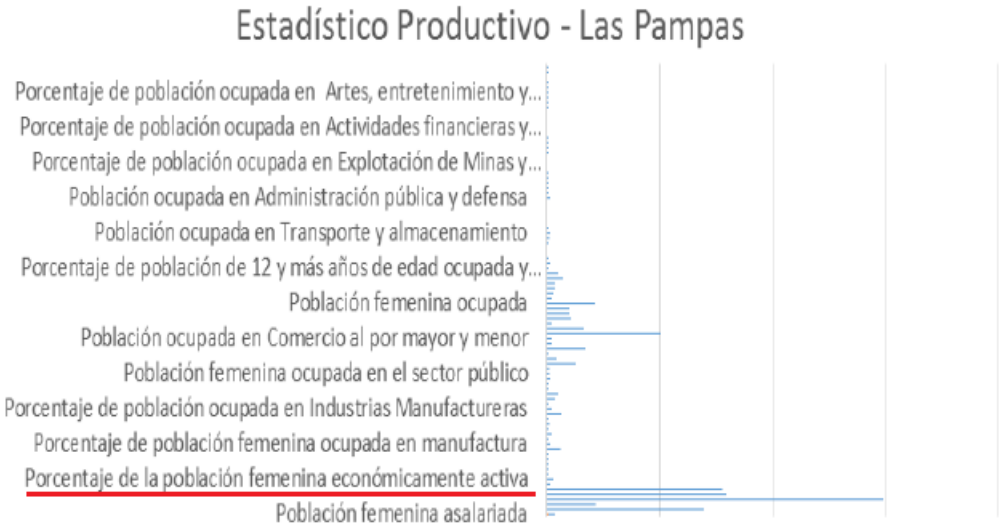


Figure 4 Population per productive sector in Las Pampas parish

In the parish of Las Pampas, at least 6 associations are located, where the role of women's is active for economic generation and for their family's economy. One of the most important associations is Flor de Caña Association whose main economic activity is the panela production and is made up of 47 women. Below information about economic situation for panela production:

SECTOR	(#) EMPRESAS	(#) EMPLEADOS	VALOR PRODUCCION ANUAL (S/. POR AÑO)
- Fabricación y refinación de panela y panela granulada (Sigchos, Las Pampas y Palo Quemado)	Existen productores que lo realizan de manera artesanal	Disponen de la mano de obra conformada por miembros de la familia	No se puede cuantificar, pero en la parroquia de Sigchos y las Pampas el 80% y Palo Quemado el 99% de las familias se dedican a esta actividad para poder subsistir.

Table 17 Economic Situation of Panela Production

c. Palo Quemado

Population of this parish are view like small communities, which are identified as precinct. The ethnic groups living in the parish are mostly mestizo 2% and montubio 98%.

According to table 3, number of men and women in this parish has been reduced by 2.83% between census 2001 and 2010. In 2010, Palo Quemado had 1030 habitants, which were distributed in 567 men and 463 women, those data represent 55% of men and 45% of women. Following table shows the population distribution by gender.

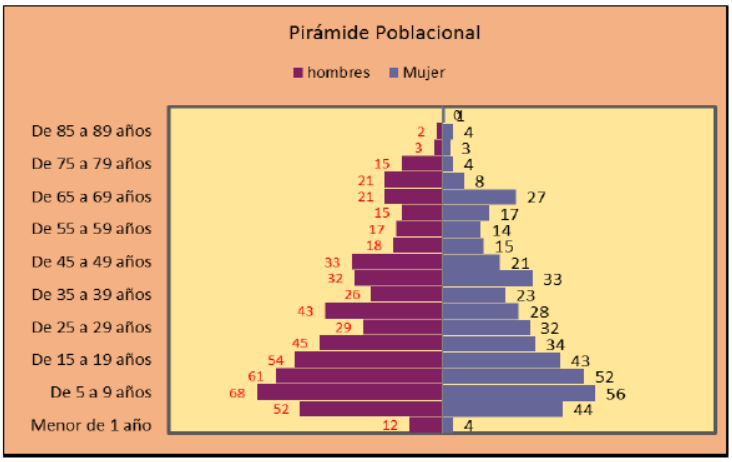


Table 18 Population Distribution by gender in Palo Quemado parish

According data from population census carried out in 2010, the economically active population was 318 men and 186 women that sum in total 504 people. While economically inactive population was 117 men and 173 women that sum 290 people. On the other hand, 91% of population can read and write.

Regarding poverty because unsatisfied basic needs 95,6% of population is poor.

In Palo Quemado parish, 46% of the population is engaged in agriculture, livestock and forestry and fishing; 28% is dedicated to industry and manufacturing, such as processing and industrialization, 1% of the population is dedicated to construction, 2% to wholesale and retail, 3% to transportation and storage, 1% Is dedicated to the accommodation and food service, 1% is engaged in public administration activities, and 4% is dedicated to teaching.

In Palo Quemado parish is located the mining company MINAS DE LA PLATA, but population is not satisfied with the presence of this mining because operations has been generated serious environmental damage in the area.

d. Alóag

According to the Population Census carried out in 2010, the total number of habitants of Mejía were 3.2% of the population. This number represents the total population of Pichincha province, and economically active population represents 2.90% of the province. The illiteracy rate, including men and women over 15 years old, reached 9.1%.

