

BIOCORREDOR MARTIN SAGRADO REDD+ PROJECT

REDUCED EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION
SAN MARTIN DEPARTMENT, PERU

A Community Forestry Initiative for Carbon and Biodiversity Conservation and Poverty Reduction



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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Biocorredor Martin Sagrado Project for Reducing Greenhouse Gas Emissions from Deforestation (“Biocorredor Martin Sagrado REDD+ Project”) aims to address deforestation and its resulting emission of greenhouse gases (GHG) in an area of the Department of San Martin, which is under land use pressure.

The objectives of the Biocorredor Martin Sagrado Project are to protect forests with high conservation value. The project seeks to protect species in risk of extinction while also improving the quality of life of the families that live in these areas.

The Biocorredor Martin Sagrado project area encompasses 295 654 hectares of Amazonian forest located alongside the Huayabamba river. Its creation and effective implementation are from PUR PROJET and Fundacion Amazonia Viva initiatives, in the aim to create a financial mechanism for generating a financial compensation from activities reducing emissions from deforestation (REDD+). The project started in January 2010, as a complementary strategy to the Alto Huayabamba reforestation project, in which PUR PROJET and ACOPAGRO are committed (since 2008), with a plan to replant more than 2,000,000 trees by 2012.



This Martin Sagrado project supports indeed sustainable forest management, agro-forestry, non timber activities and livelihood development in the reserve by providing financing through carbon credits generated from forest protection and regeneration. The project creates a 80-year income stream that will directly enhance household livelihoods and natural resource management capacity.

The project seeks to maintain and increase carbon stocks in the area, enhancing the hydrology, as well as conserving biodiversity and endangered species. Carbon financing will be used to support rural communities to develop a range of livelihood activities including non-timber forest products (NTMP), improved agro-forestry activities and productivity intensification, community-based ecotourism infrastructure, micro-credit and communication walkways development as well as other economic, social, cultural and environmental activities.

The additional resources raised from the sale of these credits will permit to implement all of the measures necessary to control and monitor deforestation within the project site, enforce the law, and improve the welfare of local communities.

From the start of the project, mobilizing of the community to protect forests has demonstrated effectiveness in halting deforestation and degradation in community forestry areas. Community members have expressed strong interests in developing activities to better preserve their land and avoid deforestation. They have listed the projected activities they are wishing to develop with the support of Pur Projet. These activities have been prioritized and discussed with Fundacion Amazonia Viva and Pur Projet during the visits of the area.

1.2 Sectoral Scope and Project Type

- Sectoral scope : AFOLU
- AFOLU project category : REDD
- Activities: Avoiding Unplanned Deforestation and/or Degradation (AUDD)

The project is not a grouped project.

1.3 Project Proponent

- Project Proponent : Pur Projet
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- Roles / responsibilities: The Project Proponent Pur Projet is the project developer, who started the project on the field, participates in project design, administrates project activities and funds, including revenues from the sale of carbon credits, conducts monitoring and inventory activities, supports forest protection and enforcement, guarantees capacity building for local communities and stakeholder consultation.

1.4 Other Entities Involved in the Project

- **Fundacion Amazonia Viva :**

The Amazonia Viva Foundation is a Peruvian non-profit foundation created at Pur Projet's initiative. It is constituted by the associations and cooperatives involved in reforestation and forest conservation projects in San Martin region : ORO VERDE and ACOPAGRO cooperatives, and 4 local community associations : APAHUI (Asociacion de Productores Agropecuarios de Huicungo), APROBOC (Asociacion de Proteccion de Bosques Comunes Dos de Mayo), APAP (Asociacion de Productores Agroforestales Pucallpillo), APAPMASAR (Asociacion de Productores Agropecuarios y Protectores del Medio Ambiente Santa Rosa). It is operated by an assembly of representatives from each member organization, and works with a management team responsible for planification of activities, daily coordination of activities, and management of funds.

Bringing together organizations and projects dedicated to the community preservation of forest in San Martin Region in Peru, the foundation has been created to support and coordinate the efforts of each organization, to reach a higher level of effectiveness and recognition. The San Martin Foundation is a way of increasing support from local, national and international authorities, and larger public or private funds to finance community activities for the preservation of the environment.

Within the scope of REDD+ project, the Fundacion Amazonia Viva coordinates project activities with member organizations, implements a global scheme for project management and a prioritization of activities, and manages the allocation of funds. The Fundacion Amazonia Viva is in charge of implicating communities in the project zone, through visits to communities with collection of data, feedback and suggestions, and organizations of regular general assemblies for all communities involved in the REDD+ project

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- **Participating communities (inside project area and in buffer zone) :**

The project is a community-implemented project, which involves all communities in the project area and in the buffer area (18 communities - list of communities detailed hereafter)

The communities are included in project design, decision process, prioritization of activities, and implementation of activities. The objective of the project is to empower these communities and give them the opportunity to manage their environment and conserve the project area over the long-term.

Communities within the project area

There are three communities living within the project area: La Morada, Canaan, and Anazco Pueblo. They mainly rely on livestock and coffee farming. As fuel they only use wood for cooking and mostly candles for light (70 to 95%) while solar energy is developing.

The three communities are typical examples of villages founded by a group of migrants, who originally came from the mountains to the jungle. The early years after establishment have been dedicated to the exploration of the environment, without interest for the protection of biodiversity. They slowly built up over 5 to 10 years some experience on the impact of mismanagement of resources.

They are located in the Eastern Andes, in the department of San Martin, on the slopes of the mountains oriented northeast above the river Huabayacu. However they depend politically on Chuquibamba in the department Amazonas. There are no roads to the villages, only paths from the district of Chuquibamba (2 to 3 days), and from the province of Bolivar (2 days). There is a proposal for the construction of a road by the Regional Government of Cajamarca, in order to facilitate the transport of forest products from Saposoa in the province of Huallaga, department of San Martin to Celendín department of Cajamarca.

- **La Morada**

Gathering 80 families, there are 150 students in the village, a kindergarten, a primary and secondary school. La Morada activity is based on coffee and livestock with a herd of about 500 animals. Community health is ensured by a medical post, a nursery and medicinal plants.

- **Canaan**

There is a kindergarten, a primary and a secondary school, 130 families and as many students in this village, 3 days walk away from the closest town. Their main income depends on livestock and coffee with 100 hectares of cocoa cultures and 400 animals. Both coffee and livestock products are sold outside of the village. Community health is also ensured by a medical post, a nursery and medicinal plants.

- **Anazco Pueblo**

Smallest community of the area, Anazco Pueblo gathers 15 families, representing 70 people in total, 22 students and 1 professor. There is only a primary school. Also relying on cocoa cultures and livestock, their herd is smaller with 100 animals and 20 hectares for farming. Community health is ensured only by medicinal plants.

Additional information on these 3 communities, collected during field trips to Chuquibamba, is available on request.

Communities within the project zone, in the provinces of Mariscal Cáceres and Huallaga

Major partners for REDD project:

- **Dos de Mayo** is the most populated village (898 inhabitants). They are considered as a “minor populated center” and have a delegated mayor. 59% of the inhabitants are men and 41% are women. 48% of the area (680 ha) are dedicated to cocoa production, with an average yearly production of 700kg/ha. The villagers also cultivate corn, plantain, cotton and oranges and have around 100 cattle animals. 10.34% of the villagers are illiterate, 48.28% have a primary education, 34.48% have a secondary education and 6.9% have a higher education. There is a medical center in the village. A technical study is under process to evaluate the opportunity to implement a drinking water system. The Association de Proteccion de bosques Comunales Dos de Mayo owns the concession El Breo and is strongly involved in the REDD project since the beginning
- **Santa Rosa:** on the bank of the Huayabamba river, Santa Rosa is constituted by ~40 cocoa farmers, majority of the area is dedicated to cocoa production, with average yields of 1200 kg/ha. As part of the REDD project, they are developing a botanical garden to value floral biodiversity, and want to develop a guesthouse for visitors to come and visit the conservation area. Strongly involved in the project since the beginning, Santa Rosa is now soliciting a concession for conservation of 10 000 ha.
- **Pucalpillo:** located a little more downstream on the bank of Huayabamba river, 30% of the area (60 ha) are dedicated to cocoa production, with an average yearly production of 800kg/ha. The villagers also cultivate corn, plantain, cotton and oranges and have around 40 cattle animals. 56% of the inhabitants have a primary education, 36% have a secondary education, 6% are illiterate and 2% have a higher education (no university). There is no medical centre in the village. Strongly involved in the project since the beginning, the asociacion of productores agropecuarios de Pucalpillo (APAP) is now soliciting a concession for conservation of 20 000ha.
- **Huicungo :** located on the banks of the Huayabamba river, only 10km before the junction with Huallaga river, it is a major populated centre, with a municipality. Major incomes come from cocoa production, with some farmers members of ACOPAGRO cooperative, while others (~130 farmers) are joining the newly created Asociacion de Prodcutores Agropecuarios de Huicungo (APAHUI), whose aim is to develop as a complete cocoa cooperative. APAHUI is the organization soliciting the concession for conservation Monte Cristo, part of the project area.

Other communities of the project zone :

- **Marisol** is the last populated community upstream on the banks of the Huayabamba River, on the historical and natural path to the inner areas of the project area. They mostly rely on cocoa production. There is primary education in the village and use hydroelectrical (mainly) and solar power for electricity generation.
- **Pizarro:** 35% of the area (80 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plantain, cotton and oranges and have around 60 cattle animals. 2% of the villagers are illiterate, 68% have a primary education, 24% have a secondary education and 6% have a higher education (no university). There is a medical centre in the village.
- **Mojarras:** 32% of the area (70 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plantain, cotton and oranges and have

around 30 cattle animals. 84% of the villagers have a primary education (complete) and 16% have a higher education. There is no medical centre in the village.

- **Santa Ines:** 29% of the area (70 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plantain, cotton and oranges and have around 100 cattle animals. 2% of the villagers are illiterate, 76% have a primary education, 20% have a secondary education and 2% have a higher education. There is a medical centre in the village.
- **Gran pajaten:** 25% of the area (10 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plantain, and cotton and have around 20 cattle animals. 10.35% of the villagers are illiterate, 48.27% have a primary education, 34.48% have a secondary education and 6.90% have a higher education. There is no medical centre in the village.
- **San Juan de Pajaten:** 7% of the villagers have a higher education, 73.33% have a primary education, 13.34% have a secondary education and 6.33% of the villagers are illiterate. There is no medical centre in the village.
- **Nueva Esperanza:** 25% of the area (25 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plantain, cotton and oranges and have around 30 cattle animals. 7% of the villagers are illiterate, 73% have a primary education, and 20% have a secondary education, 6.67% of the villagers are illiterate. There is a medical centre in the village.
- **Primavera:** 31% of the area (45 ha) are dedicated to cocoa production, with an average yearly production of 700kg/ha. The villagers also cultivate corn, plantain, cotton and oranges and have around 30 cattle animals. 4.08% of the villagers have a higher education, 81.64% have a primary education, and 14.28% have a secondary education. There is no medical centre in the village.
- **Luz del Oriente:** located at the northern tip of Martin Sagrado concession, at the boarder with Amazonas region, Luz del Oriente is a community depending on Rodriguez de Mendoza in Amazonas region. It is accessible by dust road from Mendoza up to 10km from the community.

Communities outside the reference region, however related to the project

- **Chuquibamba,** municipalty located in Amazonas region, in the Andes, is the access point and political center for the 3 communities located within the Martin Sagrado project area (Canaan, La Morada, Anazco Pueblo). As such, it is implicated in the conservation project. It is accessible by dust road coming along the Maranon river bed.
- **Comunidad Campesina de Leymebamba,** located in Leymebamba, Amazonas region, in the Andes. Leymebamba is another access point to the 3 communities located within the Martin SAgrado project area (Canaan, La Morada, Anazco Pueblo). Also, the Community has sollicitated a concession for conservation in Amazonas region whose demarcation goes up to Martin SAgrado project area. As such, coordination with this community is interesting for the sake of both conservation projects.

- **Cooperative ACOPAGRO :**

On top of local communities and community associations of local producers, the project is developed with a strong partner, owner of the Martin Sagrado concession within the project area: the cooperative ACOPAGRO.

ACOPAGRO cooperative was created in 1997, as part of a United Nations program to substitute coca plantations with cocoa and other alternative crops in the San Martin region. It now counts 2000 members: small-scale producers of cocoa and sugar cane having 5 hectares of land each, with an average 2.2 ha of cocoa fields. Most of the farmers were coca planters in the past.

The organization is FLO and Organic certified (standards EU and NOP (National Organic Program)) and is very successful, both on its commercial activities (ACOPAGRO has become in ten years Peru's first cocoa exporter) as well as towards its compliance to fair trade principles. ACOPAGRO can be considered as a model organization and has been certified under Alter Eco Gold Standards in 2009 by SGS.

3 000 hectares of cocoa fields have already been planted and are harvested, the equivalent of 3 millions cocoa trees. Cocoa trees need 40 % shade to give their best potential, hence producers are willing to plant native trees in combination with their cocoa trees. As well, the small scale producers dispose of many areas of degraded land and pastures, because of the former coca plantations or food crop plantations, which they are willing to reforest with native trees for forestry activities.

To help the farmers to achieve these objectives, ACOPAGRO and PUR PROJET set up a reforestation program in 2008 called Alto Huayabamba. The plantation started in April 2008 and the project is now fully operational with 1.2 million trees planted (June 2012) and was validated according to the VCS standard. The objective is to plant 2 million trees over 2300 hectares (depending on plantation of models between agro-forestry and forestry only plantations), of degraded land and cultivated land, practicing agro-forestry combining native trees species with cocoa trees and forestry plantations. The project is funded via the sales of environmental services (trees certificates) and of ex-ante carbon credits (VCUS).

Carbon offset is very complimentary with Fair Trade and organic production, the Internal Control System is already in place for organic production, and producers very well trained on traceability. The climatic conditions are very favourable for vegetation growth, hence for carbon offset. ACOPAGRO has already proved its capacity to plant and secure a sustainable plantation. The need of the area is very large, both for coca producers, and much as for the damaged environment of the region.

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- **ONF International :**

Technical partner assisting in the project design : technical assistance, baseline modelling, carbon inventory supervision, carbon calculations, review of Project Design Documents, management system to gather monitoring data, technical assistance.

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1.5 Project Start Date

January 1st 2010 is the starting date of the proposed REDD project activity crediting period.

Real action of the project activity started the 1st of January 2010 with ACOPAGRO starting the official application process for establishing the Martin Sagrado Concession with Conservation Purposes, and with an agreement with Asociacion Dos de Mayo for the integration the El Breo concession to the Biocorredor Martin Sagrado REDD project.

1.6 Project Crediting Period

The crediting period is **from January 1st 2010 to December 31st 2049**. The length of the crediting period is **40 years**.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	X
Mega-project	

Table 1 : Summary of Estimated GHG emission reductions or removals (tCO₂e)

Years	Estimated GHG emission reductions or removals (tCO ₂ e)
2010	
2011	11 714
2012	26 614
2013	39 844
2014	51 983
2015	70 330
2016	77 170
2017	86 138
2018	88 243
2019	88 732
2020	90 169
2021	103 249
2022	114 548
2023	126 402
2024	140 426
2025	153 229
2026	157 362
2027	178 834
2028	187 657
2029	205 421

2030	216 184
2031	235 543
2032	243 961
2033	246 730
2034	267 597
2035	271 037
2036	287 790
2037	297 985
2038	302 086
2039	319 533
2040	315 741
2041	329 606
2042	346 292
2043	360 270
2044	374 976
2045	366 119
2046	393 377
2047	395 075
2048	388 806
2049	426 108
2050	405 990
Total estimated ERs	8 788 871
Total number of crediting years	40
Average annual ERs	219 722

1.8 Description of the Project Activity

1.8.1 General project objectives

The project aims to avoid for 80 years deforestation and degradation of forest in an area of 295 654 hectares of primary forest, which is under stress of deforestation and degradation by various drivers and agents, detailed hereafter.

The project area is a high conservation value area with many endemic species and several threatened species (flora and fauna) and also boasts vital resources for downstream and surrounding communities. In particular it regulates the water resources in the Huayabamba river basin and the availability of water for downstream communities and cities.

The project is a community project aiming at empowering the local communities to let them choose and implement the conservation activities and manage sustainably their environment and resources, under the coordination of the Fundacion Amazonia Viva and Pur Projet.

The longevity of the project is 80 years

1.8.2 Deforestation threats

Historical deforestation

Peru has historically had one of the lowest annual deforestation rates in the Amazon basin, but forest loss has been increasing in past decades due to illegal logging, mining, agriculture, and expansion of road networks, including the paving of motorways that provides access to a remote and biologically-rich regions.

In 2005 — the most recent year for which data is available — at least 150,000 hectares of forest was lost, while a similar area was degraded through logging and other activities. Conflict between developers and native communities has been escalating over the past decade. In June 2010 more than 30 were killed in a clash between indigenous protesters and federal police over the government's plan to promote energy development in the Amazon rainforest. More than 70 percent of the Peruvian Amazon is now under foreign concession. Deforestation and land use change accounts for roughly 70 percent of Peru's greenhouse gas emissions, according to the Carbon Dioxide Information Analysis Center (CDIAC). Spanning a variety of ecosystems, including the dry coastal region, the tropical Amazon, and the high Andes, the country is particularly vulnerable to climate change.

The Peruvian government estimates that the country's glaciers have shrunk by more than 20% in the past 30 years and expects them all to disappear by 2040. The loss of glaciers, which are the source for as much as 50 percent of the water in the upper Amazon, could have a significant impact on agriculture and urban water supplies as well as the Amazon rainforest. Indigenous communities are believed to be especially at risk from climate shifts. (Source: Rhett A. Butler, mongabay.com, August 03, 2009).

Historical deforestation activities of San Martin

- From 1940 to 1960, the San Martin region was mostly covered with forests and with a deforestation rate of less than 8000 ha / year (Source: Asociacion Peruana por la Conservacion de la Naturaleza – APECO- , 1995).
- From 1960 to 1975, the deforested area went from 296 019 ha to 1 046 675 ha, equivalent to 50 057 ha / year, a multiplication by 6 of the annual deforestation rate. This was linked with the main motorway constructions of the region.
- From 1975 to 1979, same deforestation rate continues with 171 000 ha deforested.
- From 1980 to 1983, the region loses again 168 000 ha of forests, reaching a total of 1 386 214 ha.
- From 1983 to 1989, the total yearly deforested area accounts for 15 000 ha / year. This period sees very large increase of the coca production in the region, leading to massive pollution of soils and rivers due to heavy use of agro-chemicals and kerosene for cocaine production.
- Until 1993, the deforestation rate slightly decreases, to reach again levels of 50 000 ha / year of deforestation since that date.
- In 2002, deforestation area in San Martin accounts for 1 423 743 ha. The average yearly deforestation area is at 50 000 ha / year. (Source: INRENA – Instituto Nacional de Recursos Naturales).

According to the Regional Government of San Martin, about 26% of the Region San Martin was deforested in 2004¹.

A complete analysis of the historical deforestation in the reference region over 2000-2010, and expected future deforestation is presented in section 2.4.1 and available in appendix.

¹ F. REATEGUI REATEGUI, P. MARTINEZ DAVILA. Gobierno Regional de la Region San Martin. “Zonificacion Ecologica Economica de le Region San Martin.” Informe Tematico Forestal. Dec 2004.

Deforestation agents and drivers

Project assessments, interviews and participatory rural appraisals indicate that at least nine deforestation threats and six agents of deforestation have been and continue to be active in the San Martin Province.

Note that the identified active deforestation threats are not, by any means, an exhaustive or complete representation of the deforestation threat in Peru or even within the San Martin Province. These threats represent the most prevalent threats that have been active in the past and will continue to be active in the future.

Table 2 : Deforestation threats and agents of deforestation

Deforestation threats	Agents of deforestation						Total
	Local communities	Migrants	Mining/Oil Companies	Land dealers	Loggers	Government	
1. Conversion to croplands, pastures and housing	17%	28%		25%			70%
2. Conversion to settlements / infrastructure (Roads, water and electricity)	5%	7%				3%	15%
3. Selective logging of high-value species for commercial sales	1%	1%			8%		10%
4. Timber harvesting for local use (housing and infrastructures)	0,5%	0,5%					1%
5. Fuelwood gathering	0,5%	0,5%					1%
6. Uncontrolled fires	1%	1%					2%
7. Intentional fires (Paths opening and fires for hunting)	0,5%	0,5%					1%
8. Mining and Hydrocarbon activities encroachment			0%			0%	0%
9. Economic land concession (timber and agriculture)						0%	0%
Total	25,5%	38,5%	0,0%	25,0%	8,0%	3,0%	100%

A complete description and analysis of deforestation agents and drivers is presented in section 2.4.2 and available in appendix 4.

1.8.3 Project activities

The project aims to prevent the deforestation through the implementation over 80 years of the following categories of activities:

1. Legal: Formalization of project area will be conducted through the attribution, registration, and maintenance of concessions for conservation at regional government level, as well as registration at higher international level. In combination, financing of legal actions will help to fight illegal intrusions, encroachment and logging in the area. The project will also help developing forest management plans in a collaborative fashion. The project will support the communities in developing land and water resource development plans in a participatory and democratic manner by making improvements in the existing monitoring system managed by the local communities and by making large investments in the work of the environmental protection infrastructure and staff and the land titling agencies.

2. Control & Surveillance: Construction and maintenance of control points, demarcation of area boundaries, improvement of walkways, and patrolling/forest guarding are essential elements to effectively prevent uncontrolled deforestation. Also, increasing legitimacy of patrol groups and strengthening relationships with the local Forestry Administration will help creating a unified group of stakeholders that can prevent further forest encroachment, illegal logging, uncontrolled migration and other threats to forest integrity.

3. Sensibilization and Communication: Sensibilization of communities on conservation stakes will be done through local promoters, communication material, and implication of communities in the activities. Visits of the area will be conducted to raise awareness on forest's richness and environmental services. Education centres will be constructed to train and transmit scientific information to local communities in conservation efforts as well as to provide opportunities for the training of professionals specializing in biology, forest management, environmental education, etc.

4. Non timber forest valuation: community organization and training will be combined to improve the local capacity in forest management and forest product extraction such as seeds or medicinal plants. Research and development of new technologies will allow for innovation in the quality and types of products local communities produce. Furthermore, market development activities such as eco-tourism will be undertaken to improve market access. This combination should also enhance the production of forest products from the local communities involved in the project.

5. Scientific and Inventory: Inventories of biodiversity and carbon stocks will be conducted to improve knowledge on high conservation values species, on environmental services rendered by the forest in the whole region. Inventories will also contribute to monitoring of deforestation and conservation impacts on species conservation. Alongside, other scientific studies will investigate onsite the relationships between forest and water, food resources and food sovereignty, living conditions, wellbeing.

6. Renewable Energy: Even minor contributor, the development of renewable energy and equipment to lower fuelwood is a key component to make people aware of the need to develop alternative sources of energy.

7. Reforestation: Development in the leakage belt, where community lives, of agroforestry programs to plant native timber trees in the farmers parcels. This reforestation activity aims at lowering the pressure of agriculture on surrounding forest (yield increase), provide alternative source of fuelwood and timber to the communities, as well as raising communities awareness on forests. The project will build upon Pur Projet's experience in reforestation programs in the region. The project will also conduct Assisted Natural Regeneration within the project area to re-enrich degraded areas with native species.

8. Expansion, training and empowerment of communities: Empowerment of the communities on conservation, sustainable agriculture, resources management, and coordination with other neighbouring communities is very important to secure the sustainability of the project and limit leakage and risks from outside of the project area. It will help also promote the project in the whole region of San Martin.

Each of these activities targets one or more of the identified deforestation drivers (table 16).

Table 3 : Summary of Project Activities Categories and their effectiveness on each driver

	Contribution DF (a)	Relative reduction in the impact of driver due to activities (%)								
Deforestation threats	Relative importance of driver to total deforestation (%)	Legal	Control & Surveillance	Sensibilization & communication	Non Timber forest valuation	Scientific & inventory	Renewable Energy	Reforestation in agroforestry models	Coordination, Expansion & Transmigration	Total
1. Conversion of agricultural land to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2. Conversion of forest to agricultural land	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3. Conversion of forest to urban land	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4. Conversion of forest to industrial land	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5. Conversion of forest to mining land	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6. Conversion of forest to other land	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
10. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
11. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
14. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
15. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
16. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
17. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
19. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
20. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
21. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
23. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
24. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
25. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
26. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
27. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
29. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
30. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
31. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
33. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
34. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
35. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
37. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
39. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
40. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
41. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
43. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
45. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
46. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
47. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
48. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
49. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
50. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
51. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
52. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
53. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
54. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
55. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
56. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
57. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
58. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
59. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
60. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
61. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
62. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
63. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
64. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
65. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
66. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
67. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
68. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
69. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
70. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
71. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
72. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
73. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
74. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
75. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
76. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
77. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
78. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
79. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
80. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
81. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
82. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
83. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
84. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
85. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
86. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
87. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
88. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
89. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
90. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
91. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
92. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
93. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
94. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
95. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
96. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
97. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
98. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%
100. Conversion of forest to forest	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%

The following section contains a description on how each of these activities affects each of the drivers. It is also described how the effectiveness of each of these activities changes throughout the project's lifetime due to gained experience, or differences in funding. The relative effectiveness refers to the effectiveness relative to what is maximally achievable given the project's conditions, but may be different from this maximum due to timing of funding or lack of experience. In other words, the relative effectiveness will always be 100% at some point during the crediting period, regardless of the absolute effectiveness of the activity in reducing

1.8.3.1. Legal

Land tenure formalization :

Land is the single most important asset for most Peruvians, as economic and social lives are inexorably tied to the use of natural resources. Transparently assuring land-tenure rights structures is of upmost importance both to the livelihoods of local populations and the prevention of unregulated and unsustainable land use.

Project area:

First legal priority is to formalize the legal tenure of the project area, through the finalization of attribution and registration of the three concessions for conservation. This includes elaboration of maps and technical files for the attribution process, accompany the communities in the formal process of concession solicitation, elaboration of the management plan for the concession. The Asociacion Dos De Mayo already has the concession El Breo attributed. ACOPAGRO has been attributed the concession Martin Sagrado in 2012. APAHUI has solicited the concession Monte Cristo to the government.

Leakage belt:

Conventional land tenure for forest areas does not always extend to tenure over housing and agricultural lands, and a lack of protection for agricultural lands can lead to families moving deeper into forest areas to clear new patches. In the project zone, all of the farmers have clear land use rights as they have been there and cultivating their land for more than 5 years. However, only 10 to 20% of the farmers legally own the land on which they settle and use for agriculture. As part of the project, Amazonia Viva foundation will work with the regional government to prioritize land titling for the participating farmers who don't own a legal land title yet.

A cadastral plan has to be developed too, to manage the land use between agricultural land and forest preservation areas. By establishing legally-binding forest management agreements, this will help secure the community forest. This action provides exclusive management rights and responsibilities to the communities over the project area, greatly enhancing their ability to protect and conserve these resources.

Legal enforcement:

Without legal enforcement, maintaining tenure over land against migrants or concessionaries is extremely difficult. The establishment of these agreements often requires financial resources to implement, which can be generated by sales of carbon credits from the project. These financial resources can also be used for forest monitoring and patrolling programs, as well as forest boundary demarcation to ensure that migrant populations do not encroach on forest lands part of the Biocorredor Martin Sagrado project area.

Maintaining formal land-tenure rights is also important in ensuring that agriculture lands are not granted to large corporations as ELCs (Economic Land Concessions) or as timber concessions to harvest luxury woods. The creation and reinforcement of land tenure rights can effectively accomplish this by granting land rights to communities and ensuring this land is not taken through ELC or exploited by in-migration. The Amazonia Viva Foundation will also be responsible for meeting with new migrant communities and

leaders, as well as the local government to clarify boundaries of the project area, resolve any existing conflicts, and emphasize the intention of the AMAZONIA VIVA foundation to secure the area.

Forest management plan:

While the local village leaders are consulted in land allocation activities, there are currently no land-use plans for the project areas. However, developing forest management plans in a collaborative fashion is a key element in sustainable resource management. The project will support the communities in developing land and water resource development plans in a participatory and democratic manner. The plans contain guidelines on the amount of timber each person can harvest, based on current and future timber needs, and how much land within the project sites can be converted in the future for expansion of settlements and cropland.

The forest management plans also identify areas for assisted natural regeneration and enrichment planning. Areas of high biodiversity, hydrological value and High Conservation Areas are identified for special management. The forest management plans increase the efficiency of the current land-use, and take into account the increased need for land for settlements and agriculture in the future. By planning the future conversion and avoiding the random conversion of forest patches, forest degradation along settlement and cropland edges is reduced.

The development of forest management plans requires community-wide discussion on how to best manage natural resources, emphasizing the inclusion of all stakeholders. This policy of inclusion cultivates a feeling of resource ownership, motivating sustainable land use practices. The project guides communities in identifying appropriate areas for future settlement and agricultural expansion while clarifying and demarcating areas for permanent forest conservation. Often the need for new settlement or agricultural space leads to the degradation of forest lands. The involvement of knowledgeable local stakeholders and outside experts allows for the realization of technical and sustainable methods of expansion. During the stakeholder meetings, there are also discussions on how the forest should be managed with respect to the use of fire to “clean” the land. For this, the technical support of the ACOPAGRO and APAHUI cooperatives’ and Amazonia Viva’s technicians are key. Additionally, participatory land-use planning can also provide guidance and rules in case of disputes or conflict over land or resources.

Land-use planning procedures include the preparation of large scale maps (1:25,000) of the project area with zoning information to be posted in the community meeting room. The resource management plan maps are used for resource related discussions, annual work-plan development, fire management, and other spatial monitoring needs. Data from maps are transferred into the project GIS data base on an annual basis.

The potential of the proposed REDD+ project to generate carbon revenues for forest management has been instrumental in generating an action plan to resolve tenure conflicts in the project area through meetings, workshops, site visits, as well as higher level policy discussions.

Legal formalization and enforcement are a key backbone of the project to secure the forest areas. It is estimated to contribute to an overall 13 % of the protection of the forest against the different drivers of deforestation. It is particularly effective against oil exploration, large economic land concessions and timber concessions as it commits the communities to conservation and prevents the community or members of the community to sign a contract with these economic players.

1.8.3.2. Control and Surveillance

This strategy involves supporting the community members as they improve the pathways, demarcate forest boundaries, construct and maintain walkways, and patrol/protect forest areas. Project support

provides training in management planning, uniforms, communication equipment, patrol huts, boundary markers and signage, and employment. These actions increase the legitimacy of patrol groups in the eyes of outsiders and enhance status of AMAZONIA VIVA Foundation members in their local communities. In addition, the project seeks to strengthen cooperative relationships between the local Amazonia Viva staff, police, and military effort in order to create a unified group of stakeholders that can prevent further forest encroachment, illegal logging, forest fires set by humans and poaching.

Similarly, forest protection activities prevent the unsustainable harvesting of fuel-wood and timber for local use. The project will provide financial support to local staff to develop a quick-response mobile unit to react to illegal forest activities in cooperation with local government, police, and military.

Illegal logging risks will be mitigated through a number of measures including demarcating boundaries and posting signage, blocking tractor access through trenching and other methods, regular patrolling, development of a network of patrol huts and fire roads to facilitate rapid movement, rapid response and confiscation of chainsaws and other equipment, and improve communications through the use of mobile phones.

Migrant encroachers for illegal logging or to slash and burn require a minimum amount of time, at least one week, to clear the forest to establish a settlement on encroached land. Routine weekly forest patrols and increased monitoring activity will ensure migrant encroachers are unable to settle, or are removed quickly.

In addition, a case tracking system would be set up so that the prosecution of major offenders can be followed through.

The project would support the Amazonia Viva Foundation, ACOPAGRO and APAHUI cooperatives, local authorities, NGOs, and other partners to create a cell-phone network to act as an early warning system to control illegal forest activities. Cell phone communications provides a low-cost way to strengthen coordination among the inter-organizational enforcement team. Text messages sent to all participating communities are a rapid way to inform communities of fire or other threats. Workshops and meetings would be held to build team relationships, ACOPAGRO and APAHUI cooperatives are key to that aspect. Previous work with the communities has already increased their awareness and sensitivity to their land rights.

Overall, the control and surveillance activities will contribute to an estimated 21% of avoided deforestation and degradation.



1.8.3.3. Sensibilization & Communication

Sensibilization of the communities, the local stakeholders, and the government is critical in raising the awareness of the necessity of conservation. Local stakeholders must understand the importance and the benefits of preserving for them of for the region.

Also we have observed that this ambitious program for avoided deforestation and conservation must gain a great momentum to become effective and efficient. A way of gathering people, communities, other stakeholders around this conservation subject is to develop important communication on the project existence, the development of project activities. This can be done through the distribution of T-shirts branded to the conservation project, painting of the boats which are the common way of going around, leaflets, exhibitions, as well as of course regular visits to all communities.

It is also critical to make the communities feel directly implicated and part of the success of the project. In this sense, development of communication tools such as community radios, exhibitions, participation in concourses is key for the communities involved to be able to share their experience, communicate on their actions, their difficulties and their successes, and also to increase proudness of the communities in the project

Since the beginning of the project in 2010, a large part of the budget has been spent in communication and sensibilization activities, which allowed to create an important momentum on the region for conservation, to get on-board the project new communities and new organizations (APAHUI, Pucapillo, etc.), and to also get the full support of the regional government. Also, it is to be noted that this intense communication may have contributed to the recent increased focus of the regional government on conservation and environmental stakes, the suppression of concessions attribution to oil and mining companies. Also, the number of solicitations for concessions for conservation has increased dramatically in the last year, likely due to the huge momentum created by the communication around the reforestation and conservation projects, the creation of Amazonia Viva Foundation.

Overall, sensibilization and communication is estimated to have an impact of 21% on overall avoided deforestation and degradation.



1.8.3.4. Non timber forest valuation

The project plans several livelihood enhancement activities to boost the incomes of project participants and in neighbouring communities. These include seeds extraction and tree nurseries, enhancing production, processing, and marketing of non-timber forest products including cocoa, essential oils, traditional medicinal plants, eco-tourism, and other income generating activities, and productivity increase. Cultural activities generating income are part of this too. A micro-credit fund is made available for communities members to start non timber activities.

The sale of non-timber products will help to increase rural income, shifting the burden from the sale of agricultural and timber products, and reducing the need for cropland. The project will also assist communities in establishing micro-finance accounts that can receive small grants from carbon income,

allowing capital formation to be used for revolving loans for education, health, and small enterprise development. Small grants will be awarded to farmer-innovators who wish to perform trials of new sustainable farming system techniques.

The project will develop similar activities in the leakage area and with all the neighbouring activities.

Non-timber forest product development activities are supported during the full time span of the project. Similar as to agricultural intensification measures, a period of 5 to 10 years is assumed before these will be fully effective because marketing networks must be developed, etc. A final adoption rate of 50% is assumed after terminating the project's support for these activities. Together with legal contracting they are the main backbone of the project success and are estimated to contribute to 16% of the avoided deforestation.



1.8.3.5. Scientific & Inventory

The project will realize scientific studies and inventories in the project area and in the project zone, in order to understand and publicize better the biodiversity richness of the project zone, as well as the environmental services brought by the forest.

Such scientific studies will include inventories of biodiversity (fauna and flora), inventory of biomass, and studies about link between forest and water cycle preservation, forest and food sovereignty, forest and climate, etc.

This improved knowledge and the results of the studies will help defend better the goals of conservation against potential future alternative for local communities (cropland extension) or for the local government (oil, mining concessions or ELCs)

These studies are also critical to target better which activities to develop and in which areas specifically in order to best preserve biodiversity, ecosystemic services, and natural resources.

Altogether, it is estimated that scientific & Inventory activities will contribute to 5% of avoided deforestation and degradation.

1.8.3.6. Renewable Energy

Even minor contributor, the development of renewable energy or more efficient energy-saving techniques to lower fuelwood consumption, is a key component to make people aware of the need to develop alternative sources of energy. During the various meetings, many farmers pointed as well this as a priority to them. In July 2010, a first batch of 150 solar panel lamps (of 2 different kinds), were handed over to the Pucapillo community by Pur Projet, as a start.

In some communities, farmers have been helped to upgrade their stoves to improved cooking stoves in order to reduce fuelwood consumption and to reduce smoke in the kitchen.

Also, the development of alternative sources of energy (solar, hydroelectric) could avoid the construction of electricity lines that would degrade or deforest the area. For example, an electric line has been planned along the Huayabamba river up to upstream communities, and it will be necessary to remove some forest to build this line in a forested landscape. Would the communities be self-sufficient in electricity with other sources, this line would not be necessary.

1.8.3.7. Reforestation

Agroforestry in the leakage management areas :

Development in the buffer zone of the project area, where community lives, of agroforestry programs to plant native timber trees in the farmers' parcels. This reforestation activity aims at lowering the pressure of agriculture on surrounding forest (cocoa yield increase in agroforestry, limiting the need to expand cultivated areas), provide alternative source of fuelwood and timber to the communities (pruning and thinning products of reforested parcels), as well as raising communities awareness on forests. On top of that, the sales of trees at maturity (according to a sustainable management plan) will provide additional revenues for the farmers, diversifying their incomes, and decreasing their need for other sources of revenues they could get from deforestation of the project area

The project will build upon Pur Projet's experience in reforestation programs developed with ACOPAGRO since 2008 in the same region.

Assisted Natural Regeneration :

In the project area itself, plantation in degraded areas of removed or missing species in order to recreate natural complete ecosystems and regenerate the biodiversity, carbon stocks of these high conservation value areas. In particular, in areas where illegal loggers have come to cut selectively high value tree species such as Tornillos, Cedars, the Assisted Natural Regeneration will replant these tree species to help recreate original conditions.

1.8.3.8. Expansion, training and empowerment of communities

Training and empowerment of the communities on conservation, sustainable agriculture and resources management are a key issue for project's sustainability and will be mainly addressed by Amazonia Viva's, Pur Projet's, ACOPAGRO's and APAHUI's staff as well as the promoters in the communities. Training will be very wide and on multiple subjects, with in-field trainings and technical trainings, both on agro-forestry, forest management and the development of non-timber activities.

The communities need to feel on-board the project, implicated, and learning from the project. This only will ensure permanency and sustainability of the action.

Coordination and development with other neighbouring communities as well transmission to future generations is also very important to secure the sustainability of the project and limit leakage and risks from outside of the project area. It will help promote the project in the whole region of San Martin too.