In 2010, according to the population census, the total number of habitants in Canton Mejia was 41,552 women, which represents 51.10%, and 39,783 men, which represents 48.90%. The rural population comprised 64,824 habitants (79.70%) and surpasses the urban population that had 16,511 inhabitants (20.30%). A summary of this information is presented in the following table:

TABLA CEC 2	Población del Cantón Mejía									
Población	Mujeres	%	Hombres	%	Urbana	%	Rural	%	PEA	%
81.335	41.552	51,10	39.783	48,90	16.511	20,30	64.824	79,70	45.466	55,90

Fuente: INEC Censo de Población y Vivienda 2010
Elaboración: EQUIPO PDOT GAD MEJÍA 2014

Table 19 Mejía Canton Population

In relation to gender and economic activities, population census showed that there are 5,249 people as producers, which 3,273 are men and 1,976 are women. Of these total, 2,573 (49.01%) are engaged in agricultural activities and 2676 (50.99) are in non-agricultural activities. A summary is presented in the following table:

TABLA CEC 3		Personas productoras por sexo y actividad		
SEXO		**ACTIVIDADES AGROPECUARIAS**	**ACTIVIDADES NO AGROPECUARIAS**	**TOTAL**
Masculino	**Femenino**	2.573	2.676	5.249
3.273	1.976			

Fuente: INEC, MAG, SICA III Censo Nacional Agropecuario
Elaboración: EQUIPO PDOT GAD MEJÍA 2014

Table 20 Economically Active population by gender

e. Manuel Cornejo Astorga (Tandapi)

According to the data obtained in the population census carried out in 2010, the rural territory of the parish consisted of 3661 habitants. These are distributed as follows:

UBICACIÓN	POBLACIÓN TOTAL	HOMBRES	MUJERES
MEJIA	81.335	39.783	41.552
MACHACHI	27.623	13.511	14.112
MANUEL CORNEJO ASTORGA	3.661	1791	1870

Table 21 Manuel Cornejo Astorga population

The economically active population represents 60% of the 2,197 people and the economically inactive population represents 40% of the 1,464 people.

POBLACIÓN	HOMBRES	MUJERES	TOTAL	%
PEA	1.255	942	2197	60%
PEI	785	679	1.464	40%
TOTAL	2.040	1.621	3.661	100%

Table 22 Manuel Cornejo Astorja Economically Active Population

The lands of this parish are suitable for development of agriculture and livestock economic activities, which are main sources of income and subsistence for population. Below table shows the main economic activities for this parish:

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	806	46,78
Industrias manufactureras	57	3,31
Suministro de electricidad, gas, vapor y aire acondicionado	9	0,52
Distribución de agua, alcantarillado y gestión de deshechos	7	0,41
Construcción	71	4,12
Comercio al por mayor y menor	199	11,55
Transporte y almacenamiento	78	4,53
Actividades de alojamiento y servicio de comidas	134	7,78
Información y comunicación	5	0,29
Actividades financieras y de seguros	1	0,06
Actividades profesionales, científicas y técnicas	7	0,41
Actividades de servicios administrativos y de apoyo	42	2,44
Administración pública y defensa	14	0,81
Enseñanza	40	2,32
Actividades de la atención de la salud humana	6	0,35
Artes, entretenimiento y recreación	3	0,17
Otras actividades de servicios	12	0,70
Actividades de los hogares como empleadores	56	3,25
No declarado	155	9,00
Trabajador nuevo	21	1,22
	1723	100

Table 23 Manuel Cornejo Astorja Economic Activities

In the socialization workshops of the project, data and information were collected from members of associations, organizations or groups of women's existing in the parishes located in the project area. These data collect helps to analyze vulnerable group's situation in the project area. Below a list of data collected:

- Name of association, organization or group
- Number of women's participants
- Main economic activities of association, organization or group
- Type products produced by association, organization of group
- Land ownership

With these disaggregated data obtained, an approach of vulnerable groups' analysis could be made to know the group issues in the project area, conclusions are below:

- There is an association of the older adult
- The association has no legal status
- The association has no land for activities such as subsistence farming
- The association is made up of 30 women
- The association receives help from donations because it does not generate income

Following table summarizes results for Tandapi.

Parish	Association, Organization or Group Name	Number of Women's	Main economic activity of the Association, Organization or Group	Type of products produced by Association, Organization or Group	Do you own any property? (At level of the Association or Individually?
Manuel Cornejo Astorga (Tandapi)	Association of agricultural products	8	Cattle raising	Cheeses	Association
	Pampas Argentinas	11	Cattle raising	Milk and panela	Individually
	Elderly Association	30	No		Association

Table 24 Vulnerable Group Dissagregated data

f. El Chaupi

In PDOT document of the parish, it does not include information with gender analysis.

Agriculture and livestock have been the main sources of income and subsistence for this parish. A list of activities carried out in this parish are show below:

RAMA DE ACTIVIDAD	CASOS	%
Agricultura, ganadería, silvicultura y pesca	369	59,23
Explotación de minas y canteras	2	0,32
Industrias manufactureras	44	7,06
Suministro de electricidad, gas, vapor y aire acondicionado	5	0,80
Distribución de agua, alcantarillado y gestión de deshechos	1	0,16
Construcción	25	4,01
Comercio al por mayor y menor	41	6,58
Transporte y almacenamiento	23	3,69
Actividades de alojamiento y servicio de comidas	8	1,28
Actividades financieras y de seguros	3	0,48
Actividades profesionales, científicas y técnicas	5	0,80
Actividades de servicios administrativos y de apoyo	10	1,61
Administración pública y defensa	7	1,12
Enseñanza	10	1,61
Actividades de la atención de la salud humana	7	1,12
Artes, entretenimiento y recreación	3	0,48
Actividades de los hogares como empleadores	12	1,93
No declarado	28	4,49
Trabajador nuevo	20	3,21
Total	623	100,00

Table 25 El Chaupi Economic Activites

According to the PDOT document, El Chaupi parish promotes economic activities that include women. A community project was carried out at the farm Llovizna, where 20 women are engaged in activities such as fruit dehydration and tea production.

Project Beneficiaries by Component

Component	Men	Women	Total	Elderly	Total direct beneficiaries
1. Conserve vegetation cover	2987	2633	5620	515	178 families
2. Adapt farming practices to new climate change conditions	3191	2952	6143	671	375 (250 for crops and 125 for livestock)

Component 3Sub-output	Responsible Party	Actors	Places	Number of beneficiaries
6. At least 6 parishes being trained to take care and use meteorological information generated by meteorological stations currently installed				
Producing climatological information.	INAHMI	Farmers and livestock ranchers Women's Association, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	553 families including 55% women
7. Six development plans of local parishes incorporate measures for ecosystem-based adaptation to climate change.				
Elaboration of development and territorial planning	GADs, SENPLADES, Association of Ecuadorian Municipalities.	Associations, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	6 GADs
8. Strategic plan of communication, education knowledge transference and replication				
Preparation of communication and training plan	Project Manager of the Project	Associations, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	Associations, Organizations and Population in general. Those are located in the project area.
9. Systematization of information gathered during the whole project design and implementation using informatics platforms				

Implementing technological platform to manage data, knowledge and information related to adaptation climate change	MAE	Associations, Organizations, Population in general	Parishes: Sigchos, Las Pampas, Palo Quemado, Tandapi, Aloag, El Chaupi	Associations, Organizations and Population in general. Those are located in the project area.

VULNERABLE GROUPS: GENDER EQUITY AND WOMEN'S EMPOWERMENT

Introduction

On the project areas, the main activities are subsistence agriculture and extensive livestock farming. In the area of Palo Quemado, farmers cultivate sugarcane to produce panela (unrefined whole cane sugar); there are about 450 ha of sugarcane plantations, 98% of the harvest is used to produce panela (GADPRPQ, 2013). 28% of population is engaged in the production of panela. According to primary data collection there are associations in the area composed of women in their entirety. Those are San Pablo Association with 6 women, Marianita de Jesús en Las Pampas composed by 18 women and Flor de Caña Association with 47 women. Panela is more profitable than other activities, but its artisanal production is based on the use of local trees for firewood. Each farmer uses about -three trees per week- to cook and reduce the sugarcane juice, contributing to deforestation, soil erosion and increasing climate vulnerability. Moreover traditional production of panela can contribute to negative heath impact, due to the respiration of inorganic compounds, and local air pollution.

Vulnerability

Vulnerability is not even among groups: women, with higher poverty level and lower access to income generating activities, have fewer coping mechanism and hence they are more exposed to climate change. The project will focus on but not be limited to work with women associations, aiming to improve production, supporting sustainable management of ecosystems and reducing women's vulnerability. Moreover, the project will seek replication in other communities where adequate and that includes other vulnerability groups such as children and older adults.

Women have higher illiteracy rates, compared to men, 21.6% compared to 19.2% respectively. Moreover, in these communities, men have more years of schooling: with on average 4.7 years of schooling for men and 4.4 years for women. This gendered bias in literacy is also present at the national level, with a wider gap in rural areas (Table 1).

Illiteracy rates	Functional illiteracy rates	Digital illiteracy rates

Urban		Rural	Urban	Rural	Urban	Rural
Men	3.2%	4.6%	7.0%	20.2%	18.6%	34.4%
Women	10.7%	15.2%	8.9%	25.6%	24.7%	43.2%

Table 26: Illiteracy rates, Functional illiteracy rates and digital illiteracy rates (Source: Women and Gender Equality National Agenda, 2014 – 2017, based upon data from INEC (2013))

Selection criteria beneficiaries

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

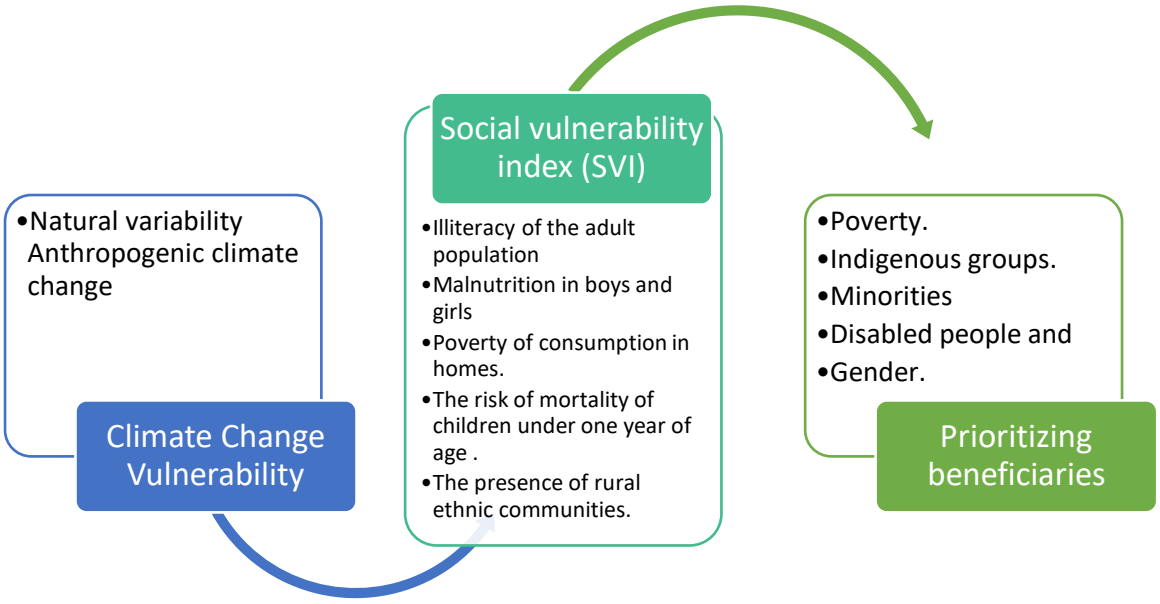


Figure 2: Methodology to define beneficiaries

Farm plans will be developed, promoting always at least 50% of women's active participation. It is necessary within this component to strengthen local communities' capacities on planning strategies, conservation practices and climate change, for this purpose a cross-sector program for awareness raising and communication is considered as detailed under component 3.

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

Table 27: Potential beneficiaries in the project

Benefits of the Project for women and vulnerable groups

The establishment of family gardens, which helps especially women as head of household to enhance the daily diet of family members and even generate additional family income by selling surplus on local markets.

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

Component 3 has a particular focus on women empowerment. Indeed, because women are on average more vulnerable to climate change, by targeting women we assure higher adaptive capacity of the community and more sustainable reduction of community's vulnerability.

Local actors will be trained to interpret data obtained from meteorological stations. This training will be carried out in the field and will have as beneficiaries at least 500 people, from component one and two, of which at least 55% will be women. To train the target population focus groups, one to one trainings will be organized. The training will include the provision of generic climatic knowledge, and technical aspects on the meteorological stations.