Table 4 : Overview of project activities and estimated budget

Costs		Total 2010-2089	Total 2010-2014	Total 2015-2049	Total 2050-2089
Total Costs		42 638 688	2 097 734	20 841 403	19 699 551
Activities		24 046 692	1 002 892	11 066 200	11 977 600
1 - Legal	Elaboration of maps Martin Sagrado	2 000	2 000	0	0
	Registration of Martin Sagrado concession	15 000	15 000	0	0
	Demarcation and registration of Monte Cristo concession	21 405	21 405	0	0
	Delimitation and elaboration of maps concessions Pucapillo & Santa Rosa	4 351	4 351	0	0
	Registration of Pucapillo and Santa Rosa Concession	15 000	15 000	0	0
	Elaboration and revision of Management plans ("Plan de manejo") to maintain concession	437 000	62 000	175 000	200 000
	Legal assistance (lawyers) to get court decision on migrants invasion in conservation area	150 000	0	70 000	80 000
	Activation and Monitoring of unique registers of associations	27 500	20 000	3 500	4 000
2 - Control & Surveillance	Construction and maintenance of 6 control checkpoints at entry points of the project area	760 000	40 000	320 000	400 000
	Land demarcation and landmarks construction, maintenance, and replacement	82 400	4 200	37 000	41 200
	Sub-Landmarks construction, maintenance, and replacement	115 200	3 600	54 000	57 600
	Forest guarding, 20 forest guards	7 640 000	140 000	3 500 000	4 000 000
	Boat and equipments for patrolling (Purchase, maintenance, replacement)	499 300	26 800	222 500	250 000
3 - Sensibilization & Communication	Painting of 15 boats to the colors of conservation and Fundacion San Martin Verde	118 000	5 500	52 500	60 000
	T-shirts Fundacion for all communities involved and surrounding communities	222 000	12 000	98 000	112 000
	Installation , improvement, extension, and maintenance of Community radios	27 541	3 541	11 200	12 800
	Radio host and programmation for Radios	121 600	1 600	56 000	64 000
	Local promotional and education material	316 000	16 000	140 000	160 000
	Educational field visits for schools in conservation area	268 600	13 600	119 000	136 000
	Local external communication especially via local transport companies and agencies.	296 000	0	136 000	160 000
	Compensations for local promoters and trainers of the program HEM	390 000	15 000	175 000	200 000
4 - Non timber forest valuation	Design, creation, and management of Botanical Garden to value flora biodiversity present in the forest and sell plants extracts locally	351 000	57 000	142 000	152 000
	Medicinal plants: seeds extraction and the nursery activities to sell	142 000	67 000	75 000	0
	Seeds extraction activity and elaboration of tree nurseries	188 300	53 300	135 000	0
	Developement of bee heaving and honey supply chain	140 000	40 000	100 000	0
	Developement of fish farming activities	126 000	51 000	75 000	0
	Construction, expansion, and maintenance of base centers in neighbouring communities to facilitate access to the concession and develop activities : agro-tourism, scientific and agroecotourism	614 000	39 000	275 000	300 000
	Ecotourism activities: tours to discover landscape, fauna and flora inside the concessions	156 000	45 000	51 000	60 000
	Equipment and developement of conservation area for ecotourism : paths, miradors, etc.	400 000	25 000	175 000	200 000
5 - Scientific & Inventory	Elaboration of the technical study (Expediente tecnico) for all concessions area	57 000	57 000	0	0
	Inventory management : monitoring of biodiversity	936 000	36 000	420 000	480 000
	Specific scientific studies: link with water, food security and sovereignty, cocoa yields, etc.	378 000	36 000	162 000	180 000
	Reporting to regional, national and international authorities and institutions, research publications	52 500	0	24 500	28 000
6 - Renewable Energy	Implementation of distribution channel for solar panels and solar lamps and coordination	77 595	2 595	35 000	40 000
	Implementation of improved cookstoves in communities	134 400	2 400	132 000	0
7 - Reforestation in agroforestry models	Plantation of timber trees in agroforestry systems in surrounding communities	170 000	50 000	120 000	0
	Natural assisted regeneration : plantation of high conservaiton value species of trees and plants in degraded areas of the project area to reinforce natural ecosystems	40 000	10 000	30 000	0
Other unplanned activities	Other unplanned activities to fight new deforestation threats	7 420 000	0	3 420 000	4 000 000
Damages and unexpected	Damages and unexpected operational expenses	1 135 000	10 000	525 000	600 000
Local Project management and coordination. Expansion, training, and empowerment of communities		3 609 462	145 462	1 620 000	1 844 000
	Supervision of conservation activities, management of San Martin Verde Foundation, and coordination with government.	943 926	43 926	420 000	480 000
	Coordination of all legal and administrative processes. Expansion and empowerment of ...	625 324	25 324	280 000	320 000
	Training and assistance of farmers and community members in conservation activities	774 243	24 243	350 000	400 000
	Management of conservation activities by forestry engineers	772 000	22 000	350 000	400 000
	Construction, Expansion and maintenance of offices buildings in concessionaires	166 000	19 000	71 000	76 000
	Empowerment of Asociacions members of San Martin Verde and contractualization of ...	228 500	3 500	105 000	120 000
	Implication and participation in Mesa REDD San Martin	5 072	3 072	2 000	0
	Meeting and coordination with regional government (ARA) for formalization of concessions	47 043	2 043	21 000	24 000
	Field visit of Regional Government's representants	47 354	2 354	21 000	24 000

Costs		Total 2010-2089	Total 2010-2014	Total 2015-2049	Total 2050-2089
Monitoring costs		1 419 000	149 000	820 000	450 000
	Monitoring carbon	445 000	95 000	350 000	0
	Monitoring of leakage	90 000	20 000	70 000	0
	Monitoring of drivers of deforestation	234 000	9 000	105 000	120 000
	Monitoring of activities	390 000	15 000	175 000	200 000
	Monitoring of environmental and socio-economic impacts	260 000	10 000	120 000	130 000
External partners and network for project strengthening, distribution and promotion		1 316 778	41 778	595 000	680 000
	Field visit of partners, prospective clients; base camp installation in the concession	157 778	7 778	70 000	80 000
	Project presentation and promotion (European and US network), and Consortium. Lobbying, Media, advertising, partnership and conferences.	392 000	17 000	175 000	200 000
	International promotion and recognition (UNEP, IUCN, UNESCO, Bio Fund)	767 000	17 000	350 000	400 000
Project certification		3 347 878	411 301	1 922 601	1 013 976
	Preparation to VCS Validation	127 500	127 500	0	0
	Preparation to VCS Verification	400 000	25 000	175 000	200 000
	Validation audit costs VCS	25 000	25 000	0	0
	Verification audit costs VCS	400 000	25 000	175 000	200 000
	VCS credits issuance costs	1 157 878	16 301	1 087 601	53 976
	Preparation to CCBA Validation	62 500	62 500	0	0
	Preparation to CCBA Verification	375 000	0	175 000	200 000
	Validation audit costs CCBA	25 000	25 000	0	0
	Verification audit costs CCBA	400 000	25 000	175 000	200 000
	External forestry expertise and technical assistance in monitoring (ONFI)	375 000	80 000	135 000	160 000
Project taxes & Insurance		1 917 878	26 301	1 437 601	453 976
	Taxes to Peruvian State	1 157 878	16 301	1 087 601	53 976
	Insurance	760 000	10 000	350 000	400 000
Project development and management (Pur Projet)		6 140 000	180 000	2 760 000	3 200 000
	Project design, implementation and coordination	6 140 000	180 000	2 760 000	3 200 000
Marketing & Sales costs		841 000	141 000	620 000	80 000
	Media (Videos/Photos)	25 000	10 000	15 000	0
	Annual reports	156 000	6 000	70 000	80 000
	Sales costs (sales and client follow-up)	660 000	125 000	535 000	0
Total Costs		42 638 688	2 097 734	20 841 403	19 699 551

1.9 Project Location

General location:

The project is located in Northern Peru, in the western part of the San Martin province. The province of San Martin is located in the Amazon Andes, tropical region of Peru at the transition between the high Andes and the lower Amazon basin.

Figure 1 : General location of the project



Project area:

The project area is constituted by three concessions with conservation purposes: Martin Sagrado, El Breo, and Montecristo encompassing 303 699 hectares

Boundaries are defined as follows:

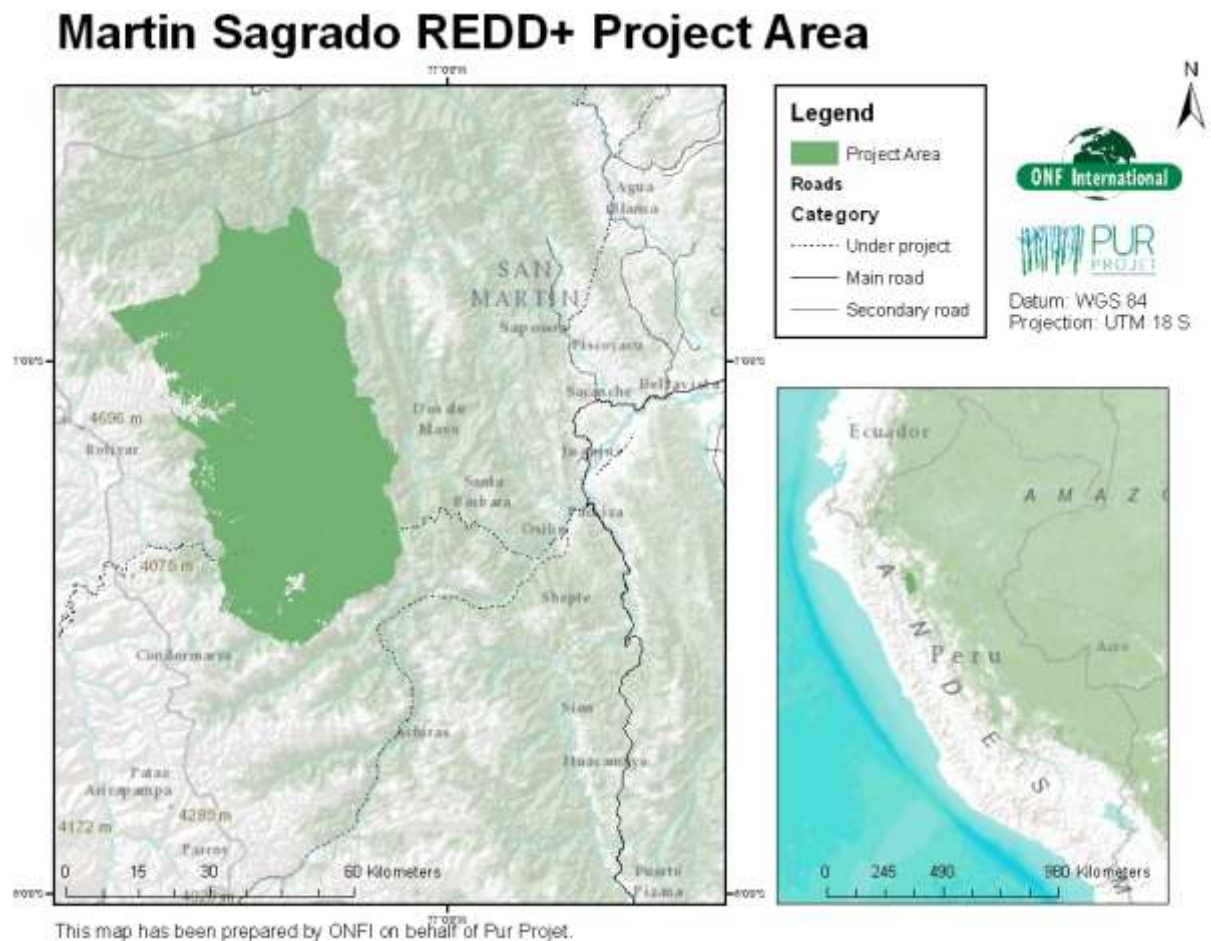
Northern limit	Frontier with the Amazonas region, Rio Verde river
Southern limit	Frontier with National Park Rio Abiseo
Eastern limit	Huayabamba river
Western limit	Frontier with the concession Alto Huayabamba (Andes)

- The Association de Proteccion de bosques Comunes Dos de Mayo (APROBOC) owns the concession title of the concession El Breo.
- ACOPAGRO cooperative owns the concession title of the concession Martin Sagrado
- The Asociacion de Productores Agropecuarios de Huicungo (APAHUI) is in the process of obtention of the concession Monte Cristo.

Removing from the area of the 3 concessions the non-forested areas, we get the exact project area, which covers 295,654 hectares.

See section 2.3.1 and GIS files for more details.

Figure 2: Location of the project area

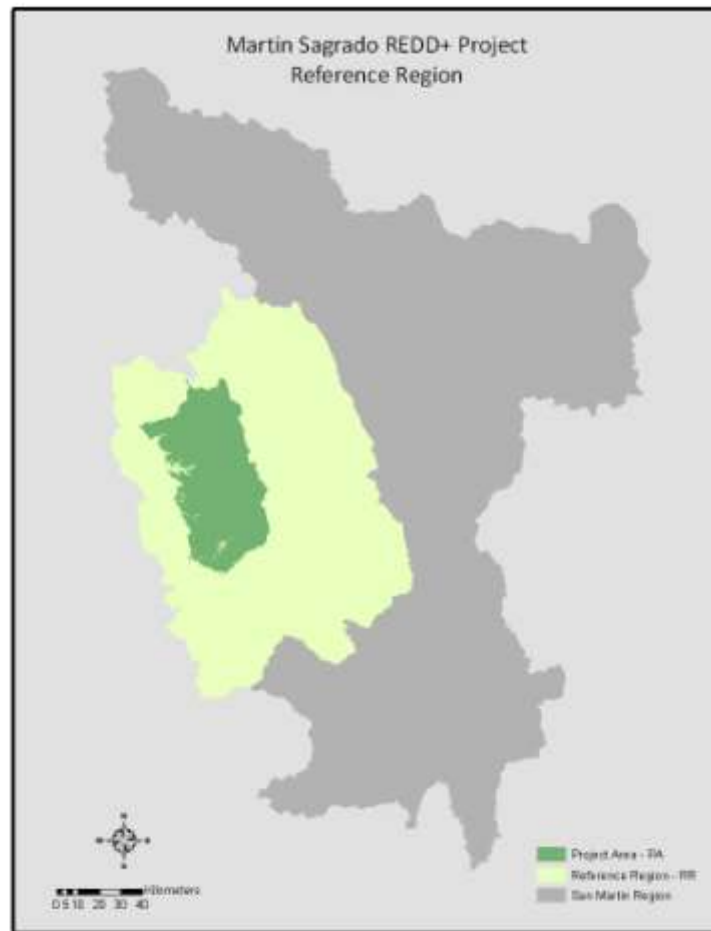


Reference region :

The reference region encompasses the two provinces of Mariscal Caceres and Huallaga.

The reference region was chosen to meet all criteria of the Methodology VM0015/ Version 1.0, in terms of size, homogeneity of drivers of deforestation, landscape and ecological conditions, socio-economic and cultural conditions. See section 2.3.1 and GIS files for more details.

Figure 3 : Location of the reference area



1.10 Conditions Prior to Project Initiation

1.10.1 [Forest, vegetation, ecosystems](#)

The project area is constituted by primary forest, hosting a great diversity of fauna and flora. For a detailed description of climatic, geographic conditions, vegetation, biodiversity, and ecosystems, please refer to Appendices 1 and 2.

For Land-use and Land-Cover classes before prior project initiation, please refer to section 2.4.1.

1.10.2 [Deforestation trend in the reference region](#)

The reference region has been and still is subject to strong deforestation pressures from various deforestation threats and agents. Refer to section 1.8.2 for a more detailed description of historical trend,

deforestation threats and agents, as well as Appendix 4 for a complete deforestation drivers and agents analysis.

Depending on deforestation types, there are two transitions types that have been selected for project work:

- Transition from Forest to Bare Soils (pastures, annual crops, settlements)
- Transition from Forest to Non-Forest Vegetation (permanent crops such as cocoa, banana, cotton, orange, fallows in cyclic slash and burn system ...)

A historical analysis of deforestation over the 2000-2010 period was completed in the reference region and shows an **average deforestation rate of 0.60%**. Please refer to section 2.4.1. and to appendix for more detailed analysis.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The proposed project activities are all within the existing national and regional legal framework of the Government of Peru.

The project area is constituted by the concessions for conservation attributed for 40 years by San Martin Regional Government for conservation activities, in accordance with the legal framework. The Regional Government authority, as attributor of the concessions, warrants the respect of the legal framework.

All project activities are implemented in the framework of - and in accordance with - the required Management Plans of the Concessions for conservation, approved by the San Martin Regional Government for periods of 5 years. In particular, the regional authority (Autoridad Regional Ambiental) approves the concessions Management Plans making sure that legal framework is respected.

The management of concessions for conservation falls into the legal framework constituted by the laws described in appendix, in particular the following laws : Ley General del Ambiente (ley N° 28611), Ley orgánica de Aprovechamiento sostenible de los Recursos naturales (ley N° 26821), Ley forestal y de Fauna Silvestre y su Reglamento (D. Leg.N°1090), Ley de Áreas Naturales Protegidas (Ley N° 26834).

Additionally, the Regional Environment Authority (ARA: Autoridad Regional Ambiental) of the San Martin Regional Government, in charge of the attribution and supervision of areas for conservations, has specifically approved the Biocorredor Martin Sagrado project, recognizing officially (supporting evidence available) that the project:

- is operated in accordance with Peruvian national and regional legal framework
- does not threaten the existence of high value species
- has a positive impact on the environment and ensures its sustainability

Moreover, the development of the Biocorredor Martin Sagrado project is development in the context of the REDD development initiative in San Martin Region. Pur Projet and the Fundacion Amazonia Viva participate actively to the regional working group on REDD projects and regulations, called the Mesa REDD, created by the regional government and in coordination with the Ministry of Environment, and which defines the conditions for the development of mixed private / public REDD projects . Pur Projet has presented the project in front of the participants of the Mesa REDD; the project Biocorredor Martin Sagrado falls into the framework of REDD project developments in San Martin Region.

Finally, the project will not encroach uninvited on private property, community property, or any other government property. Together, the cooperative ACOPAGRO, the Association APROBOC and the Association APAHUI have land tenure through concessions for conservation for the Project area, 303 699 hectares.

The project will also comply with work / labour regulatory framework. In almost all cases, the project will not hire directly people, but will instead transfer funds to the community associations for the implementation of specific activities, always with the vision of empowering the communities in the self-management of the conservation activities. The transferred funds will be used for the purchase of services and equipment (through legal purchase contracts), or compensation of the participating farmers in accordance with the internal rules of the community associations.

A list of relevant laws and regulatory framework is available for consultation.

1.12 Ownership and Other Programs

1.12.1 Proof of Title

Land tenure

The project area is constituted by 3 concessions for conservation (Martin Sagrado, El Breo, Montecristo), solicited respectively by ACOPAGRO, Asociacion Dos De Mayo, and APAHUI.

These are concessions given upon solicitation by the regional government for a period of 40 years (renewable), with the sole purpose of conservation. The concessionaires must solicit the concession first, building a technical file describing the area, the conservation stakes, and are given the concession after a public comment period of 3 months where communities can contest the concession. Once obtained, the concessionaires must submit within 3 years a detailed management plan for the concession, and the conservation activities will be monitored every 5 years by the government, which can reclaim back the concession in case of non-respect of the conditions.

- The Asociacion Dos de Mayo APROBOC already has the concession El Breo (concession contract signed), and has submitted the concession management plan for approval by regional Government and complete attribution of the concession.
- ACOPAGRO already has the concession Martin Sagrado (concession contract signed), and is in the process of completion of the concession management plan.
- APAHUI is in the process of solicitation of the Montecristo concession. It already submitted the technical file to the regional government, who already verified possible superposition or territorial conflicts. APAHUI will now enter the 3-month publication period, after which it will get the concession contract.

It is part of the REDD project activities (even the first priorities) to help the communities and organizations in the process of securing land tenure over the project area.

Once the concessions have been attributed, there are no longer possibilities for disputes over the project area within the San Martin Region.

Transfer of the emission rights

Transfer agreements for carbon emission rights have been signed between each concessionaire and The Pure Project (APAHUI and The Pure Project, APROBOC and The Pure Project, ACOPAGRO and The Pure Project). The agreements stipulate that ACOPAGRO, Asociacion Dos de Mayo and the Apahui association transfer their carbon credits to the Pure Project for distribution along the development of the project, in exchange for the funding and support in implementation of conservation activities.

1.12.2 Emissions Trading Programs and Other Binding Limits

The VERs generated by the GHG emission reductions of the project will be sold exclusively on the voluntary market, to private or public organizations willing to voluntarily offset their emissions. The Project Proponent itself does not have any binding limits on GHG emissions, and does not look for any compliance with an emissions trading program.

1.12.3 Participation under Other GHG Programs

The project has not been registered under any other GHG programs and is not seeking registration under any other GHG programs.

1.12.4 Other Forms of Environmental Credit

The project has not participated in any other program of environmental crediting for GHG emission removals. The project participates to CCBA (Climate, Community, Biodiversity Alliance) certification program, which is only a certification program for certifying environmental and community benefits, but does not bring any GHG-related environmental credit.

The project does not intend to generate any other kind of GHG-related environmental credit other than through the VCS Program. The Project Proponent aims to finance the project through the sales of VERs issued under the VCS program only to private companies buying VERs as voluntary offsetting of their emissions. Any other form of environmental credit for GHG removals would not be valued extra by the companies offsetting voluntarily their emissions and would therefore not be envisioned by the Project Proponent.

1.12.5 Projects Rejected by Other GHG Programs

The project has not participated in any other GHG programs and has therefore not been rejected by any of them.

1.13 Additional Information Relevant to the Project

1.13.1. Eligibility Criteria for grouped projects

The project is not developed as grouped projects.

1.13.2. Leakage Management

The quantification of leakage emissions is treated in chapter 3.3 in accordance with the selected methodology, and the monitoring of leakage over the lifetime of the project is presented in the monitoring plan, in chapter 4.

There is potential leakage to manage, but not in large amount. To the South of the project area there is a natural park managed by the Peruvian State; to the West there is a concession for conservation purposes; to the East there is a legal concession for commercial timber activities, and to the North-West the accessibility is reduced, the only way being a 2 days walk mountain path, which lightens the leakage management constraint for these parts of the buffer area surrounding the project area.

For the Northern and South-eastern areas, several of the activities of the Biocorredor Martin Sagrado REDD project are already considered as leakage risk mitigation measures. Agro-forestry activities with the communities of the area would provide locally-sourced timber, while increasing agronomic yields, which should reduce the extension of agricultural land and reduce at the same time the probability of deforestation for timber in those areas. Furthermore, the project activities include communication and training, including educational actions for the communities inside and outside the project area. These actions would emphasize in particular environmental issues and encourage self-managed alternative activities and socio-economic benefits of sustainable activities like non-timber activities, agro-forestry practices, eco-tourism, botanical gardens or other activities, on top of the non-timber activities already developed in the framework of the project. Not only those activities would contribute to preserve the forest inside the project area but they would also create alternative sources of revenues for communities living in the buffer area.

1.13.3. Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

1.13.4. Further Information

Further detailed information is available in appendix on:

- Description of climatic, geographic, physical information in the reference area
- Description of biodiversity and high conservation values in the reference and project area
- Description of socio-economic conditions in participating communities

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Approved VCS Methodology VM0015/ Version 1.0/ Sectoral Scope 14 “Methodology for Unplanned Deforestation.”

2.2 Applicability of Methodology

The choice of the methodology is justified because:

(a) Baseline activities include “deforestation of old-growth forest without logging (legal commercial logging)”;

- The forest is old-growth :

The forest in the project and reference area is primary forest.

- Baseline activities include deforestation :

A remote sensing analysis of historical deforestation over 2000-2010 in the reference area (see section 2.4.1 and appendix for detail) shows a deforested area of 75 102 hectares in the reference region (average deforestation rate of 0,60%), and the baseline scenario (see section 2.4.3) identifies an additional area of 79 693 hectares to be deforested from 2010 to 2020.

- Deforestation is unplanned and does not include commercial logging as defined in Methodology categories:

Identified deforestation drivers and agents in the reference area are described in Table 5 below.

A complete description and analysis of deforestation agents and drivers is available in appendix 4

(b) The project activities are “Protection without logging, fuel wood collection or charcoal production” (case A, table 1. Scope of the Methodology);

The baseline is deforestation of old-growth forest without logging” and the project activities for forest protection do not include logging, fuel wood collection or charcoal production. Please report to chapter 1.8 for detailed project activities.

(c) The project area is covered by old-growth forest

The description of forest in the project area is in appendices A1.9, A2.1 et A2.2.

Forest stratification is described in section 2.4.1

Biomass inventories were completed in the project area and show average stock of biomass typical of primary forest. They are presented in section 3.1.1; more details are available in appendix.

The height of the trees, the presence of vines, and the presence of native tree species are elements that justify the presence of an old-growth forest.

(d) At project commencement, the project area only includes land qualifying as “forest” for 10 years and more prior to the project start date

The exact project area delimitation excludes the few already deforested points in the concessions for conservation constituting the limits of the project area. (GIS file of project area available)

(e) The project area does not include any peatland

For further information about soil characteristics, please report to Appendix 1.

Table 5 : Deforestation threats and agents of deforestation

Deforestation threats	Agents of deforestation						Total
	Local communities	Migrants	Mining/Oil Companies	Land dealers	Loggers	Government	
1. Conversion to croplands, pastures and housing	17%	28%		25%			70%
2. Conversion to settlements / infrastructure (Roads, water and electricity)	5%	7%				3%	15%
3. Selective logging of high-value species for commercial sales	1%	1%			8%		10%
4. Timber harvesting for local use (housing and infrastructures)	0,5%	0,5%					1%
5. Fuelwood gathering	0,5%	0,5%					1%
6. Uncontrolled fires	1%	1%					2%
7. Intentional fires (Paths opening and fires for hunting)	0,5%	0,5%					1%
8. Mining and Hydrocarbon activities encroachment			0%			0%	0%
9. Economic land concession (timber and agriculture)						0%	0%
Total	25,5%	38,5%	0,0%	25,0%	8,0%	3,0%	100%

2.3 Project Boundary

2.3.1 Spatial boundaries

2.3.1.1 Reference region

According to Methodology VM0015, a Reference Region (RR) had to be defined for Martin Sagrado REDD+ Project in order to serve both the historical analysis of deforestation (rates, agents, drivers and patterns of land-use and land-cover change) and ex-post monitoring of future evolution of deforestation.

Martin Sagrado REDD+ Project falls within San Martin region in Peru. A jurisdictional REDD+ program is currently under preparation in San Martin. As the process could take time, Pur Projet made the decision to develop a baseline scenario and an MRV system for Martin Sagrado project. Once available, jurisdictional

results will have to be adopted, according to VCS Jurisdictional REDD+ Initiative. In the meanwhile and as results are not available yet, a Reference Region had to be defined.

Size of the region and cost of remote sensing data analysis did not enable to consider the whole San Martin region as the reference region. Hence, a smaller reference region has been defined, according to VM0015 criteria.

According to this methodology, several similarity criteria have been used to define the reference region and to ensure that the reference region was representative to project area (PA) in terms of:

- Agents and Drivers of deforestation;
- Landscape configuration and ecological conditions;
- Socio-economic and cultural conditions

In addition to those similarity criteria, the availability and quality of remote sensing data as well as the cost of their interpretation have been considered.

The chosen reference region encompasses the **two provinces of Mariscal Caceres and Huallaga**.

- Size:

The project area encompasses 295 654 hectares. The reference region includes the project area and encompasses **1 668 333 hectares**, and is therefore 5,6 times larger than the project area.

- Similarity of agents and drivers of deforestation:

Deforestation trend is similar all across the provinces of Mariscal Caceres and Huallaga, with the presence of local communities living on subsistence cropping (homogeneity of crops: cocoa, orange, corn, banana, etc.), increasing migrants coming from the Higher Andes to settle in better farming conditions, land dealers clearing the land to resell it to migrants, loggers who extract specific timber species.

- Homogeneity of landscape and ecological conditions:

Reference area has been elected to meet criteria of homogeneity in terms of Forest/ Vegetation classes, Elevation, Slope, and Rainfall. (See details in Appendix : Geographical Boundaries)

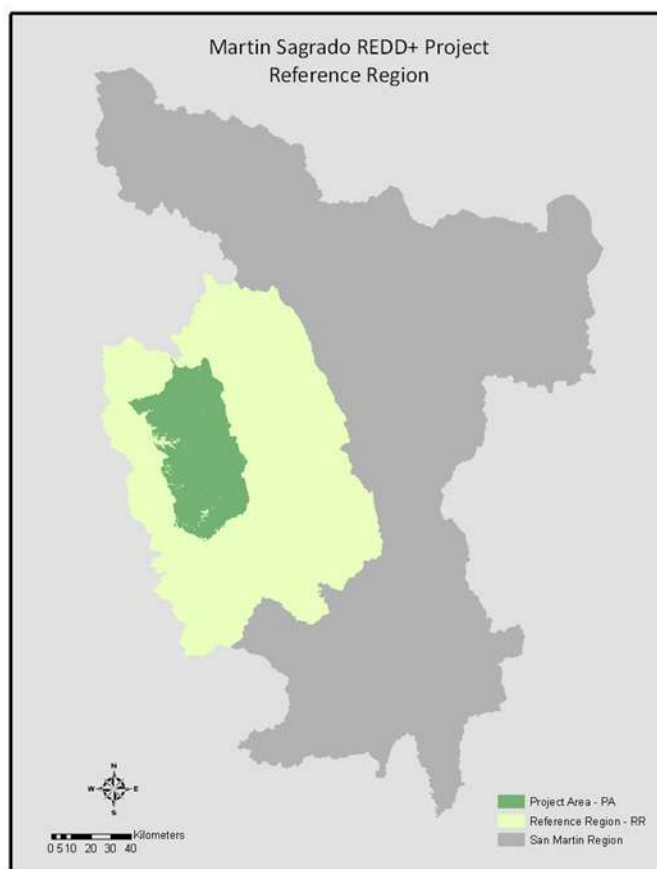
- Similarity of socio-economic and cultural conditions:

The project area is constituted by concessions for conservation. Others concessions for conservation purposes have existed in San Martin region, in particular in the reference area: concession for conservation Alto Huayabamba, owned by the NGO AMPA.

Current land-use in the project area is primary forest. Forest is also present elsewhere in the reference region. Projected non-forest land-use will be bare soils (pastures, annual crops, and settlements) and non-forest vegetation (permanent crops such as cocoa, banana, orange; fallows in cyclic slash and burn agriculture). These land-use are typical from small subsistence farming found everywhere in the reference region. Living and socio-economic conditions are similar for all small farmers present across the reference region and to a larger extent in San martin Region.

The project area is governed under the same legal framework as the whole region of San Martin, in particular the following laws : Ley General del Ambiente (ley N° 28611), Ley orgánica de Aprovechamiento sostenible de los Recursos naturales (ley N° 26821), Ley forestal y de Fauna Silvestre y su Reglamento (D. Leg.N°1090), Ley de Áreas Naturales Protegidas (Ley N° 26834).

Figure 4 : Location of the reference region



2.3.1.2 Project area

The project area is constituted by three concessions with conservation purposes: Martin Sagrado, El Breo, and Montecristo encompassing 303 699 hectares

Boundaries are defined as follows:

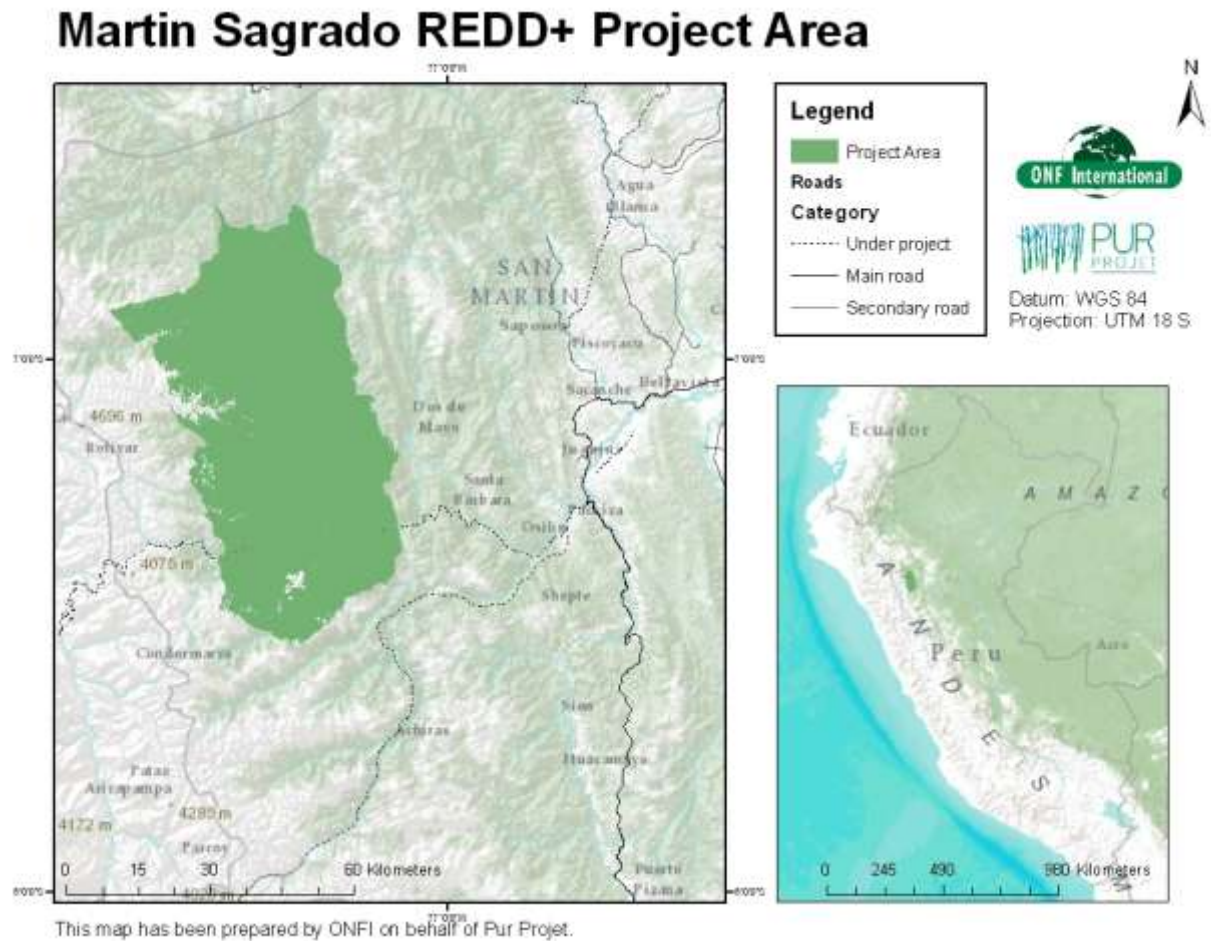
Northern limit	Frontier with the Amazonas region, Rio Verde river
Southern limit	Frontier with National Park Rio Abiseo
Eastern limit	Huayabamba river
Western limit	Frontier with the concession Alto Huayabamba (Andes)

- The Association de Proteccion de bosques Comunales Dos de Mayo (APROBOC) owns the concession title of the concession El Breo.
- ACOPAGRO cooperative owns the concession title of the concession Martin Sagrado
- The Asociacion de Productores Agropecuarios de Huicungo (APAHUI) is in the process of obtention of the concession Monte Cristo.

The project area excludes the few areas inside the three concessions that are already deforested in 2010, as well as the course of the planned road that will cross the Montecristo concession (Juan Jui-Salaverry road) on a width of 20 meters. As a result, the exact project area covers **295 654 hectares**.

Please refer to GIS file of project area.

Figure 5 : Map of the project area



2.3.1.3 Leakage belt

As said before, Martin Sagrado REDD+ Project falls within San Martin region in Peru. A jurisdictional REDD+ program is currently under preparation in San Martin. As the process could take time, Pur Project made the decision to develop a baseline scenario and an MRV system for Martin Sagrado project. Once available, jurisdictional results will have to be adopted, according to VCS Jurisdictional REDD+ Initiative. In the meanwhile and as results are not available yet, a leakage belt has to be defined. .

Leakage Belt (LB) corresponds to the geographical area surrounding or adjacent to the Project Area (PA) where agents of deforestation could displace their deforestation activities, outside of the Project Area (PA), due to project implementation.

LB has been defined analyzing agents' mobility, in accordance with the methodology (part 1.1.3, VM0015). Mobility of deforestation agents has been assessed through an integrated analysis of geographic information systems (GIS) and multi-criteria evaluation (MCE) (Guezo Fédowidé, 2010). This type of analysis refers to decisions-making situations based on a multiple criteria analysis (Bensaid et al., 2007). First challenge was to identify factors (i.e. criteria) that may influence the mobility of deforestation agents from one place to another. For each criterion, a weighting hypothesis has been calculated. Multi

criteria analysis enabled to identify areas surrounding PA where agents could displace their deforestation activities if they want to circumvent constraints that will result from project activities implementation.

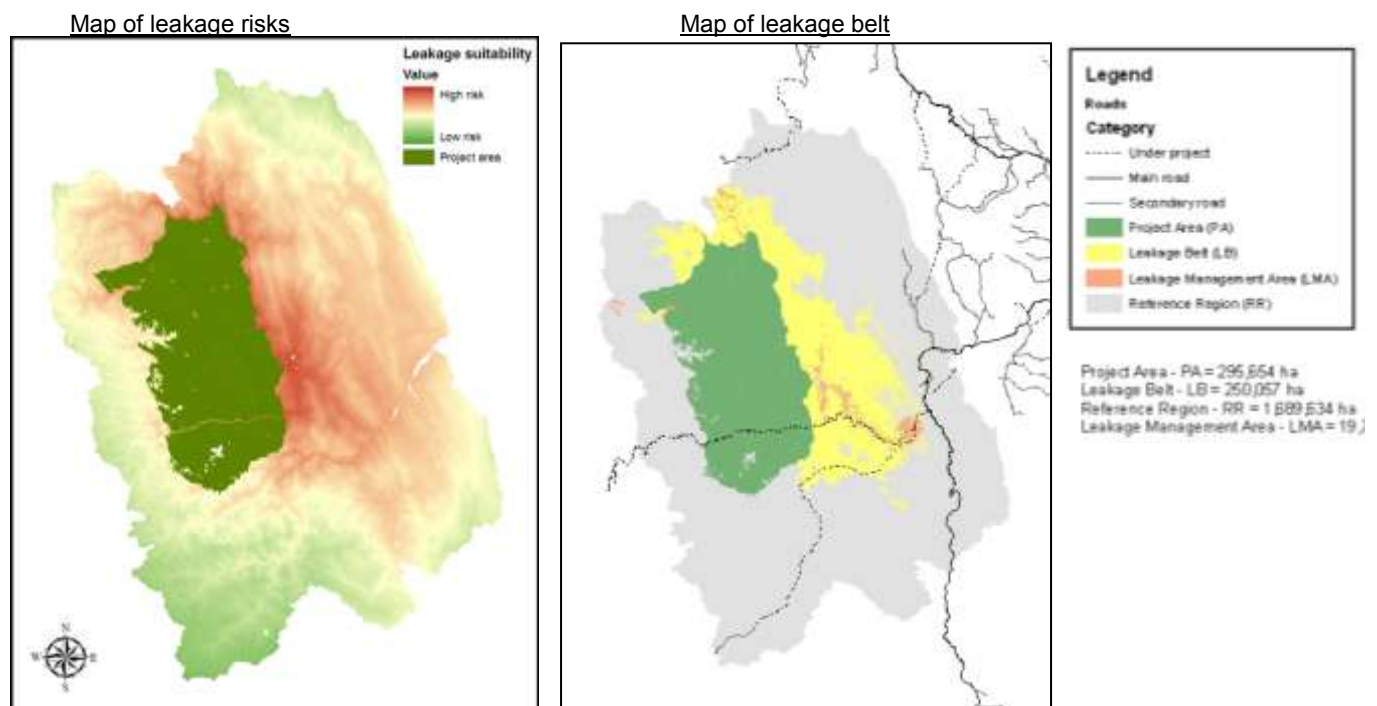
The criteria selected for the analysis were the following: Distance to Project Zone, Elevation, Distance to already cleared land, Distance to cities and villages, Distance to roads and tracks, Slope, Distance to rivers.

A maximum area must also be defined to define the leakage belt (LB) boundaries. According to the Avoided Deforestation Partners methodology (VM0007, VMD0007 v3.0), LB must at least equals 90% of PA. As there is not such an indication in VM0015, we used VMD0007 threshold and assumed that Martin Sagrado REDD Project LB should be at least 265,500 ha (i.e. 90% of 295,000 ha).

In order to increase homogeneity a filter has been applied to remove less than 100 hectares holes within LB. All those small patches have been included within LB.

Finally, leakage management areas (non-forest area only) have been excluded from the leakage belt.

Figure 6 : Maps of leakage risks and leakage belt



The detailed process for leakage belt definition is available in appendix “Geographical Boundaries”.

Expected leakage intensity

Leakage is expected to be low because of the presence around the project area of other protected areas or areas dedicated to conservation : to the South, the National Park Rio Abiseo, to the West, the concession for conservation Alto Huayabamba, to the North West, the conservation area of Leymebamba.

On top of that, accessibility is difficult in the region and it is hard for deforestation agents to move from one place to another (no roads, no paths, rugged terrain, etc.).

To the North (Province of Leymebamba, Mendoza area), communities are already settled and have deforested extensively in the past. It is therefore likely that additional deforestation will be low and not directly attributed to the project. To the East (left bank of Huayabamba), most of the area is already leased as forestry concessions. Commercial loggers are therefore already present in the area and additional deforestation is likely not to be attributed to the project activities but part of the baseline scenario really.

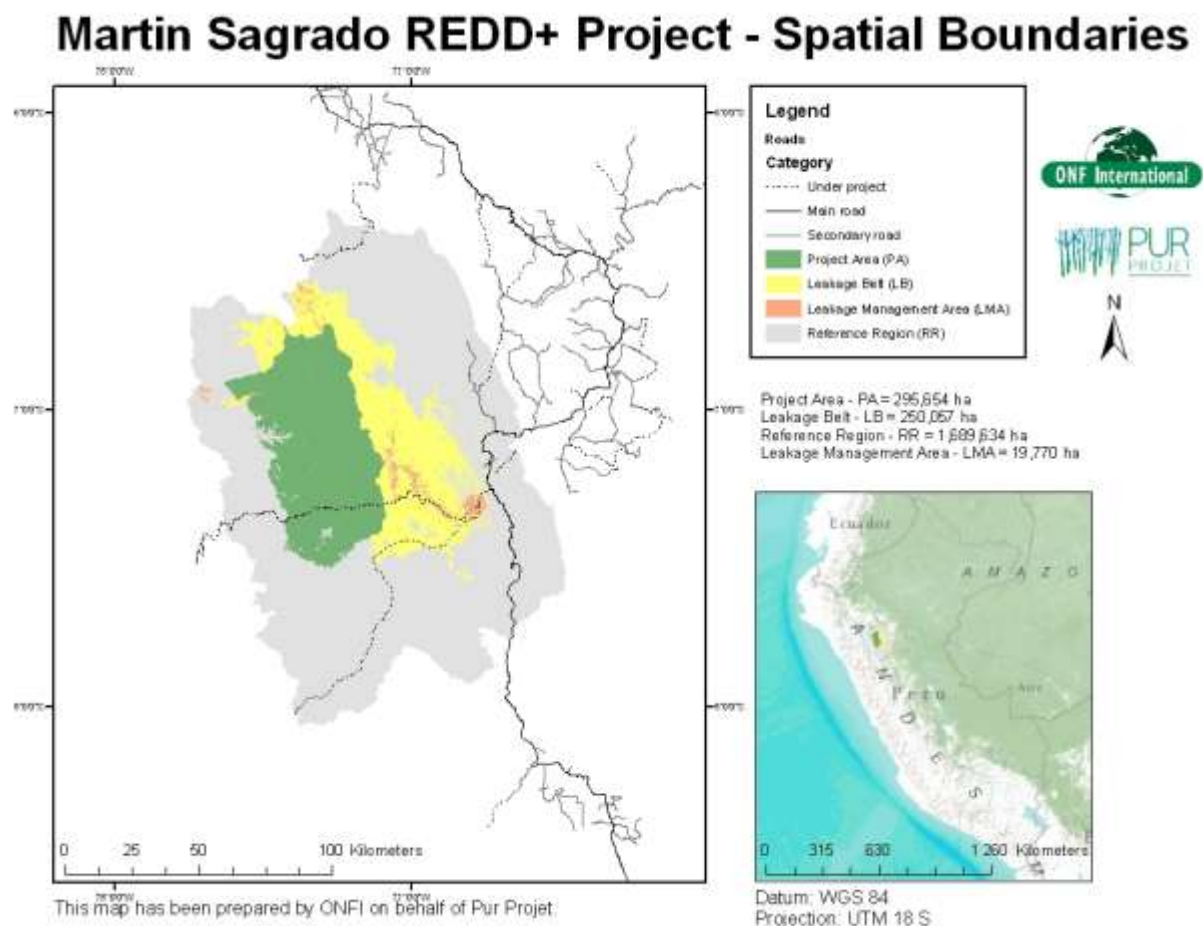
Still, to the North, and to the East, the leakage area was selected according to methodology described above to encompass all accessible forests around the project areas that could be under pressure during the project's lifetime.