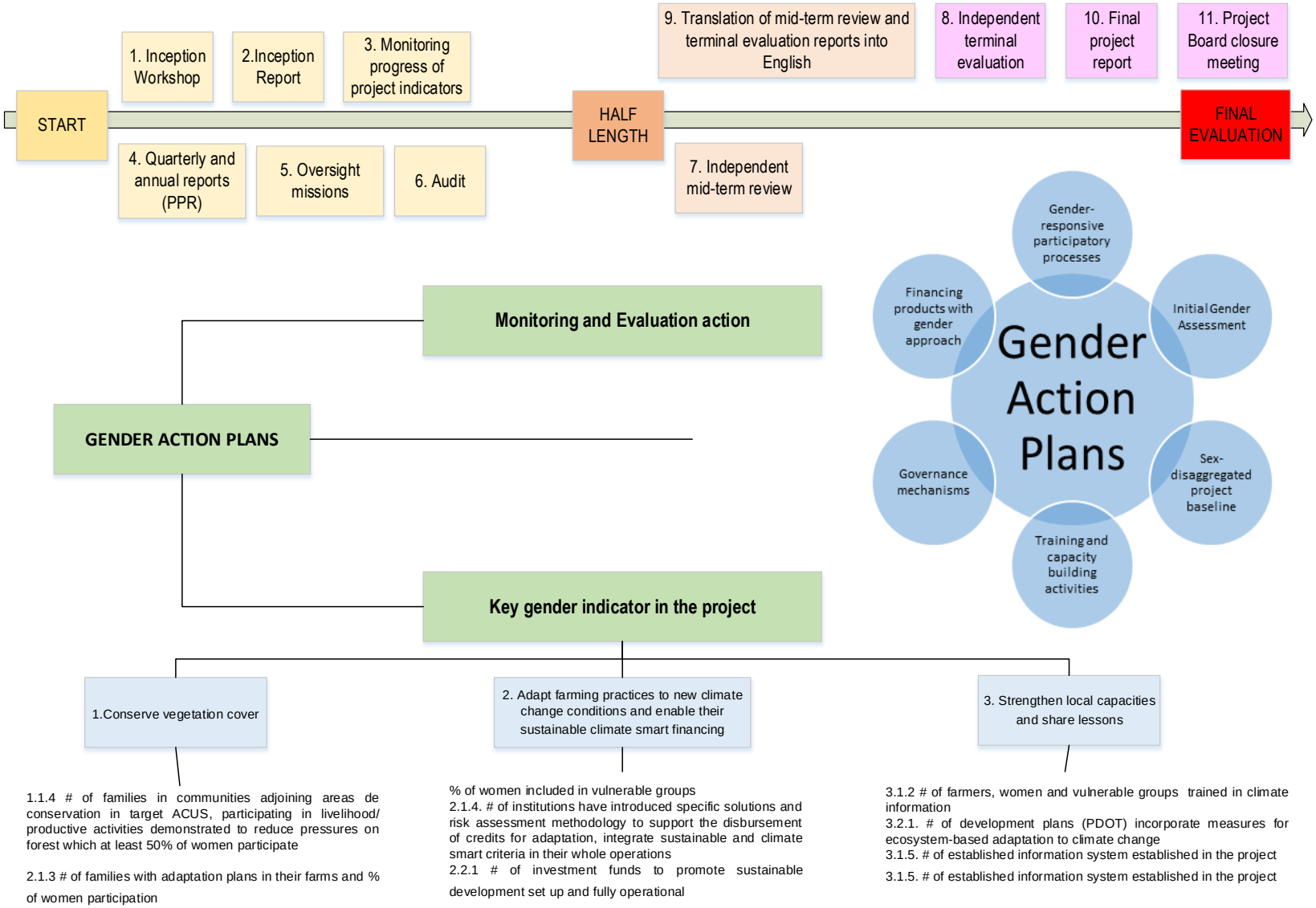
Therefore, incorporating measures for ecosystem-based adaptation to climate change in the PDOTs, is very natural and will benefit the communities in the parishes, including women, associations, vulnerable groups and the community at large. Ecosystem based adaptation measures assure the alignment between ecosystem conservation and climate change adaptation. By conserving the local ecosystems, agriculture production is strengthened as well as community resilience to climate change. The opinion of vulnerable groups regarding changes in the ecosystem will be heard and considered

Project activities where they will participate actively

Objective	**Activity**
1.3.1 Incentive systems for set-asides on private and community lands based on ACUS have been strengthened	In this component, the sustainable production actions will be implemented according to the reality of each part of the Basin. For the "Pilaton" area, a change of technology with efficient kilns in the panela production process will be promoted, as well as the reduction in the use of forest in at least 30%. For the lower part, the creation of urban gardens will be promoted, sustainable productive alternatives and actions that include the participation of women and vulnerable groups.
1.4 Increase in # of families in communities adjoining conservation areas in target ACUS, participating in productive activities demonstrated to reduce pressures on forest with at least 50% of women participate	The effective participation of women in decision making, farm planning and sustainability strategies process within their productive activities will generate autonomous processes of adaptation to climate change. This activity is complemented by component 1 and will be evaluated with the number of farms plans that have at least 50% of participation of women and vulnerable groups.