2.3.1.4 Leakage Management Areas

Most of the project activities from the categories: Non Timber Forest Valuation, Sensibilization & Communication, Reforestation, Renewable Energy will be implemented in the leakage belt with the communities involved in the project. These activities both prevent deforestation inside the project area as well as leakage outside the project area (in particular, awareness campaigns, education, reforestation, non-timber products, etc.)

The Leakage Management Areas are therefore the non-forest areas where these activities will be implemented, in the vicinity of the communities participating to the project (list of communities in section 1.4)

Figure 7 : Map of Leakage Management Areas



2.3.1.5 Forest

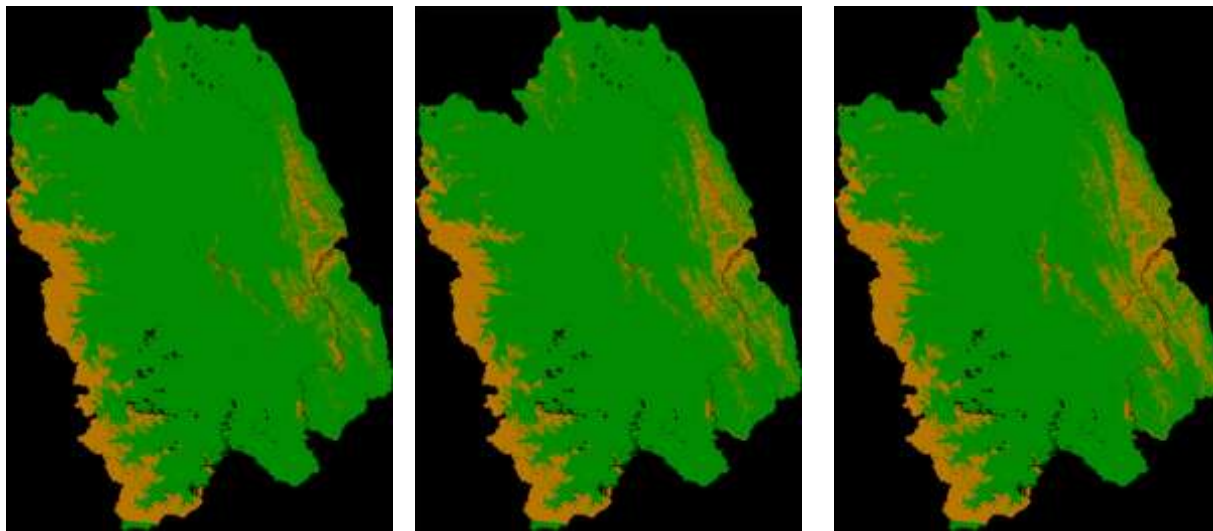
- **Forest definition** used for demarcation of forest area is the definition of forest communicated by Peruvian DNA : Land with a minimum area of 0,5 hectares, a minimum tree crown cover of 30 %, and a minimum tree height of 5 meters.

-**The Minimum Mapping Unit** used to complete the forest maps is 1 hectare

- Maps of forest cover were completed for the historical reference period for the years 2001, 2005, 2010, and annual projections for the baseline scenario.

Detailed process is described in appendices “Historical analysis of land-use and land-cover changes” and “Projection of future deforestation”. All maps are available in GIS format.

Figure 8 : Maps of Forest Cover in 2001, 2005, 2010



Forest Cover Benchmark map -
2001

Forest Cover Benchmark map -
2005

Forest Cover Benchmark map -
2010

Legend :

	Forest
	Non Forest
	No data : clouds / shadows, water

2.3.2 Temporal boundaries

2.3.2.1 Historical reference period

The historical reference period is from 2001 to 2010

2.3.2.2 Crediting period

The crediting period is from January 1st 2010 to December 31st 2049. The length of the crediting period is 40 years.

2.3.2.3 First fixed baseline period

The first fixed baseline period runs from January 1st 2010 to December 31st 2019. (Duration of 10 years)

2.3.2.4 Monitoring period

The monitoring periods will be periods of 5 years. First monitoring period will be from January 1st 2010 to December 31st 2014.

2.3.3 Carbon pools

2.3.3.1 Carbon pools

Table 6 : Carbon pools included or excluded within the boundary of the proposed REDD project activity

Carbon pools	Included / TBD ¹ / Excluded	Justification / Explanation of choice
Above-ground	Tree: Included	Carbon stock change in this pool is always significant
	Non-tree: Included for non-forest post deforestation classes	This carbon pool is included only for post-deforestation non-forest classes (perennial crops such as cacao, orange, etc.). For initial forest classes, this carbon pool is not significant and has not been included in forest carbon stocks. This approach is conservative.
Below-ground	Included	Recommended for trees as it usually represents between 15% and 30% of the above-ground biomass.
Dead wood	Partly included	■ Lying dead wood has not been included in forest classes based on field observations. ■ Standing deadwood has been included in forest classes as it was easy to measure and looks significant (analysis showed that it is accounting for part of the stocks). Only above 5cm DBH standing deadwoods have been taken into consideration. In order to avoid overestimates, standing deadwood stocks have been divided by two.

		- Both lying and standing deadwood are included in Lapeyre et al. (2004). - It is conservative to consider those pools in post-deforestation classes and not in forest classes as they should not increase under baseline scenario. As a matter of fact, deforesting farmers use slash and burn practices which consumes almost all biomass, and they remove possible remaining burned logs, which would disturb the installation of their crops (cocoa, corn, etc). Dead wood is therefore not significant in post-deforestation classes.
Harvested wood products	Not Included	Not significant (see explanation below)
Litter	Not included	Not to be measured according to VCS Program Update of May 24 th , 2010
Soil organic carbon	Not included	Not to be measured according to VCS Program Update of May 24 th , 2010. It is conservative.

Non-significance of harvested wood products:

- As described in the analysis of drivers and agents of deforestation, deforestation for selective extraction and commercial timber sales accounts for 10% of total deforestation.
- Of these 10%, below-ground biomass represents 20% and is not converted to wood-products, leaving a maximum of 8% of above-ground biomass potentially converted to wood-products. But only a fraction of above-ground biomass can be converted in long-term wood products; considering a biomass expansion factor of 1,5 for tropical deciduous species (IPCC GPG table 3A.1.10) and average loss in sawmills of 58% (source: INRA (Institut National pour la Recherche Agronomique) / Ecoinvent), this leaves 3,1% of total biomass that could potentially be converted to wood products.
- However, only trees with a minimum diameter of 25 cm are typically sold commercially or used in local constructions, smaller trees are left on the ground or burned. Average values from biomass inventories conducted in the project area indicate that 76% of total above-ground biomass is in trees with diameter larger than 25cm. This leaves 2.3% of total forest biomass potentially converted to wood products
- On top of that, only high value species are converted into wood products, which means loggers will clear some forest over a given area but only extract and sell the higher value species (caoba, tornillo, cedro, ishpingo..) which represent an estimated 20% of all biomass of trees above 25cm diameter, i.e. 0,46% of total biomass deforested.
- Finally, a 10% loss can be reasonably estimated in the extraction and transport of the timber (complex extraction via rivers), which can be damaged, lost, or left degrading for a period of time.

This leaves an estimated 0,41% of total biomass deforested potentially going into long-lived wood products. According to VCS definition of “significant” carbon pools, **the harvested wood products are not a significant carbon pool.**

2.3.3.2 Sources of GHG emissions

Table 7 : GHG emissions included or excluded within the boundary of the proposed REDD project activity

Sources	Gas	Included?	Justification / Explanation
Biomass burning	CO ₂	No	Excluded by the methodology
	CH ₄	No	The project activities will precisely tend to decrease the fires to clear forests, leading to a reduction of biomass burning emissions. The exclusion of biomass burning emissions is therefore conservative (in line with methodology recommendation in 6.2) Leakage management activities such as reforestation in agroforestry models do not foster additional fires as the trees are planted in agroforestry systems or in already cleared areas.
	N ₂ O	No	Excluded by the methodology
Livestock emissions	CO ₂	No	Excluded by the methodology
	CH ₄	No	The project activities will not increase the number of livestock in the project and leakage areas. On the contrary, the project will tend to avoid the conversion of forest to pasture and promote activities alternative to livestock farming, therefore reducing the amount of livestock emissions. The exclusion of livestock emissions is therefore conservative.
	N ₂ O	No	

2.4 Baseline Scenario

The baseline scenario was completed following the methodology steps of the methodology VM00015. The complete process and results are available in appendices “Historical analysis of land-use and land-cover changes”, “Analysis of agents, drivers, and underlying causes of deforestation”, and “Projection of future deforestation”. A summary of main results is presented hereafter in the PDD.

2.4.1 Analysis of historical land-use and land-cover change

The analysis of historical land-use and land-cover change was completed following the methodology VM00015, and the complete process and results of the analysis are available in appendix “Historical analysis of land-use and land-cover changes”.

2.4.1.1 Data sources

According to the methodology and based on data availability, three time points were selected over the historical reference period: 2001 / 2005 / 2010.

Due to cloud cover and Landsat 7 ETM+ SLC problem, a time window of ± 2 year was tolerated for each time point. When Landsat 7 ETM+ had to be used, an algorithm has been used to fill the gaps, as explained below in pre-processing chapter.

Two types of data have been used for both interpretation and validation. Landsat 7 ETM+ data have been acquired throughout the Glovis USGS portal. SPOT 5 data have been acquired thanks to PLANET ACTION initiative. Those images were directly ordered to SPOT IMAGE SA and acquired in orthorectified pre-processed format.

Table 8 : Data used for historical LU/LC change analysis

Vector	Sensor	Resolution		Coverage (km ²)	Acquisition date	Scene or point identifier	
		Spatial	Spectral (μm)			Path / Latitude	Row / Longitude
Satellite	Landsat 5	30m	0.45 – 2.35	34 225	25/08/01	08	65
Satellite	Landsat 7 ETM+	30m	0.45 – 2.35	34 225	30/06/01	08	66
Satellite	Landsat 7 ETM+	30m	0.45 – 2.35	34 225	12/08/05	08	65
Satellite	Landsat 7 ETM+	30m	0.45 – 2.35	34225	16/01/05	08	65
Satellite	Landsat 5	30m	0.45 – 2.35	34 225	08/09/06	08	65
Satellite	Landsat 5	30m	0.45 – 2.35	34 225	24/11/05	08	66
Satellite	Landsat 5	30m	0.45 – 2.35	34 225	19/11/09	08	65
Satellite	Landsat 5	30m	0.45 – 2.35	34 225	03/11/09	08	65
Satellite	Landsat 5	30m	0.45 – 2.35	34 225	18/08/10	08	65
Satellite	Landsat 7 ETM+	30m	0.45 – 2.35	34 225	27/09/10	08	65
Satellite	Landsat 7 ETM+	30m	0.45 – 2.35	34 225	08/09/09	08	65
Satellite	Landsat 7 ETM+	30m	0.45 – 2.35	34 225	26/08/10	08	66
Satellite	SPOT 5	10m	0.5 – 1.75	3 600	21/08/10	647	365
Satellite	SPOT 5	10m	0.5 – 1.75	3 600	20/07/10	645	364
Satellite	SPOT 5	10m	0.5 – 1.75	3 600	20/07/10	645	365

2.4.1.2 Categories of Land-Use and Land-Cover classes

Land-use and land-cover classes have been defined crossing several approaches:

- Agents and drivers analysis, as well as Pur Projet very good knowledge of the area, enabled to pre-identify land-use and land-cover classes that should be looked at in order to translate the on-the-ground situation (including classical changes) and to follow the IPCC 2006 AFOLU Guidelines;
- An unsupervised classification has been run on the remote sensing data. It enabled to differentiate different spectral answer and to discriminate several classes. This unsupervised classification method have then been adjusted using supervised classification (SVM) thanks to ground-truthing points (see later);

- Classification has also been refined based on carbon stock assessment. Some classes have been merged due to their carbon stock homogeneity (e.g. Rock, Settlements and Bare Soil have been merged in a <Bare Soil> class).

- Post-processing enabled to further stratify forest class, using Ecological Systems such as defined by Josse, C. et al. (2007). Four of the ecological system groups are within Reference Region:

- Amazonian Moist Forests (Bosques Húmedos Amazonicos)
- Andean Moist Forests (Bosques Húmedos Andinos)
- Andean Dry Forests and Weric Scrub (Bosques secos y matorales wericos andinos)
- White Water Floodplain Forests (Bosques inundables por aguas blancas)

Explanations on how the classification has been post processed using those groups are provided in Appendix “Historical Analysis of LULC Changes”. Results of biomass inventory enabled to assess the suitability of this forest stratification.

- Water class has been discriminated through unsupervised classification. Very few changes occurred over time probably due to the water volume evolution. The final <Water> used for all three time points result from the merging of water-classified areas.

Table 9 : Land use and land cover classes existing at the project start date within the reference region

Class Identifier		Trend in Carbon stock ¹	Presence in ²	Baseline activity ³			Description (including criteria for unambiguous boundary definition)
ID _{cl}	Name			LG	FW	CP	
1Fcl	Bare Soil, Cropland and Settlements	constant	RR, LB	No	No	No	Bare soil refers to all surfaces which carbon density is null or close to be null. It includes: ▪ Urban and rural areas (settlements, roads network, infrastructures, etc.); ▪ Rocks, sand deposit areas; ▪ Non wood vegetated areas such as grasslands; ▪ Annual crops (maize, sugar cane, etc.) Bare soil can be a natural state (rocks) or an anthropogenic transformation (annual crops). In all cases, bare soil has to be understood as a permanent state, i.e. bare soil is not expected to naturally regenerate into forest or other vegetation, at least not in the next 10 to 15 years. This permanent characteristic can be due either to soil degradation (soil became too degraded to recover) and/or to permanent human activities. Among anthropogenic activities, bare soils host cattle raising (grasslands), settlements, and annual crops. Bare soils are of different types and can therefore be located in different areas. Rocks will be located in mountainous areas while sands deposit will be located alongside or within existing or former rivers' banks. Grasslands, annual crops fields are usually located in most accessible areas, with good irrigation capacities, i.e. alongside rivers or close to urban/rural areas.
2Fcl	Water	constant	RR, LB	n/a	n/a	n/a	This class refers to all delimited water surfaces, i.e. rivers, streams, lakes, artificial basins, etc. A priori, no vegetation can developed in water areas. For geophysical reasons, water will be found in valleys, but also in elevated areas (such as for high altitude lakes).
1Icl	Amazonian Moist Forests	constant	RR, LB, PA	Yes	Yes	No	Amazonian Moist Forests refer to dense evergreen forests, tall and multi-stratified. They are distributed along the low sub-Andean ridges with humid to hyper-humid pluvial bioclimates, below 1300m approximately. Species of <i>Rubiaceae</i> and <i>Lauraceae</i> are important components of the system, as well as <i>Oenocarpus</i>, <i>Iriartea</i> and <i>Wettinia</i> palm trees.

2Icl	Andean moist Forests	Constant	RR, LB, PA	Yes	Yes	No	Andean Moist Forests refer to several types of forest from 2000m to 1200m. Those forests are 10 to 25 meters evergreen forests dominated by coriaceous, sclerophyllous, dark leaves. Abundant presence of epiphytes, vascular and non vascular. In some lower areas, Andean palms (<i>Dictyocaryum lamarckianum</i>) are abundant or <i>Lauraceae</i> species (in mountainous hillsides the least exposed to the fog).
3Icl	Andean Dry Forests	Constant	RR, LB, PA	No	Yes	No	Andean Dry Forests refer to low and drought deciduous forests and. Those forests are found in xeric dru to semiarid bioclimate, between 2000m and 3100m, in inter-Andean valleys subject to a marked topographic rain shadow effect.
4Icl	Floodplain Forests	constant	RR, LB	No	No	No	Floodplain Forests are exposed to seasonal and relatively short sediment rich, white-water floods. It develops in the recent and sub-recent alluvial plains of white-water rivers. These forests reach up to 30m in height, and are characterized by an association of trees and palm trees of caespitose and thorny habits.
3Fcl	Non-forest vegetation (fallows and plantations)	Increasing	RR, LB	No	Yes	No	Non-forest Vegetation is a dynamic class. It refers to all successive states of slash and burn agriculture from just-burnt state to 4 to 5 years fallows. This class also includes plantations such as cocoa, bananas and oranges. In a general point of view, this class includes all surfaces that are not tall and/or dense enough to be classified within <Forests> class. In terms of land use, Vegetation in Transition should be seen as areas which where natural forests before and has been slashed and burnt. Those areas are usually cultivated for a 2 to 5 years period then left to fallows. During the following period, the area will recover and if not disturbed again, forest might regenerate. Most of the time, fallows are left for a period of time than slashed and burnt again. Repetition of slash and burn cycles will likely result in permanent bare soil areas (grasslands in non irrigated areas, shrublands in sandy areas). In some areas, while soil quality might be good enough to enable forest natural regeneration, invasive species (such as palms and bamboos) will stop the process. <Non-forest Vegetation> will likely be found in middle-accessible areas, i.e. not in direct periphery of rural and urban areas, contrary to bare soil. Non-forest Vegetation is usually frontier to forest and located in very mosaic landscape, i.e. in areas where cultivation fields are inserted into forests remaining patches.

Notes:

1. Note if “decreasing”, “constant”, “increasing”
2. RR = Reference Region, LK = Leakage Belt, PA = Project area
3. LG = Logging, FW = Fuel-wood collection; CP = Charcoal Production (yes/no)
4. Each class shall have a unique identifier (ID_c). The methodology sometimes uses the notation icl (= 1, 2, 3, ... Icl) to indicate “initial” (pre-deforestation) classes, which are all forest classes; and fcl (=1, 2, 3, ... Fcl) to indicate final” (post-deforestation) classes. In this table all classes (“initial” and “final”) shall be listed.

2.4.1.3 Categories of Land-Use and Land-Cover change classes

Land-use and land-cover changes have been defined based on analysis of agents and drivers of deforestation and forest degradation and thanks to Pur Projet knowledge on local agricultural practices. Figure 8 illustrates the possible types of changes that might occur on the Reference Region. The tables hereafter respectively lists the potential land-use and land-cover changes matrix from initial to final classes, and the corresponding categories of land-use and land-cover change categories.

Figure 9 : Land-Use and Land-Cover Changes Scheme

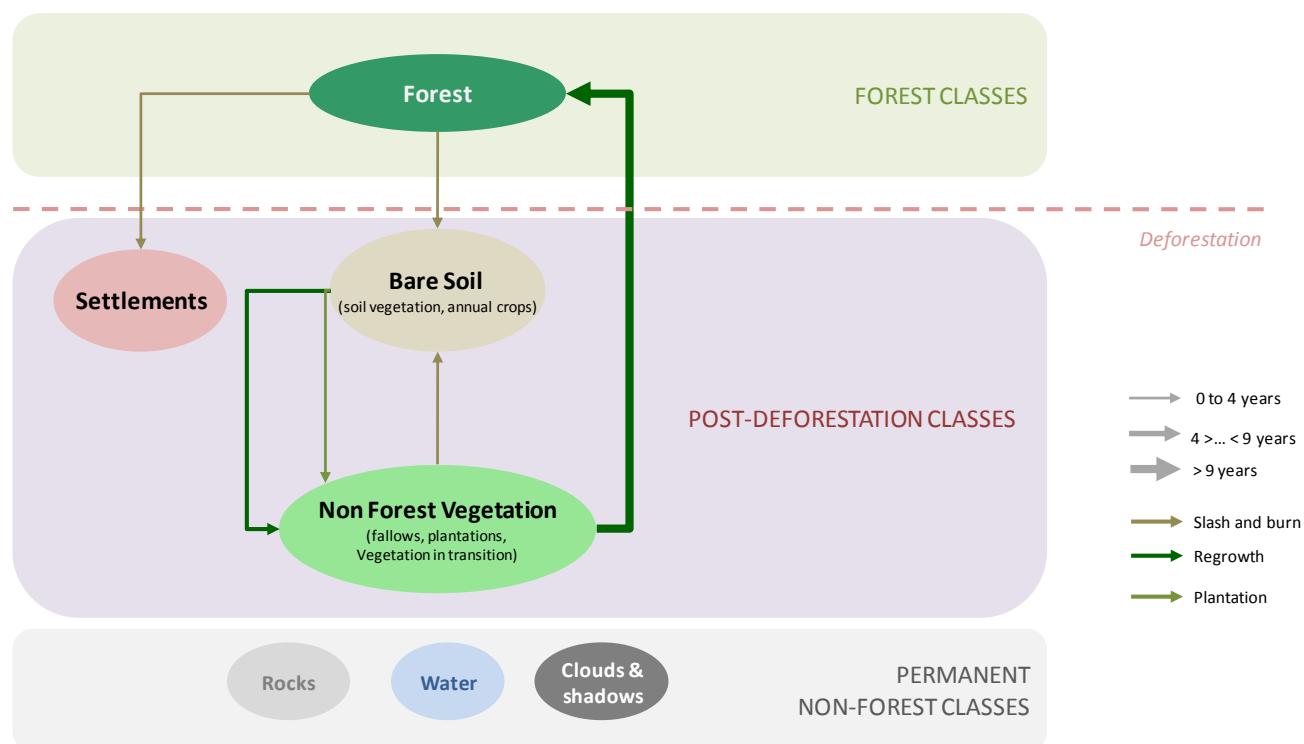


Table 10 : Potential land-use and land-cover change matrix

<i>ID_{cl}</i>		Initial LU/LC class			
		<i>1lcl – Amazonian Moist Forest</i>	<i>2lcl – Andean moist Forest</i>	<i>3lcl – Andean Dry Forest</i>	<i>4lcl – Floodplain Forest</i>
Final LU/LC class	<i>1Fcl – Bare Soil, croplands, settlements</i>	1lcl/1Fcl	2lcl/1Fcl	3lcl/1Fcl	4lcl/1Fcl
	<i>2Fcl – Water</i>	*	*	*	4lcl/2Fcl
	<i>3Fcl – Non Forest vegetation (fallows, plantations)</i>	1lcl/3Fcl	2lcl/3Fcl	3lcl/3Fcl	**
	<i>0-Cloud and Shadows</i>	***	***	***	***

*Changes from Forests classes other than floodplain forests to water are not possible.

**Fallows and plantation are usually not implemented in floodplain areas.

***Changes from or to Cloud and Shadows are not possible as the three years cloud and shadow have been merged into one class.

Table 11 : List of land-use and land-cover change categories

ID _{ct}	Name	Trend in Carbon stock ¹	Presence in ²	Activity in the baseline case ³			Name	Trend in Carbon stock	Presence in	Activity in the project case ³		
				LG	FW	CP				LG	FW	CP
1lcl/1Fcl	Amazonian Moist Forests	constant	RR, LB, PA	Yes	Yes	No	Bare Soil, Cropland and Settlements	constant	RR, LB	No	No	No
1lcl/3Fcl	Amazonian Moist Forests	constant	RR, LB, PA	Yes	Yes	No	Non-forest vegetation (fallows and plantations)	Increasing	RR, LB	No	Yes	No
2lcl/1Fcl	Andean moist Forests	Constant	RR, LB, PA	Yes	Yes	No	Bare Soil, Cropland and Settlements	constant	RR, LB	No	No	No
2lcl/3Fcl	Andean moist Forests	Constant	RR, LB, PA	Yes	Yes	No	Non-forest vegetation (fallows and plantations)	Increasing	RR, LB	No	Yes	No
3lcl/1Fcl	Andean Dry Forests	Constant	RR, LB, PA	No	Yes	No	Bare Soil, Cropland and Settlements	constant	RR, LB	No	No	No
3lcl/3Fcl	Andean Dry Forests	Constant	RR, LB, PA	No	Yes	No	Non-forest vegetation (fallows and plantations)	Increasing	RR, LB	No	Yes	No
4lcl/1Fcl	Floodplain Forests	constant	RR, LB	No	No	No	Bare Soil, Cropland and Settlements	constant	RR, LB	No	No	No
4lcl/2Fcl	Floodplain Forests	constant	RR, LB	No	No	No	Water	constant	RR, LB	n/a	n/a	n/a

2.4.1.4 Historical Land-Use and Land-Cover Change

According to the methodology and to good practices, three successive steps enabled to analyse historical land-use and land-cover changes in the reference region:

- Pre-processing
- Interpretation and classification
- Post-processing

A complete description of methodology, process, and assumptions is available in the Appendix “Historical Analysis of LULC changes”

The results of the analysis are presented hereafter:

A total of **75 042 hectares** were deforested from **2001 to 2010** (32 711 ha from 2001 to 2005 and 42 331 ha from 2005 to 2010), equivalent to an **average annual rate of deforestation of 0,6% over the historical period**.

Figure 10 : LULC maps, after forest stratification

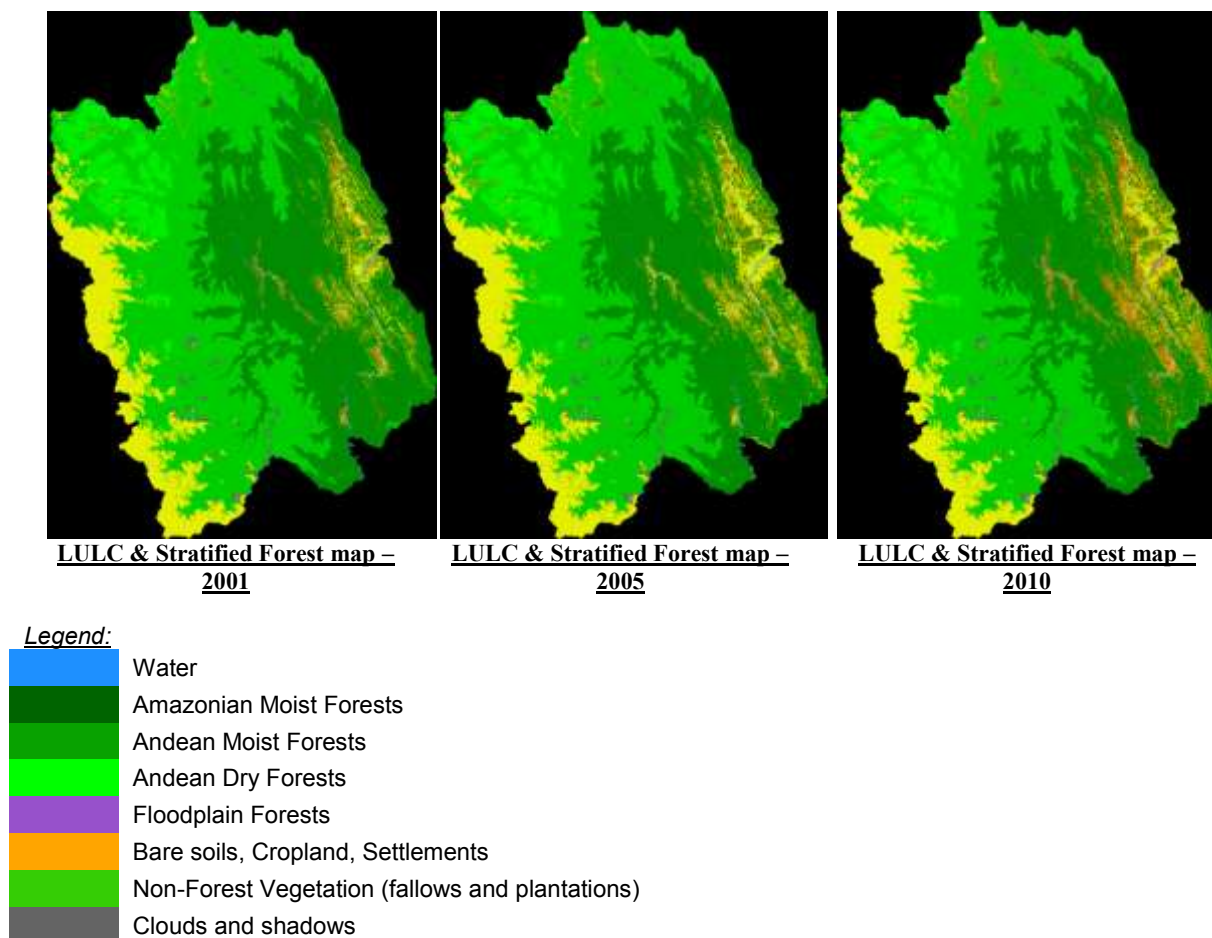
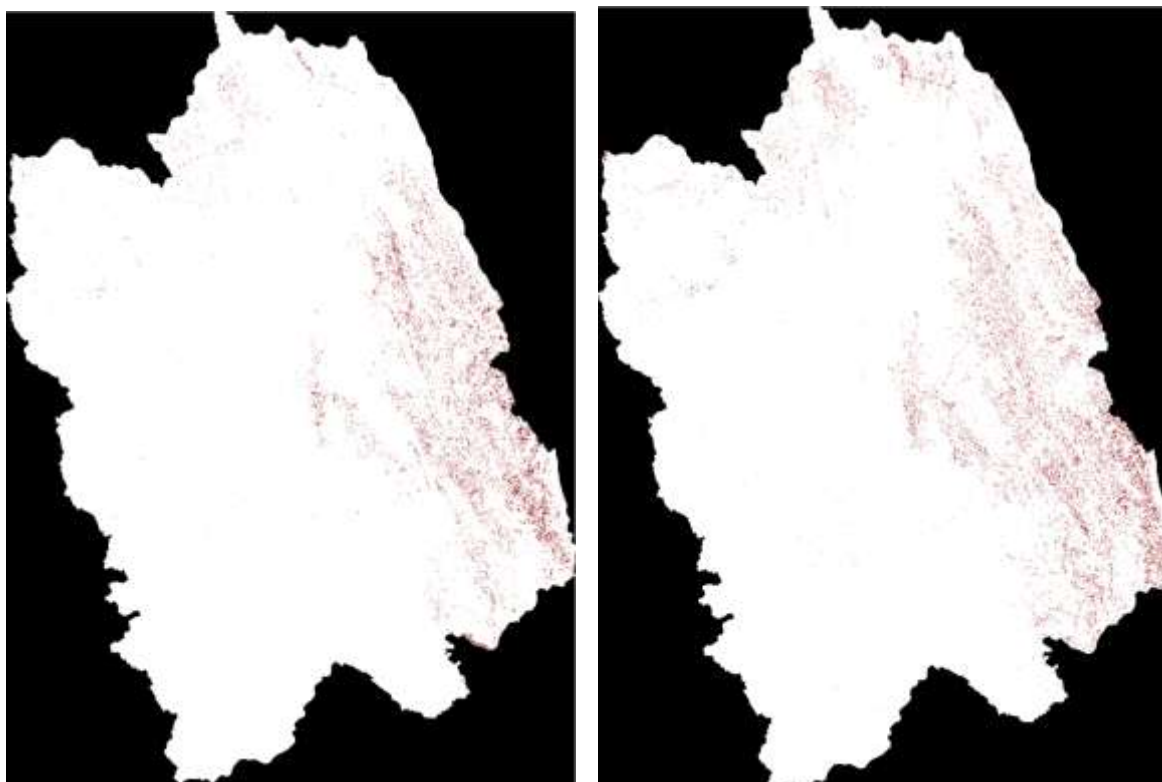


Table 12 : LULC classes area after forest stratification

IDcl	LULC classes	Areas 2001 (ha)	Areas 2005 (ha)	Areas 2010 (ha)
2Fcl	Water	7 199	7 199	7 199
1lcl	Amazonian Moist Forests	604 684	574 398	537 303
2lcl	Andean moist Forests	718 813	716 537	711 615
3lcl	Andean Dry Forests	88 730	88 595	88 286
4lcl	Floodplain Forests	125	85	78
1Fcl	Bare soils and cropland, Settlements	224 646	246 803	245 370
3Fcl	Non-Forest vegetation	31 364	41 919	85 683
0	Clouds and shadows	14 235	14 235	14 235

Figure 11 : Deforestation Maps for 2001/2005 and 2005/2010 periods



Deforestation map – 2001 / 2005

Deforestation map – 2005 / 2010

Legend:

Deforestation
 No Changes

Table 13 : LULC changes matrix in ha, after forest stratification

Class		LULC 2005						TOTAL (2010)
		1lcl - Amazonian Moist Forest	2lcl - Andean moist Forest	3lcl – Andean Dry Forest	4lcl – Floodplain Forests	3Fcl – Non-Forest Vegetation	1Fcl – Bare Soil, Croplands, Settlements	
LULC 2010	1lcl - Amazonian Moist Forest	537 303	0	0	0	0	0	537 303
	2lcl - Andean moist Forest	0	711 615	0	0	0	0	711 615
	3lcl – Andean Dry Forest	0	0	88 286	0	0	0	88 286
	4lcl – Floodplain Forests	0	0	0	78	0	0	78
	3Fcl – Non-Forest Vegetation	19 171	3 115	140	2	27 252	35 988	85 668
	1Fcl – Bare Soil, Croplands, Settlements	17 912	1 804	168	4	14 666	210 798	245 351
TOTAL (2005)		574 385	716 534	88 594	85	41 918	246 786	1 668 302

Additional maps (Forest Cover Benchmark Map, LULC Change Map, etc) are available in Appendix “Historical Analysis of LULC changes” and in GIS files.

2.4.1.5 Map Accuracy assessment

According to VM0015, map accuracy has been assessed to validate classification process (i.e. LULC maps before stratification).

Neither ground-truthing points, nor aerial pictures or high resolution data were available for 2001 and 2005 time points. Following the methodology, map accuracy assessment has therefore only been performed for the most recent time point (2010). Improvement enabled through this process has then been applied to 2005 and 2001 time point.

2010 LULC map accuracy has been assessed through ground-truthing points and high resolution data, before post-processing (only one forest class has been validated):

- 287 ground-truthing points have been collected following the Field Validation Guidebook available in a separate document. Ground-truthing points are distributed over Forest class (before post-processing stratification), Bare soil, cropland and settlements class, and non-forest vegetation class, as shown in Table 17.
- In addition, to improve the statistical representativeness of forest class which represents about 80% of the Reference Region, 60 random points have been added in homogeneous forested areas. These points have been collected within a 1 000 meters buffer inside forest class of 2010 LULC map (before post-processing forest stratification) in order to avoid resolution data uncertainty. Indeed, as no higher resolution data were available, those points have been controlled on 10m SPOT images. This was possible considering the fact that most of ground-truthing points have been collected in accessible areas, i.e. in very mosaic landscapes.

LULC maps assessment

Results show that 94.4% of forest points have been well-classified. On the contrary, 4.2% of forest points had been mistaken classified in non-forest vegetation class. Among the 98 validation points of non-forest vegetation, 84.9% have been well-classified while 81.6% of 106 Bare soil, croplands and settlements validation points have been well-classified. The mean accuracy of 2010 LULC map is about **87%**.

Forest Cover Benchmark Map assessment

Results show that 94.4% of Forest class and 92.2% of Non-Forest class have been well-classified. Mean accuracy of 2010 Forest cover Benchmark map is **93.3%**.

Detailed process and results of Map Accuracy assessment is available in appendix "Map Accuracy Assessment Protocol".

2.4.2 Analysis of agents, drivers and underlying causes of deforestation

A complete analysis of deforestation threats, identifying agents, drivers, and underlying causes of deforestation is detailed in Appendix 4.

The following table summarizes deforestation threats, agents, drivers, and underlying causes of deforestation.

Table 14 : Summary of deforestation threats, agents, drivers, and underlying causes

A.5 CAUSE-DRIVEN DEForestation										CAUSE-DRIVEN DEForestation										UNDERLYING CAUSES OF DEForestation									
Deforestation Drivers		Land Use Change		Land Use Change		Land Use Change		Land Use Change		Land Use Change		Land Use Change		Land Use Change		Land Use Change		Land Use Change		Land Use Change		Land Use Change							
Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact	Driver	Impact						
1. Conversion of agricultural land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
2. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
3. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
4. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
5. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
6. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
7. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
8. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
9. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						
10. Conversion of forest land to other uses (e.g., urban, industrial, infrastructure)	10%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%						

2.4.3 Projection of future deforestation

The projection of future deforestation was completed following the methodology VM00015, and the complete process and results are available in the appendix “Projection of future deforestation”. Main results are summarized hereafter.

2.4.3.1 Projection of the quantity of future deforestation

Stratification of forest class

Forest in the reference region area was stratified using Ecological Systems such as defined by Josse, C. *et al.* (2007).² Four of the ecological system groups are within Reference Region:

- Amazonian Moist Forests (*Bosques Humedos Amazonicos*)
- Andean Moist Forests (*Bosques Humedos Andinos*)
- Andean Dry Forests (*Bosques secos y matorales vericos andinos*)
- White Water Floodplain Forests (*Bosques inundables por aguas blancas*)

See section 2.4.1 for more details on Ecological systems, vegetation types.

Stratification is static (delimitation of vegetation types is due to climatic / geographic parameters)

The list of stratae is the same as Land-Use/ Land-Cover classes described in section 2.4.1.2.

Baseline approach

The choice of the baseline approach was made following the recommendations of step 4.1.1 of the methodology.

The analysis of historical LU-LCC changes was completed over two sub-periods only (2001-2005, 2005-2010). Given this small number, the deforestation rates measured in the two sub-periods (-0.59% from 2001 to 2005, and -0.62% from 2005 to 2010) do not reveal a statistically meaningful trend.

Additionally, no conclusive evidence emerges from the analysis of agents and drivers explaining the different historical deforestation rates between the two sub-periods. Indeed, 85% of the deforestation comes from the expansion of communities due to migration and agricultural land expansion, but no specific changes in the conditions (neither legal, climatic, nor political) could explain a change in these practices from one sub-period to the other. Disrupting changes had happened before the period of historical analysis (eradication of coca in 1993-1995).

No variables can be thought of that would explain the different historical rates and that could be used for a modelling approach (“approach c”)

Finally, the “approach a” based on historical average approach is more conservative than the other approaches (approach b would lead to an increase of deforestation rate)

As a result, the chosen baseline approach is “approach a” according to VM00015 methodology: Historical average approach, where the rate of baseline deforestation assumed to be a continuation of the average annual rate (-0,604%) measured during the historical reference period in the reference region.

² Josse, C., G. Navarro, F. Encarnación, A. Tovar, P. Comer, W. Ferreira, F. Rodríguez, J. Saito, J. Sanjurjo, J. Dyson, E. Rubin de Celis, R. Zárate, J. Chang, M. Ahuite, C. Vargas, F. Paredes, W. Castro, J. Maco y F. Reátegui. 2007. Ecological Systems of the Amazon Basin of Peru and Bolivia. Clasification and Mapping. NatureServe. Arlington, Virginia, USA. Data are available in shapefile format at http://www.natureserve.org/aboutUs/latinamerica/gis_data_downloads.jsp

Constraints

The result of the analysis of constraints shows that the average annual area of deforestation over the period 2000-2010 (7 509 ha) is 104 times smaller than the maximum potential area for deforestation. We consider therefore that there is no constraint on deforestation, which matches Olander et al. analysis on the regions with high forest cover.

Quantity of future deforestation

As a result of the projection of the historical average deforestation rate, the quantity of deforestation in the reference region for the fixed baseline period is the following:

Table 15 : Quantity of future deforestation in the reference region

Date	Zone référence	
	Taux de déforestation	Surface de déforestation
2010-2011	-0,60%	8088
2011-2012	-0,60%	8040
2012-2013	-0,60%	7991
2013-2014	-0,60%	7943
2014-2015	-0,60%	7890
2015-2016	-0,60%	7842
2016-2017	-0,60%	7795
2017-2018	-0,60%	7748
2018-2019	-0,60%	7701
2019-2020	-0,60%	7655
Total	X	78693
Annuel moyen	-0,60%	7869,3

2.4.3.2 Projection of the location of future deforestation

The model has been calibrated based on Forest Benchmark Maps (Forest/Non-Forest) maps that have been produced for 2001 and 2005 time points.³ In consistency with the analysis of drivers and agents of deforestation made by Pur Projet, two types of location factors have been introduced into the model: the anthropogenic ones and the natural ones (Mas et al., 2002 ; Lambin, 1994). Locations where human activities are developed (including agriculture and settlements expansion), strongly depend on natural constraints (such as slope, elevation or soil types) and on accessibility (such as existence of roads, cities or villages, existence of hydrological network).⁴

Based on the analysis of deforestation drivers and agents, several location factors have been identified and tested. The best combination of statistically significant location factors has been input into the model. The factors finally used in the model are listed below⁵:

- Distance to cities and villages;
- Distance to roads and tracks;
- Distance to large rivers;
- Distance to already cleared lands;
- Elevation;
- Slopes;
- Combination of distance to already cleared lands and distance to large rivers.

³ See the document prepared to describe the historical analysis of Land-Use and Land cover changes.

⁴ Many authors underlined the influence of natural constraints and accessibility on deforestation: (Maeda et al., 2010; Roy Chowdhury, 2006, Geoghegan et al., 2001, Sader, 1988, Geist, et al. in 2002, Mertens et al., 2002, Greenberg, et al., 2005).

⁵ Other variables were tested during calibration as soil types, land tenure, rainfall, geology and climate but they were not included because they damage the predictive quality of the final model.

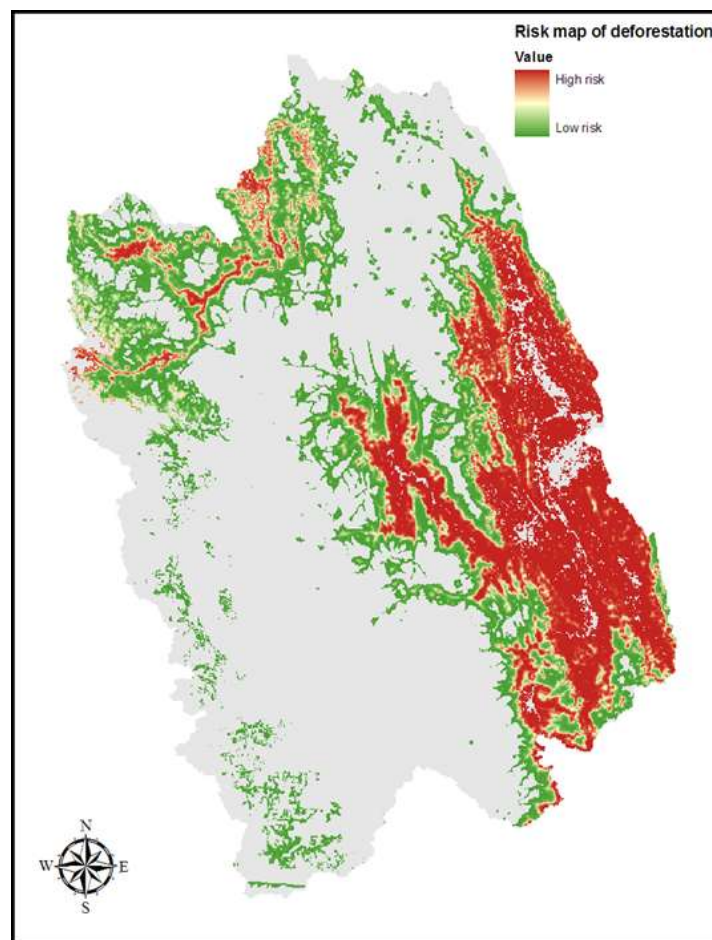
Among those factor maps, some are static (i.e. constant over time) and others are dynamic (i.e. need to be updated every year). Elevation, slope, large rivers as well as cities and villages (for which no extension are planned and documented) have been considered as constant, i.e. only one layer has been used over the whole projection period (2010-2020). On the opposite, roads and tracks, as well as already cleared lands are dynamic ones for which the evolution will have to be updated every year during the projection period (2010-2020). Indeed, some roads are planned to be developed on the RR by 2015, and documents are available to assess it.

In a location of deforestation model, factors based on already cleared lands (i.e. here distance to already cleared lands and combination of distance to already cleared lands with distance to large rivers) are considered as endogen because their evolution is directly linked to deforestation expansion. Evolution of those factors will be updated every year using the previous year deforestation projection.

Deforestation risk map

Based on the identified factors, deforestation risk maps for the reference region were produced, showing the level of deforestation threats on a given area. Since some variable (Distance to roads, Distance to already cleared land and Combined distance to rivers and already cleared land) are dynamic the risk map must be updated for each year of the baseline period.

Figure 12 : Deforestation risk map for 2011

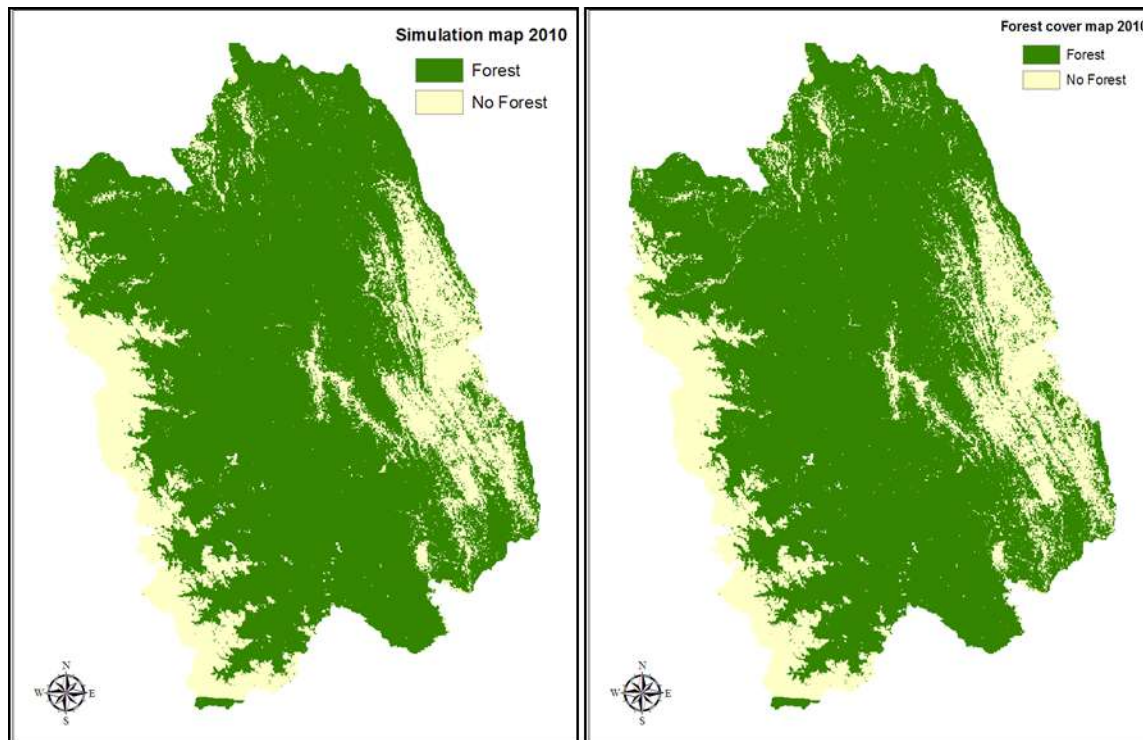


Model validation

The process used to determine the quality of models is the calibration and validation on two sub-periods: 2000-2005 and 2005-2010. The model is calibrated over the period 2001-2005 and validated over the period 2005-2010.

Once the model is calibrated, a simulation map of 2010 is produced and compared for validation to historical map of 2010, using statistical analysis

Figure 13 : Comparison of 2010 simulated and observed maps



Map of Baseline deforestation

Using the model of future deforestation localization and the quantity of deforestation as defined by the historical average annual deforestation rate, deforestation has been projected over 2010-2020 baseline fixed period. The deforestation risk map is used to select pixels with the highest probability of deforestation until the annual area of deforestation (ABSLRR) has been reached. The operation is repeated for each year of the baseline period.

According to the analysis of deforestation drivers and agents, some roads are projected to be implemented in 2015, within the Reference Region. Those roads have then been introduced in the model, starting to be considered from 2015 simulations.

We obtain the following Maps of Baseline Deforestation:

Figure 14 : Map of Baseline Deforestation

Period 2010-2010



Period 2010-2050



2.4.4 Definition of the land-use and land-cover change of the baseline

Combining the maps of annual baseline deforestation presented in section 2.4.3 with LU/LC maps, we obtain the following tables of annual surface gain / loss per forest and non-forest class.

To allocate deforestation to each post-deforestation classes, we use the “Historical LU/LC change” method, in which historical LU/LC changes observed from 2005 to 2010 (2000-2010 LU/LC change matrix completed in the historical analysis (section 2.4.1)) are assumed to be representative of future trends. This is relevant to the project as there is no expected disruption in the deforestation agents / drivers and the deforestation practices will remain similar.

Therefore, the weight of each final non-forest class in the total area deforested is assumed to be equal to the percentage computed in the 2000-2010 LU/LC change matrix completed in the historical analysis (section 2.4.1).

In our case, it means **53%** of deforested areas are assumed to be converted **to non-forest vegetation** (perennial crops, fallows) and **47%** of deforested areas converted **to bare soils** (pastures, annual crops, etc)

Table 16 : Annual area deforested / created per class in the project area in the baseline scenario (ABSLPA)

		Annual areas deforested / created per class in the project area (ABSLPA)								
Year	Project year	Initial forest classes					Final non-forest classes			
		1lcl Amazon Moist Forest	2lcl Andean Moist forest	3lcl Andean Dry Forest	4lcl Floodplain forest	Total Forest	3Fcl Non-forest vegetation	1Fcl Bare Soil, Croplands and settlements	2Fcl Water	Total Non- Forest
		ha	ha	ha	ha	ha	ha	ha	ha	ha
							53%	47%		
2011	1	36	75	9	0	120	63	56	0	120
2012	2	42	82	12	0	136	72	64	0	136
2013	3	38	86	7	0	131	70	62	0	131
2014	4	51	69	6	0	126	67	59	0	126
2015	5	67	73	11	0	151	80	71	0	151
2016	6	76	74	10	0	160	85	75	0	160
2017	7	87	78	9	0	174	92	82	0	174
2018	8	88	81	8	0	177	94	83	0	177
2019	9	93	75	7	0	174	92	82	0	174
2020	10	92	75	9	0	176	93	83	0	176
2021	11	109	85	8	0	202	107	95	0	202
2022	12	120	98	7	0	225	119	106	0	225
2023	13	134	104	10	0	248	132	117	0	248
2024	14	155	108	12	0	275	146	129	0	275
2025	15	161	131	10	0	302	160	142	0	302
2026	16	164	135	10	0	309	164	145	0	309
2027	17	186	149	19	0	354	187	166	0	354
2028	18	199	155	15	0	369	196	173	0	369
2029	19	219	167	18	0	404	214	190	0	404
2030	20	228	175	21	0	424	225	199	0	424
2031	21	252	185	25	0	462	245	217	0	462
2032	22	253	201	24	0	479	254	225	0	479
2033	23	248	212	24	0	484	257	228	0	484
2034	24	274	227	24	0	525	278	247	0	525
2035	25	273	226	31	0	531	281	249	0	531
2036	26	298	235	28	0	561	297	264	0	561
2037	27	313	236	31	0	579	307	272	0	579
2038	28	307	244	38	0	589	312	277	0	589
2039	29	331	259	31	0	621	329	292	0	621
2040	30	320	255	38	0	613	325	288	0	613
2041	31	329	273	40	0	642	340	302	0	642
2042	32	350	276	50	0	675	358	317	0	675
2043	33	366	278	59	0	703	372	330	0	703
2044	34	387	297	46	0	729	386	343	0	729
2045	35	354	305	56	0	715	379	336	0	715
2046	36	416	285	60	0	762	404	358	0	762
2047	37	394	308	69	0	770	408	362	0	770
2048	38	380	305	73	0	757	401	356	0	757
2049	39	437	322	70	0	829	439	390	0	829
2050	40	414	294	76	0	785	416	369	0	785

Table 17 : Annual area deforested / created per class in the project area in the reference region (ABSLRR)

		Annual areas deforested / created per class in the reference region (ABSLRR)								
Year	Project year	Initial forest classes					Final non-forest classes			
		1Icl Amazon Moist Forest	2Icl Andean Moist forest	3Icl Andean Dry Forest	4Icl Floodplain forest	Total Forest	3Fcl Non-forest vegetation	1Fcl Bare Soil, Croplands and settlements	2Fcl Water	Total Non- Forest
		ha	ha	ha	ha		ha	ha	ha	
							53%	47%		
2011	1	7 484	555	47	3	8 089	4 287	3 802	0	8 089
2012	2	7 482	514	42	2	8 040	4 261	3 779	0	8 040
2013	3	7 438	514	40	0	7 991	4 236	3 756	0	7 991
2014	4	7 407	499	36	1	7 943	4 210	3 733	0	7 943
2015	5	7 358	493	37	1	7 890	4 182	3 708	0	7 890
2016	6	7 354	453	35	1	7 842	4 156	3 686	0	7 842
2017	7	7 241	518	35	1	7 795	4 131	3 663	0	7 795
2018	8	7 216	487	44	1	7 748	4 106	3 641	0	7 748
2019	9	7 169	500	32	0	7 701	4 082	3 619	0	7 701
2020	10	7 142	471	41	1	7 654	4 057	3 597	0	7 654
2021	11	7 078	492	38	1	7 608	4 032	3 576	0	7 608
2022	12	6 994	534	34	0	7 562	4 008	3 554	0	7 562
2023	13	6 934	537	45	0	7 517	3 984	3 533	0	7 517
2024	14	6 809	611	51	1	7 471	3 960	3 511	0	7 471
2025	15	6 770	610	45	1	7 426	3 936	3 490	0	7 426
2026	16	6 715	627	39	0	7 381	3 912	3 469	0	7 381
2027	17	6 596	690	51	0	7 337	3 889	3 448	0	7 337
2028	18	6 554	678	59	1	7 293	3 865	3 427	0	7 293
2029	19	6 448	735	64	1	7 249	3 842	3 407	0	7 249
2030	20	6 358	765	81	0	7 205	3 819	3 386	0	7 205
2031	21	6 291	795	74	1	7 161	3 796	3 366	0	7 161
2032	22	6 202	840	75	0	7 118	3 773	3 345	0	7 118
2033	23	6 113	859	102	0	7 075	3 750	3 325	0	7 075
2034	24	6 010	928	93	0	7 032	3 727	3 305	0	7 032
2035	25	5 912	969	108	1	6 990	3 705	3 285	0	6 990
2036	26	5 850	993	104	1	6 948	3 682	3 265	0	6 948
2037	27	5 756	1 039	110	1	6 906	3 660	3 246	0	6 906
2038	28	5 645	1 079	140	1	6 864	3 638	3 226	0	6 864
2039	29	5 618	1 069	134	1	6 823	3 616	3 207	0	6 823
2040	30	5 517	1 112	153	0	6 782	3 594	3 187	0	6 782
2041	31	5 434	1 149	157	1	6 741	3 573	3 168	0	6 741
2042	32	5 349	1 180	170	1	6 700	3 551	3 149	0	6 700
2043	33	5 264	1 193	202	1	6 659	3 530	3 130	0	6 659
2044	34	5 173	1 265	180	0	6 619	3 508	3 111	0	6 619
2045	35	5 074	1 285	220	1	6 579	3 487	3 092	0	6 579
2046	36	5 029	1 277	233	0	6 540	3 466	3 074	0	6 540
2047	37	4 893	1 349	258	0	6 500	3 445	3 055	0	6 500
2048	38	4 817	1 365	277	2	6 461	3 424	3 037	0	6 461
2049	39	4 756	1 388	277	1	6 422	3 404	3 018	0	6 422
2050	40	4 686	1 411	285	1	6 383	3 383	3 000	0	6 383

Table 18 : Annual area deforested / created per class in the project area in the leakage belt (ABSLLB)

		Annual areas deforested / created per class in the leakage belt (ABSLLK)									
Year	Project year	Initial forest classes					Final non-forest classes				
		1Icl Amazon Moist Forest	2Icl Andean Moist forest	3Icl Andean Dry Forest	4Icl Floodplain forest	Total Forest	3Fcl Non-forest vegetation	1Fcl Bare Soil, Croplands and settlements	2Fcl Water	Total Non- Forest	
		ha	ha	ha	ha		ha	ha	ha	ha	
							53%	47%			
2011	1	2 090	229	10	0	2 329	1 234	1 095	0	2 329	
2012	2	2 182	213	8	0	2 403	1 273	1 129	0	2 403	
2013	3	2 193	216	7	0	2 417	1 281	1 136	0	2 417	
2014	4	2 240	217	9	0	2 465	1 306	1 158	0	2 465	
2015	5	2 269	199	5	0	2 473	1 311	1 162	0	2 473	
2016	6	2 357	178	5	0	2 541	1 347	1 194	0	2 541	
2017	7	2 303	199	5	0	2 507	1 329	1 178	0	2 507	
2018	8	2 328	200	9	0	2 536	1 344	1 192	0	2 536	
2019	9	2 356	207	4	0	2 567	1 361	1 206	0	2 567	
2020	10	2 391	201	6	0	2 598	1 377	1 221	0	2 598	
2021	11	2 436	212	6	0	2 654	1 407	1 248	0	2 654	
2022	12	2 360	215	7	0	2 583	1 369	1 214	0	2 583	
2023	13	2 326	225	9	0	2 560	1 357	1 203	0	2 560	
2024	14	2 327	254	9	0	2 591	1 373	1 218	0	2 591	
2025	15	2 349	244	6	0	2 599	1 377	1 221	0	2 599	
2026	16	2 297	263	4	0	2 564	1 359	1 205	0	2 564	
2027	17	2 308	283	5	0	2 596	1 376	1 220	0	2 596	
2028	18	2 296	268	9	0	2 573	1 364	1 209	0	2 573	
2029	19	2 245	302	12	0	2 558	1 356	1 202	0	2 558	
2030	20	2 259	304	16	0	2 578	1 367	1 212	0	2 578	
2031	21	2 220	341	12	0	2 573	1 364	1 209	0	2 573	
2032	22	2 255	351	11	0	2 617	1 387	1 230	0	2 617	
2033	23	2 228	356	17	0	2 602	1 379	1 223	0	2 602	
2034	24	2 189	383	19	0	2 591	1 374	1 218	0	2 591	
2035	25	2 152	412	22	0	2 586	1 371	1 216	0	2 586	
2036	26	2 134	428	15	0	2 577	1 366	1 211	0	2 577	
2037	27	2 114	456	16	0	2 586	1 370	1 215	0	2 586	
2038	28	2 059	473	21	0	2 553	1 353	1 200	0	2 553	
2039	29	2 059	462	20	0	2 541	1 347	1 194	0	2 541	
2040	30	2 080	505	24	0	2 609	1 383	1 226	0	2 609	
2041	31	1 986	499	28	0	2 514	1 332	1 181	0	2 514	
2042	32	1 981	530	27	0	2 538	1 345	1 193	0	2 538	
2043	33	2 003	527	35	0	2 565	1 359	1 205	0	2 565	
2044	34	1 911	560	32	0	2 502	1 326	1 176	0	2 502	
2045	35	1 928	585	41	0	2 554	1 353	1 200	0	2 554	
2046	36	1 900	591	44	0	2 534	1 343	1 191	0	2 534	
2047	37	1 896	595	51	0	2 543	1 348	1 195	0	2 543	
2048	38	1 844	625	43	0	2 513	1 332	1 181	0	2 513	
2049	39	1 809	622	54	0	2 485	1 317	1 168	0	2 485	
2050	40	1 812	656	44	0	2 512	1 332	1 181	0	2 512	

2.5 Additionality

Additionality is demonstrated using the “VT0001 tool for the demonstration and assessment of additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) project activities, version 3.0”.

2.5.1 Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Sub-step 1a. Credible alternative land-use scenarios

The project area is constituted only of by old-growth forest that has not suffered deforestation.

In the absence of the project, credible land-use scenarios include the four most likely deforestation trends identified in the baseline scenario developed in section 2.4:

- a/ Conversion to croplands (perennial or annual crops), pastures and housing
- b/ Conversion to settlements / infrastructure,
- c/ Selective logging of high-value species for commercial sales;
- d/ Conversion to Economic Land concessions, Mining or Oil concessions

In the last 10 years, there has been no other land-uses within the project area than the ones described above.

Overall, the most credible alternative scenario is the baseline scenario developed and presented in section 2.4., which is a combination of the various possible land-uses listed above.

Sub-step 1b/ Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

In the absence of clear land property / land tenure for most of the reference region (forested area), there is no legal limitation on settlements and clearings of forested areas for agricultural practices.

Selective logging and sales of high-value species is illegal practice outside of Permanent Production Forest areas (BPPs) but has been observed in the reference region during the reference period, for lack of enforcement.

Conversion to ELCs, Mining or Oil concessions is unlikely given the "Ordenanza Regional" signed and published by the Regional Government in Oct 2010, committing not to deliver these kinds of concessions in the project region anymore.

Overall, the baseline scenario presented in section 2.4 already takes into account these restrictions.

Sub-step 1c/ Selection of the baseline scenario

According to the VM0015 methodology, **the most likely baseline scenario for the VCS AFOLU REDD project activity is the baseline scenario developed in detail in section 2.4 in accordance with VM00015 methodology steps.**

2.5.2 Step 3. Barrier analysis

Sub-step 3a. Identification of barriers

- Barriers due to local traditions, social conditions, and traditional land-use practices

The communities of the region don't have a tradition of long term vision / self-projection over several dozens of years (even less over 80 years); most of them have a tradition to focus on short-term activities (agriculture, timber extraction, etc.) that can provide them immediate revenues for livelihood purposes.

The understanding or consideration of long-term conservation benefits through preservation of local climate, farming, and living conditions is not natural for farmers who are for most of them migrants, and don't necessarily think of their surrounding environment as important for their subsistence ("land is big and fertile, conditions are good, just use it!")

Traditional land use (agriculture) respond better to the direct socio-economic needs of the farmer families than conservation activities: socio-economic surveys showed that a list of important requirements should be met by activities/ land-use alternative to traditional agriculture in order to be implemented:

For farmer families the following characteristics and requirements for land use are considered important:

1. Income within a relatively short period
2. Possibility to have direct access to capital in case of emergencies.
3. Investments should generate an increase value of their land.
4. Markets for products should be visible; farmers are more willing to invest if clear markets exist for their products.
5. Access to markets should be relatively easy, preferable access should be possible on an individual basis, without intervention of many intermediary stakeholders (middleman, community or producers organizations, etc.).
6. Handling of products should be relatively easy.
7. Constant and secure markets are preferred over insecurity in markets.
8. Labour demand, and peaks in labour demand should be well related to labour supply,
9. Relatively simple land use methods are preferred above more complex land use methods.
10. Level of investment.
11. Cost-benefits.

Without project intervention using specific strategies to solve the social and economic needs mentioned above, it is not very likely that farmers would implement conservation actions by themselves and manage them over time, due to the following: REDD/ conservation activities cannot compete in terms of points 5,6,7,8,9,10 compared with traditional land-use systems (farming)

Population are farmers by tradition, and don't have sufficient knowledge, training, or education to develop by themselves other non-timber forest valuation activities, such as botanical gardens, ecotourism, bee heaving, etc., that would give them revenues alternative to crop expansion or timber harvesting.

Social conflicts exist between farmers, depending on their vision of land-use. A limited number of farmers may have been interested in conservation purposes, but they have faced a majority of unaware farmers that don't see an interest in conservation, leading to social conflicts between farmers or communities, and preventing the implementation of a widespread conservation activity.

- Barriers due to lack of organization of communities

The implementation of a conservation activity as large as the project requires the coordination of almost 20 communities (some of them begin very far apart one from each other) and the constitution of a coordinating body to supervise the overall implementation of the project. Communities have traditionally been fragmented, some being in conflicts one with each other for historical disagreements. Although some most advanced communities have created their own community associations, historical larger conflicts between communities, as well as the lack of organization skills, prevents the communities to develop a widespread collaborative action at the scale of the project area

- Barriers related to land tenure

Two thirds of the project area was not under control of the communities before the beginning of the project (Out of the 3 concessions, only the concession El Breo existed). As mentioned above, most of the forested land is not attributed to anyone and does not have clear land property / tenure. It is therefore impossible for communities to implement a conservation program over several hundred thousand hectares without having rights on the land they intend to protect. The process of requesting concessions for conservation purposes has only been possible under the lead of the project proponent in the framework of the project (requires long-term administrative coordination skills with regional authority, technical expertise to develop technical files / management plans, etc)

- Institutional barriers

The authority for land concessions attribution and management was transferred from the national government to the regional government recently in 2009. In this new legal framework, no concession for conservation had ever been attributed in San Martin Region, before Acopagro asked for the concession Martin Sagrado, in the scope of the REDD project and at the project proponent's initiative. Considering the lack of experience and of other requests, it has been a long process of appropriation by the regional government where the project proponent and local coordinator (Fundacion Amazonia Viva) helped along for 2 years for the regional government to build capabilities and legal framework on concessions for conservation. It is likely that without this strong coordination, communities would have been unable to get the concessions, as much as the regional government might have taken many years before issuing concessions.

The project proponent's initiatives in San Martin Region - reforestation projects developed from 2008 on with ACOPAGRO and ORO VERDE cooperatives, REDD+ project started in 2010 in Huayabamba riverbasin - were a trigger for the regional government to start to develop conservation policies and a framework for promoting these types of activities in the region (e.g. mesa REDD initiated in 2010, "Ordenanza Regional" in Oct 2010 against oil and mining). There were no such policies or perspectives before.

- Investment barriers:

Project activities would not be possible without revenues from the sale of carbon credits and carbon compensation services to companies through the Project Proponent activities, and the proposed project will guarantee the financing need during the entire project period.

The key barrier to implementation of the project is financial. This is partly because almost ¾ of the project costs are not covered by revenues from project activities. There is no tradition within Peruvian companies for long-term investments, especially when repayment periods are long. Also the local partners do not have the financial resources to for the required initial investment: ACOPAGRO members have a total net disposable income of a maximum of 5 000 Euros / year per family to cover basic needs. The access to debt funding would not be possible for this kind of project because of a lack of equity capital and because the project would not be economically profitable without the origination of carbon credits, that the local actors would not have been able to obtain because of practical reasons such as a lack of financing or geographical isolation for instance. Finally, the local actors do not have access to international capital markets, except carbon markets in the case of the proposed project.

Only one NGO (AMPA) has a concession for conservation purposes (CC Alto Huayabamba) in the western part of the region, but available budget is too low to develop conservation activities at a similar scale as the Biocorredor Martin Sagrado project over 80 years. Moreover, budget for AMPA concession is only implemented with grants or other non-commercial finance.

Sub-step 3b. Barriers would not prevent the implementation of the alternative land-use scenarios

The alternative scenarios (a, b, c, d) identified in step 1a. are by definition observed land-use practices (best use of one's own land between cocoa, annual crops, fallows). Barriers identified in 3a. are therefore not an obstacle for these alternative scenarios. The alternative scenarios don't require external investment as traditionally farmers have managed their land and economic activities with their own funds. Investment barriers identified in 3a are therefore not an obstacle to the alternative scenarios.

Step 4. Common practices

At the start of the project, there were no concessions for conservation attributed to communities or communities associations in San Martin Region.

The only areas dedicated to conservation were publicly administrated areas such as National Parks (Parque Nacional Rio Abiseo, Parque Nacional Cordillera Azul, Bosque de Proteccion Alto Mayo, etc.). One concession for conservation purposes was already attributed in the region (CC Alto Huayabamba), however to an NGO (AMPA), relying on grants and non-commercial finance for its budget. The initiative is different from the project's in the sense that the CC Alto Huayabamba is neither owned by the communities nor meant to be managed by the communities themselves, but by the NGO directly, with minimal budget.

Since the project start, other REDD Initiatives have emerged in San Martin region following the set-up of the Mesa REDD roundtable, however the other projects build on areas already publicly administered for conservation (Bosque de Proteccion Alto Mayo, Parque Nacional Cordillera Azul) and are developed by private entities without implication of communities.

The existing initiatives in San Martin Region are therefore different in the set-up, timing (date of project start), long-term vision, or implication of communities in the implementation of the project.

There is therefore no similar activity as the project.

As a result of the previous steps, the project is **additional**.

2.6 Methodology Deviations

There are no methodology deviations.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

3.1.1 Estimation of long-term average carbon stocks of each LU/LC class

Forest classes

Estimation of carbon stocks per hectare in the three forest classes was completed through field measurements.

A stratified random sampling was implemented, using the stratification of forest classes as defined above (classification of NatureServe, Josse et al, 2007⁶).

Sample sites were located in the areas expected to be deforested to achieve maximum accuracy of the carbon stock estimates, and in these locations, random points were distributed with the help of a Geographic Information System.

The inventory was carried out following the guidance of appendix 3 of the applied methodology: “Methods to estimate carbon stocks”. This work was divided in two phases,

- A pre-sampling was done in order to estimate sample size required to achieve an error maximum of 10% with a confidence level of 95%. 36 permanent sample plots were established and measured in this first phase.

- In a second phase, 42 sample plots were established and measured to achieve the required confidence level.

A total of **78 sampling plots** over the three classes were completed, allowing for a statistically reliable estimation with a **sampling error of 9,4%**.

Table 19 : **Sample size calculations**

Stratum	Area (ha)	Ncl	Wcl	Mean	SI	CI	ncl	n real
Amazon Moist Forest	59 018	1 180 370	20%	480	198,22	1	17	28
Andean Moist Forest	188 103	3 762 052	65%	374	169,08	1	47	42
Andean Dry Forest	40 860	817 196	14%	353	85,60	1	5	8
Total	287 981	5 759 618	100%		453	7	69	78

Sample plots are circulars with a size of 500 m². Diameter of all trees above 5cm diameter (at breast height) were measured, height was measured for palm. Dead wood was not included (conservative approach) as field observations showed little dead wood on the ground.

For the estimation of carbon stocks, allometric equations method is used. Three local equations were identified and evaluated (Nogueira *et al*⁷. 2008, Higuchi *et al.* ⁸ 1998, Arévalo *et al*⁹. 2003). The three

⁶ Josse, 2007. Ecological Systems of the Amazon basin of Peru and Bolivia: Classification and Mapping.

⁷ Nogueira, E., Fearnside P., Nelson, B., Barbosa, R. and Keizer E. 2008. Forest Ecology and Management. 256 (1853-1867)

⁸ Higuchi, et al 1998 Acta Amazonica 28(2): 153-166. 1998

equations give similar result at tree level, which was also confirmed through an ANOVA (Analysis of Variance)

Finally, tree aboveground biomass has been estimated using the equation from Arévalo et al., which is a local allometric equation developed by the International Center for Research in Agroforestry (ICRAF) with data collected from different Peruvian Amazonia forest types, especially from Alto Amazonas region (Yurimaguas) and Ucayali Region (Pucallpa). See ICRAF, 1997. Several forest types were sampled for this study: more than 40 years old primary forest with slight human interventions, 3.5 to 25 years old secondary forests in Yarimaguas, and 3 to 15 years old forests in Pucallpa. See Arévalo et al., 2003.

This equation has been recognized by the Peruvian Ministry of Environment as a suitable methodology to estimate carbon stocks in Peruvian forest ecosystems in a communication to UNFCCC (Ministerio del Ambiente, 2009). Lapeyre et al. (2004) validated this equation in a study carried out in San Martin Region. In addition, it has been used in several studies, including:

- Guzmán, W. and Arévalo, L. 2003. Servicios ambientales de almacenamiento de carbono como activo para el desarrollo en la Amzonia Peruna: avances y retos
- Lapeyre, T., Alegre, J. and Arévalo 2004. Determinación de las reservas de carbono de la biomasa aérea, en diferentes sistemas de uso de la tierra en San Martín, Perú
- Yquise, A., Pocomucha, V. and Vargas, Y. 2008 Carbono almacenado en diferentes sistemas de uso de la tierra del distrito de José Crespo y Castillo, Huánuco, Perú. Tesis de grado, Universidad Agraria de la Selva).

For palm aboveground biomass, a local model has been used. It has been developed by Saldarriaga et al. (1988) through the analysis of long term chronosequence of forest succession in the upper Rio Negro of Colombia and Venezuela.

Detailed protocol, assumptions, equations, and results are available in the Appendix: Estimation of carbon stocks.

Non-Forest classes

In general, for the Amazon basin, a large amount of studies evaluating biomass stocks in vegetation is available, but most of them are specific to forest classes. Nevertheless, at local level, for San Martin Region, one carbon study (Lapeyre et al., 2004¹⁰) covering different land uses was identified.

The study matches the eligibility criteria:

- Data is less than 10 years old;
- Data is derived from multiple measurement plots;
- All species above a minimum diameter are included in the inventories;
- The minimum diameter for trees included is 30 cm or less at breast height (DBH);
- Data is sampled from good coverage of the classes over which they will be extrapolated.

The main results of the study are the following:

⁹ Arévalo L., Alegre J.C. & Palm C. 2003. Manual de reservas de carbono en diferentes Sistemas de uso de la tierra

¹⁰ Lapeyre, T., Alegre, J. and Arévalo, L. 2004. Determinación de las reservas de carbono de la biomasa aérea, en diferentes sistemas del uso de la tierra en San Martín, Perú. *Ecología Aplicada*. 3 (1,2)

Table 20 : Summarized results of literature carbon stocks, Lapeyre et al., 2004

Source	Date	LULC class	Carbon stocks						Observation
			TOTAL tC/ha	Viva tC/ha	Muerta en pie tC/ha	Muerta caída tC/ha	Sotobosqu e tC/ha	Chojarasqu a tC/ha	
Lapeyre et al. [1]	2004	Primary Forest	485,6	184,5	63,1	233,1	0,0	4,9	Carbon in Above-ground biomass (living and dead), non-tree vegetation and litter
		Secondary Forest (50 years)	234,6	178,3	2,3	49,3	0,0	4,7	
		Secondary Forest (20 years)	62,1	49,1	5,6	3,1	0,6	3,7	
		Rice	1,7						
		Maize	4,4						
		Grassland	2,3						
		Coffee with shadow (Guaba trees)	19,3	15,2				4,1	
		Cacao with shadow	47,2	42,0				5,2	

This literature data was used to compute average carbon stocks for the 2 initial classes : “Bare Soils” and “Non-Forest vegetation”.

- Class “Bare soils, annual croplands, settlements”: Literature values were available for Corn, Rice, and Pastures, which correctly represent the land-uses in the reference region that fall in that class. An average value of these three land-uses is used for the project.

- Class “Non-Forest Vegetation”: Literature values were available for crop systems Café-Guaba and Cacao, which are representative of a majority of land-uses in the class “Non-Forest Vegetation”. Additionally, we find in the reference region plantations of banana, cotton, or young fallows that fall in the “Non-Forest vegetation” class. However, carbon stocks in banana, cotton plantations or young fallows in 5-year rotation cycles are typically lower than carbon stocks in Cacao or coffee-guaba systems. It is indeed conservative to use the higher carbon stock values of Coffee-Guaba and Cacao to compute an average carbon stock value for “Non-Forest vegetation” class.

Detailed assumptions, source data used, are available in the Appendix: “Carbon stocks”.

Summary of long-term average carbon stocks for each LU/LC class:

Table 21 : Average long-term carbon stocks for each LU/LC class

LU/LC class		Average carbon stock per hectare ± 90% CI										Uncertainty
		Above-ground		Below-Ground		Dead wood	Litter	Soil	Harvested wood products	Total		
		Cab_{cl}		Cbb_{cl}		Cdw_{cl}	Cl_{cl}	$Csoc_{cl}$	Cwp_{cl}	$Ctot_{cl}$		
ID_{cl}	Name	stock t CO ₂ e ha ⁻¹	± 90% CI t CO ₂ e ha ⁻¹	stock t CO ₂ e ha ⁻¹	± 90% CI t CO ₂ e ha ⁻¹	stock t CO ₂ e ha ⁻¹	stock t CO ₂ e ha ⁻¹	stock t CO ₂ e ha ⁻¹	stock t CO ₂ e ha ⁻¹	stock t CO ₂ e ha ⁻¹	± 90% CI t CO ₂ e ha ⁻¹	
1lcl	Amazon Moist Forest	879,9	13%	211,2	13%	Not included	Not included	Not included	Not included	1 091	0	10,6%
2lcl	Andean Moist Forest	685,4	11%	164,5	11%	Not included	Not included	Not included	Not included	850	0	9,5%
3lcl	Andean Dry Forest	646,9	14%	174,7	14%	Not included	Not included	Not included	Not included	822	0	11,5%
3Fcl	Non-forest vegetation	121,9		51,2						173	52	30%
1Fcl	Bare Soil, Croplands and settle	10,3		16,2						26	8	30%
2Fcl	Water	-		-						-	-	

3.1.2 Transition in carbon stocks after a LU/LC change

Carbon stock estimates presented in section 3.1.1 are long-term average for each LU/LC class. Whenever there is a LU/LC change, carbon stocks from pre-deforestation class are not all released instantly. Similarly, new carbon stocks from post-deforestation classes do not appear instantly.

In accordance with AFOLU Requirements section 4.5.3, a transition period is considered for each LU/LC class over which pre-deforestation carbon stocks will decrease linearly until reaching 0 after a period of 10 years, and post-deforestation carbon stocks will increase as new crops/plantations grow, linearly until reaching their long-term average value after 10 years.

- Deforestation: for all forest classes:

Common deforestation practice in the reference area is slash and burn.

Therefore, above ground carbon stocks can be assumed to be released in the air and be reduced to 0 "instantly". Below-ground biomass will remain in the ground until it gets degraded over time by natural degradation cycle or replacement by other crops / land-uses. A 10 year linear decay is considered, in accordance with AFOLU Requirements 4.5.3.

- Growth of post-deforestation classes:

According to revised version of methodology VM00015, a linear increase of carbon stocks over 10 years shall be considered for post-deforestation classes.

The following table summarizes the evolution of carbon stocks for each LU/LC class in case of a transition: carbon stocks per class C_{tot,cl,A_c} for a given Age of change A_c (Number of years after the transition)

Table 22 : carbon stocks evolution for each LU/LC class after a transition :

Year	Age of change	Land-Use class											
		1ld Amazon Moist Forest			2ld Andean Moist Forest			3ld Andean Dry Forest			3Fd Non-forest vegetation	1Fd Bare Soil, Croplands and	2Fd Water
	A _c	Cab _{Ac} (Above-	Cbb _{Ac} (Below-	Ctot _{Ac} (Total)	Cab _{Ac} (Above-	Cbb _{Ac} (Below-	Ctot _{Ac} (Total)	Cab _{Ac} (Above-	Cbb _{Ac} (Below-	Ctot _{Ac} (Total)	Ctot _{Ac} (Total)	Ctot _{Ac} (Total)	Ctot _{Ac} (Total)
	years after transition	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1	t CO2e ha-1
Before deforestation		880	211	1 091	685	165	850	647	175	822	0	0	0
to (change year)	0	0	190	190	0	148	148	0	157	157	17	3	0
to+1	1	0	169	169	0	132	132	0	140	140	35	5	0
to+2	2	0	148	148	0	115	115	0	122	122	52	8	0
to+3	3	0	127	127	0	99	99	0	105	105	69	11	0
to+4	4	0	106	106	0	82	82	0	87	87	87	13	0
to+5	5	0	84	84	0	66	66	0	70	70	104	16	0
to+6	6	0	63	63	0	49	49	0	52	52	121	19	0
to+7	7	0	42	42	0	33	33	0	35	35	138	21	0
to+8	8	0	21	21	0	16	16	0	17	17	156	24	0
to+9	9	0	0	0	0	0	0	0	0	0	173	26	0
to+10, and forward	>10	0	0	0	0	0	0	0	0	0	173	26	0

And the following table gives the annual carbon stocks gain or loss per class $\Delta C_{tot,cl,A_c}$ for a given Age of Change A_c (number of years after the transition)

Table 23 : Annual carbon stocks loss or gain for a given Age of change A_c

Year	Age of change	Land-Use class					
		1Icl Amazon Moist Forest	2Icl Andean Moist Forest	3Icl Andean Dry Forest	3Fcl Non-forest vegetation	1Fcl Bare Soil, Croplands and	2Fcl Water
	A_c years	$\Delta Ct_{tot,Ac}$ (Total) $t\ CO_2e\ ha^{-1}$	$\Delta Ct_{tot,Ac}$ (Total) $t\ CO_2e\ ha^{-1}$	$\Delta Ct_{tot,Ac}$ (Total) $t\ CO_2e\ ha^{-1}$	$\Delta Ct_{tot,Ac}$ (Total) $t\ CO_2e\ ha^{-1}$	$\Delta Ct_{tot,Ac}$ (Total) $t\ CO_2e\ ha^{-1}$	$\Delta Ct_{tot,Ac}$ (Total) $t\ CO_2e\ ha^{-1}$
Before deforestation		0	0	0	0	0	0
t0 (change year)	0	-901	-702	-664	17	3	0
t0+1	1	-21	-16	-17	17	3	0
t0+2	2	-21	-16	-17	17	3	0
t0+3	3	-21	-16	-17	17	3	0
t0+4	4	-21	-16	-17	17	3	0
t0+5	5	-21	-16	-17	17	3	0
t0+6	6	-21	-16	-17	17	3	0
t0+7	7	-21	-16	-17	17	3	0
t0+8	8	-21	-16	-17	17	3	0
t0+9	9	-21	-16	-17	17	3	0
t0+10, and onward	10	0	0	0	0	0	0

3.1.3 Calculation of baseline carbon stock changes

As a result of existing transition periods in carbon stocks per ha evolution after a LU/LC change, the total carbon stock changes for a given year t can be computed as the following:

$$\Delta CBSLPA_t = \sum_{y=1}^t \left[\sum_{icl=1}^{Icl} ABSLPA_{icl,y} * \Delta Ct_{tot,icl,t-y} + \sum_{fcl=1}^{Fcl} ABSLPA_{fcl,y} * \Delta Ct_{tot,fcl,t-y} \right]$$

Where :

$\Delta CBSLPA_t$ Total baseline carbon stock change within the project area at year t ; $t\ CO_2e$
 $ABSLPA_{icl,y}$ Area of initial forest class icl deforested at time t within the project area in the baseline case ; ha
 $\Delta Ct_{tot,icl,Ac}$ Carbon stock loss in the initial forest class icl at Age of change A_c (# of years after LU/LC change)
 $ABSLPA_{fcl,y}$ Area of the final non-forest class fcl at time t within the project area in the baseline case ; ha
 $\Delta Ct_{tot,fcl,Ac}$ Carbon stock gain in the final non-forest class fcl at Age of change A_c (# of years after LU/LC change)

3.2 Project Emissions

3.2.1 Ex-ante estimation of actual carbon stock changes in project scenario

3.2.1.1 Decrease in carbon stocks due to planned activities

There will be no decrease in carbon stocks due to planned activities in project scenario : Most of the project activities will be conducted In the leakage belt with the communities in the buffer area of the project area. Activities conducted inside the project area will be scientific studies, patrolling, demarcation, which, ecotourism, which do not require infrastructure or significant intervention in the forest. No timber harvesting, charcoal production, nor fuelwood collection is planned inside the project area.