Objective	Activity
1.4.1 Planning and zoning of the river basin with a participatory and inclusive approach has been introduced	At both, the farm within the biocorredor level and ACUS of conservation level, it will be carried out planning and zoning, which will allow the access to credits and the strengthening of the local capacities. This activity will be mainly promoted by women.
1.4.2 Inclusion of governance activities with active women participation has started	The governance mechanisms of the productive activities, the declaration of protected areas and the functionality of the investment fund will count on the active participation of women.
2.1.1 Farm's zoning and plan elaboration.	This activity has a close relationship with item 1.4, because it requires the improvement of planning at a farm level with the active participation of women. These components and their interaction intend to benefit at least 840 people.
2.1.4 Technology change (ovens change to promote efficiency in the production of panela)	This activity complements the investment component of the project, for the sustainable production actions will be implemented according to the reality of each part of the Basin. For the "Pilaton" area, a change of technology with efficient kilns in the panela production process will be promoted, as well as the reduction in the use of forest in at least 30%. For the lower part, the creation of urban gardens will be promoted, sustainable productive alternatives and actions that include the participation of women and vulnerable groups.
2.3 Increase in the process of planning and zoning of farms in which at least 50% of women participate	The Project will start a territory planning process at a farm level to achieve protection, adaptation to climate change and sustainable use of resources, activities that are strongly linked to women's participation.
6.1.3 Capacity building for communities	Training 500 families in the use of climate data and their application in activities, such as: agriculture and livestock. This training will be address for 55% percent of women. Including field visits, food and transportation. An appropriate mechanism to transmit climate information to the population will be developed.
6.1.4 Development of training and information material	Designing of interactive content, infographics and generation of newsletters to training GAD population in the area including women associations, older adults and vulnerable groups. Policy briefs will be elaborated for policy makers.
6.1.5 Developing a communication strategy	Integrating the digital media technologies for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
8.1 Development of a communication strategy	Developing a communication plan addressed for stakeholders in the project including specific women associations and organizations.
8.2 Integration of ICT solutions and social media	Integrating the digital media technologies and different approaches for communication plan and addressed it to the population in general including women, older adult, youth people and children's.
8.4 Development of training materials of sustainable agricultural practices	Training modular courses on sustainable agriculture and good agricultural practices, open to associations and selected farmers to participate. 12 modules, 6 theorists, 6 in the field and an on-site supervision within 6 months of completing the course. 50% women

Vulnerability groups and gender analysis



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

ANNEX 10

Definition of beneficiaries of the Río Blanco upper basin

República del Ecuador

August of 2017

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

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Petitioner: YAPU Solutions & DSE Consultores

Date: July 28 of 2017

Methodology

To determine the beneficiaries of the project to be implemented in the Río Blanco upper watershed inside the scope of the Adaptation Fund, an analysis of the social and environmental conditions of the basin was carried out. The information provided by the Ministry of the Environment of Ecuador and official sources such as those of the 2016 Population Census was used. The process of information processing is described below.

Unit of analysis

The Río Blanco upper Basin is located in the territory of 3 provinces, and several parishes. However, for the present report the census sector was defined as the unit of analysis. The census sector is the smallest special unit defined by the INEC for the conduct of censuses. The use of the census sector was defined as the analysis basin shows a high dispersion of the population concentrated in the rural sector. Due to this condition, obtaining population information without field survey is very complex, and for this reason the estimate of the beneficiaries will be based on information from the available census of INEC (INEC, 2011).

Census information

The 2010 Population and Housing Census is a very important source of information as it contains details at the provincial, cantonal, parish and population and housing levels. Since 2011, these data are available for analysis and can be found on the official INEC website. In order to obtain INEC census data, ECLAC's REDATAM processor and the 2010 Census database were used. Using the REDATAN processor, data were collected at the parish level using the "Statistical Processor" function (Figure 1). The data obtained were exported to a spreadsheet and the values were assigned to the corresponding census code in the database of the variables.

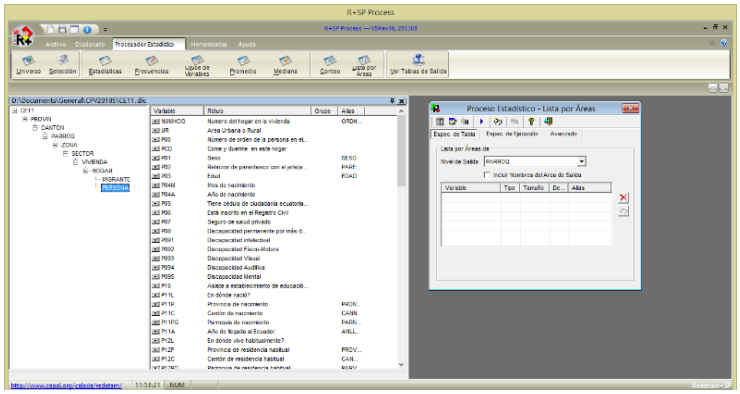

Figure 1. REDATAM Processor View.

Information processing

For the information processing was used the program ArcGis version 10.2 and Excel spreadsheets for the treatment of the data. The information collected was spatially analyzed based on the data available for the study basin.

To define the beneficiaries of the project, the following aspects will be considered:

- Location of defined villages to participate (points).
- Obtain population data of each point in relation to the census sector where it is located (polygons).
- Vulnerable areas (raster).
- Location of the measurements (polygons).
- Deforestation 2014-2016 (polygons).
- Data of the 2010 population census (INEC).

Outcomes:

Census tracts

A total of 186 census tracts were identified within the Río Blanco upper Basin (Figure 2). The project was located in the northern part of the basin, reaching a total of 54 census tracts, 50 in the rural area and 4 important population settlements (Sigchos, Palo Quemado, Tandapi and Las Pampas) Of the provinces of Cotopaxi and Pichincha (Figure 3).

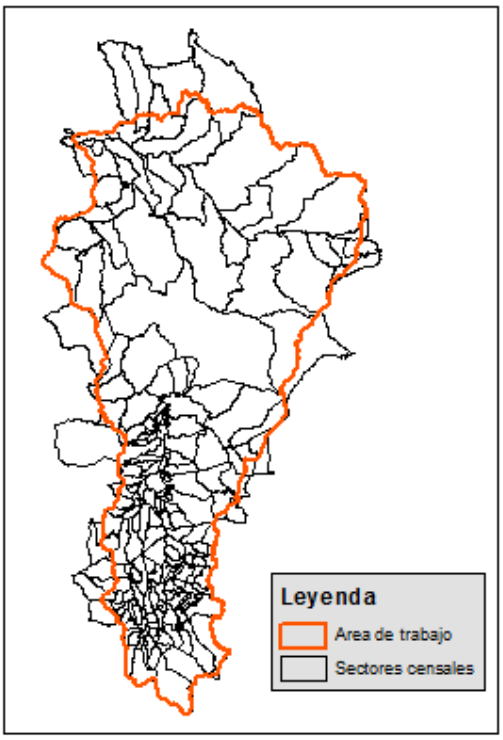

Figure 2. Census tracts in the Río Blanco upper watershed.

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

Figure 3. Census sectors within the project intervention area in Río Blanco upper watershed.

A total of 234 human settlements of different sizes are located in the project's intervention area. The settlements are located mainly nearby of the Aloag-Santo Domingo road and on the road that leads to Sigchos (Figure 4).

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

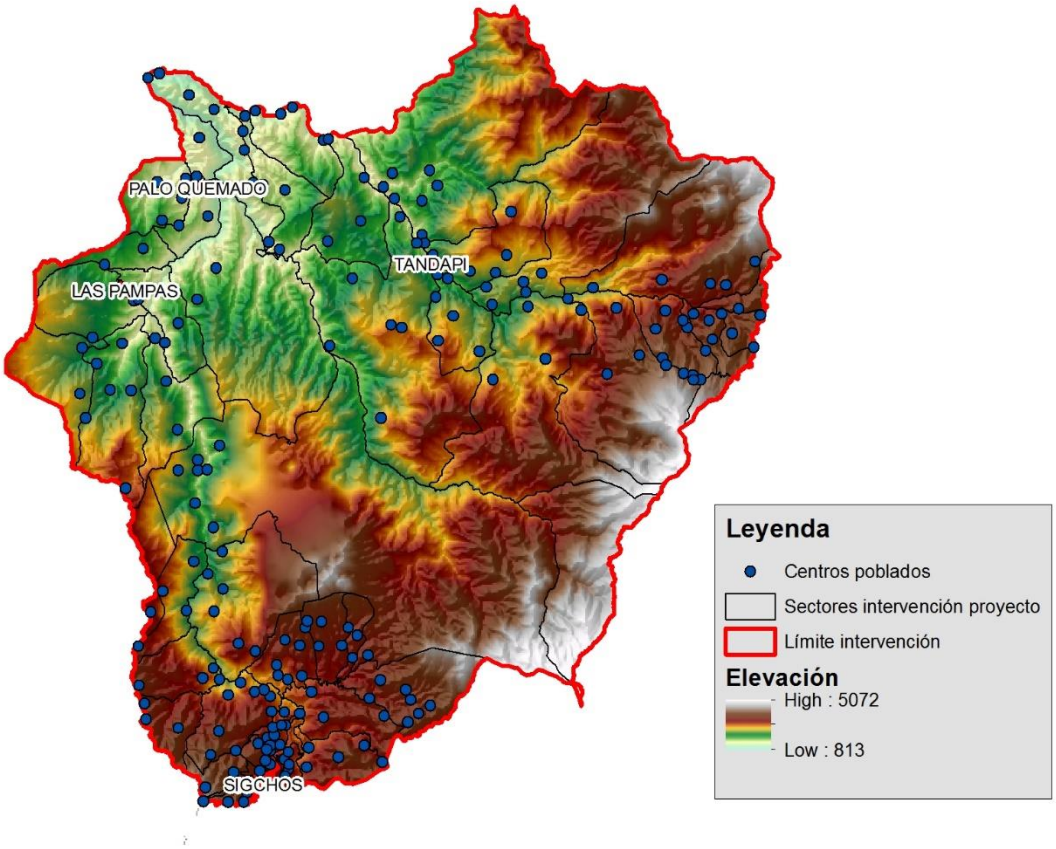

Figure 4. Location of human settlements within the project intervention area.

Population composition

In the analyzed basin there are a total of 43 200 inhabitants based on information from the census tracts present in the area. However, when defining the area of general intervention of the project, the number of inhabitants in this area is 10 450, with men 49.14% and women 50.86%.

Total population in the basin and in the project intervention area.

Area	Men	Women	Total
Basin	24258	25109	49367
Intervention area (rural sector)	5567	4975	10542
Intervention area (populated spots)	3070	3097	6167

Population by age group

Area	0-14 years	15-64 years	64 or more	Total
Basin	17504	22296	3400	43200
Área intervención	3498	5996	1048	10542
Área intervención	2075	3582	510	6167

(centros poblados)				

Population density

The population settled in the basin is low and the majority of the population is located near the most important populated centers of the basin and near the main roads. The population density of the basin varies between 0.76 and 145 inhabitants per km2 in rural areas of intervention. Population density is an important criterion since it shows the dispersion in the rural area of the basin (Figure 4).

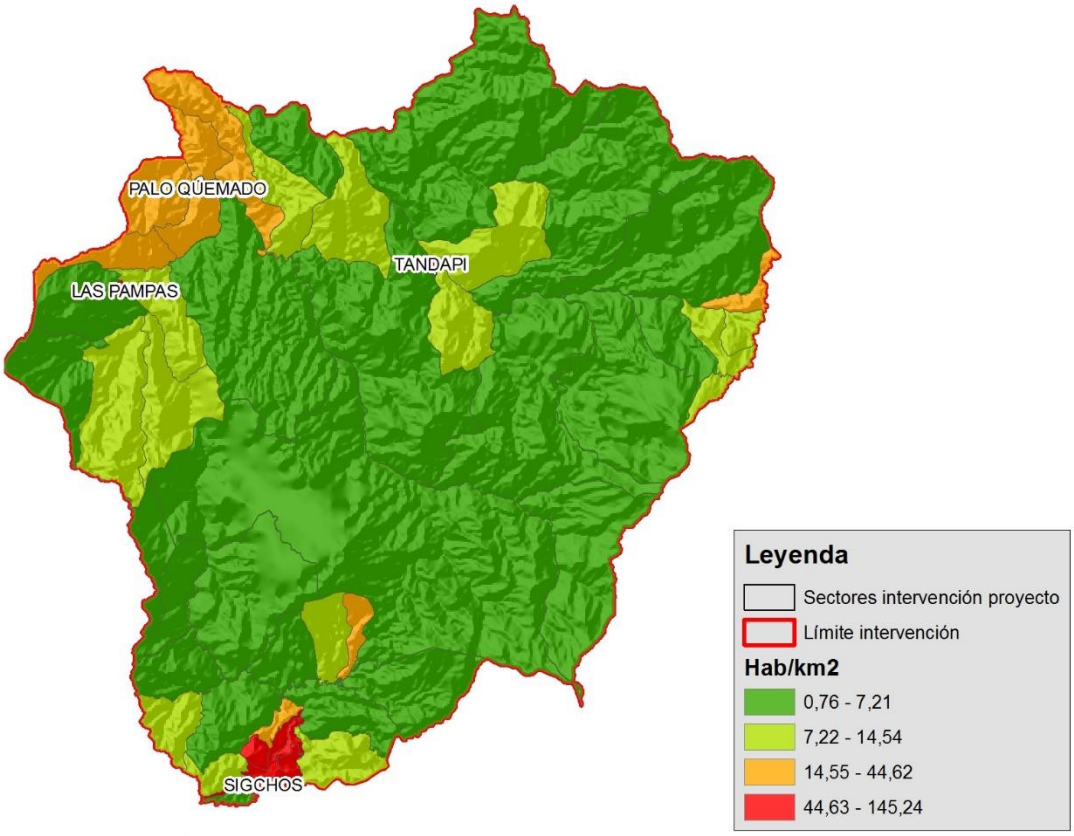

Figure 4. Population density in the intervention sectors of the project

Deforestation.