3.2.1.2 Increase of carbon stocks due to planned activities

Forest in the project area is old-growth primary forest where carbon stocks are already at their optimal level at maturity. No increase in carbon stocks due to project activities is therefore expected. Anyhow, it is conservative not to consider potential carbon stocks increases in project scenario.

3.2.1.3 Unavoidable unplanned deforestation

- Optimal effectiveness index:

To assess overall effectiveness of project to stop deforestation, the impact of each project activity category on each of the deforestation threats was assessed, based on the activity plans, the feasibility of Implementation and the challenges from the field. Refer to detailed description of each activity category in section 1.8.3 for more details.

This analysis leads both to the calculation of an overall effectiveness index of the project on each of the threats, and the effectiveness of each of the activity category on the whole deforestation. Combining both dimensions and using the estimated contribution of each deforestation threat to the total deforestation (see section 2.2), we estimate a **total optimal Effectiveness Index of the project of 70%**

Table 24 : Relative reduction in the impact of each deforestation threat due to each project activities (Optimal effectiveness of activity a on deforestation threat d)

		Effectiveness index								
		Relative reduction in the impact of driver due to activities (%)								
Deforestation threats	Relative importance of driver to total deforestation (%)	Legal	Control & Surveillance	Sensibilization & communication	Non Timber forest valuation	Scientific & Inventory	Renewable Energy	Reforestation in agroforestry models	Coordination, Expansion & Transmission	Total
1. Conversion to croplands, pastures and housing	70%	15%	15%	10%	15%	5%		10%		70%
2. Conversion to settlements / infrastructure (Roads, water and electricity)	15%	15%	10%	20%		5%	5%		15%	70%
3. Selective logging of high-value species for commercial sales	10%		30%	20%	15%	5%		5%		75%
4. Timber harvesting for local use (housing and infrastructures)	1%			30%			5%	5%	10%	50%
5. Fuelwood gathering	1%			15%			20%	10%	5%	50%
6. Uncontrolled fires	2%		30%	40%					20%	90%
7. Intentional fires (Paths opening and fires for hunting)	1%		30%	15%	30%	5%			10%	90%
8. Mining and Hydrocarbon activities encroachment	0%	40%			40%				20%	100%
9. Economic land concession (timber and agriculture)	0%	50%			50%					100%
Effectiveness of activity on total deforestation		12,8%	15,9%	13,4%	12,3%	4,8%	1,0%	7,7%	2,9%	70,7%

- Adoption rate

Due to various causes such as project timing, availability of funding, necessity of preliminary work to be completed before starting an activity, etc., all activities will not reach their optimal effectiveness in the first year. The relative effectiveness refers to the effectiveness relative to what is maximally achievable (optimal effectiveness) given the project's conditions, but may be different from this optimum due to the reasons listed above. In other words, the relative effectiveness will always be 100% at some point during the crediting period, regardless of the absolute effectiveness of the activity in reducing deforestation.

The increase of the relative effectiveness over time was estimated based on progressive adoption of the project by the communities, length of bureaucratic procedures, local knowledge of field conditions

1/ Legal

Impact of legal activities will be maximal after all concessions for conservation planned or wished by the communities will be attributed by the government. This will allow the communities to enforce legal control, demarcate the area, and control migration and Illegal logging. 60% of the optimal effectiveness is estimated to be reached in the 3rd year when the status of the 3 concessions constituting the project area is legally defined. Within two more years, the other envisioned concessions for conservation in the leakage belt will be attributed by the government, and legal interventions will be possible in the whole leakage management area.

2/ Control and surveillance

The progressive increase in effectiveness depends on the progressive adoption of the project by the communities in all regions around the project area. Some communities have been involved earlier and are already implicated in the control & surveillance activities. Control and patrolling work requires the

construction of small Infrastructure (checkpoints) at the entrance of the project area, and demarcation of project area, which can take several months.

3/ Sensibilization & Communication

Most of the communities have known Pur Projet and the project's idea and objectives for a long time (previous presence in the area with a reforestation project in agroforestry systems). Some communities have therefore been Implicated, empowered, trained since project start. This process will progressively replicate to all communities, especially after year 3 in which a comprehensive education, training plan for the first ten years of the project has been decided and started. Still, it is estimated that it will take 5 to 6 years so that all communities involved are fully aware of the conservation stakes.

4/ Non-Timber Valuation

The impact of this activity will be progressively reached as more and increasingly diverse alternative economic activities will be implemented in the communities. Project has started from the beginning with seeds collection and nursery, botanical garden, and is now expanding with more activities (bee keeping, fish breeding, essential oils, medicinal products, etc.). 5 to 6 years will be needed to have complete sustainable product chains.

5/ Scientific and inventory

Some biodiversity, biomass inventories and socio-economic surveys have been completed since project start to create a baseline. However, effectiveness of scientific activities will be optimal when ongoing monitoring procedures will be fully implemented.

6/ Renewable energy

Optimal effectiveness will be progressively reached as more community members will get equipped with solar panels/lamps, improved cookstoves. Plan is to equip all voluntary people within 6 years.

7/ Reforestation in agroforestry models

Although this activity was started since the beginning of the project (and even before since 2008 in the zone), benefits and effectiveness will be progressive as the trees grow and bring benefits for crops yields, soil regeneration, extra fuelwood, revenues from timber, etc.

8/ Coordination, Expansion, and transmission

Implication, training, and smooth cooperation between all stakeholders (not only the communities, but also government institutions, native communities, universities, etc) implies a progressive learning curve. Optimal emancipation and empowerment of the communities to manage the interactions at all levels is estimated to be reached after 6 years.

Table 25 : **Evolution of relative effectiveness of each activity over time**

Adoption rate : Relative effectiveness of activity									
Project Year	Calendar Year	Legal	Control & Surveillance	Sensibilization & communication	Non Timber forest valuation	Scientific & Inventory	Renewable Energy	Reforestation in agroforestry models	Coordination , Expansion & Transmission
0	2010	10%	0%	10%	0%	10%	0%	10%	10%
1	2011	30%	10%	30%	20%	20%	20%	20%	30%
2	2012	60%	40%	50%	40%	20%	20%	30%	50%
3	2013	80%	80%	70%	60%	40%	40%	40%	70%
4	2014	100%	100%	90%	80%	80%	80%	50%	90%
5	2015	100%	100%	100%	100%	100%	100%	70%	100%
6	2016	100%	100%	100%	100%	100%	100%	90%	100%
7	2017	100%	100%	100%	100%	100%	100%	100%	100%
8	2018	100%	100%	100%	100%	100%	100%	100%	100%
9	2019	100%	100%	100%	100%	100%	100%	100%	100%
10	2020	100%	100%	100%	100%	100%	100%	100%	100%
>10	After 2020	100%	100%	100%	100%	100%	100%	100%	100%

- Dynamic effectiveness impact and estimation of carbon stock changes due to unavoidable unplanned deforestation

Applying the adoption rates of each activity to each activity's optimal effectiveness index, we get the following evolution for the total project effectiveness index, from 4% in year 0 to **70% (optimal index) after 7 years**

The annual carbon stock changes due to unavoidable unplanned deforestation correspond to the "non-effective" part of the activity in the given year.

As a result, the following table shows the effectiveness index over time, and the ex-ante estimation of total annual carbon stock changes in the project scenario and in the project area

Table 26 : **Effectiveness index and total ex-ante estimated annual and cumulative carbon stock changes in the project area**

Project Year	Calendar Year	Baseline scenario		Project scenario		
		Annual baseline carbon stock change (ΔCBSLPAT)	Cumulative Annual baseline carbon stock change (ΔCBSLPA)	Effectiveness Index	Net carbon stock change - project scenario (ΔCPSPAT)	Cumulative Net carbon stock change - project scenario (ΔCPSPA)
		t CO2e	t CO2e	%	t CO2e	t CO2e
0	2010			4,2%		
1	2011	-89 535	-89 535	15,5%	-75 697	-75 697
2	2012	-102 963	-192 498	30,5%	-71 524	-147 221
3	2013	-99 955	-292 453	47,1%	-52 886	-200 107
4	2014	-99 651	-392 104	61,6%	-38 241	-238 348
5	2015	-121 458	-513 561	68,4%	-38 375	-276 722
6	2016	-130 354	-643 916	69,9%	-39 191	-315 913
7	2017	-143 929	-787 844	70,7%	-42 171	-358 084
8	2018	-147 446	-935 290	70,7%	-43 202	-401 286
9	2019	-148 263	-1 083 553	70,7%	-43 441	-444 727
10	2020	-150 665	-1 234 218	70,7%	-44 145	-488 872
11	2021	-172 520	-1 406 738	70,7%	-50 548	-539 420
12	2022	-191 399	-1 598 137	70,7%	-56 080	-595 500
13	2023	-211 206	-1 809 343	70,7%	-61 883	-657 383
14	2024	-234 640	-2 043 983	70,7%	-68 749	-726 133
15	2025	-256 033	-2 300 015	70,7%	-75 018	-801 150
16	2026	-262 939	-2 562 954	70,7%	-77 041	-878 191
17	2027	-298 815	-2 861 769	70,7%	-87 553	-965 744
18	2028	-313 559	-3 175 328	70,7%	-91 873	-1 057 617
19	2029	-343 240	-3 518 569	70,7%	-100 569	-1 158 187
20	2030	-361 225	-3 879 793	70,7%	-105 839	-1 264 025
21	2031	-393 572	-4 273 366	70,7%	-115 317	-1 379 342
22	2032	-407 637	-4 681 002	70,7%	-119 438	-1 498 780
23	2033	-412 264	-5 093 266	70,7%	-120 793	-1 619 573
24	2034	-447 131	-5 540 397	70,7%	-131 009	-1 750 582
25	2035	-452 880	-5 993 277	70,7%	-132 694	-1 883 276
26	2036	-480 872	-6 474 149	70,7%	-140 896	-2 024 172
27	2037	-497 907	-6 972 057	70,7%	-145 887	-2 170 059
28	2038	-504 759	-7 476 815	70,7%	-147 894	-2 317 953
29	2039	-533 911	-8 010 727	70,7%	-156 436	-2 474 389
30	2040	-527 575	-8 538 302	70,7%	-154 580	-2 628 968
31	2041	-550 743	-9 089 045	70,7%	-161 368	-2 790 336
32	2042	-578 624	-9 667 669	70,7%	-169 537	-2 959 873
33	2043	-601 980	-10 269 649	70,7%	-176 380	-3 136 253
34	2044	-626 553	-10 896 202	70,7%	-183 580	-3 319 833
35	2045	-611 752	-11 507 954	70,7%	-179 243	-3 499 077
36	2046	-657 299	-12 165 253	70,7%	-192 589	-3 691 665
37	2047	-660 136	-12 825 389	70,7%	-193 420	-3 885 085
38	2048	-649 660	-13 475 050	70,7%	-190 350	-4 075 435
39	2049	-711 990	-14 187 039	70,7%	-208 613	-4 284 048
40	2050	-678 373	-14 865 413	70,7%	-198 763	-4 482 812

3.3 Leakage

3.3.1 Decrease in carbon stocks and increase in GHG emission due to leakage prevention measures

Activities developed with deforestation agents (communities) in the leakage management areas include reforestation, agroforestry, bee heaving, secondary forest enhancement and botanical garden, artisanal products, education, etc.

None of the activities have negative impacts on carbon stocks in the leakage management areas. On the contrary they tend to increase carbon stocks in the leakage belt (reforestation, agroforestry, secondary forest valuation, etc.). None of the activities imply significant additional GHG emissions (no fires, no grazing). There is no intensification of grazing; on the contrary the project intends to diminish grazing which is a deforestation driver.

There is therefore no leakage due to implementation of project activities in the leakage management areas.

3.3.2 Activity displacement leakage

Baseline scenario in leakage belt

Ex-ante baseline assessment of deforestation in the leakage belt is completed using the methodology described in 2.4 for projection of future deforestation / LU/LC changes, and in 3.1 for carbon stock changes for each transition class.

The results of baseline assessment of carbon stock changes in the leakage belt are shown in the following table

Table 27 : Baseline Carbon stock changes in the leakage belt

		Total annual baseline carbon stock change in the leakage belt (Δ CSLLBt)			Total cumulative baseline carbon stock change in the leakage belt (CBSLLBt)		
Year	Project year	Initial forest classes	Final non-forest classes	TOTAL	Initial forest classes	Final non-forest classes	TOTAL
		Total Forest	Total Non-Forest		Total Forest	Total Non-Forest	
		t CO ₂ e	t CO ₂ e		t CO ₂ e	t CO ₂ e	t CO ₂ e
2011	1	-2 050 619	24 269	-2 026 350	-2 050 619	24 269	-2 026 350
2012	2	-2 168 889	49 307	-2 119 582	-4 219 507	73 575	-4 145 932
2013	3	-2 230 915	74 493	-2 156 421	-6 450 422	148 069	-6 302 353
2014	4	-2 323 583	100 178	-2 223 405	-8 774 005	248 247	-8 525 758
2015	5	-2 386 240	125 949	-2 260 292	-11 160 245	374 196	-10 786 049
2016	6	-2 502 637	152 422	-2 350 214	-13 662 882	526 618	-13 136 264
2017	7	-2 521 189	178 550	-2 342 639	-16 184 071	705 168	-15 478 903
2018	8	-2 598 133	204 976	-2 393 157	-18 782 204	910 144	-17 872 060
2019	9	-2 678 451	231 726	-2 446 725	-21 460 656	1 141 870	-20 318 786
2020	10	-2 760 029	258 795	-2 501 234	-24 220 684	1 400 665	-22 820 019
2021	11	-2 814 593	262 187	-2 552 406	-27 035 277	1 662 852	-25 372 426
2022	12	-2 754 702	264 065	-2 490 637	-29 789 980	1 926 917	-27 863 063
2023	13	-2 735 314	265 557	-2 469 757	-32 525 294	2 192 474	-30 332 820
2024	14	-2 759 063	266 870	-2 492 193	-35 284 357	2 459 344	-32 825 013
2025	15	-2 771 152	268 180	-2 502 972	-38 055 509	2 727 524	-35 327 985
2026	16	-2 737 353	268 423	-2 468 929	-40 792 862	2 995 948	-37 796 914
2027	17	-2 763 214	269 350	-2 493 865	-43 556 076	3 265 297	-40 290 779
2028	18	-2 745 078	269 732	-2 475 345	-46 301 154	3 535 030	-42 766 124
2029	19	-2 724 475	269 642	-2 454 832	-49 025 629	3 804 672	-45 220 956
2030	20	-2 739 739	269 441	-2 470 298	-51 765 367	4 074 113	-47 691 254
2031	21	-2 726 620	268 595	-2 458 025	-54 491 987	4 342 708	-50 149 279
2032	22	-2 763 532	268 948	-2 494 583	-57 255 519	4 611 656	-52 643 863
2033	23	-2 747 835	269 382	-2 478 454	-60 003 354	4 881 038	-55 122 316
2034	24	-2 732 491	269 388	-2 463 103	-62 735 845	5 150 426	-57 585 419
2035	25	-2 720 621	269 260	-2 451 361	-65 456 466	5 419 686	-60 036 780
2036	26	-2 709 964	269 392	-2 440 572	-68 166 429	5 689 078	-62 477 351
2037	27	-2 711 222	269 282	-2 441 940	-70 877 652	5 958 360	-64 919 291
2038	28	-2 676 262	269 073	-2 407 189	-73 553 914	6 227 433	-67 326 480
2039	29	-2 666 969	268 887	-2 398 083	-76 220 883	6 496 320	-69 724 563
2040	30	-2 717 624	269 208	-2 448 415	-78 938 507	6 765 528	-72 172 979
2041	31	-2 631 586	268 586	-2 363 000	-81 570 093	7 034 115	-74 535 978
2042	32	-2 644 991	267 767	-2 377 224	-84 215 084	7 301 881	-76 913 203
2043	33	-2 665 556	267 382	-2 398 174	-86 880 640	7 569 264	-79 311 376
2044	34	-2 602 043	266 453	-2 335 591	-89 482 683	7 835 716	-81 646 967
2045	35	-2 638 656	266 110	-2 372 545	-92 121 339	8 101 827	-84 019 512
2046	36	-2 618 270	265 672	-2 352 599	-94 739 609	8 367 498	-86 372 111
2047	37	-2 621 303	265 224	-2 356 078	-97 360 912	8 632 723	-88 728 189
2048	38	-2 589 152	264 809	-2 324 343	-99 950 064	8 897 531	-91 052 533
2049	39	-2 561 157	264 233	-2 296 924	-102 511 221	9 161 764	-93 349 456
2050	40	-2 577 777	263 223	-2 314 555	-105 088 998	9 424 987	-95 664 011

Displacement leakage factor

The relative impact of leakage is quantified by the estimation of a displacement leakage factor, representing the percent of deforestation expected to be displaced outside of the project boundary.

To estimate the displacement leakage factor, a detailed analysis of the estimated leakage factor for each of the identified deforestation threats was completed:

1. Conversion to Croplands

The availability of arable land is typically less of a constraint than the availability of farm inputs or water. Agroforestry and improvements in agricultural efficiency will improve crop yields from existing agricultural land, preventing the need for further deforestation to create new land to grow crops. Also, development of non-timber forest activities bringing additional revenues will prevent the local populations to increase their agriculture activities for income purposes. Also, project participants will have approved binding forestry agreements preventing the expansion of croplands within the project areas. Still, it is expected that about 15% of the impacts of reducing the conversion to cropland within the project area will be annulled in the leakage area.

2. Conversion to Settlements

Project participants will have approved binding forestry agreements that prevent the clearing of forestland for the creation of new settlements. In addition participatory land use plans will reduce the accelerated deforestation from random conversion to settlements. Furthermore, improvements in infrastructure subsidized including water distribution and purification in existing settlements will reduce the need for settlement expansion. With these measures, it is estimated that 15% of the benefits from reducing the forest area for conversion to settlements will be cancelled due to increased conversion in the leakage area.

3. Selective logging for commercial sales

Illegal loggers denied access to the project areas by forest patrols will also shift the location of their logging operations to alternate locations outside of the project area. However, a lot of the forest outside of the project area have already suffered degradation from selective extraction of high value species in the past, especially in the areas designated by the ZEE as Permanent Production Forest areas. This will result in an estimated a 20% leakage cancellation rate.

4. Timber Harvesting for Local Use

The need for timber on a local level will not decrease as a result of project implementation. However, some timber can be harvested from areas undergoing reforestation as leakage management activities and by controlling the timber harvesting volumes. Therefore, a moderate 30% leakage cancellation rate is assumed. Since the timber is harvested for local use, leakage from this driver will be confined to the leakage belt.

5. Fuel-wood Gathering

Because of very limited population within the project boundary compared to the total area, even in the neighbouring communities, there should not be significant leakage. Moreover, the project will help the communities switch to more fuel-efficient cookstoves and solar energy, reducing the need for fuelwood. However, to remain conservative, we estimate a 20% leakage cancellation rate within the leakage area.

6. Uncontrolled fires

Uncontrolled fires are triggered by slash and burn practices in agriculture parcels outside of the project area. The project will not displace the effect of this fire (in the leakage belt, fires are also already occurring), but will target the source of the fires, trying to reduce the occurrence. There is no leakage for this driver.

7. Intentional Fires

Hunters denied access to the project areas by forest patrols will shift the location of their hunting grounds to alternate locations. The use of forest fires to concentrate and drive animals from forest cover will shift to the leakage belt, however it is not very much developed in the area as it is already closer to populations and availability of animals is low. This results in a 10% leakage cancellation rate.

8. Mining and Hydrocarbon activities encroachment

It is likely that oil and mining companies that are not able to explore and extract in the project area due to the legal registration of the project and its protection like via forest patrolling will search for other concessions elsewhere (not likely outside the San Martin region). In addition, oil and mining companies are not geographically constrained as they operate at national or international level and can open new exploration frontiers in any other region. However, some further exploration could happen in the leakage belt. Therefore, an expected leakage of 30% is estimated.

9. Economic Land Concessions

Economic Land Concessions granted by the government will not be allowed within the project areas. However, a number of large ELCs will continue to be granted at the national level. Since the project design will have affected national policies to a certain extent, the effective cancelling rate is envisioned to be around 30% outside of the project area.

Multiplying the estimated leakage factor for each threat by the estimated contribution of each identified threat to total deforestation, we obtain a weighted average of **15 % which is the global Displacement Leakage Factor**

Table 28 : **Summary of Leakage factor per deforestation threat and calculation of overall Displacement Leakage factor**

Deforestation threats	Relative importance of driver to total deforestation (%)	Displacement leakage factor (%)	Weighted Displacement leakage factor (%)
1. Conversion to croplands, pastures and housing	70%	15%	10,5%
2. Conversion to settlements / infrastructure (Roads, water and electricity)	15%	15%	2,3%
3. Selective logging of high-value species for commercial sales	10%	20%	2,0%
4. Timber harvesting for local use (housing and infrastructures)	1%	30%	0,3%
5. Fuelwood gathering	1%	20%	0,2%
6. Uncontrolled fires	2%	0%	0,0%
7. Intentional fires (Paths opening and fires for hunting)	1%	10%	0,1%
8. Mining and Hydrocarbon activities encroachment	0%	30%	0,0%
9. Economic land concession (timber and agriculture)	0%	30%	0,0%
Total			15%

3.3.3 Ex-ante estimation of total leakage

As a result of the application of the leakage factor to net project impact in carbon stock in the project area under the scenario, the ex-ante estimation of the total leakage is the following:

Table 29 : **Total leakage**

Project Year	Calendar Year	Project scenario
		Leakage (ΔCLKt)
		t CO ₂ e
0	2010	
1	2011	-2 124
2	2012	-4 826
3	2013	-7 225
4	2014	-9 426
5	2015	-12 753
6	2016	-13 994
7	2017	-15 620
8	2018	-16 001
9	2019	-16 090
10	2020	-16 351
11	2021	-18 723
12	2022	-20 771
13	2023	-22 921
14	2024	-25 464
15	2025	-27 786
16	2026	-28 535
17	2027	-32 429
18	2028	-34 029
19	2029	-37 250
20	2030	-39 202
21	2031	-42 712
22	2032	-44 239
23	2033	-44 741
24	2034	-48 525
25	2035	-49 149
26	2036	-52 186
27	2037	-54 035
28	2038	-54 779
29	2039	-57 942
30	2040	-57 255
31	2041	-59 769
32	2042	-62 795
33	2043	-65 330
34	2044	-67 996
35	2045	-66 390
36	2046	-71 333
37	2047	-71 641
38	2048	-70 504
39	2049	-77 268
40	2050	-73 620

3.4 Summary of GHG Emission Reductions and Removals

3.4.1 Significance assessment

No carbon sources were ever considered in the assessment. All carbon pools (above-ground biomass, below-ground biomass) included in the assessment are significant according to EB-CDM approved “Tool for testing significance of GHG emissions in A/R CDM project activities

3.4.2 Calculation of ex-ante estimation of total net GHG emissions reductions and VCUs

The Risk Assessment completed with VCS AFOLU Non-Permanence Risk Tool (see Appendix: “Non-permanence report”) shows a Risk Factor of 10% for the project.

The overall ex-ante net GHG emissions reductions and number of VCUs are summarized in the following table.

The project is estimated (ex-ante) to contribute to GHG emissions reductions for 8 788 871 tCO₂e , and to generate 7 750 611 VCUs over the 40 years of the crediting period

Table 30 : Summary of ex-ante net GHG emissions reductions and VCU

Project Year	Calendar Year	Baseline scenario	Project scenario						
		Annual baseline carbon stock change (ΔCBSLPAt)	Annual carbon stock change - project scenario (ΔCPSPAAt)	Leakage (ΔCLKt)	Annual Total net GHG emissions reductions (ΔREDDt)	Cumulative Total net GHG emissions reductions (ΔREDD)	Buffer VCS (VBCT)	Annual number of VCUs (VCUt)	Cumulative number of VCUs (VCU)
		t CO ₂ e	t CO ₂ e	t CO ₂ e	t CO ₂ e	t CO ₂ e	t CO ₂ e	t CO ₂ e	t CO ₂ e
							10%		
0	2010								
1	2011	-89 535	-75 697	-2 124	11 714	11 714	-1 384	10 330	10 330
2	2012	-102 963	-71 524	-4 826	26 614	38 327	-3 144	23 470	33 800
3	2013	-99 955	-52 886	-7 225	39 844	78 171	-4 707	35 137	68 936
4	2014	-99 651	-38 241	-9 426	51 983	130 155	-6 141	45 842	114 779
5	2015	-121 458	-38 375	-12 753	70 330	200 484	-8 308	62 021	176 800
6	2016	-130 354	-39 191	-13 994	77 170	277 654	-9 116	68 053	244 854
7	2017	-143 929	-42 171	-15 620	86 138	363 792	-10 176	75 962	320 816
8	2018	-147 446	-43 202	-16 001	88 243	452 035	-10 424	77 818	398 634
9	2019	-148 263	-43 441	-16 090	88 732	540 766	-10 482	78 250	476 884
10	2020	-150 665	-44 145	-16 351	90 169	630 935	-10 652	79 517	556 401
11	2021	-172 520	-50 548	-18 723	103 249	734 185	-12 197	91 052	647 453
12	2022	-191 399	-56 080	-20 771	114 548	848 732	-13 532	101 016	748 468
13	2023	-211 206	-61 883	-22 921	126 402	975 134	-14 932	111 469	859 938
14	2024	-234 640	-68 749	-25 464	140 426	1 115 560	-16 589	123 837	983 775
15	2025	-256 033	-75 018	-27 786	153 229	1 268 789	-18 102	135 128	1 118 903
16	2026	-262 939	-77 041	-28 535	157 362	1 426 151	-18 590	138 773	1 257 675
17	2027	-298 815	-87 553	-32 429	178 834	1 604 985	-21 126	157 707	1 415 383
18	2028	-313 559	-91 873	-34 029	187 657	1 792 642	-22 169	165 489	1 580 871
19	2029	-343 240	-100 569	-37 250	205 421	1 998 063	-24 267	181 154	1 762 025
20	2030	-361 225	-105 839	-39 202	216 184	2 214 248	-25 539	190 646	1 952 671
21	2031	-393 572	-115 317	-42 712	235 543	2 449 791	-27 826	207 718	2 160 389
22	2032	-407 637	-119 438	-44 239	243 961	2 693 751	-28 820	215 141	2 375 529
23	2033	-412 264	-120 793	-44 741	246 730	2 940 481	-29 147	217 583	2 593 112
24	2034	-447 131	-131 009	-48 525	267 597	3 208 078	-31 612	235 985	2 829 097
25	2035	-452 880	-132 694	-49 149	271 037	3 479 116	-32 019	239 019	3 068 116
26	2036	-480 872	-140 896	-52 186	287 790	3 766 906	-33 998	253 793	3 321 908
27	2037	-497 907	-145 887	-54 035	297 985	4 064 891	-35 202	262 783	3 584 692
28	2038	-504 759	-147 894	-54 779	302 086	4 366 977	-35 686	266 399	3 851 091
29	2039	-533 911	-156 436	-57 942	319 533	4 686 510	-37 748	281 785	4 132 876
30	2040	-527 575	-154 580	-57 255	315 741	5 002 251	-37 300	278 441	4 411 318
31	2041	-550 743	-161 368	-59 769	329 606	5 331 857	-38 938	290 669	4 701 986
32	2042	-578 624	-169 537	-62 795	346 292	5 678 150	-40 909	305 384	5 007 370
33	2043	-601 980	-176 380	-65 330	360 270	6 038 420	-42 560	317 710	5 325 080
34	2044	-626 553	-183 580	-67 996	374 976	6 413 396	-44 297	330 679	5 655 759
35	2045	-611 752	-179 243	-66 390	366 119	6 779 515	-43 251	322 868	5 978 627
36	2046	-657 299	-192 589	-71 333	393 377	7 172 892	-46 471	346 906	6 325 533
37	2047	-660 136	-193 420	-71 641	395 075	7 567 968	-46 672	348 404	6 673 937
38	2048	-649 660	-190 350	-70 504	388 806	7 956 773	-45 931	342 875	7 016 812
39	2049	-711 990	-208 613	-77 268	426 108	8 382 882	-50 338	375 771	7 392 583
40	2050	-678 373	-198 763	-73 620	405 990	8 788 871	-47 961	358 029	7 750 611

4 MONITORING

4.1 Data and Parameters Available at Validation

Data Unit / Parameter:	Surface of each LULC strata in the reference region – historical: 2001, 2005, 2010
Data unit:	Hectares
Description:	Area of each LULC strata for three pivot years in the historical reference period: 2001, 2005, 2010
Source of data:	Remote sensing analysis and field validation. See section 2.4.1
Value applied:	See section 2.4.1
Justification of choice of data or description of measurement methods and procedures applied:	See section 2.4.1
Any comment:	Computed once at validation for completion of baseline scenario.

Data Unit / Parameter:	Surface of each LULC strata in the reference region – yearly projection for 2010-2020
Data unit:	Hectares
Description:	Projected area of each LULC strata for every years of the baseline period
Source of data:	Deforestation model. See section 2.4.3
Value applied:	See section 2.4.3
Justification of choice of data or description of measurement methods and procedures applied:	See section 2.4.3
Any comment:	To be reassessed for the next 10 years at each re-validation of the baseline

Data Unit / Parameter:	Carbon stocks per hectare for each LULC strata
Data unit:	tCO ₂ /ha
Description:	Carbon stock per hectare in aerial and below-ground living biomass in each strata

Source of data:	Complete Biomass inventory protocol for forest stratae. Literature for non-forest stratae. See section
Value applied:	See section 3.1.1
Justification of choice of data or description of measurement methods and procedures applied:	See section 3.1.1
Any comment:	Assessed and validated once at project validation for the whole duration of the project.

4.2 Data and Parameters Monitored

Data Unit / Parameter:	Actual area per LULC strata in the reference region, in the year of each verification (every 5 years – planned 2015, 2020, 2025,..)
Data unit:	Hectares
Description:	Actual area in each LULC strata at the moment of verification
Source of data:	Remote sensing analysis. Application of same process as for historical deforestation analysis. See section 2.4.1
Value applied:	Results of analysis
Justification of choice of data or description of measurement methods and procedures applied:	Same measurement methods as for historical deforestation analysis. See section 2.4.1
Any comment:	The measurement of actual area per LULC strata allows immediate computing of area per LULC change class from one verification year to another. The measurements made in the project area allow for ex-post calculation of actual carbon stock changes in the project area Measurements made in the leakage belt allow for ex-post estimation of activity displacement leakage Measurement made in the reference region may be used in case of re-validation of the baseline scenario

Data Unit / Parameter:	Potential carbon stock decreases due to catastrophic events
Data unit:	T CO2/ha
Description:	Potential carbon stock decreases in case of natural disturbances or other catastrophic events
Source of data:	Field measurements in the affected areas after the event occurred.
Value applied:	Results of field measurements
Justification of choice of data or description of measurement methods and procedures applied:	Same field measurement method as for the carbon stock measurement completed for validation (see section 3.1.1)
Any comment:	Monitoring of potential carbon stock changes will only be necessary in case of catastrophic events. Otherwise, In accordance with Methodology VM00015 section 1.1.3 (no significant carbon stock decrease estimated in the ex-ante assessment), monitoring of carbon stocks is not mandatory and values measured for validation can be used throughout the baseline period.

4.3 Description of the Monitoring Plan

4.3.1 Monitoring plan

4.3.1.1 GHG removals monitoring

In accordance with VM00015 methodology and VCS AFOLU requirements, the monitoring plan includes two main tasks, and a third one at first verification only.

Task 0: At first verification, confirmation of project area boundaries

At the date of validation, the concession Montecristo (81055 hectares) has not been legally given from the government to APAHUI. As a result, only 73% of the project area is under control at time of validation.

In case the concession Montecristo does not become under control by the first verification, the following will be applied:

Spatial boundaries:

- The project area will be modified to exclude all forest area present in the boundaries of the concession Montecristo.
- The area within the boundaries of the concession Montecristo will be included in the leakage belt.
- The reference region will not be modified, as it will still match the requirements of the methodology.
- The leakage management area will not be modified, as the concession Montecristo does not encompass non-forest areas under control or potentially under control of the communities.

Baseline calculations:

- The projection of future deforestation completed at time of validation was completed for the whole reference region, so it will not be necessary to recompute it.
- However, the results will be re-segmented according to the new project area, and the new leakage belt, to have the baseline data for each updated area (project area, leakage belt, reference region).

Monitoring of land-use and land-cover change:

- As described hereafter, the monitoring of land-use and land-cover change will be completed for the whole reference region, so will not be impacted by the change of project area.
- The results will then be segmented according to the new project area, and the new leakage belt, to have the monitoring data for each updated area (project area, leakage belt, reference region).

Implementation of activities :

- In case the concession Montecristo does not become under control, it will not impact the implementation of most project activities, as most of the activities occur in the leakage management areas (non-forest populated areas) and the leakage management areas will not be modified.

- However, a certain number of activities will be slightly adapted:

Legal, control, patrolling: physical demarcation of the project area will follow the boundaries of the new project area, control points may be displaced closer to the updated boundary of the project area, patrolling circuits will be updated to control more specifically the boundaries of the project area.

Scientific : although scientific inventories and studies will still be conducted in the concession Montecristo, a stronger focus will be placed on the updated project area. Some scientific activities may be displaced from the concession Montecristo to the updated project area.

Task 1: Monitoring of carbon stock changes for periodical verifications

- Monitoring of project implementation

The implementation of project activities is decided and discussed on a continuous basis between the participating communities, the Fundacion Amazonia Viva, and the Project Proponent.

All records of project activities implemented are transferred from the Foundation Amazonia Viva to Pur Projet. The foundation transfers to the Project Proponent at least quarterly activity and economic reports of activities implemented (monthly in the first years), including pictures, testimonies, additional specific reports.

All material are kept both by the Fundacion Amazonia Viva and the Project Proponent in a digital way, organized by category of activities implemented, in accordance with project activities management plan.

- Monitoring of land-use and land-cover change

Monitoring of actual land-use and land-cover change will be done periodically at each VCS verification of the project, in one of the two ways:

- If Peru or San Martin Region have developed by then a jurisdictional program or approved MRV system, the project will use the MRV data generated by the jurisdictional program.

- In the contrary, the Project Proponent will contract GIS and remote sensing specialists, in the first place ONFI, technical partner of the project, to complete the Land-Use and Land-Cover change analysis since last verification/ monitoring. The procedures used will be the exact same procedures and methodologies as for historical analysis for validation, as described in section 2.4.1, in order to ensure consistency with baseline completion.

Data collected will be the area of forest-land converted to non-forest land, per LULC change class, in the whole reference region.

Quality control : results of the analysis will be controlled by Pur Projet for consistency with local observed conditions and evolutions. Analysis results will also be cross-checked with potential results from other deforestation monitoring programs in the region of San Martin or at the national level.

Data will be archived by the Project Proponent in the project's digital data room, and will also be shared with- and archived by- the Fundacion Amazonia Viva.

- Monitoring of carbon stocks and non-CO2 emissions

Monitoring of potential carbon stock changes will only be necessary in case of catastrophic events. Otherwise, In accordance with Methodology VM00015 section 1.1.3 (no significant carbon stock decrease estimated in the ex-ante assessment), monitoring of carbon stocks is not mandatory and values measured for validation can be used throughout the baseline period.

- Monitoring of impact of natural disturbances and other catastrophic events

In case of natural disturbances and other catastrophic events occurring in the project area, field measurements of carbon stock per hectares in the affected area will be conducted within 3 months after the event. The measurements will be completed by the local project team along with local farmers, under the supervision of the Foundation Amazonia Viva, following the same biomass inventory protocol as for carbon stock measurements completed for validation.

Field data will be transferred to the project proponent for interpretation, quality control, and archiving. Consistency of data will be cross-checked against other literature sources for land-covers similar as the one after the event.

- Monitoring of leakage

Monitoring of leakage will be done periodically at each VCS verification of the project, in one of the two ways:

- If Peru or San Martin Region have developed by then a jurisdictional program or approved MRV system, the project will use the MRV data generated by the jurisdictional program.

- In the contrary, the leakage monitoring will be completed along with the monitoring of project area carbon stock changes. Activity displacement leakage in the leakage belt follows the exact same procedure as monitoring for the project area but focuses on the measurement of LULC changes in the leakage belt.

As described in section 3.3.1, and in accordance with the methodology, there will be no leakage associated with leakage prevention activities; this type of leakage will therefore not be monitored.

Similarly, emissions from forest fires are not included in the baseline and will therefore not be monitored.

Table 31 : Summary table of monitoring steps for monitoring LU&LC changes and ex-post estimation of net emission removals and number of VCUs

Activity	Detail	Perimeter	Output data	Responsability	Quality control	Archiving
Images collection and pre-processing						
1 Collection of data sources for year Yv	In order to be as close as possible to the work completed for baseline, satellite images of Landsat with 30m resolution of the year of the verification shall be collected. In case of failure or replacement of Landsat sensor in the future, the most similar images should be used. If higher resolution images are used, they will be degraded to match work completed with Landsat at validation	Cover of the whole reference region	Set of satellite (or toher vector's) images of year Yv	Technical partner (ONFI)	- Pur Projet : quick review of other potential forgotten available data, from partners (e.g. Planet Action) or public sources	Archiving of data both in data room of Pur Projet and by Technical partner
2 Pre-processing of images	Apply same pre-processing procedures as for validation ¹	All images from the data set	Pre-processed images			
Production of main maps / matrices for the reference region						
3 Production of LULC map (before forest stratification) for year Yv	Apply same procedures as for validation ¹ , in particular same classification algorithm	Reference region	LU&LC map for reference region	Technical partner (ONFI)	- Pur Projet : review of produced maps, matrices, and documents. Check for inconsistencies, errors, or divergences from field observations - Amazonia Viva : check for divergences with field observations	Archiving of data both in data room of Pur Projet and by Technical partner
4 Production of deforestation map for the period Y _{v-1} to Y _v	Apply same procedures as for validation ¹	Reference region	Deforestation map (Y _{v-1} to Y _v) for reference region			
5 Production of LULC change map	Apply same procedures as for validation ¹	Reference region	LU&LC change map for reference region			
6 Production of LULC change matrix	Apply same procedures as for validation ¹	3 different matrices : - Reference region - Project Area - Leakage Belt	3 different LU&LC change matrices : - Reference region - Project Area - Leakage Belt (areas in hectares)			
Post-processing: Forest Stratification						
7 Production of stratified LULC change map	Overlap forest stratification map (same map as for validation, permanent strates) with produced maps. Apply same procedures as for validation ¹	Reference region	Stratified LU&LC change map for reference region	Technical partner (ONFI)	- Pur Projet : review of produced maps, matrices, and documents. Check for inconsistencies, errors, or divergences from field observations - Amazonia Viva : check for divergences from field observations	Archiving of data both in data room of Pur Projet and by Technical partner
8 Production of stratified LULC change matrices	Apply same procedures as for validation ¹	3 different matrices : - Reference region - Project Area - Leakage Belt	3 different stratified LU&LC matrices : - Reference region - Project Area - Leakage Belt (areas in hectares)			
Calculation of ex-post carbon stock changes and ex-post project impact for period Yv-1 to Yv						
9 Calculation of ex-post carbon stock changes	Apply carbon stocks decay models to deforested areas per initial forest class, and carbon stocks increase models to deforested areas per final non-forest class (using model of GHG calculations VCS - V2.0.xls workbook)	Calculations for: - Project Area - Leakage Belt	Ex-post carbon stock changes for the period Yv-1 to Yv for Project Area and Leakage Belt	Pur Projet	Cross verification of the calculations, data entry, and results by a second person at Pur Projet.	Archiving of Ex-post GHG calculations VCS workbook in data room of Pur Projet and by Technical Partner.
10 Calculation of ex-post net project emissions reductions (before leakage)	Compute the difference between the baseline carbon stock changes and the ex-post carbon stock changes in the Project Area a, to determine ex-post net project emissions refutions for the period Yv-1 to Yv (using model of GHG calculations VCS - V2.0.xls workbook)	Project Area	Ex-post net project emissions reductions (before leakage) (in t CO2eq)	Pur Projet		
11 Calculation of ex-post leakage	Compute the difference between the baseline carbon stock changes and the ex-post carbon stock changes in the Leakage Belt, to determine ex-post leakage for the period Yv-1 to Yv (using model of GHG calculations VCS - V2.0.xls workbook)	Leakage Belt	Ex-post leakage (in t CO2 eq)	Pur Projet		
12 Calculation of Total net GHG emissions reductions (ΔREDD)	Compute the difference between the baseline carbon stock changes and the ex-post carbon stock changes in the Leakage Belt, to determine ex-post leakage for the period Yv-1 to Yv (using model of GHG calculations VCS - V2.0.xls workbook)	Project Area+Leakage Belt	Total net GHG emissions reductions (ΔREDD) for the period (in tCO2eq)	Pur Projet		
13 Calculation of number of VCUs	Apply the updated risk rating to know the percentage of VCU withholdings for the buffer and discount it from the Total net GHG emissions reductions to compute the number of VCUS for the period Yv-1 to Yv (using model of GHG calculations VCS - V2.0.xls workbook)	Project Area+Leakage Belt	Number of VCUs to be issued for the period (in number of VCUs)	Pur Projet		

Task 2 : Revisiting the baseline at the end of the baseline period

Baseline will be revisited every ten years.

- Monitoring of agents, drivers, and underlying causes of deforestation

An ongoing surveillance and monitoring of deforestation threats, agents, drivers will be conducted all along the project by the participating actors (communities, organizations) and by the Foundation Amazonia Viva. All relevant information, data, reports, legal documents collected will be kept by the foundation Amazonia Viva and communicated to the Project Proponent on a yearly basis.

All information collected will be used at each revisiting of the baseline to conduct a complete analysis of agents, drivers, and causes of deforestation, in the same way it was completed for validation

- Adjustment of LU/LC change component of baseline

Projection of future deforestation for next baseline period will be conducted in the exact same way as for the first baseline period, using monitoring data from the first baseline period as historical data to recompute deforestation trends and projected rates of deforestation.

The Project Proponent will contract GIS and remote sensing specialists, in the first place ONFI, technical partner of the project, to complete the modeling.

Quality control: results of the analysis will be controlled by Pur Projet for consistency with local observed conditions and evolutions. Analysis results will also be cross-checked with potential results from other deforestation monitoring programs in the region of San Martin or at the national level

New baseline scenario will be archived by the Project Proponent in the project's digital data room, and will also be shared with- and archived by- the Fundacion Amazonia Viva.

- Adjustment of carbon component

Carbon stocks per hectare in each strata will not be adjusted unless significant evolution has been observed over the first baseline period (natural disturbances, strong degradation), or unless more precise external data becomes available.

4.3.1.2 Global monitoring plan

More generally, the Project Proponent will monitor various elements along the project lifetime, as described in the following table:

Table 32 : Global monitoring plan

Topic	Elements to be monitored	Procedure of monitoring	Responsibility and field participants	Frequency over the project lifetime
Emissions reductions	Net emissions of each timber plot	Verification of each timber company's net emissions	Project manager, company, local stakeholders, community, NGOs	Periodically, at each verification period
	Carbon stock per hectare (initial, 2012, 2014)	Field inventory, biomass measurement	Project manager, community, NGOs, local stakeholders, company	Every 2 years, with a regular interval, or when there are changes in forest management
Leakage	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period
	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period
Drivers of deforestation	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period
	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period
Activities	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period
	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period
Environmental and socio-economic impact	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period
	Net emissions of each timber company	Sub-site inventory The site-level emissions Production emissions from forest activities Non-forest emissions	Project manager, community, NGOs, local stakeholders, company	Periodically, at each verification period

4.3.1.3 Details on monitoring of socio-economic and environmental impacts

Monitoring of socio-economic and environmental impacts of the project will be completed using various tools: scientific inventories and thematic studies contracted to experts in each of the fields investigated (biodiversity, water, soils, etc.), surveys in the communities, and analysis of third-party (potentially public) socio-economic studies, environmental studies.

Surveys in the communities have been started in order to define a starting state against which comparing the evolutions. Existing templates and first results of community surveys are available.

Key indicators to be monitored during the project lifetime are the following (developed with Fair Trade Foundation):

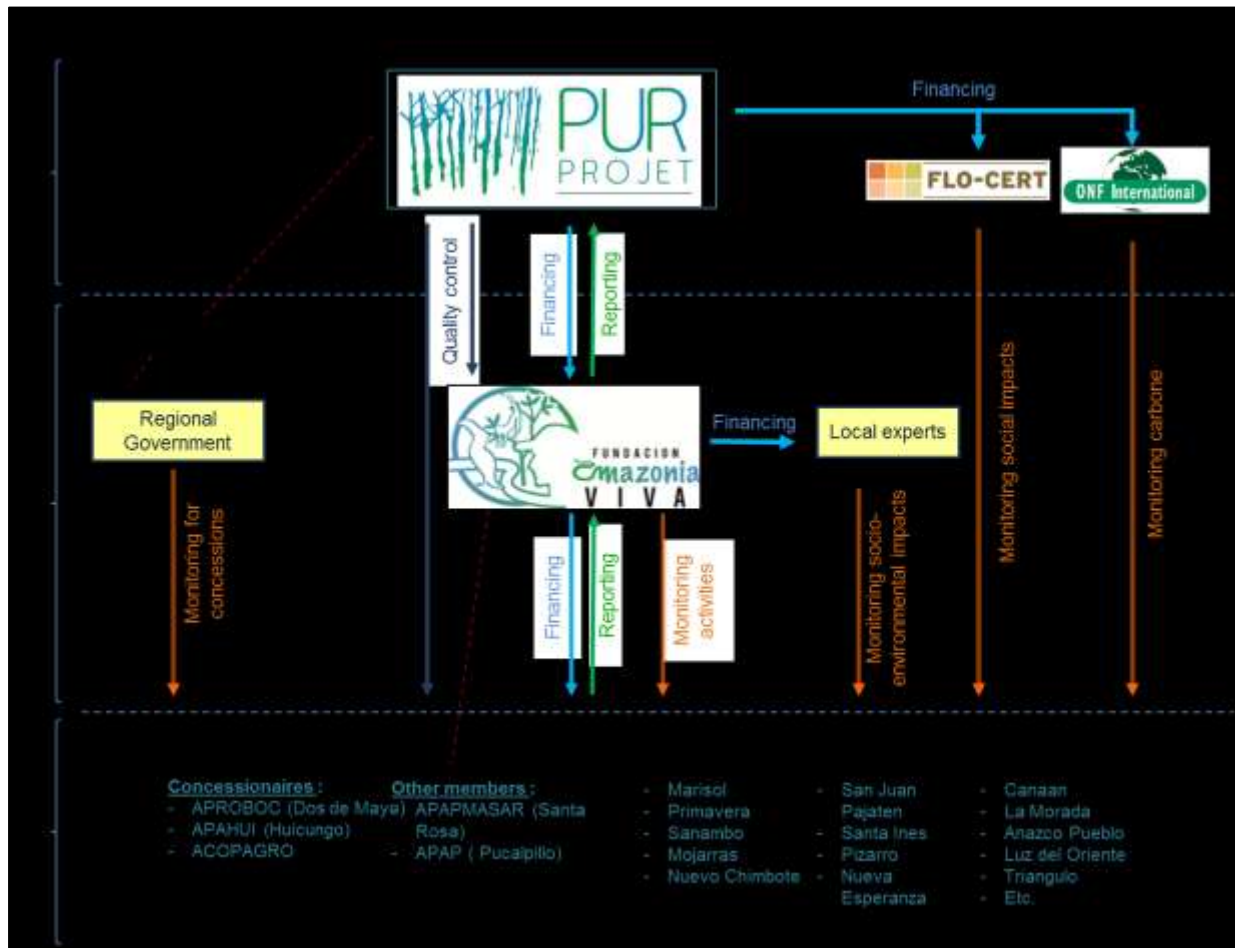
Table 33 : Key environmental and socio-economic indicators to monitor over time

Indicator	Monitoring	Method	Frequency
Avoided deforestation	Conservation area and leakage area forest coverage in ha, comparison with baseline scenario (done by Regional Government within the REDD Roundtable)	Satellite pictures and checks on site	Every 5 years (for VCS verifications)
Carbon sequestration	Biomass/ Carbon inventories in all stratae of forest area	Field inventories	Every 10 years (more frequently in case of natural disturbances, catastrophic events, or evolution trends)
Forest quality	Forest inventory and check on environmental services delivered by conserved forests, in comparison to baseline.	On site inventories	Every 10 to 15 years
Micro-climate regulation	Micro-climate follow-up with 3 to 5 local meteo stations, recording levels of rain, and counting drought days, both in forested and non-forest lands, at strategic points and different altitude levels.	Meteorological records	Throughout the years with analysis on a yearly, 5 years, and 50 years (back and forward) time span analysis.
CO2 Sequestration	CO2 Inventory in demonstrative parcels of the HEM conservation area, measures at BH to calculate trees biomass and qty of Carbon / ha	Satellite pictures and checks on site	Every 5 years (for VCS registration)
Biodiversity preservation	Biodiversity inventories throughout the project lifetime both in the pure conservation area as well as in the human related activities areas, HCV areas and watershed areas. (See PDD for more details). Special follow up of endangered species.	On site inventory (infrared cameras), observations.	Yearly with 5 to 10 years milestone inventories
Soil enrichment	Soil composition, especially nutrients, and soil activity, lombrics, NPK,,,,	On site sampling and analysis	Every 5 years, or on specific occasion (sampling in specific areas : degraded for long or still preserved, to monitor the link between forest conservation and soil quality)
Water quality	Water quality, purity, presence of synthetic products (organochloral, organophosphates,...), % of dry matter / litter, drinkability, ...	On site sampling and analysis	Every 5 years, or on specific occasion (sampling in specific areas : degraded for long or still preserved with forests, to monitor the link between forest conservation and water quality)
Water regulation	Water regulation throughout the year, between deforested areas and still forested areas. Within the concession, around the concession, and in the leakage area, in already severely degraded areas.	On site questionnaires and measurements on floods and droughts.	Every 5 to 10 years, with specific measurement in forest and non-forest areas.
Community incomes	Local communities income increase thanks to the project. Both via direct and indirect consequences of the project.	On site questionnaires and follow up on investments via RUPP. .	Sociological impact study at least every 5 years. Usually PP undertakes such studies every year at the community level on all key indicators or specific ones, depending on applicability and partners demands.
Food Security	Food security level of local communities thanks to the project, link between forest preservation and food security and diversity.	On site questionnaires	Every 3 years questionnaire follow-up and workshops at community level.
Food Sovereignty	% of food produced locally, by the participating communities themselves.	On site questionnaires	Every 3 years questionnaire follow-up and workshops at community level.
Grassroot empowerment and ownership feeling	Feeling expressed by local communities and subjectively perceived by auditors about actual empowerment and ownership feeling over the project by local communities. Local dynamics is the key element of a development project.	Questionnaires and workshops	Every year
Communities adaptation to Climate Change	Checking how the project contributes to helping the local communities to adapt to climate change (severe droughts, storms, ..)	Questionnaires and records	Every 10 years
Happiness	% of satisfaction expressed by local communities, both in general as well as level of satisfaction with the project	Questionnaires	Yearly with monitoring and reporting, to see eventual correlation between climate project and pride and self motivation to undertake development activities

4.3.2 Organizational structure for monitoring

The Biocorredor Martin Sagrado REDD project is based on the very close relationship between Pur Projet, project developer, fund raiser and carbon offset trader, and the Foundation Amazonia Viva, in charge of the local coordination and implementation of the project.

Figure 15 : Organizational diagram and responsibilities



4.3.3 Adaptative management plan

All the procedures described in the documents are already the results of recurrent corrections and adaptations of precedent procedures.

More generally, the project has an adaptive approach, in which the project proponent and the local management team regularly document the lessons learned from previous experience and identify improvements to the project procedures.

After all visits to the project of the Project proponent, a report of progress, lessons learned and suggested corrections is made, discussed, and approved by the Project Proponent and Foundation Amazonia Viva. Examples of such reports, proceedings, or meeting minutes can be found appended to the PDD. These reports lead to the adaptation of project procedures to constantly improve quality of the project.

5 ENVIRONMENTAL IMPACT

The project was designed first of all to have positive environmental impacts in order for the communities and farmers to maintain their favorable living and farming conditions.

Impact on water cycle, water resources, and soils

The appropriate conservation measures within the Martin Sagrado area and its buffer areas will allow the forests and rivers to remain in their natural state. This is key for maintaining the natural hydrological cycles, the quality and quantity of the water and soil conservation.

One of the consequences of the conversion of the Amazon forest into pasture will be a decline in rainfall in the Amazon and adjacent regions, considering that these rains come from the water that is recycled through evapotranspiration (Fearnside, 1997).

Undisturbed forest has very low rates of soil and sediment loss. Deforestation generally increases rates of soil erosion by increasing the amount of surface runoff. The effect is considerably less than that which would exist with the presence of leaf litter, stems and branches. Roots increase the permeability of soil, increasing the absorption and infiltration of water. Forests also contribute to terrestrial evaporation and regulate the humidity of the soil through transpiration. Leaf litter and other organic residues transform the physical properties of the soil, increasing its capacity to hold water and nutrients. Deforestation can change the quantity of water present on the surface and underlying soil layers as well as the humidity in the atmosphere. Furthermore, these processes influence the rates of erosion and availability of water for ecological processes and for the maintenance of environmental services.

The creation and implementation of the Biocorredor Martin Sagrado project will protect not only the biodiversity of forests, but also the quality of life of the local inhabitants, and the climate. It will conserve the quality of soil and water, and the equilibrium of key processes like local hydrological cycles.

Impact on biodiversity

The main goal of the project is to ensure the conservation of key habitat for threatened flora and fauna over 303 000 hectares and avoid the deforestation and degradation of 53 000 hectares, constituted by rich and threatened flora and fauna ecosystems. The project seeks to conserve and regenerate forest ecosystems through improved protection from illegal logging, fire, and through assisted natural regeneration activities and agro-forestry practices. This strategy would restore unique habitat for amphibians, reptiles, mammals, and birds, while restoring high value and endangered tree species (see annex 3 for a list of potential species). The project will also create greater awareness among local communities regarding the value of biodiversity, as well as build monitoring, patrolling, and habitat restoration skills, which will result in better controls over hunting, poaching, and damage to critical habitat. Mobilizing the communities committees to engage in biodiversity conservation will also result in the community establishing rules and sanctions prohibiting hunting and regulating non-timber forest products collection to sustainable levels.

In the without-project scenario forest cover is expected to continually decrease causing a loss of biodiversity, quantity of species present, and quality of forest ecosystems. Under the with-project scenario forest cover will increase and forest ecosystems will be enhanced. Native species to the project area are expected to flourish with the project. Overall the project will have a net positive benefit to biodiversity in the project area.

More information on positive biodiversity impacts can be found both in the CCBA Project Description Document and in Appendix 2 "Biodiversity and High Conservation Values in the project area".

Impact on carbon sequestration

As a REDD project, the project is designed to avoid GHG emissions, therefore playing a positive role in regulation of climate change

Recognition of positive environmental impacts

Additionally, the Regional Environment Authority (ARA: Autoridad Regional Ambiental) of the San Martin Regional Government, in charge of the attribution and supervision of areas for conservations, has specifically approved the Biocorredor Martin Sagrado project, recognizing officially (supporting evidence available) that the project:

- is operated in accordance with Peruvian national and regional legal framework
- does not threaten the existence of high value species
- has a positive impact on the environment and ensures its sustainability

6 STAKEHOLDER COMMENTS

6.1 Identification and Organization of Stakeholders and Communities Affected by the Project

The main stakeholders are the owner of the concessions constituting the project area: ACOPAGRO cooperative, Asociacion Dos De Mayo, and APAHUI association, as well as two other main communities (Santa Rosa and Pucapillo), also willing to ask for large concessions for conservation in the same zone, and heavily involved in the project since the beginning. These 5 main stakeholder were selected due to the concessions they had or they wanted to ask on large forest areas in the Huayabamba river, in the biological corridor between National Park Rio Abiseo and Bosque de Proteccion Alto Mayo, because of their commitment to for protection of the forests and their awareness about environmental issues, and their capacity to form an organization towering the project (Amazonia Viva). They has also been involved (ACOPAGRO in the first place) in the development and success of a reforestation program started in 2008 in the same region.

The Amazonia Viva Foundation was founded by these 5 stakeholders (plus the cooperative ORO VERDE, involved in another reforestation program in San Martin province), in order to coordinate actions for conservation and reforestation in the province, and more specifically to coordinate locally the Biocorridor Martin Sagrado REDD project. The Foundation is today constituted by the 6 members, with elected representatives at the board, and managed by a General Manager and a team of engineers and technicians. The members of the foundation will meet at least quarterly to review progress and take decisions.

The other stakeholders are all the forest dependent communities in the project zone (Huayabamba river basin). These communities have expressed their desire to support and comply with the carbon project management plans in return for technical and financial support to build their stewardship capacity and local economy. The communities along the Huayabamba river have been involved in the previous reforestation program developed by Pur Projet and ACOPAGRO and have been identified and consulted through this channel on the REDD project. Communities in the northern part of the project zone have been identified by Amazonia Viva Foundation a bit later on, and consulted and included in project design through various onsite visits to the communities (Chuquibamba, Leymebamba)

Other stakeholders in the REDD project include the provincial and district governments, commune chiefs and councils, NGOs and civil society groups, and the national and local Forestry Administration. All of them have been consulted by Pur Projet and Amazonia Viva Foundation, and implicated to a lesser extent in the feasibility and design of the project. Pur Projet has a long history of presence in the province and zone, through the development of reforestation projects, and has build strong relationships with all stakeholders in the area.

6.2 Involvement of Communities in Project Design

A series of meetings was organized to involve the identified stakeholders in the project design process. This series of meetings coincided with field sampling and social appraisals. The meetings had high levels of community participation to the Amazonia Viva Foundation activities, and therefore helped to ensure that decision making is done transparently and through the consensus of group members. Given high levels of illiteracy in project communities and the complexities of carbon project modalities, the project development team



communicated and shared project concepts with communities through a series of village meetings.



In July 2010, contracts were signed between ACOPAGRO Cooperative and Pur Projet to start the operational activities, organize additional meetings with all project neighbouring communities, to discuss the procedures and modalities of the REDD project including introducing the concept, benefits and risks, as well as exploring the current situation and existing problems that communities are facing. This information has been used to formulate contractual agreements with local communities covering project participation, as well as in designing the annual work plans for technical and financial assistance.

The following sections contain a summary of the input of each of the stakeholder

6.2.1 Specific Inputs from Participating Communities (including Dos de Mayo)

The project developers and AMAZONIA VIVA Foundation members met with communities to ask their opinion and get input on the project design, key problems, and other development priorities. For the most part, the problems and needs mentioned by the different communities were very similar, as were their requests for support.

A number of communities wanted to improve walkways and build more patrol posts. Communities also requested employment opportunities to be built into the project design, and that the majority of funds actually go to them.

Communities have requested legal support to address encroachment by more powerful stakeholders and economic land concessionaires. The AMAZONIA VIVA Foundation shall organize a series of meetings in 2011 and 2012 to inform other stakeholders of the project's goals and request that they respect the boundaries of the project area.

The communities also mentioned they would like to restore their forests and would like to regenerate native and medicinal species. Most of these species have multiple uses and are endangered or threatened species. In addition, villagers would like to enrich plant species that are valuable, including frutal species.

Some leaders reported that while initially community members were reluctant to confront migrant encroachers, as they have become better organized they are actively confronting individuals engaged in illegal forest activities. The community members have requested more of the following to strengthen protection: budget to better the walkways, patrol posts, legal recognition from the Forestry Administration for sites that are not yet approved, boundary posts, walking paths around boundary, two-way radios, some salary subsidies for patrols, and uniforms. In addition, the communities would like to receive some livelihood development support including training on cocoa and coffee cultivation, seeds collection and other non timber revenues. The villages also expressed a need for improved access to schools.

These communities' inputs have been key in the design of the project to support activities which will directly build their capacity to protect forests, while generating employment and income to local communities. Special initiatives funded under the project will reflect community priorities including walkways improvement and development, livelihood training and micro-financing, agricultural intensification, and related needs.

6.2.2 Specific Inputs from ACOPAGRO cooperative

Another main stakeholder is the organic and fair trade cooperative ACOPAGRO. The Cooperative is key to the project, as it was implicated since the beginning in the design of the project. Moreover, it has been developing since 2008 with Pur Projet a reforestation program in the same region with the same communities, and has therefore a strong legitimacy among farmers on environmental programs. On top of that, it is a famous cocoa cooperative in the whole province of San Martin and even outside the province, with a strong legitimacy and image. It is therefore helpful as primary member of Amazonia Viva foundation, to make the link and ensure smooth communication between Pur Projet and the participating communities.

On a technical point of view, ACOPAGRO's extensive experience in the development of agro-forestry organic agriculture and natural productivity intensification will be key as well to give training to the communities. Moreover, the Cooperative will be in capacity to setup and manage the supply chains and ensure distribution of non-timber products like seeds, medicinal plants extracts, honey, etc... ACOPAGRO will also be in charge as well of developing micro-credit activities.

ACOPAGRO will provide training to the communities on:

- improved agro-forestry practices, agro-ecological practices, forest protection, boundary demarcation,
- patrolling support including uniforms, huts, and communication equipment;
- Assisted Natural Regeneration activities;
- Small enterprise training and micro-finance development.

6.2.3 Specific Inputs from APAHUI organization

APAHUI is a strong organization of cocoa producers created recently before the project start with 80 farmers, but with a strong motivation and goal to become a complete cooperative with higher volumes of production.

They decided to join the REDD project in 2011, with the goal of joining their "Municipal Area for Conservation Huicungo" to the 2 others concessions for conservation, and formalize the land tenure of this area by asking for a concession for conservation for an area of 80 000 has from this municipal conservation area. The project expanded from 236 000 has to 316 000 has at their initiative.

6.2.4 Specific Inputs from Local Government

At the origination of the project, Local Government representatives mentioned that they have no funding to dedicate to meetings to discuss community forestry management issues at the provincial, district, or municipality level. They even requested funding from the project to allow provincial and district officials to travel to community forests areas, as well to meetings with stakeholders to resolve forest conflicts.

Local Forest Administration (INRENA) staff comment that they have limited resources with which to provide extension and custodial support to the community forests groups. They have requested project support to cover travel expenses to the forest areas including, transportation, gas and maintenance, and per diem for accommodation and food.

The stakeholder meetings with Forestry Administration, Local Government, and civil society organizations generated a range of comments that were discussed, explored and integrated into the project strategy and work plan. Community comments, as well as those of other stakeholders provide the basis for formulating activities.

This includes:

- improved forest protection through walkways improvement, boundary demarcation, patrolling support including uniforms, huts, and communication equipment;
- employment for Assisted Natural Regeneration activities;
- small grants for agro-forestry development;
- enhanced livelihoods through small enterprise training and micro-finance institution development.

Later after project initiation, local government developed the “Mesa REDD San Martin”, workgroup and exchange platform dedicated to the elaboration of the baseline scenario for REDD readiness of San Martin region in Peru. The roundtable involves technical consultants, representatives from regional and national government, representatives from the different conservation initiatives in the region, representatives of native communities, etc. Pur Projet and Amazonia Viva are part of the roundtable. So far the roundtable has been a platform to exchange on drivers and agents of deforestation, historical deforestation rates, future threats, etc. These elements were integrated to the project design.

6.3 Provisions for On-going Stakeholder Consultation during Project Implementation

The project ensures regular community feedback through discussions between the AMAZONIA VIVA Foundation and the implementing communities, and Pur Projet. The Amazonia Viva Foundation will meet quarterly to review experience and best practices to identify innovations for extension. These practices will receive special attention for inclusion in the coming year's work plan. AMAZONIA VIVA Foundation will also organize quarterly broader assemblies where all community members will be able to participate to give their feedback on the project. Given the lack of accessibility of some communities, AMAZONIA VIVA Foundation staff will also conduct regular field visits to all communities involved to collect their feedback. The AMAZONIA VIVA Foundation will play an active role in distributing key project documents to affected community members and key stakeholders as well as publicizing community events/meetings.

In addition, monitoring of socio-economic and environmental impacts will be conducted on a continuous basis, through the use of surveys (see questionnaire in appendix). A sample of farmers in the participating communities will be surveyed every 2 years to monitor the impact of conservation activities and collect their feedback on the project.

Periodic focus group discussions will be used to document how key activities are progressing and identify problems and issues. Case studies will be written by project staff and consultants to ensure lessons are captured.

Quarterly meetings of the provincial working group and the AMAZONIA VIVA Foundation will be used to inform local government representatives regarding project achievements and experiences.

Project documents and biodiversity and community monitoring data will be collected and processed by Pur Projet, and put at disposal of the communities and the cooperatives.

Annual work plans and budgets are developed each year based on feedback from the previous year's operations. The goal of this annual review by the AMAZONIA VIVA Foundation is to enhance the impact of project resources on carbon storage and sequestration, as well as livelihood and biodiversity goals. While an overall budget and strategic plan is provided in the Project Development Document (PDD) and related documents, the AMAZONIA VIVA Foundation together with project implementing organizations and community participants will have the flexibility to modify their annual strategies and budgets based on experiences from the previous years and emerging development priorities.

6.4 Procedure to publicize Public Comment Period

Parallel to the publishing of the English-version of the complete PDD and of an English and Spanish version of the PDD on CCBA website, Amazonia Viva organized a series of community sessions to present the document in each community, in 2 to 3 hour sessions with all community members, and in presence of communities' authorities. During these presentations, the fundacion Amazonia Viva presented the project in detail, and community members had a chance to ask questions and give inputs for inclusion in the project design. At the end of the meeting, a paper copy of the Spanish summary of the PDD was given to the community authority for consultation by all community members.

All Spanish comments were centralized by one person within the AMAZONIA VIVA Foundation, and translated into English, and sent to Pur Projet before the end of the public comment period.

6.5 Process for Handling Unresolved Conflicts

The project relies on existing and emerging institutions to mediate any conflict arising from project related activities. The AMAZONIA VIVA Foundation, ACOPAGRO, and APAHUI are the focal point in the community for preparing annual work plans and ensuring a transparent and participatory process among members. Since the AMAZONIA VIVA Foundation has close interaction with ACOPAGRO staff, and receives support from them, this process allows a consensus plan to emerge that minimizes the chance for conflict. Leading up to the start of project implementation, the project team will meet with all AMAZONIA VIVA Foundation members to receive their input into the first year work plan.

Conflicts that may arise during the course of project implementation will be handled by a defined process (available on request) supervised by Public authority of National Park Rio Abiseo, in whose buffer area is developed the project. The National Park Rio Abiseo authority approved his role as a third-party mediator to address conflicts within 30 days and resolve them. Since the park creation, the park authority has had a strong implication in the park's buffer area, and has a strong legitimacy for the communities and the various organizations in the area. Project conflicts and their associated responses will be documented by the National Park Authority and Fundacion Amzonia Viva.

HISTORY OF THE DOCUMENT

Version	Standard version	Date	Nature of revision
1.0	VCS v3	September 10 th , 2012	First version sent to SCS
2.0	VCS v3	October 30 th , 2012	Version revised after first round of findings. Revision of surfaces. Map of project area. Revision of leakage management area, leakage belt. Correction of the first fixed baseline period. Tables of projected deforestation for ref region and leakage belt Corrected Root to Shoot ratios. Correction of carbon stock decay/increase model. Update of tables with new inputs.
3.0	VCS v3	November 16 th , 2012	Version revised after second round of findings. Corrected monitoring periods in section 2.3.2.4.
4.0	VCS v3	December 21 th , 2012	Version revised after auditor's technical internal review. Acronyms defined in the whole document.

APPENDICES

- APPENDIX 1 : Geographical, physical, climatic description of the reference area
- APPENDIX 2 : Biodiversity and high conservation values in the project area
- APPENDIX 3 : Description of socio-economic conditions in participating communities
- APPENDIX 4 : Analysis of agents, drivers and underlying causes of deforestation
- APPENDIX 5 : Analysis of socioeconomic impacts

APPENDIX 1 : GEOGRAPHICAL, PHYSICAL, CLIMATIC DESCRIPTION OF THE REFERENCE AREA

A1.1 Climate

The proposed REDD project activity takes place in the Tropical Rainforest area (GPG LULUCF 2006, IPCC). According to the Koppen Classification System, the climate of the region is of the type AM, that is to say tropical warm, season humid, characterized by presenting abundant rainfall and a short dry season, which has no significant influence on the development of the vegetation due to the abundance of rainfall during the rest of the year.

According to the climatic classification proposed by Dr. W. Thornthwhite it has been determined that the climate in the area is humid and warm.

In general terms, it can be concluded that the climate in the studied area allows the development of agricultural activities and cattle raising without major limitations. On the other hand, the forestry sector is limited during the rainy season with respect to wood supply, which leaves a maximum of 5 months appropriate for the efficient use of this resource.

According to the Economic Ecological Zoning San Martín Region, the proposed area has the following types of weather:

Climate AB'4 Type: Corresponds to a super-humid climate (A) and semi-warm (B'4). It is located above 1200 to approximately 2000 m, especially on mountain slopes. It is estimated that every month excess moisture is present. It covers an area of approximately 15.67% of the proposed area.

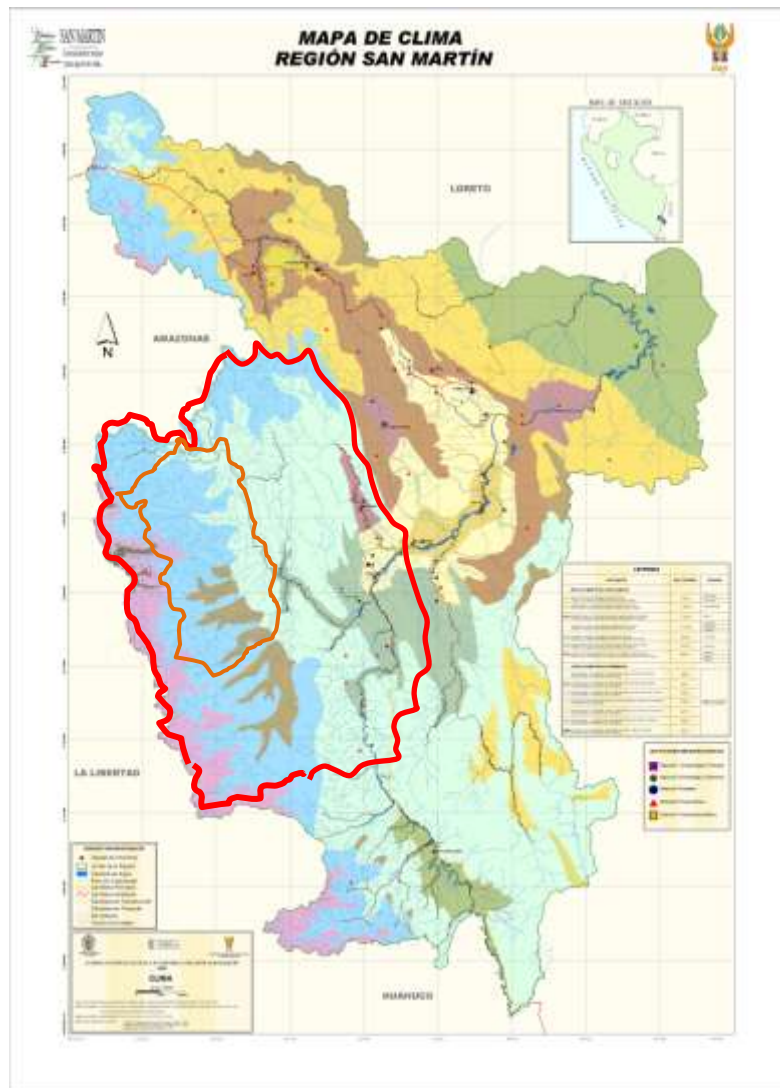
Climate B1rA'a' type: corresponds to a slightly damp climate (B1) and Warm (A'), with no water deficit (r) and low heat concentration in the summer (a '). It is estimated that every month excess moisture is present. It covers an approximate area of 0.01% of the proposed area.

Climate B4B'2 Type: Corresponds to a very humid climate (B4) and cool temperate (B'2), which corresponds to the jungle, which is located above 3000 m, especially on the hillsides. It is estimated that every month excess moisture is present. It covers an approximate area representing 2.64% of the proposed area.

Climate B4B'3 Type: Corresponds to a very humid climate (B4) and warm temperate (B'3). It is located at altitude levels ranging between 1800 and 2800 meters. It is estimated that every month excess moisture is present. It covers an area representing approximately 50.74% of the proposed area.

Climate B4B'4 Type: Corresponds to a very humid climate (B4) and semi-warm (B'4). It is located below 1200 m, especially on the slopes of mountains. It covers an area representing approximately 30.94% of the proposed area.

Figure 16 : Climate map of the project zone



A1.2 Geology

The geological units that form part of the Concession are as follows (see Map No. 05: Geological Survey)

Intrusive San Martín (Ps-gr/gd): Its composition is represented mainly by granite and granodiorite whitish color (leucocratic). This unit is considered an intrusive complex, as it shelters different types of igneous rocks ranging from granites, granodiorites and subvolcanic bodies as quartz latite. It occupies an approximate area equivalent to 0.11% of the proposed area.

Yarahuango Formation (Py): Corresponds to a set of red lithology continental layers, which begins the continental sedimentation with minor interruptions of marine transgressions. It occupies an area approximately equivalent to 0.19% of the proposed area.

Chonta Formation (Km-ch): Formed by limestone sequences as micritic limestones, bituminous marl, shale levels, pelitic as silty clays, gray-green. Silty clay presents gray-green laminar sequences, housing among drywall layers that are exposed in cross and parallel manner, and rectangular lenses of sandstone. Occupies approximately an area equivalent to 0.38% of the proposed area.

East Group (Ki-o): Includes white sandstone outcrops of medium-grained quartz. East Group sediments have undergone depositional stages, ranging from those made in an epicontinental shallow sea, which ranged between stages of transgression and regression; to sediments deposited in a tidal environment (deep sea). It occupies an area approximately equivalent to 3.91% of the proposed area.

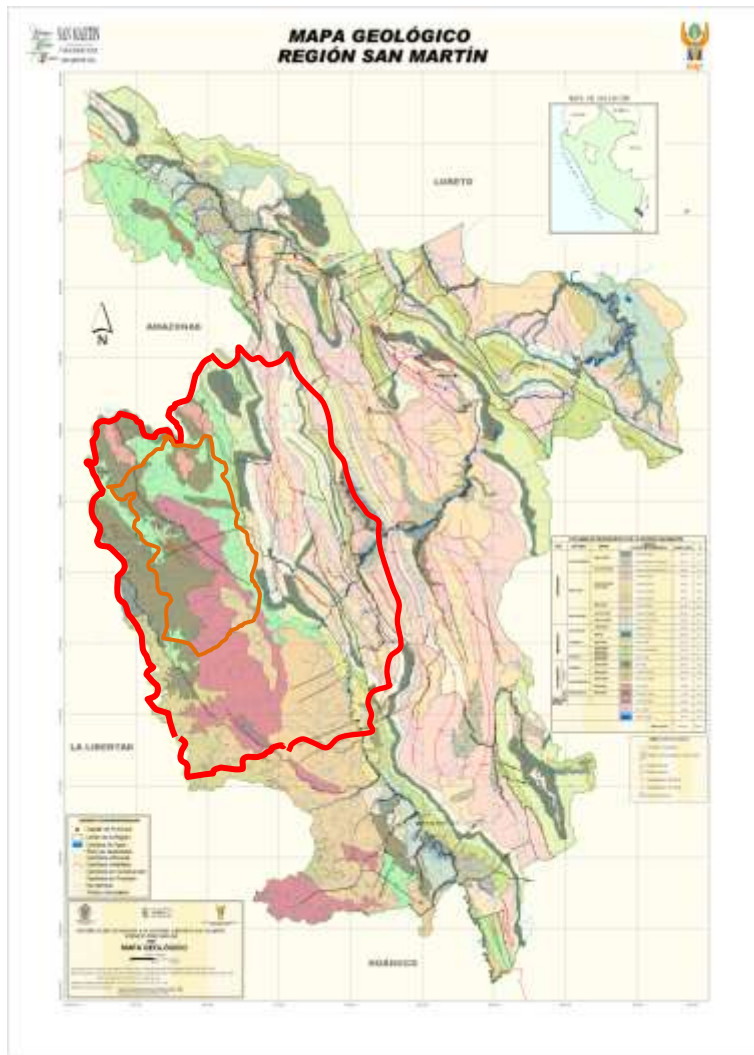
Ipururo Formation (Nm-i): Formed by reddish calcareous claystones grading to siltstone, sandstone interspersed with thin gray to greenish calcareous beds. Includes gray marl, reddish sandstone fine to medium grained, calcareous red claystones and volcanic sediments. It covers an area approximately equivalent to 7.09% of the proposed area.

Pucara Group (TsJi-p): Training Chambar, carbonate sequence consists of dark gray limestone interbedded with bituminous limestone and dolomitic limestone. As seen in the area where it floats Huicungo Huayabamba-gray limestone sequences, which occurs in thin to medium layers. It encompasses an area approximately equivalent to 26.18% of proposed area.

Mitu Group (Ps-m): Composed of a purely detrital molasse sequence alternating with volcanic material. These molasses are composed of conglomerates and sandstones interbedded with coarse-grained thin red shale levels. The clusters have the nature of shale, quartzite and granite, forming a sequence whose key feature is red. This group covers an area approximately equivalent to 29.01% of the proposed area.

Marañon Complex (PE-m): The representative lithology consists of greenish shales, gray gneiss, quartzite, slate, and metavolcanic. It occupies an area approximately equivalent to 33.13% of the proposed area.

Figure 17 : Geology map of the project zone



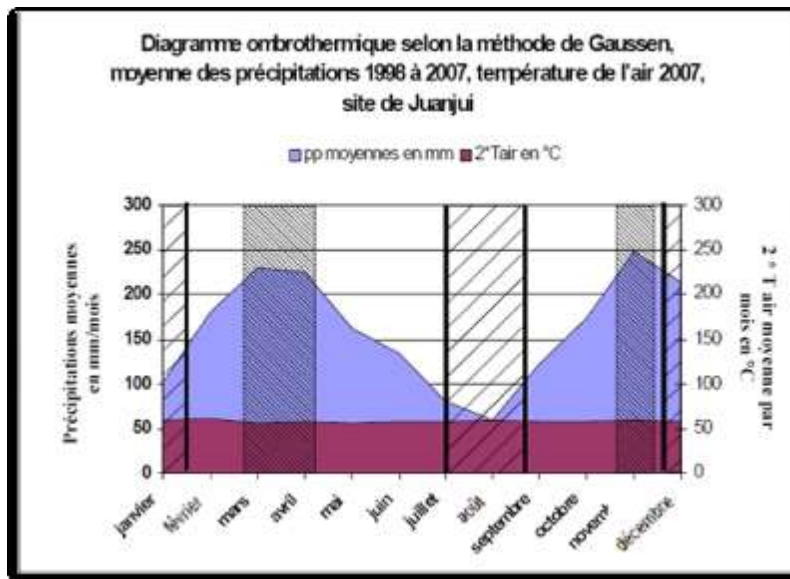
A1.3 Hydrology

In general terms, the area is characterized by the presence of abundant rainfall during most part of the year, being able to differentiate a long season denominated “winter” from October to May and a short dry season denominated “summer” from June to August. This pattern does have a significant influence on the development of the vegetation in the area.

Based on the information obtained from the Assis and Brasileia meteorological stations in Brazil between 1980 and 1989, the total medium annual rainfall is 2000 mm. This same data amounts to 1837 mm in Martin Sagrado. It can be appreciated that rainfall has less intensity during the months of May to September, where 20 to 25% of the total annual rainfall occurs. However, the dry season is not so dry, and there’s no severe drought in the region.

During the most rainy period, from October to April, 75 to 80% of the total annual rainfall occurs. Medium rainfall in the area shall be evaluated to approximately 1800 mm annually.

Figure 18 : Hydrology diagram in Juanjui (1998-2007)



Source: (RAJAUD, 2008)¹¹

A1.4 Hydrography

Taking as a reference to Maco, J. (2005), rivers and streams that make up the hydrographic network of the project zone are of the "clear water", which is characterized by the presence of crystalline water, allowing full transparency and clear observation of the channel bottom. This feature is that these water bodies are born and walk among the hills that present fairly consolidated geologic material. Many of them have moderate electrolyte content is reflected in the moderate electrical conductivity values. It is characteristic observed in these bodies of water turbidity after the fall of rain in the area of its basin, a process that lasts a very short time, and the presence of rapids in the rivers certain sections due to steep slopes of the channel into sections very short. These sections are usually partially blocked by rocks or stones that obstruct water, gaining power faster.