In the census tracts defined for component 1 between 2008 and 2014; 5.891,33 hectares were deforested, and between 2014 and 2016 a total of 2.200,14 hectares was deforested. This means deforestation of 8.091 hectares between 2008 and 2016 in the area in which the activities of component 1 (Figure 5).

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

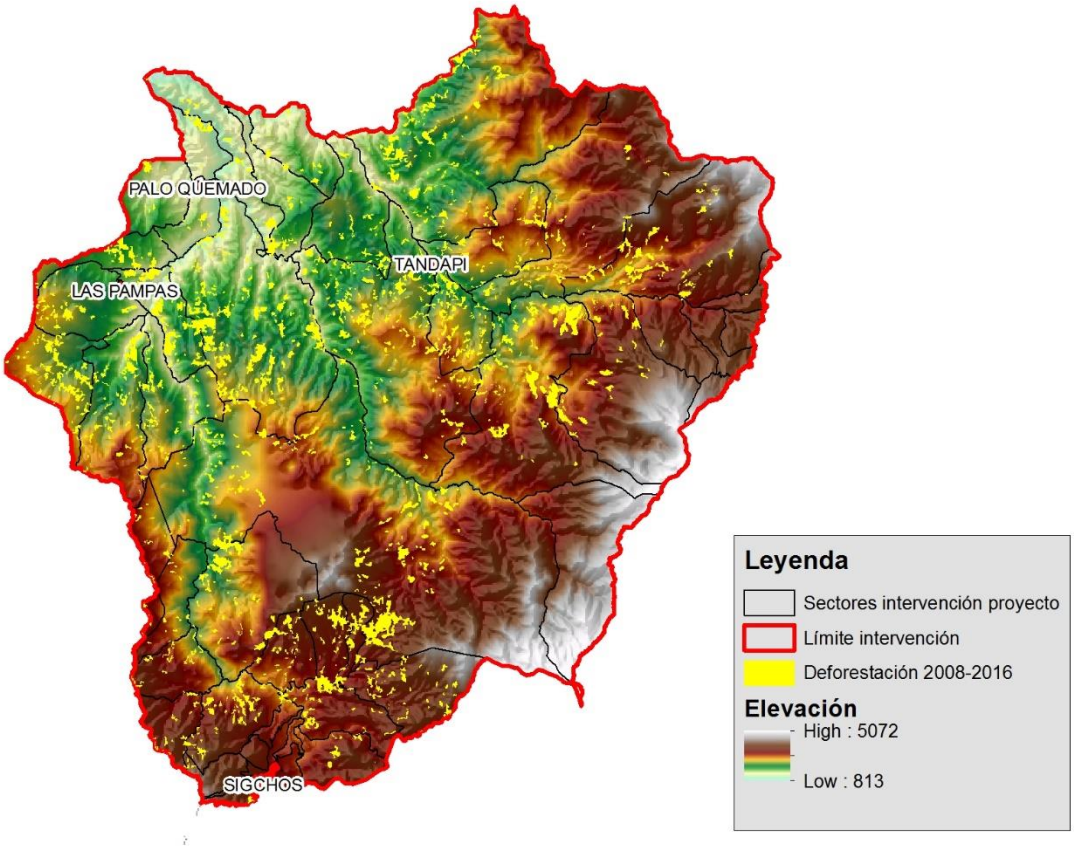

Figura 5. Cumulative deforestation between 2006 and 2016 in the intervention area.

In order to define the approximate number of beneficiary settlers per component, information was taken on the measures to be implemented and suggested by the vulnerability study of the basin and a spatial selection analysis was carried out to determine the census sectors to which the project components applies.

In the case of component 1, being a component of conservation and forests management the sectors selected are those with a higher remoteness, low population density and pressure for deforestation. The reference coverage used in this case was the so-called "Zonas_potenciales_regulacion_ ciclo_hidrologico_protegidas_TOACHI" the same that was compared with the respective census sectors. A total of 30 sectors were selected from a total of 54 present in the project intervention area (Table 1). In the selected sectors they inhabit a total of 5.620 inhabitants. It is estimated that a total of 840 people would benefit directly from the activities of this component (Figure 6).