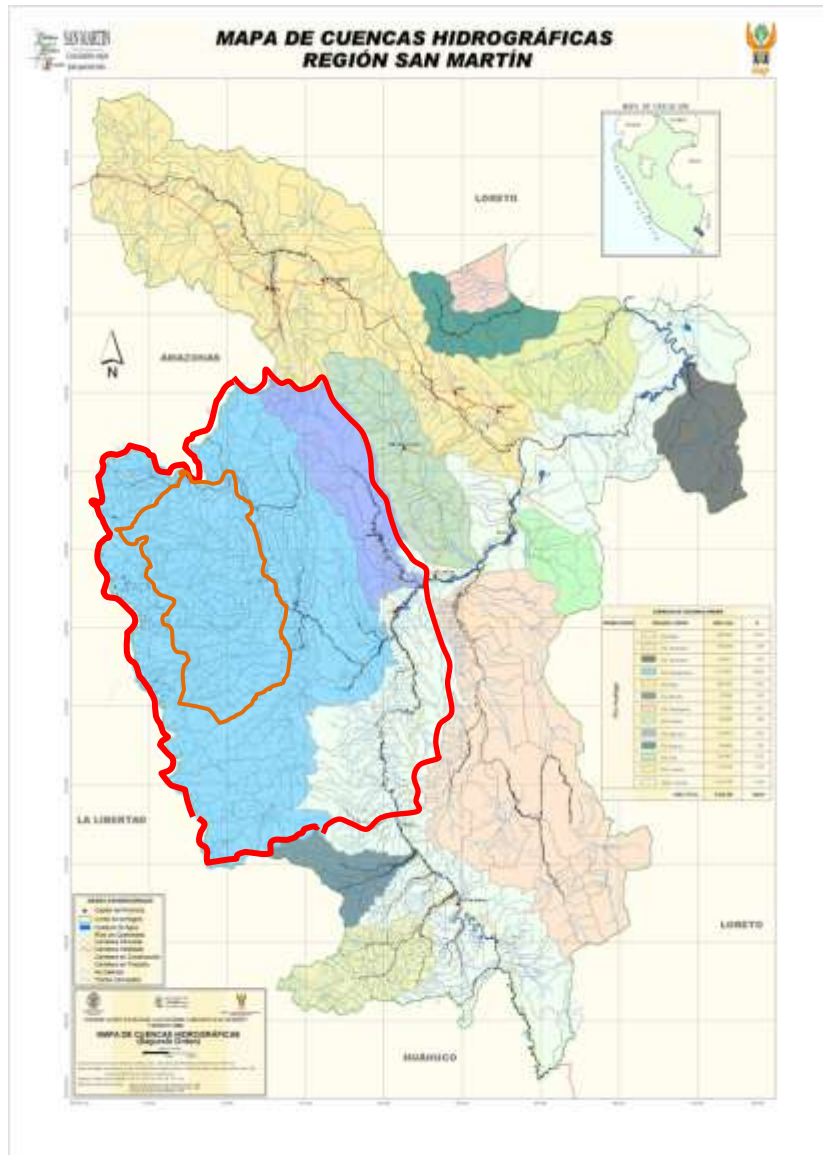
In the concession EL Breo, there are two watersheds: the watershed of Condorcillo 70,237.63 ha (61.71%). And the watershed of Rio Breo, comprising 43,588.50 hectares that represents 38.29% of the area. These rivers are major tributaries Huayabamba, born in the foothills of the Cordillera Oriental (see Map No. 08 Basin).

Below the confluence of Jelache to the confluence of Abiseo, there are no major tributaries of the river

¹¹ RAJAUD A, 2008. Analyse-diagnostic d'une petite région agricole située dans l'aire d'influence de la coopérative cacaoyère Acopagro, région de San Martín, Pérou - *Mémoire de DAA Développement Agricole AgroParisTech*.

Huayabamba, but only a series of short gorges (4-6km) on its right bank. In its lower reaches, the Huayabamba receives input from the Abiseo.

Figure 19 : Hydrography map of the project zone



A1.5 Physiography

Physiographic units that make up the surface area for project zone are described below:

Physiographic Province: Andean Cordillera

The Andes is generally characterized by presenting a varied topographical configuration from alluvial valleys and terraces to form hills and mountains, with very uneven relief. The project area has two units physiographic province weather: cold Land and Land perhumid warm to temperate.

A1.5 A) Unit warm to temperate climate Land:

Covers much of the project area. It covers an area approximately equivalent to 97% of the proposed area. With temperatures ranging from 14.5 ° C - 25 ° C, with annual rainfall of 500 to 4,000 mm and altitude from 500 to 3,500 meters. In the proposed area, this unit has two major climatic landscapes: mountainous (eastern range), mountainous terrain and hills (mountains subandina).

- Great mountainous landscape (Cordillera Oriental):

It is characterized by rugged topography with slopes ranging from 25 to 75%. It features a single landscape: High Mountain Landscape. It is formed by the elevations of land which have an altitude above 800 m. These categories are:

- High mountains of steep slopes: Dissected relief Presents Protection Association of Communal Forest Dos de Mayo - Alto Huayabamba Technical Proposal that supports the creation of the Conservation concession for "The Breo '30 with slopes ranging from 25-50%, soils are very shallow due to contact lithology.
- High mountains of steep slopes: Presents strongly dissected relief with slopes ranging from 50 to 75%. The soils are very shallow.
- High mountains extremely steep hillside: Presents strongly dissected relief with slopes greater than 75%. The soils are very shallow lictico by contact.

- Great Landscape mountainous terrain and hills (Sub-Andean Cordillera)

Exhibits from flat topography with slopes (0-4%) located in the valleys to very rough relief with slopes greater than 75%. It consists of a landscape that is described below: High Mountain Landscape. It consists of ground elevations have an altitude of over 800m. They have identified two sub landscapes according to its slope:

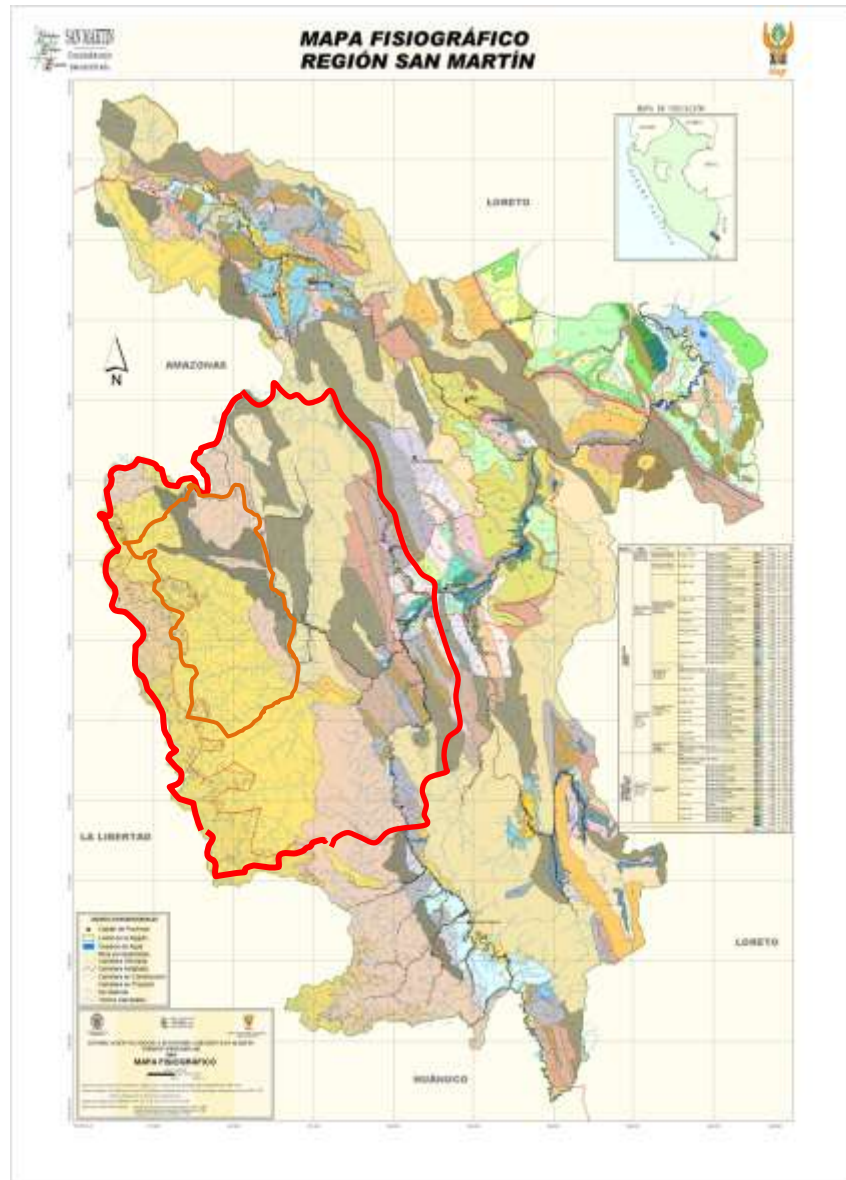
- High mountains steep slopes: Presents relief with slopes ranging from 25 to 50%. The soils are shallow.
- High mountains of steep slopes: Presents strongly dissected relief with slopes ranging from 50 to 75%. The soils are shallow to very shallow

A1.5 B) Unit Climate: Cold Lands perhumid

It covers an approximate area of 3% of the project area. With temperatures ranging from 3 ° to 6 ° C, with average annual rainfall of 1,750 to 1,800 mm and 3.250 to 4.500 m altitude. This unit features a large landscape climate, mountainous relief (Cordillera Oriental), described below: Great Landscape: Mountainous Terrain (Cordillera Oriental), is characterized by rugged topography with slopes ranging from 25 to 75%. It features a single landscape: High Mountain Landscape. It is formed by the elevations of land which have an altitude of over eight hundred feet high. These categories are:

- High mountains steep slopes: Raised dissected with slopes ranging from 25 to 50%, soils are shallow to moderately deep, moist depressions in areas dominated soil organic in nature.
- High mountains of steep slopes: located in the western part of the San Martin region, have strongly dissected relief with slopes ranging from 50 to 75%, the soils are shallow to very shallow.

Figure 20 : Physiography map of the project zone



A1.6 Soils

Generally soils are poor in nutrients, due to the nature of the lithology below, the strong chemical meteorization (caused by high temperatures and high humidity) and the washing of nutrients due to heavy rain during great part of the year. In these natural conditions, the fertility of the soil is linked to the organic cycle. Due to the abundant vegetative cover of the tropical forest there is a constant supply of organic matter, mainly as litter that afterwards is transformed into humus. Due to climatic conditions and the action of microorganisms, the decomposition of the organic matter is so fast that it only leaves a thin layer of humus relatively rich in nutrients. It is observed that most of the roots of the plants are found in this superficial layer to absorb the nutrients.

In the high plains, soils are generally well drained. Only in these not very dissected units, soils are poor and moderately drained. Soils in the high plains have low fertility and could develop toxic levels of aluminum for the plants.

Soils in low plains vary from poor to moderately well drained, depending on the grade of dissection. They have low to very low fertility and the aluminum saturation is very high.

In the highly dissected hills and in lower proportion, soils present a franca texture in the superficial layer and an accumulation of clay in the subsoil, consequently they are very susceptible to erosion.

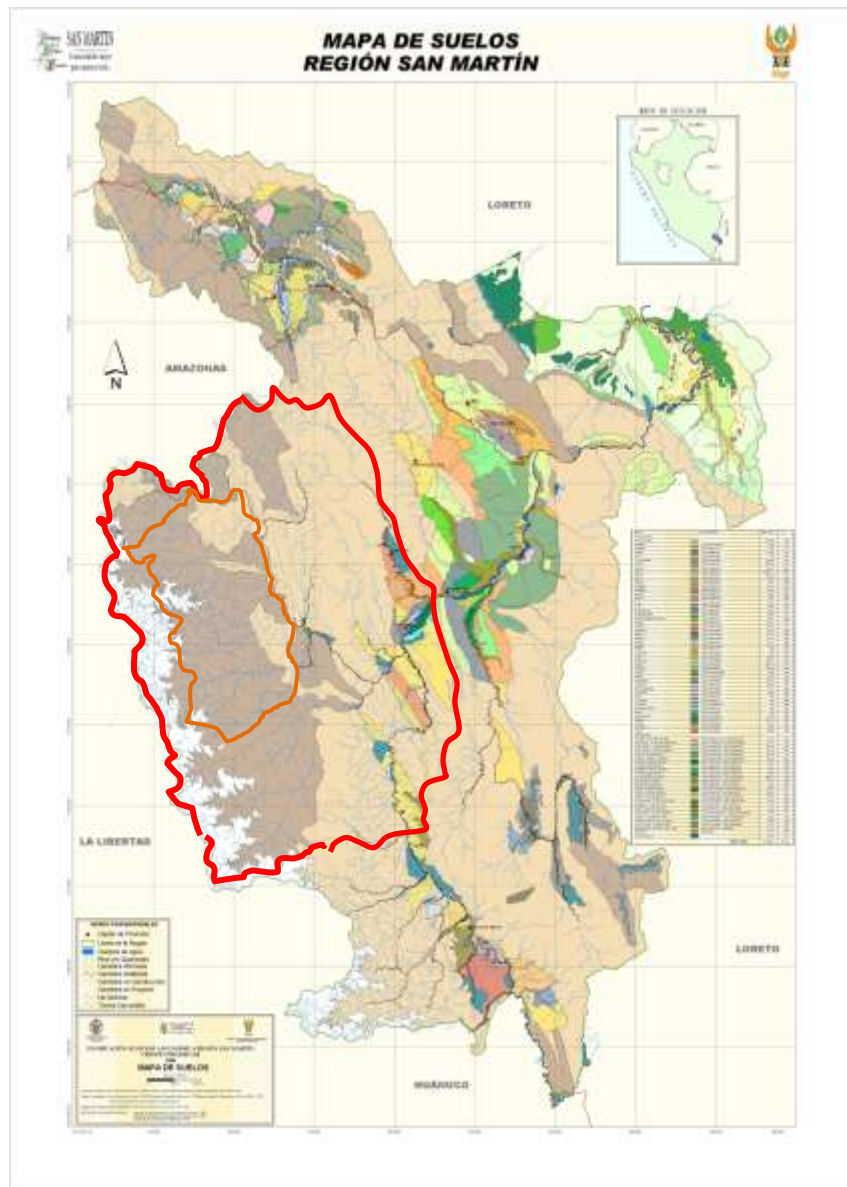
There are 5 soil series in the project zone, according to the “Zonificación Ecológica Económica 2004”, made by the regional government of San Martín, following the US Soil Taxonomy (1990):

Calera Series I (Lithic Udorthents): Equivalent to 78% of the proposed area. Made up of soils derived from calcareous residual materials (shales and limestones). The soil is very superficial, with a weakly developed A horizon, thin layered (less than 40 cm), well drained, variable texture, granular structure and friable consistency. These soils have a neutral reaction (pH 6.6-7.3), high organic matter content (8.48%). Due to some limitations of slope and depth, these soils are targeted for protection purposes only.

Nippon Series I (Lithic Udorthents): Equivalent to 20% of the proposed area. Made up of soils derived from acidic waste materials (quartz sandstones). Located in areas of steep slopes of high hills and mountains. They are very shallow, well drained, coarse-textured, friable mass. When there is still a C horizon of limited thickness and gravel mixed with smaller gravel of different degrees of decomposition. Extremely acidic reaction (pH 4.5), high aluminum saturation and base saturation. Due to some limitations of slope and depth, the vocation of these soils is geared for protection purposes only.

In very small proportions, on the banks of Huaybamba river close to Dos de Mayo, Santa Rosa communities, there are 3 more soil types: **Belavista Palido (Typic Hapludalts), Copara I (Typic Eutrudepts), and Moparo I (Typic Dystrudepts).**

Figure 21 : Soil map of the project zone



A1.7 Soils Use capacity

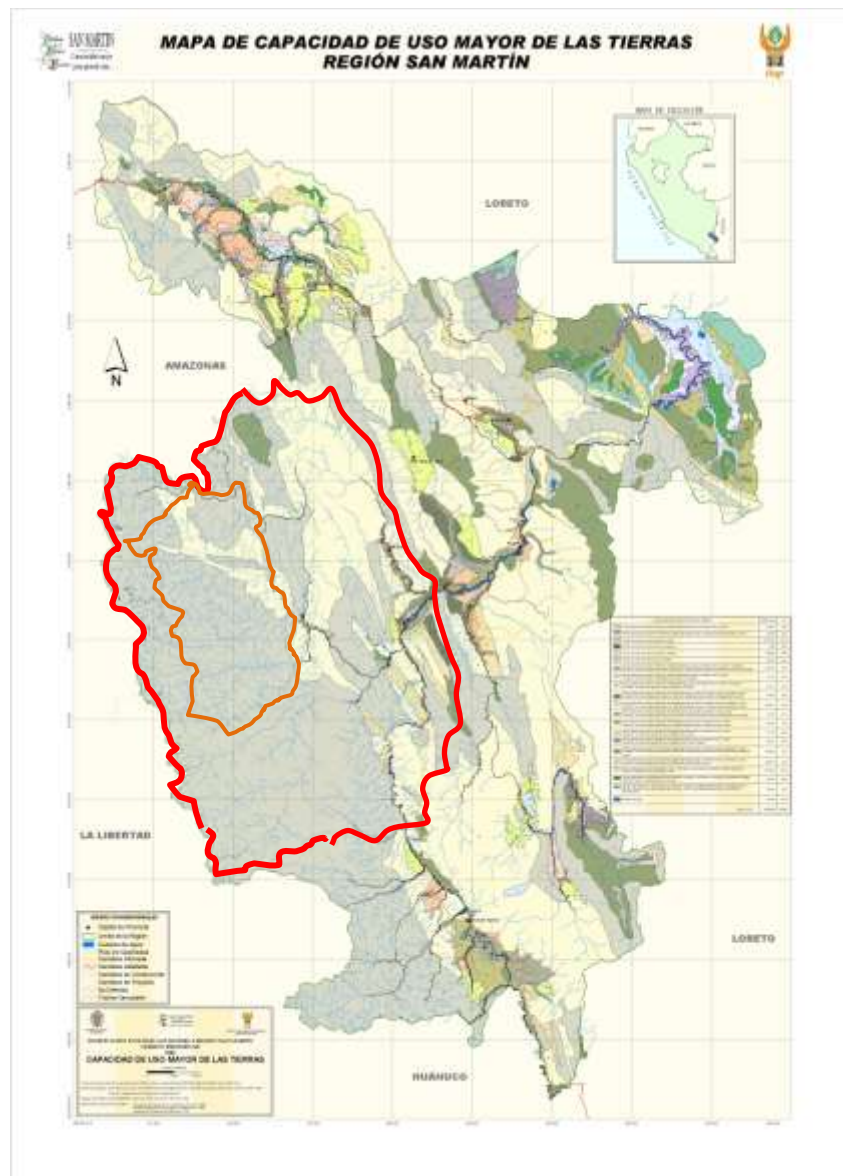
The project zone includes lands that have no ecological or soil conditions required for the operation of crops, pasture or forest production and other lands, although they have natural forest vegetation. Its use is not economical and should be managed for watershed protection, wildlife, scenic values, recreational and other involving collective benefit or social interest. Within this group we have:

Simple: Xes: Includes an approximate area of 85%, includes surface soils, in areas of steep slopes, with evidence of erosion. The limitations of use are related to soil and topographic factors, soil erosion.

Associated: Xes-F2es: Includes an approximate area of 15 %: association of soils for land protection with limitations concerning relief which is very steep, and land suitable for forest production, but with limitations concerning terrain, poor fertility and depth the ground.

At very small scale, on the banks of the Huayabamba river near the communities of Dos de Mayo and Santa Rosa, the project zone includes areas of land for permanent cultivation of average quality with limitations due to slopes and erosion, and land for forestry of average quality with limitations due to slopes and erosion.

Figure 22 : Soil use capacity map of the project zone



A1.8. Ecosystems

The project area completes a major role in the connectivity between the Abiseo River National Park and the “Bosque de Protección Alto Mayo”, part of the Conservation Corridor for Abiseo - Condor - Kutukú, considered as high priority for conservation and nucleus of one of the centers of high diversity (“Biodiversity hotspots”) in the Tropical Andes.

Part of the project area also has the status of being a buffer zone for the Abiseo River National Park.

Due to its hydrographic position and its topographic variations, the project area includes the following ecological floors: Tropical Wet Forest (bh T) and Subtropical Wet Forest (bh S/T) (in transition to a subtropical very wet forest).

Terrestrial Ecological Systems – SETs

The Data Center for Conservation - UNALM & TNC (2006), using biophysical models from different inputs and different methods, identifies and describes the terrestrial ecological systems (SET) of the Peruvian Yungas. Applying the digital map material produced by superimposing the reference and the proposed area coverage using the program Arc View 3.3, it was determined 09 types of SETs for the project zone, which are detailed below:

Pluviseasonal Andean shrub and high mountain grasslands:

They have a brush or grass-type cover, and xeric tropical or tropical pluviseasonal bioclimate. It is located in high mountain areas. Altitude 2900 m from the potential to over 3600msl.

High Mountain Rainforests:

Yunga hyper humid rain forest system, dominated and characterized by several species of evergreen trees and shrubs, and leaves lauroides sub-escleromorfos. Among species present in this well-preserved forests, the genera Podocarpus, Weinmannia, Oreopanax, Hesperomeles and Ilex. The forests are of low or medium height, canopy between 10 and 20 meters, featuring several levels or layers of undergrowth, large biomass of epiphytic non-vascular. It is located on high mountain slopes and ridges of mountains with frequent fog. Frequent Chusquea spp. and Ericaceae in the understory. Potential Altitude 3100 - 3200 msl to 3700 msl.

High Mountain Pluviseasonal forest:

Yunga forests in areas with humid pluviseasonal bioclimate. Existence of an period with marked decrease in annual rainfall. Crop conditions and human uses are also different from those in High Mountain rainforests, with a significant incidence of fire as an element or factor anthropic landscape transformation. It is located on high mountain slopes, soil deep, well drained. Potential Altitude 2900 - 3100 m to 4000 - 4200msl.

Medium Mountain Rainforests:

Set of associations of evergreen forests, of medium or high height, multi-layered and quite diverse. They have abundant epiphytes and common ferns. They thrive in areas with hyperhumid tropical bioclimate, on deep soils and well drained humus. Forests well preserved are generally dominated by species Podocarpus, Weinmannia Prumnopitys. It is located on mountain slopes with well drained soils and frequent fog. Potential Altitude 1700 - 1900 m to 2900 - 3100 meters.

Medium Mountain Pluviseasonal forest:

Ecological system similar as the Medium Mountain Rainforests, but in areas of pluviseasonal tropical bioclimate, particularly in mountain areas with less steep slopes or in valleys with partial effect of orographic rain shadow. Associations of seasonal evergreen forests, developed in humid pluviseasonal areas. And, as in the previous case, well preserved rain forests are dominated by Podocarpaceae species or genera as Weinmannia, Clethra, Hesperomeles and Ilex. It is located on mountain slopes with well drained soils. Potential Altitude 1700 - 1900m to 2900 - 3100msl.

Lower Mountain Evergreen forests:

Ecological system of the thermotropical Yungas whose potential vegetation is evergreen high and middle-height forest (15 - 20 meters). Vegetation is quite diverse, but often has in common several species of *Juglans Cinchonoideas* (*Cinchona*, *Ladenbergia*). They thrive in moist soil very deep, well drained to excessively drained slopes of the sub-Andean mountains. Potential Altitude 1200 - 2200msl.

Lower Mountain rainforests and palm forest:

Ecological system with dense multilevel forest vegetation, often with abundant palms *Andes* (*Dictyocaryum*), developed in the higher elevations of the lower mountains, above about 1200 to 1400 meters, where it is preferably higher slopes and ridges or mountain ridges of the sub-Andean terrain well exposed to rain and fog. It develops on soils quite deep. The floristic composition is often characteristic of species of trees and shrubs *Cinchonoideas* (*Ladenbergia*, *Cinchona*). It is located on high mountain slopes and ridges dividing well-drained soils. Potential Altitude 900 - 1000 m to 1700 - 2000 meters.

Mountain forests and xeric shrublands of interAndes valleys:

Vegetation of semi-dry and dry valleys of the interandes floor of the Yungas, which shows a marked climatic effect of orographic rain shadow with dry xeric bioclimate. It is located on the mountain slopes of the montane well-drained soils to more or less degraded or eroded. Altitude 2300-3200m.

Transitional Rainforest of the foothills:

Forest is structurally high (20-30 meters), multi-layered, evergreen and with high floristic diversity, constituting one of the most complex ecological systems, diverse and less known. It is strongly threatened by recent human colonization, involving high annual rates of deforestation. Mountain slopes and foothills with well drained soils. 800 to 900 meters above sea level from 1700 to 2000 meters.

A1.9. Vegetation

Based on the interpretation of LANDSAT TMS satellite images, the Technical Unit in charge of the Ecologic Economic Zoning of the San Martin Province carried out a classification of vegetation types. 53 vegetal formations have been identified of which 39 correspond to forests, totaling 2.8 million hectares in San Martin (Source: ZEE, 2005).

The presence of associations and subtypes of forests within the major identified vegetation types is caused by the heterogeneity that characterizes the tropical forests. Generally, the timber species are distributed within the whole area, varying in frequency and volume in each type of forest.

The proposed project zone encompasses 5 vegetation types :

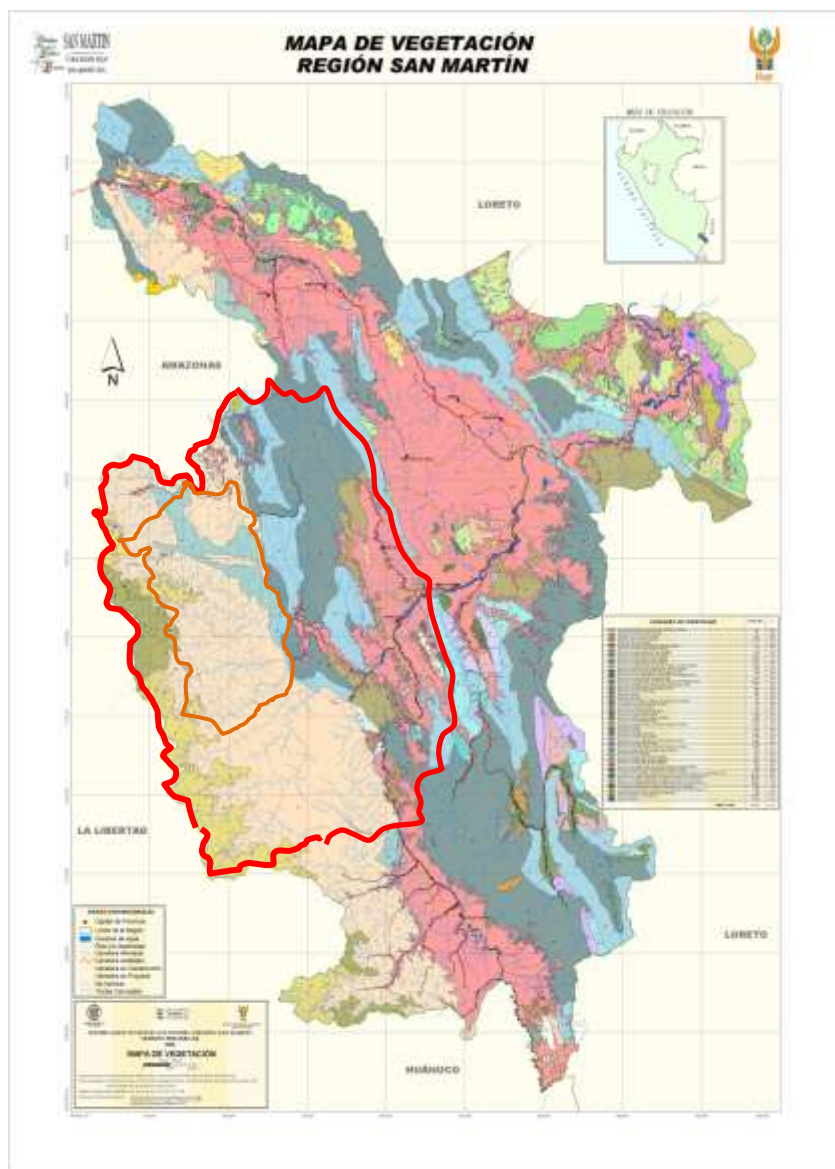
- Forests of higher Andean mountains with medium trees in association with "matorrales" (approximately 85% of the area)
- Forests of lower Andean mountains with medium trees and dense "matorrales" (~5%)
- Forests of higher Andean mountains with medium trees and dense "sotobosque" (~4%)
- Combination in higher Andes of herbaceous with bushes and smaller trees and "matorrales" dispersed
- Combination in lower Andes of medium and dispersed trees with dense "matorrales"

This Amazon Andean foothill forest is characterised by the following species:

Aspidosperma rigidum, *Astrocaryum murumur*, *Attalea phalerata*, *Brosimum acutifolium*, *B. lactescens*, *Cariniana estrellensis*, *Cedrela odorata*, *Celtis schippi*, *Cetrolobium ochtryxylum*, *Clarisia biflora*, *C. racemosa*, *Coussapoa ovalifolia*, *C. villosa*, *Erythrina poeppigiana*, *Guarea macrophylla*, *Iriartea detoidea*, *Leonia glyxicarpa*, *Porcelia steinbachii*, *P. ponderosa*, *Poulsonia armata*, *Pourouma cecropiifolia*, *Protium opacum*, *Pseudolmedia laevis*, *P. macrophylla*, *Ruizodendron ovale*, *Sloanea*

guianensis, *Socratea exorrhiza*, *Spaattosperma leucanthum*, *Swietenia macrophylla*, *Tabebuia serratifolia*, *Tapura acreana*, *Terminalia amazonica*, *T. oblonga*, *Trichilia pleeana*, *Thrihis caucana*. (Navarra, 2002¹²).

Figure 23 : Vegetation map of the project zone



¹² Navarro, 2002, *Geografía Ecológica de Bolivia. Vegetación y Ambientes Acuáticos*. Centro de Ecología Simón I. Patiño-Departament de Difusión. Cochabamba. 719

APPENDIX 2 : BIODIVERSITY AND HIGH CONSERVATION VALUES IN THE PROJECT AREA

A2.1 Terrestrial Ecological Systems – SETs

The Data Center for Conservation - UNALM & TNC (2006), using biophysical models from different inputs and different methods, identifies and describes the terrestrial ecological systems (SET) of the Peruvian Yungas.

At coarse filter level (ecosystem level), within the Peruvian Yungas Ecoregion, the CDC-UNALM identified 18 SETs as conservation targets (CDC-UNALM and TNC, 2006). The SETs are defined as "groups of plant communities that tend to co-occur in the landscape due to its relationship with common factors and determinants and ecological processes, substrates and / or environmental gradients" (Josse et al., 2007:11). The use of SETs to evaluate the effectiveness of conservation has many advantages because it combines in one system: ecological, dominant vegetation and landforms.

Applying the digital map material produced by superimposing the reference and the proposed area coverage using the program Arc View 3.3, **09 types of SETs** have been identified as priority conservation targets for the project area, which are detailed in the General information G1.2 "The types and condition of vegetation within the project area".

These units synergistically complement those already included in the Abiseo River National Park and the Concession for Conservation "Alto Huayabamba," forming a more robust and resilient block to global climate changes to come.

A2.2 Flora inventory in the reference project area

Table 34 : **List of species of flora listed in the inventory**

FLORA		
Angiospermae	Families	Species
	PROTEACEAE	<i>Oreocallis grandiflora</i> (Lam.) R. Brown "saltaperico", "cucharilla"
	OLACACEAE	<i>Heisteria acuminata</i> (H.B.K.) Engler "chuchuhuasi"
	SANTALACEAE	<i>Cervantesia tomentosa</i> R. & P.
	POLYGONACEAE	<i>Muehlenbeckia volcanica</i> (Benth.) Endlicher "mullaca"
		<i>M. tamnifolia</i> (H.B.K.) Meiss "bejuco"
		<i>Polygonum aviculare</i> L. "pica pica"
		<i>P. hydropiperoides</i> Michaux "pica pica"
		<i>Rumex acetocella</i> L. "lengua de vaca"
		<i>R. crispus</i> L. "lengua de vaca"
		<i>R. conglomeratus</i> Murray "lengua de vaca"
		<i>R. obtusifolius</i> L. "lengua de vaca"
		<i>Triplaris peruviana</i> Fisch. & Meyer ex C.A. Meyer
	CHENOPODIACEAE	<i>Chenopodium ambrosioides</i> L. "paico"
		<i>C. murale</i> L. "hierba gallinazo"
		<i>C. pallidicaule</i> Aellen "cañigua"

		<i>C. quinoa</i> Willd. "quinua"
	AMARANTHACEAE	<i>Alternanthera elongata</i> (Willd. ex Roem. & Schultes) Schinz "hierba"
		<i>A. macbridei</i> Standley "yahuar milckay"
		<i>A. porrigens</i> (Jacq.) Kuntze "moradilla"
		<i>Amaranthus caudatus</i> L. "kiwicha"
		<i>Guilleminea densa</i> (Willd.) Moq.
		<i>Iresine difusa</i> H.B.K. ex Willd.
	ANNONACEAE	<i>Unonopsis guatterioirdes</i> (A.DC.) R.E. Fries
	MONIMIACEAE	<i>Siparuna pyricarpa</i> (R. & P.) Perkins
		<i>S. weberbaueri</i> Perkins "limoncillo"
	LAURACEAE	<i>Endlicheria bracteata</i> Mez "canela moena"
		<i>Nectandra cissiflora</i> Nees "muina"
		<i>Ocotea balanocarpa</i> Mez. "muena"
		<i>Persea caerulea</i> (R. & P.) Mez.
		<i>Pleurothyrium cuneifolium</i> Nees "canela muena"
	PIPERACEAE	<i>Peperomia ferreyrae</i> Yuncker "peperomia"
		<i>P. galioides</i> H.B.K. "peperomia"
		<i>P. hilli</i> Trelease "peperomia"
		<i>P. obtusifolia</i> (L.) A. Dietrich "peperomia"
		<i>Piper aduncum</i> L. "matico"
		<i>P. corpunya</i> R & P. "matico"
		<i>P. moho moho</i> C. DC. "matico"
		Y otras especies de Piper y Peperomia probablemente nuevas para la
D > U O H	PAPAVERACEAE	<i>Bocconia integrifolia</i> H & B. "pincullo"
		<i>Bocconia pearcei</i> Hutchison "pincullo"
	BRASSICACEAE	<i>Rorippa nasturtium-aquaticum</i> (L.) Hayek "berro"
	ROSACEAE	<i>Rubus roseus</i> Poir "zarzamoras"
		<i>R. acanthophyllus</i> Focke "fresas"
	FABACEAE	<i>Amburana cearensis</i> (Allem & Atilde) A.S. Smith "ishpingo"
		<i>Astragalus garbancillo</i> Cav. "garbancillo"
		<i>Cedrelinga cateniformis</i> Ducke "tornillo"
		<i>Caesalpinia sepiaria</i> Roxb "caesalpinia"
		<i>Dalea cilíndrica</i> Hook. "dalea"
		<i>Desmodium limense</i> Hook "pie de perro"
		<i>Erythrina peruviana</i> Krukoff "pajuro"
		<i>Indigofera tephrosioides</i> Kunth "añil"
		<i>Medicago lupulina</i> L. "alfalfilla"
		<i>M. polymorpha</i> L. "alfalfilla"
		<i>Melilotus indica</i> (L.) All. "alfalfilla"
		<i>Otholobium glandulosum</i> (L.) J.W. "culén"
		<i>O. mexicanum</i> Grimes "culén"

		<i>Senna birostris</i> (Dombey ex J. Vogel) Irwin & Barneby
		<i>Trifolium amabile</i> Kunth “chijape”, “trébol”
		<i>Vicia andicola</i> Kunth “alberjilla”
	GERANIACEAE	<i>Erodium cicutarium</i> (L.) L’Herit ex Aiton “alfiler”
		<i>E. malacoides</i> (L.) L’Herit & Eacute “alfiler”
		<i>E. moschatum</i> (L.) L’Herit & Eacute ex Aiton “alfiler”
		<i>Geranium sessiliflorum</i> Cav. “ojotilla”
	ERYTHROXYLACEAE	<i>Erythroxylum coca</i> Lam. “coca”
	EUPHORBIACEAE	<i>Chriopetalum ruizianus</i> (muell. Arg.) Pax & Hoffm.
		<i>Croton alnifolius</i> Lam. “crotón”
		<i>C. lechlerii</i> Muell. Arg. “sangre de grado”
		<i>C. palanostigma</i> Klotzsch “sangre de grado”
		<i>C. ruizianus</i> Muell. Arg “cabra cabra”
		<i>Dalechampia aristolochiaefolia</i> Kunth
		<i>Euphorbia huachanhana</i> (Klotzsch & Grarcke) Boiss
		<i>Hura crepitans</i> L. “habilla”
		<i>Sebastiania obtusifolia</i> (H.B.K.) Pax & Hoffm.
	MELIACEAE	<i>Cedrela odorata</i> L. “cedro”
		<i>Swietenia macrophylla</i> “caoba”
	MALVACEAE	<i>Malva parviflora</i> L. “malva”
		<i>Sida rhombifolia</i> L. “sida”
		<i>Urocarpidum macrocerpum</i> Krap. “malva”
	BOMBACACEAE	<i>Ceiba insignis</i> (Kunth) Gibas & Semir “barrigón”
	PASSIFLORACEAE	<i>Passiflora huamachucoensis</i> L.K. Escobar
		<i>P. ligularis</i> Juss. “granadilla”
		<i>P. peduncularis</i> Cav. “cholgama”
		<i>P. tripartita</i> var. <i>mollisima</i> (Kunth) Hala. Nielse & Jorgense “poro poro”
	CARICACEAE	<i>Vasconcellea candicans</i> (Gray) A. DC. “papaya”
		<i>V. heterophylla</i> (Gray) DC. “papaya”
	BEGONIACEAE	<i>Begonia hirtella</i> Link “begonias”
		<i>B. acerifolia</i> Kunth “begonias”
		<i>B. octopetala</i> L’Herit. “begonias”
		Y probables especies nuevas para la ciencia.
	MELASTOMATACEAE	Existen varias especies por determinar, posiblemente nuevas para la ciencia.
	RUBIACEAE	<i>Arcytophyllum tymifolium</i> (R. & P.) Standl.
		<i>Cinchona pubescens</i> M. Vahl. “cascarilla”
		<i>C. micrantha</i> R. & P. “cascarilla”
		<i>Galium aparine</i> L.
		<i>Manettia peruviana</i> Standl.
		<i>Palicourea macrobotrys</i> (R. & P.) Roem & Schult (otras especies más)

		<i>Psychotria caerulea</i> R. & P. (otras especies más)
		<i>Randia obovata</i> R & P.
		<i>R. killippi</i> Standl.
	VERBENACEAE	<i>Aloysia tripilla</i> (L'Herit) Britton "cedrón"
		<i>Cytharexylum flexuosum</i> R. & P.) D. Don
		<i>Duranta membranacea</i>
		<i>Lantana armata</i> Schauer "lantana"
		<i>L. camara</i> L. "lantana"
		<i>L. reptans</i> Hayek "lantana"
		<i>Stachytarpheta cayennensis</i> (Rich) M. Vahl
		<i>Verbena cuneifolia</i> R. & P. "verbena"
		<i>V. litorales</i> Kunth "verbena"
		<i>V. fasciculata</i> Benth "verbena"
	SOLANACEAE	<i>Acnistus arborescens</i> (L.) Schltdl. "chimulala"
		<i>A. umbellatus</i>
		<i>Browalia americana</i> L. " flor de mayo"
		<i>Brugmansia arborea</i> (L.) Lagerth "floripondio blanco"
		<i>B. sanguinea</i> (R.&P.) D.Don "puca campanilla", "floripondio rojo"
		<i>Cestrum auriculatum</i> L'Herit "hierba santa"
		<i>C. strigilatum</i> R. & P. "hierba hedionda"
		<i>Cyphomandra betacea</i> (Cav.) Sendtn "berengena"
		<i>Dunalia spinosa</i> (Mey.) Dammer "espino"
		<i>D. umbellata</i> (Dunal) J.F. Macbr.
		<i>Lochroma calycinum</i>
	SOLANACEAE	<i>I. grandiflorum</i> Benth "campanilla"
		<i>I. umbellatum</i> (R.&P.) Hunziker ex D'Arcy "shirac"
		<i>Jaltomata biflora</i> (R.& P.) Benitez , y otras especies más
		<i>Larnax</i> género con varias especies
		<i>Nicandra physalodes</i> (L.) Gaertn "capulí cimarrón"
		<i>Nicotiana glauca</i> Graham "tabaco silvestre"
		<i>N. glutinosa</i> L. "tabaco silvestre"
		<i>N. paniculata</i> L. "tabaco cimarrón"
		<i>Physalis peruviana</i> L. "tomate silvestre", ""aguaymantu"
		<i>Salpichroa ramosissima</i> Miers. "cuytulumbo"
		<i>S. tristris</i> Miers.
		<i>Solanum abitaguense</i> S. Knapp "papa de zorro"
		<i>S. bukasovii</i> Rybin "papa de zorro"
		<i>S. jalcae</i> Ochoa "papa de zorro"
		<i>S. trinitense</i> Ochoa "papa de zorro"
		<i>S. sesile</i> R. & P. "papa de zorro"
		<i>Streptosolem jamesonii</i> (Benth) Miers.