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

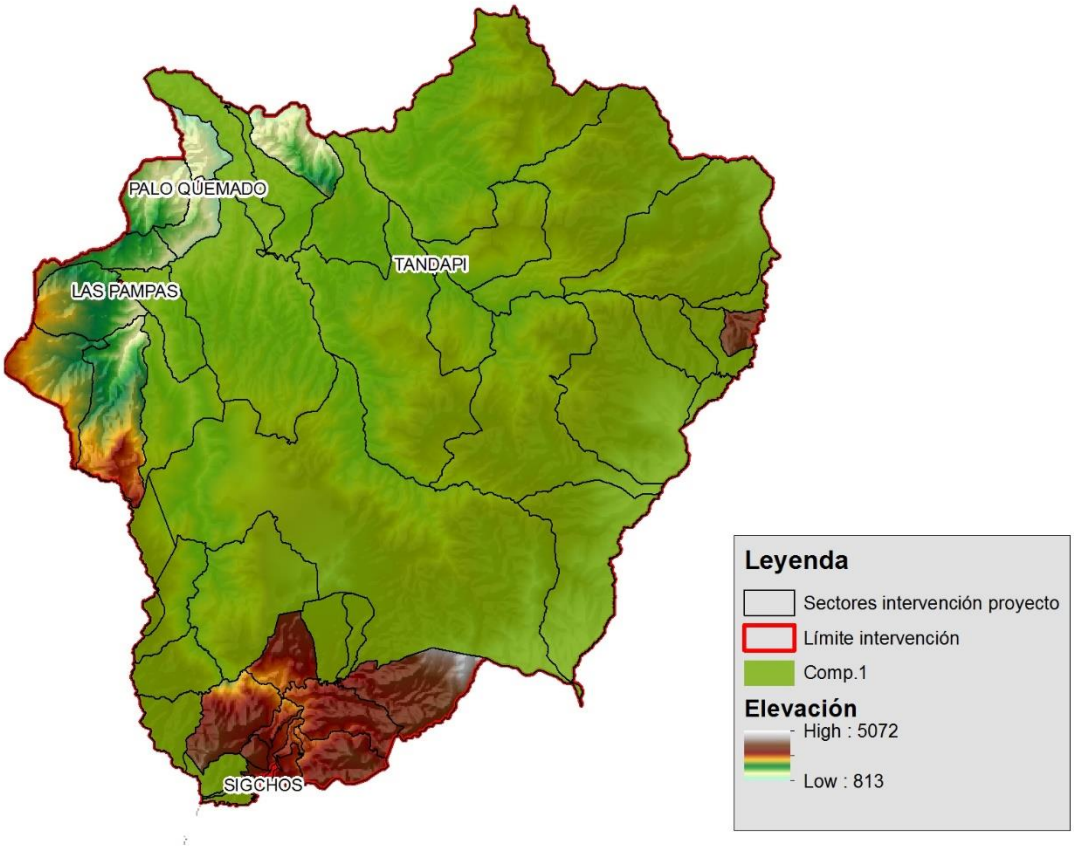

Figure 6. Location of sectors benefiting from the component 1.

In the case of Component 2, being a component of pasture and crop management, the selected sectors are those with a higher level of intervention, greater population density and pressure for deforestation due to the expansion of the agricultural frontier. The reference coverage used in this case was the so-called "Zonas_potenciales_sistemas_gestion_sostenible_TOACHI" which was compared with the respective census sectors. In this case, the project estimates an intervention in a total of 500 hectares. Considering 2 hectares per family for farmers we would need a total of 250 families to participate, the total direct beneficiaries would be approximately 1225 people. In the case of livestock farmers, the participation of 125 families is assumed, representing 625 people, giving a total of 1850 (Table 1). In this case, a total of 39 sectors were selected from the 54 present throughout the project intervention area.

Annex 14. Definition of beneficiaries in the Río Blanco upper basin

Table 1. Total population benefited by component (Total, total men, total women, senior citizens).

Component	Men	Women	Total	Senior	Total direct beneficiaries
1. Conserve vegetation cover	2987	2633	5620	515	840
2. Adapt farming practices to new climate change conditions	3191	2952	6143	671	1850
3. Strengthen local capacities and share lessons	**Por definir**	**Por definir**	**Por definir**	**Por definir**	**Por definir.**

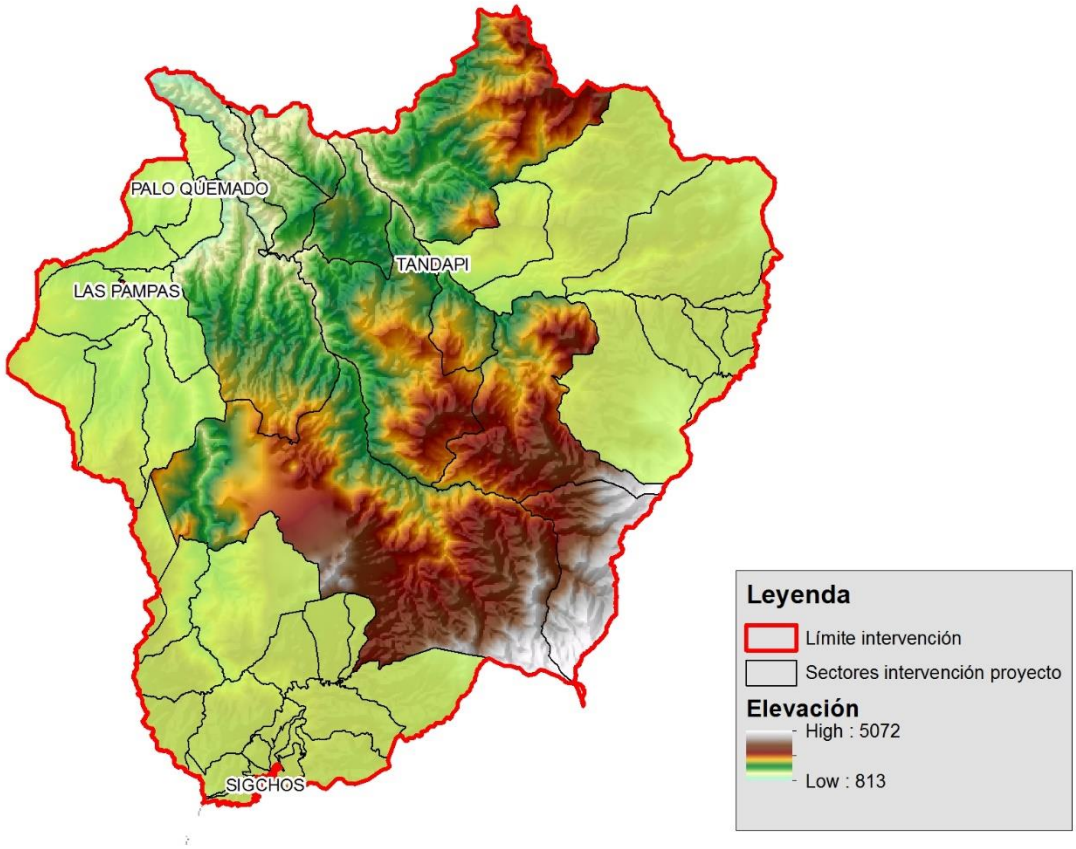

Figure 6. Location of sectors benefiting from the component 2.