	PLANTAGINACEAE	<i>Plantago lanceolata</i> L. “llantén”
		<i>P. limensis</i> Pers “llantén”
		<i>P. rigida</i> Kunth “llantén”
	CAPRIFOLIACEAE	<i>Sambucus peruviana</i> Kunth “saúco
		<i>Viburnum ayavacense</i> H.B.K.
		<i>V. triphyllum</i> Benth
	VALERIANACEAE	<i>Phyllactis rigida</i> (R. & P.) Pers. “valeriana estrella”
		<i>Valeriana candolleana</i> Gardner “valeriana”
		<i>V. clematitis</i> H.B.K. “valeriana”
		<i>V. decussata</i> R. & P. “polo polo”
		<i>V. mirophylla</i> Kunth “valeriana”
		<i>V. pinnatifida</i> R. & P. “alberjilla”
	ASTERACEAE	<i>Achyrocline alata</i> (H.B.K.) DC. “espigo de oro”, “huira huira”
		<i>Ageratina azangaroensis</i> (Schultz-Bip ex Wedd.) King & H. Rob. “huarmi huarmi”
		<i>Bidens andicola</i> H.B.K. “amor seco”
		<i>B. pilosa</i> L. “amor seco”
	BROMELIACEAE	<i>Aechmea mertensii</i> (Mey) Schult. f
		<i>Bromelia varias</i> especies
		<i>Guzmania strobilanthes</i> (R. & P.) Mez
		<i>G. monostachia</i> (L.) Rugby ex Mez
		<i>Greigia macbrideana</i> L.B.Sm.
		<i>Pitcairnia ferreyrae</i> L.B. Sm.
		<i>P. paniculata</i> (R. & P.) R & P.
		<i>Puya fulgens</i> L. B. Sm. Y varias especies más
DYCOTYLE DONEAE	BROMELIACEAE	<i>Tillandsia capillaris</i> R. & P.
		<i>T. latifolia</i> Mey
	BROMELIACEAE	<i>T. sagasteguii</i> L.B. Sm.
		<i>T. seemannii</i> (Baker) Mez
		<i>T. tectorum</i> E. Rorren
		Y otras especies más.
	ARECACEAE	<i>Ceroxylon crispus</i> Burret
		<i>Wettinia augusta</i> Poepp & Endl.
		<i>Prestoea acuminata</i> (Willd.) Moore
	CYCLANTHACEAE	<i>Carludovica palmata</i> R. & P. “bombonaje”, “
		<i>Cyclanthus bipartitus</i> Poit. “sangapilla”
	ARACEAE	<i>Anthurium soukupii</i> (con varias especies más)
		<i>Colocasia esculenta</i> (L.) Schott “pituca”
		<i>Phylodendron</i> con varias especies más
	MUSACEAE	<i>Heliconia</i> con varias especies más
	ORCHIDACEAE	Muchos géneros y especies (algunos muy novedosos)

Details on tree species

Peru is the third largest extent of tropical forest in the World, after Brazil and the Republic of Congo. It counts 2500 species of native tree species of which 33 are critically endangered, 14 endangered and 54 vulnerable. (Source: Mongabay.com, 2010)

Hereunder, a brief description of the most important timber species present in the area, and their characteristics from plantation to maturity (source : Universidad La Molina, Peru)

a) Swietenia macrophylla - Mahogany

Habitat: sites with high rates and persistent rainfall; despite being intolerant to long term droughts, it also happens in areas with a remarkable dry season. Specie usually developed in light, loamy to sandy soils with good fertility conditions, well drained and medium stoned. Fructification: usually near to the end of the year. Seed dispersion: by means of the wind; medium distances of 32 to 36m and a maximum of 95 up to 100m. Germination: 54 to 95% of germination for fresh seeds on average environmental conditions. Said rate is reduced to 30% within 60 days on average environmental conditions. Growing conditions: seedlings are planted every 3m (3m x 3m) up to 7m x 4m. The recommended rotation is of 35-40 years. In well-fertilized alluvial soils, very fast growths were reported, reaching at the age of 3 years diameters of 15-20cm. Growing/Mortality rate: 1.8m of height is reached by the trees since their plantation up to their first year; diameters of 6-27cm in 6-12 years respectively and 15-20m of height in 7-12 years respectively.



b) Cedrela odorata – Cedar

Habitat: sites with high rates and persistent rainfall but also in areas with a remarkable dry season. Specie usually developed in clayey to sandy soils with normal fertility conditions, well drained and sometimes highly stoned. Fructification: near to the end of the dry season, but also during the whole year. Seed dispersion: by means of the wind. Germination: 60-70% of germination for fresh seeds on average environmental conditions. Seeds should be sowed directly in nursery beds with a mixed substrate of sand and soil, at half shadow.

Growing conditions: seedlings with their substrate are transplanted to the field, considering a 4m distance between one plant and the other. Plantation areas are of alluvial soils, loam-sandy to clayey, flat or with low slopes. Growing/Mortality rate: 2-4cm/year is the average growing rate; reaching 4-5m of height in 7-11 years respectively. This specie has showed a good survival rate in the in-field tests carried out by the concessions (70%).



c) *Manilkara bidentata* – Quinilla

Habitat: sites with high rates and persistent rainfall. Specie usually developed in clayey to slimy soils, mainly acid, well drained and medium stoned. Fructification: since the end of the dry season up to the start of the rainy one, between September and January. Seed dispersion: by means of fauna species: monkeys and bats. Some rodents also disperse seeds of fallen fruits.

Germination: on the one hand this specie has a good germination rate, but on the other hand it germination power is low, reaching only a 20% and loosing it in 1 or 2 months. Growing conditions: seedlings with their substrate are transplanted to the field. The area of plantation is a high terrace with alluvial soils, loam-sandy and mainly flat. Growing/Mortality rate: the average annual diametric growth is of 6-10 at the 7-10th years of plantation respectively and the average height reached in the same period of time is of 6-7m. The survival rate is high, 70-90% without any maintenance activities. A thinning-out was tested in the 7th year of plantation with good results on the faster diametric increase of the individuals.



d) *Dipteryx spp.* – Shihuahuaco

Habitat: sites with high rates and persistent rainfall, but also in areas with a remarkable dry season. Specie usually developed in clayey to slimy soils, well drained, with good fertility conditions and medium stoned. Fructification: at the end of the dry season. Seed dispersion: mainly by means of bat species (*Artibeus jamaicensis*, *Artibeus lituratus* and *Carollia spp.*), which get and then take the fruits to safe places to eat them quietly. Some monkey species (*Ateles spp.*) and large rodents (*Dasyprocta spp.* and *Myoprocta spp.*) could also act eventually as seed spreaders.



Germination: getting 79-80% of germination power. Growing conditions: good initial growth in alluvial, well-drained soils. Growing/Mortality rate: an average annual increase of 1m of height in a 3 year plantation was registered, on alluvial and well-drained soils. On the other hand, average annual increases of 0.57m of height in an 8 year plantation were registered in a Forest Reserve in Ducke, Manaus, Brazil.

e) *Amburana cearensis* – Ishpingo

Habitat: sites with high rates and persistent rainfall, but also in areas with a remarkable dry season. Specie usually developed in clayey to slimy soils, well drained and medium stoned. Fructification: during the dry season, between July and August. Germination: good rate. Growing/Mortality rate: despite the growing rate is apparently slow, in a 3 year plantation established in the Pucallpa height growths of 1.5-1.6m were registered.



f) *Eschweilera coriacea* – Misa

Habitat: sites with high rates and persistent rainfall. Specie usually developed in clayey soils, mainly acid, well drained, sometimes with poor fertility conditions and low stoned. Fructification: during the rainy season, between January and March. Germination: good rate. Growing conditions: not tested yet. Plantation should be made with bare root and also by no till plantation.

Growing/Mortality rate: slow growing rate; volumetric increases of about 1000m³/ha/year.

g) *Apuleia leiocarpa* – Ana caspi

Habitat: sites with high rates and persistent rainfall, but also in areas with a remarkable dry season. Specie highly adaptable to different textures and fertility conditions of soils, well-drained and medium stoned. Fructification: during the rainy season, between November and March. Germination: good rate in seeds with a pre-germination treatment, reaching 90% of germination power. In fresh seeds without treatment the percentage is lower, around 20%.



h) *Aspidosperma parvifolium* – Quillobordón

Habitat: sites with high rates and persistent rainfall. Specie usually developed in clayey to slimy soils, well drained and medium stoned. Fructification: at the start of the rainy season, between November and December. Seed dispersion: by means of the wind, winged seeds. Germination: seed propagation is successful. Growing conditions: the area of plantation is a high terrace with alluvial, loam-sandy soils, flat or with a light slope.

Growing/Mortality rate: the average annual diametric increase is of 8-11cm in plantations of 10-14 years respectively. The average height reached at the age of 14 is 10m. The survival rate is low, around 20%.

i) *Brosimum lactescens* – Manchinga

Habitat: sites with high rates and persistent rainfall. Specie usually developed in clayey to slimy soils, slightly acid, well drained and medium stoned. Fructification: at the end of the dry season, in October. Seed dispersion: by means of bird and mammal species, which eat the fallen fruits. Among them, it should be highlighted *Mozama Americana* (Venado), *Tayassu spp.* (Pecaríes) and some rodents. Germination: reaching 98% of germination power for fresh seeds, but only 25% for seeds that had been collected 15 days before. Growing conditions: seedlings with their substrate are transplanted to the field, with 2m distance between one plant and the other (2mx2m). The areas of plantation are high terrace, mostly flat and of loam-sandy to loam-silty soils. Growing/Mortality rate: the survival rate is medium, around 52% in-field and 55-73% under shadow.



j) *Ruagea insignis* – Requía

Habitat: sites with high rates and persistent rainfall but also in areas with a remarkable dry season. Specie highly adapted to a varied range of soils in terms of texture, acidity and fertility conditions; sometimes temporarily flooded areas and also next to the rivers.

Fructification: there are flowers and fruits during the whole year, but it seems to be more fructification at the end of the rainy season, between March and April. Seed dispersion: by means of bird species, which are attracted by the intense red color of the seeds. Also some monkey specie and maquisapas (*Ateles spp.*) eat said fruits and therefore participate in the seed dispersion. Germination: reaching 40-58% of germination power in fresh seeds.

k) *Terminalia oblonga* – Yacushapana

Habitat: sites with high rates and persistent rainfall but also in areas with a remarkable dry season. Species usually developed in loam to loam-sandy soils, neutral to acid, well drained and sometimes highly stoned. Fructification: during the dry season up to the start of the rainy one, between May and December. Seed dispersion: by means of the wind. Germination: reaching 80% of germination power in fresh seeds. Growing conditions: seedlings with their substrate are transplanted to the field after 8-12 months of plantation. Root pruning and the removal of some foliage is recommended before the in-field planting. Growing/Mortality rate: Costa Rica registers state a diametric increase of 13cm and a height increase of 12m in a 14 year plantation of Yacushapana.



l) *Copaifera reticulata* – Copaiba

Habitat: sites with high rates and persistent rainfall. Species usually developed in clayey to slimy soils with good fertility conditions, well drained and medium stoned. Fructification: since the end of the dry season up to the start of the rainy one, between September to January. Germination: reaching 31-78% of germination power in fresh seeds. Growing/Mortality rate: registers made in Brazil for a congenus specie *Copaifera langsdorfii* show slow growth rates, with diameters of 9-11cm in average reached in 14-25 years and heights of 9-12m in the same period. The survival rate is very high, around 90%.



m) *Myroxylon balsamum* – Estoraque

Habitat: sites with high rates and persistent rainfall but also in areas with a remarkable dry season. Species developed in primary forests, on clayey to slimy soils with good fertility conditions, well drained and variably stoned. Fructification: next to the end of the dry season, but also during the whole year. Seed dispersion: by means of the wind; fruits are samaras. Additionally, some parrot species could also participate in the seed dispersion. Germination: reaching 60-75% of germination power in fresh seeds.

Growing conditions: characteristic species in primary forests, mainly on high terrace or low hills zones and on rich and well-drained soils. Growing/Mortality rate: registers made in Brazil for a congenus specie *Myroxylon peruiferum* show slow growth rates, with diameters of 6-7cm in 14 years and heights of 6-7m in the same period. The survival rate is very high, around 90%.



A2.3 Fauna within the project zone

Diverse species of mammals, birds, reptiles and amphibians are observed, as well as numerous species of invertebrates. Within the project zone over 160 mammal species, 324 bird species, 26 butterfly species, 106 reptile species, 123 amphibian species exist, as well as many other species of invertebrates have been identified

Among the most representative species present in the surroundings the following should be highlighted:

Sachavaca (*Tapirus terrestres*), venado colorado (*Mazama americana*), majaz (*Agouti paca*), añuje (*Dasyprocta variegata*), conejo silvestre (*Sylvilagus brasiliensis*), oso hormiguero (*Myrmecophaga tridactyla*), armadillo gigante (*Priodontes maximus*), carachupa (*Dasypus novemcinctus*), puma (*Felis concolor*), otorongo (*Panthera onca*), mancos (*Eira barbara*), perro de monte (*Atelocynus microtis*), mono leoncito (*Cebuella pygmaea*), pichico de barriga naranjada (*Saguinus labiatus*), musmuqui (*Aotus nancymae*), maquisapa (*Ateles paniscus*), as well as dangerous reptiles as shushupe (*Lachesis muta*), naca naca (*Micrurus* sp), mantona (*Boa constrictor*) and “quelónidos” as the motelo (*Geochelone denticulata*), taricaya (*Podonemis* sp), birds as the harpia (*Harpia harpia*), Cóndor de la selva (*Sarcoramphus papa*), Guacamayo (*Ara macao*), Paujil (*Mitu tuberosa*), Tucan (*Ramphastos cuvieri*), Paguana (*Crypturellus undulatus*), pucacunga (*Penelope jacquacu*) and manacaraco (*Ortalis guttata*).

A2.4. High Conservation Values (HCVs) and description of the qualifying attributes

The World Wild Fund for Nature has delineated three yungas ecoregions along the eastern side of the Andes. San Martin Region is located in the northernmost one (Peruvian Yungas). These yungas ecoregions are transitional zones between the Andean highlands and the eastern forests. The yungas forests are extremely diverse, ranging from moist lowland forest to evergreen montane forest and cloud forests. The terrain is extremely rugged and varied, contributing to the ecological diversity and richness. A complex mosaic of habitats occurs with changing latitude as well as elevation. There are high levels of biodiversity and species endemism throughout the yungas regions. Many of the forests are evergreen, and the South Andean Yungas contains what may be the last evergreen forests resulting from Quaternary glaciations.

Within the different forest types listed above there are areas of High Conservation Value (HCV), divided into areas of biological and cultural significance. Biological HCV areas include the primary forest of the project area, composed primarily of evergreen forest. Due to the presence of several IUCN listed threatened species in the project area (see previous section), the project area can be designated as a biological HCV area.

Hereunder, a summary of the existent biodiversity conditions within Martin Sagrado project area at the starting date of the REDD Project, as well as the conditions in its immediate surroundings defined by the leakage belt determined in the present REDD Project.

It is based on the results of a series of studies related to the biophysical and biodiversity conditions of the area as well as communities observations and feed-back. Said documents represent a joint effort made by the communities and their partners with the aim to achieve the sustainable management of their forests, using the accumulated knowledge of the biodiversity component of the project.

A2.4.1. Globally, regionally or nationally significant concentrations of biodiversity values

A2.4.1.a. Protected areas

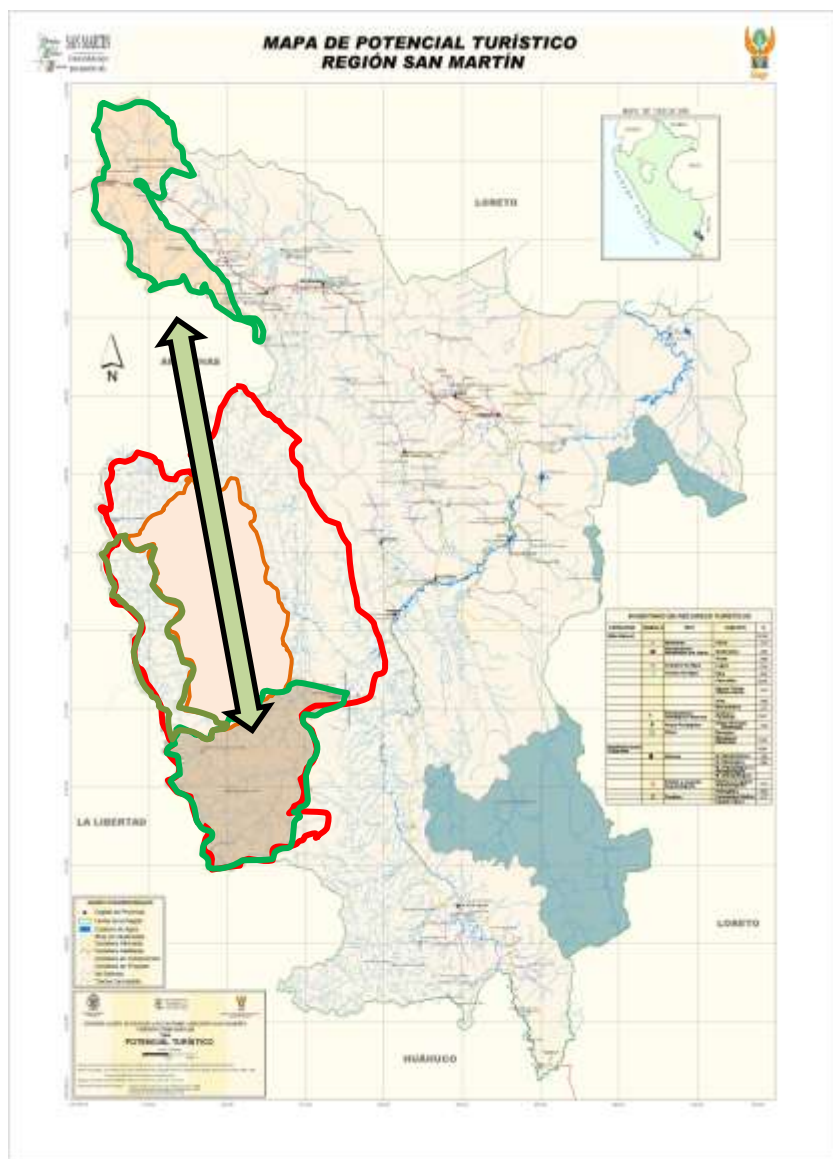
The National Park Rio Abiseo is the major protected area in the project zone. It encompasses 274520 hectares of rainforest. The National Park was established in 1983; UNESCO pronounced it as Natural and Cultural Heritage of Humanity (World Heritage Site) in 1990. The park is home to a large number of species of flora and fauna, as well as the location of over 30 pre-Columbian archaeological sites. Since 1986, the park has not been open to tourism due to the fragile nature of both the natural and archaeological environment.

Other conservation areas include the Concession for Conservation Alto Huayabamba, attributed to the NGO AMPA in 2006. Located on the most western part of San Martin Region, in the highest part of the Andes, it encompasses 143 928 hectares of mostly high Andean ecosystems.

Just outside the project zone, to the north of San Martin region, across the boarder with Amazonas region is the “Bosque de protection Alto Mayo”, a forest conservation area created in 1987, encompassing 182 000 hectares of forest.

The project area completes a major role in the connectivity between the Abiseo River National Park and the “Bosque de Proteccion Alto Mayo”, and as part of the more global Conservation Corridor for Abiseo - Condor - Kutukú, considered as high priority for conservation and nucleus of one of the centers of high diversity ("Biodiversity hotspots") in the Tropical Andes

Figure 24 : Map of protected areas and conservation corridor



A2.4.1.b. Threatened species

Based on current legislation and lists of endangered species worldwide (IUCN)) the following species have been registered and have a high probability of occurrence in the project area (CDC-UNALM and TNC, 2006, Angulo et al. 2008; AMPA, 2009). They are displayed here according to their threat level according to INRENA, IUCN and CITES.

Table 35 : Endangered species in the proposed project zone

ESPECIES	GRADO DE AMENAZA		
	PERU	UICN	CITES
FLORA			
<i>Cyathea spp.</i> "helecho arbóreo"	--	--	II
<i>Podocarpus oleifolius</i> "saucecillo"	CR	LC	--
<i>Ceroxylon crispum</i> "palma de cera"	VU--	--	--
<i>Cedrela odorata</i> "cedro"	VU	VU	III
<i>Cedrela montana</i> "cedro"	VU--	--	--
<i>Cedrela lilloi</i> "atoc cedro"	EN	EN	--
<i>Swietenia macrophylla</i> "caoba"	VU	VU	II
<i>Polylepis multijuga</i> "quinoa"	EN	VU	--
<i>Juglans neotropica</i> "nogal"	NT	EN	--
FAUNA			
Aves			
<i>Aulacorhynchus huallagae</i> "tucancito semiamarillo"	EN	EN	--
<i>Aburria aburri</i> "pava negra"	NT	NT	--
<i>Hemispingus rufosuperciliaris</i> "hemispingo cejirufo"	VU	VU	--
<i>Leptosittaca branickii</i> "loro de mejillas doradas"	VU	VU	II
<i>Thripophaga berlepschi</i> "rabiblando bermejo"	EN	VU	--
Mamíferos			
<i>Oreonax flavicauda</i> "mono choro de cola amarilla"	EN	CR	I
<i>Aotus miconax</i> "mono nocturno"	EN	VU	II
<i>Callicebus oenanthe</i> "mono tocon andino"	VU	EN	II
<i>Pudu mephistophiles</i> "sachacabra"	EN	VU	II
<i>Tremarctos ornatus</i> "oso de anteojos"	EN	VU	I
<i>Panthera onca</i> "otorongo"	-	VU	I
<i>Tapirus terrestris</i> "sachavaca"	-	-	II

Elaborated by AMPA. Source. UICN 2008, CITES, PERU 2004 y 2006.

The International Union for Conservation of Nature (UICN 2008), brings together a diverse panel of experts who evaluated and ranked based on species extinction. The categories used are: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LR), Data Deficient (DD) and Not Evaluated (NE). The species listed in categories CR, EN and VU are considered threatened.

Consistent with the model used by the IUCN, nationally, equivalent categories are used to this

international system. Thus, the categorization for threatened fauna in Peru is under the aegis of Supreme Decree N ° 034-2004-AG, which defines threat categories as follows: Critically Endangered (CR), Endangered (EN) , Vulnerable (VU), Near Threatened (NT). In the case of plants, the categorization comes under Supreme Decree No. 043-2006-AG, which employs categories equal to the categories of animals indicated above. The CITES (Convention on International Trade in Endangered Species) includes in its appendices to those species that have undergone some drastic changes or decrease in abundance due to excessive hunting or trade of their products, such as skins, teeth and bones. CITES Appendix considers three categories:

- Appendix I includes all species of animals and plants who bear an increased risk of extinction, CITES generally prohibits the international trade in specimens of these species. However, trade may be permitted in exceptional circumstances the same, eg for scientific research.
- Appendix II includes species not necessarily threatened with extinction but could become, unless strictly controlled trade, international trade in specimens of these species may be authorized to grant an export permit or re-export certificate, not must have an import permit.
- Appendix III includes species included at the request of a country that already regulates trade in the species and requires the cooperation of other countries to prevent unsustainable or illegal exploitation of the same, including species regulated for conservation purposes by individual countries.

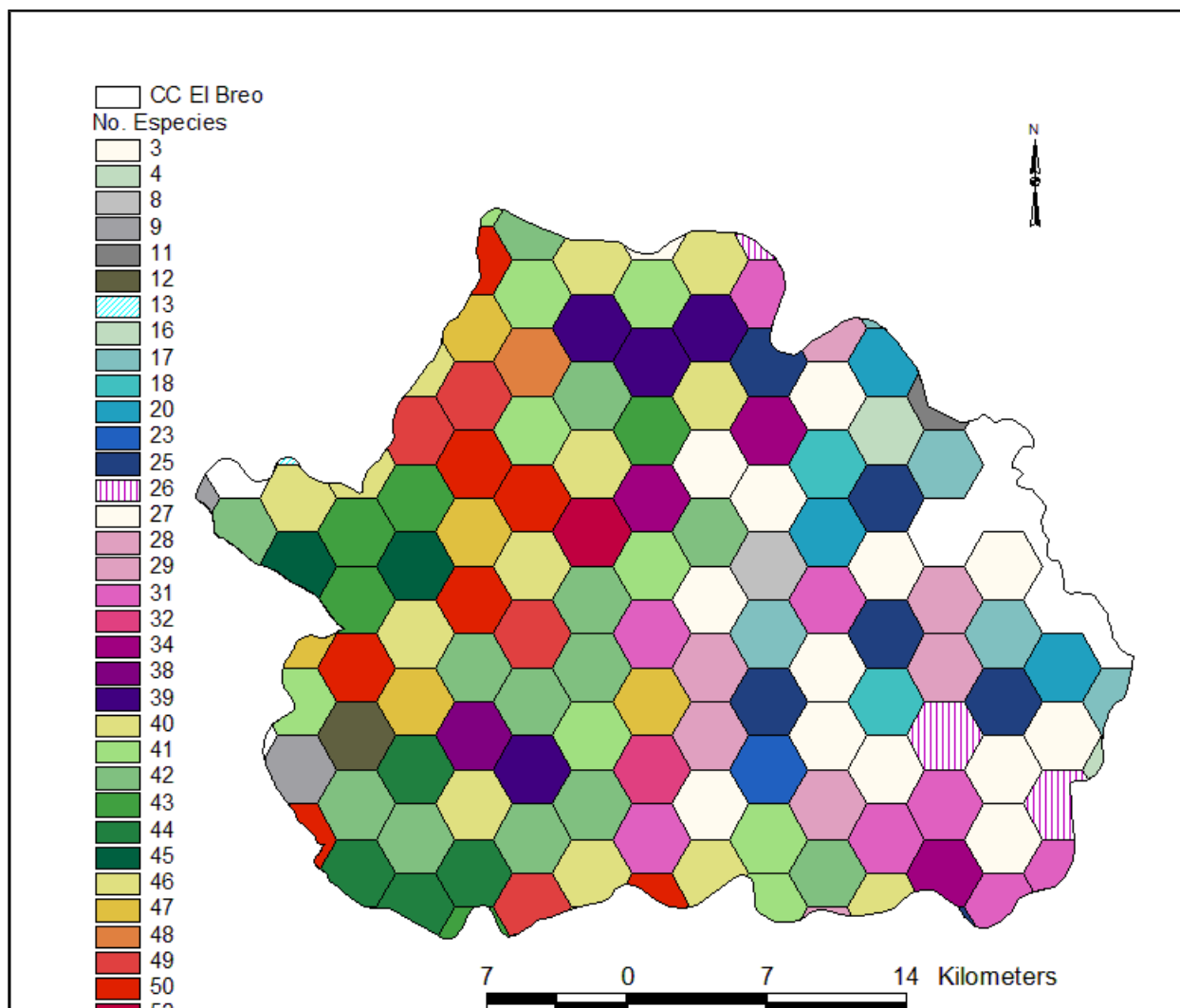
In the project area, we have a list of 21 species found in any of the lists of threatened species nationally and internationally, or are listed in the Appendices to CITES. Undoubtedly, this list highlights the endemic monkeys *Oreonax flavicauda* (yellow-tailed woolly monkey) and *miconax Aotus* (night monkey), and endemic birds *Aulacorhynchus huallagae* (Toucanet semiamarillo) *Thripophaga berlepschi* (rabiblando vermillion) and *Hemispingus rufosuperciliaris* (hemispingo cejirufo). On the other hand, in terms of flora highlight what we believe are the populations of mahogany mountains and the rare saucecillo (*Podocarpus oleifolius*). Although, these species have some level of protection in places like the Rio Abiseo National Park, has always been calling for the extension of the protection zones of these endemic species (CDC-UNALM and TNC, 2006). We believe the project addresses this need for expansion of habitat for these species are endemic.

A2.4.1.c. Distribution and occurrence of endemic species

Diverse species of mammals, birds, reptiles and amphibians are observed, as well as numerous species of invertebrates. Within Martin Sagrado reserve over 160 mammal species, 324 bird species, 26 butterfly species, 106 reptile species, 123 amphibian species exist, as well as many other species of invertebrates.

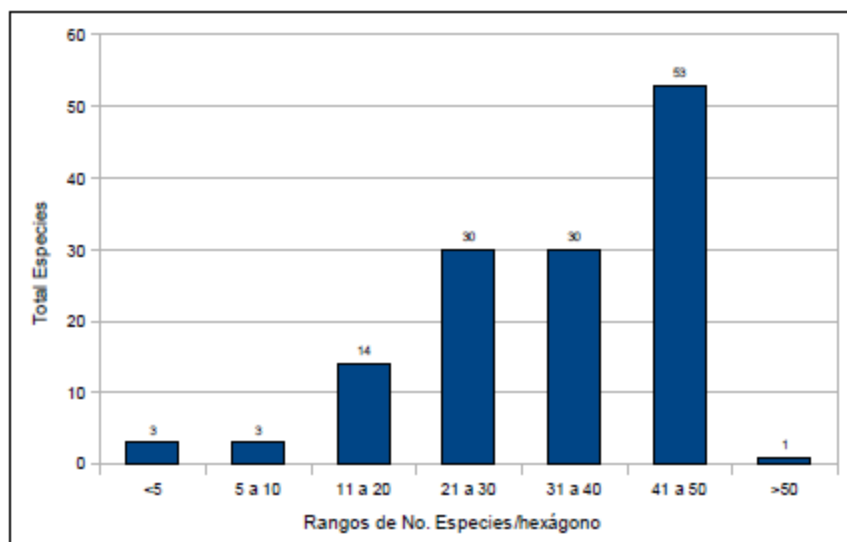
As mentioned earlier in the fauna inventory (section G.1.7.3) more than 700 species have been identified (amphibians, reptiles, birds and mammals) whose unique characteristics (endemism, continuous distribution and conservation status) makes them worthy of being viewed as objects of conservation for the entire Peruvian Yungas ecoregion. In the area of the concession El Breo, the theoretical spatial distribution of these species (fundamental niche) has been projected onto hexagons (10 ha approx.) which indicate the total number of species they contain. The map obtained shows the areas with the greatest concentration of species, and the maximum record of occurrence obtained for a polygon within the Peruvian Yungas is 52 species.

Map information based on that we have developed a distribution map of these sites for the requested area. There we can see that our proposal includes a high concentration of sites with high richness of species, including an hexagon with an occurrence of 51 species.

Figure 25 : Spatial distribution of species considered as objects of conservation

Elaborated by AMPA. Source: CDC-UNALM y TNC, 2006

Similarly, around this hexagon occurs exceptional concentration of sites with high species richness (> 40 species per hexagon) to the west side of the area. A distribution histogram of the number of species per polygon reveals a bias toward hexagons with high wealth. About 60% of these sites display more than 31 species unique to the Peruvian Yungas.

Figure 26 : Distribution of hexagons / Richness of species for the conservation of the Yungas

Elaborated by AMPA. Source: CDC-UNALM y TNC, 2006

A2.4.2 Threatened or rare ecosystems

A2.4.2.a. Area with vulnerable soils

According to the Economic Ecological Zoning of St. Martin, the proposed project area is within the protection zones for soil and slope conditions, with a smaller area corresponding to an association of slope protection zones and soils associated with timber potential forest production fair to poor. Thus, we are facing very fragile areas unsuitable for agriculture. It is recommended to their protection from migration trends that lead to disordered occupation of the territory of the basin, it does not take into account the natural ability of soils.

This classification as protected areas comprises those lands that have no ecological or soil conditions required for the operation of crops, pasture or forest production and other lands that have natural vegetation forest but its use is not economical and should be handled with for watershed protection, wildlife, scenic values, recreational and other benefits involving collective or social interest.

A2.4.2.b. Rare ecosystems with conservation objectives

The Data Center for Conservation - UNALM & TNC (2006), using biophysical models from different inputs and different methods, identifies and describes the terrestrial ecological systems (SET) of the Peruvian Yungas.

At coarse filter level (ecosystem level), within the Peruvian Yungas Ecoregion, the CDC-UNALM identified 18 SETs as conservation targets (CDC-UNALM and TNC, 2006). The SETs are defined as "groups of plant communities that tend to co-occur in the landscape due to its relationship with common factors and determinants and ecological processes, substrates and / or environmental gradients" (Josse et al., 2007:11). The use of SETs to evaluate the effectiveness of conservation has many advantages because it combines in one system: ecological, dominant vegetation and landforms. 09 types of SETs have been identified as priority conservation targets for the project area, which are detailed in the General information G1.2 "The types and condition of vegetation within the project area".

These units synergistically complement those already included in the Abiseo River National Park and the Concession for Conservation "Alto Huayabamba," forming a more robust and resilient block to global climate changes to come.

A2.4.2.c. Conservation targets

The Data Center for Conservation (DCC-UNALM) and The Nature Conservancy (TNC) has identified two major Peruvian Yungas blocks that are of high priority because they encompass a large number of species and key ecosystems and still maintain a high level of integrity (low human intervention, high connectivity). One of these blocks is the San Martín Yunga - that stretches from Huánuco northern Monsoon Valley to the headwaters of Alto Mayo (CDC-UNALM, 2003, DCC-UNALM and TNC, 2006).

The following conservation targets (species level) have been selected by the organizations mentioned above:

Mammals	1. Mono choro de cola amarilla - <i>Oreonax flavicauda</i> 2. Oso de Anteojos - <i>Tremarctos ornatus</i>
Birds	3. Gallito de las rocas - <i>Rupicola peruviana</i> 4. Loro mejillas doradas - <i>Leptosittaca branickii</i>
Quina o Cascarilla Tree	5. <i>Cinchona officinalis</i> y <i>Cinchona pubescens</i>

Also, based on information about range, habitat preference and distribution of forest types, we project that would be found within the area as well: the night monkey (*Aotus miconax*), the Andean stump monkey (*Callicebus oenanthe*) and three palm trees Andean (*Ceroxylon crispum*, and *Prestoea maynensis* *Wettinia acuminata*). All these elements have also been selected as conservation targets of the Yungas de San Martín and NorthEast Huanuco.

Mamíferos	6. Mono nocturno - <i>Aotus miconax</i> 7. Mono tocón andino - <i>Callicebus oenanthe</i>
Palmeras Andinas	8. <i>Ceroxylon crispum</i> , <i>Wettinia maynensis</i> y <i>Prestoea acuminata</i>

The identification of species conservation objectives was done by incorporating the criteria used by the DCC-UNALM, which are:

- Species known to society, especially local communities (cock of the rock, spectacled bear, the cinchona tree).
- Species of great scientific and endemic (endemic primates such as yellowtail woolly monkey, monkey Andean night monkey Andean stump, rare birds such as parrots and golden cheeks spectacled bear).
- Species of scientific and social importance (Andean palms).
- Endangered species (primates, spectacled bear, parrot golden cheeks)

Furthermore, the prioritization of species as conservation targets are made taking into account the sensitivity of these to changes in the environment (eg primates, spectacled bear, parrot golden cheeks). The same shall take into account the availability of scientific information on the species (habitat requirements and conservation status). Below is the most outstanding characteristics (description) of the species listed as conservation targets in the project area, indicating its importance (CDC-UNALM & TNC, 2006).

Figure 27 : Description of species considered as conservation targets

Palmeras Andinas <i>Ceroxylon crispum</i> , <i>Wettinia maynensis</i> y <i>Prestoea acuminata</i>	
Distribución: <i>Ceroxylon crispum</i> en Huánuco, endémico y San Martín; <i>Wettinia maynensis</i> en Huánuco, San Martín y Loreto; <i>Prestoea acuminata</i> en Cajamarca-San Martín y Huánuco-Junín.)	
	
(Fotos: Archivo de AMPA. C.Flores. 2008)	
Hábitat: <i>Ceroxylon crispum</i> en bosque natural montano, entre 2500 y 3000 msnm; <i>Wettinia maynensis</i> en bosque natural montano, entre 160 y 1700 msnm; <i>Prestoea acuminata</i> en bosque de neblina a 1650 – 2500 msnm.	
Rol Ecológico: Las palmeras andinas son fuente de alimento (frutos aceitosos, inflorescencias) para muchas especies de fauna silvestre de montaña.	
Amenazas: <i>Ceroxylon crispum</i> es usada como material de construcción regularmente comercializado en mercados de la región, por lo que actualmente se le considera vulnerable, además destrucción de bosques donde existe para abrir campos agrícolas y para pastizales.	

Árbol de la Quina o Cascarilla <i>Cinchona officinalis</i> y <i>Cinchona pubescens</i>	
	Aspectos generales: <i>Cinchona officinalis</i> es un árbol de 11 – 15 m de alto con fuste cilíndrico (diámetro 30 – 40 cm), ramificación simpodial y copa globosa irregular. <i>Cinchona pubescens</i> es un árbol de 8 – 12 m de alto con fuste cilíndrico irregular (diámetro 18 – 28 cm), ramificación simpodial y copa globosa.
Archivo AMPA. K.Pinasco 2007	Distribución: <i>Cinchona officinalis</i> es una especie de amplia distribución, encontrándose en ambas vertientes de la Cordillera de los Andes, en Colombia, Ecuador, Perú y Bolivia; en Perú se distribuye desde Amazonas hasta Puno.
<i>Cinchona pubescens</i> se distribuye desde Costa Rica hasta Bolivia; en Perú se distribuye desde Piura y Amazonas hasta Puno.	
Hábitat: <i>Cinchona officinalis</i> se encuentra tanto en bosques naturales como en áreas disturbadas, entre los 1000 y 3150 msnm. <i>Cinchona pubescens</i> también en bosques naturales y áreas disturbadas, entre 400 y 3250 msnm.	
Rol Ecológico: Desconocido, solo se tiene reportes que <i>Cinchona pubescens</i> puede comportarse como una agresiva especie invasiva en las áreas donde se introduce como exótica.	
Amenazas: Para ambas especies de cascarilla existe presión por parte de la población para ampliación de las áreas agrícolas y la extracción de los recursos del bosque.	

Mono Choro Cola Amarilla*Oreonax flavicauda*

University of Wisconsin

Aspectos Generales: Es uno de los primates de mayor peso en el Perú: 8 a 10 kilos. Longitud de cabeza y cuerpo: 51 – 53 cm. Cola: 56 – 61 cm. Se caracteriza por tener el escroto y base de la cola prensil con pelos de coloración rojo-amarillenta y el hocico color amarillo pálido marcadamente contrastado con la coloración oscura del resto de la cabeza y cuerpo. Reciente se ha propuesto restablecer el nombre científico original: *Oreonax flavicauda*.

Distribución: Endémico del Perú, se distribuye exclusivamente en los departamentos de San Martín y Amazonas.

Hábitat: Especie exclusiva de bosques húmedos montanos y premontanos con fisiografía muy accidentada; bosques de neblina, entre 500 y 2700 msnm.

Rol Ecológico: Herbívoro arborícola diurno. Se alimenta de frutos, flores, raíces y pseudobulbos de epífitas, líquenes y peciolo de hojas.

Amenazas: Caza de subsistencia en áreas cercanas a caseríos, pérdida de cobertura forestal para establecimiento de agricultura y ganadería de vacunos y captura de individuos jóvenes como mascotas. La Unión Mundial para la Naturaleza considera una población de menos de 250 individuos en su área de distribución natural.

Mono Tocón Andino*Callicebus oenanthe*

Aspectos Generales: Pesa aproximadamente 1 kg. Longitud de cabeza y cuerpo: 29 - 36 cm, cola (no prensil): 33 – 48 cm. El cráneo y piel del holotipo (macho adulto), colectado por L. Rutter en 1924 se encuentra depositado en el British Museum of Natural History de Londres.

Distribución: Endémico del Perú (localidad tipo: Moyobamba, San Martín, Perú 840 msnm). Solo en el norte del departamento de San Martín.

Hábitat: Bosques de neblina. Rango altitudinal conocido: 750 – 950 msnm.

Rol ecológico: Arborícola diurno. Probablemente se alimenta de hojas y frutos, ya que es reconocido que varios representantes del género *Callicebus* se encuentran entre los primates folívoros más pequeños.

Amenazas: Raramente es cazado para subsistencia debido a su escaso peso corporal, pero está perdiendo hábitat debido al establecimiento de agricultura y vacunos.

Oso de Anteojos*Tremarctos ornatus*

Aspectos Generales: Oso de tamaño mediano, el largo de la cabeza y cuerpo varían entre 1.20 y 2.20 m, el largo de la cola es 7 cm. Tiene un peso variable entre 90 y 175 kg, siendo los machos más grandes y pesados que las hembras. El oso de anteojos presenta el cuerpo entero de color negro o marrón oscuro, a excepción de los grandes círculos o semicírculos blanco-amarillentos alrededor de los ojos que generalmente tiene – de ahí el nombre común de la especie – cuyas líneas se pueden prolongar hacia el pecho (estas líneas o manchas claras son particulares para cada individuo).



ecoportal.net

Distribución: El oso de anteojos es el único representante de la familia Ursidae en América del Sur, se distribuye desde Yuracay – Cordillera de Mérida, en Venezuela, hasta la provincia de Porta en Bolivia, comprendiendo así Venezuela, Colombia, Ecuador, Perú y Bolivia,

encontrándose las mayores poblaciones en las laderas inaccesibles del este de la cordillera de los Andes en Ecuador y Perú.

Hábitat: En el Perú, ocupa una gran variedad de hábitat en las cordilleras Occidental, Central y Oriental de los Andes, encontrando a las mayores poblaciones en la cordillera Oriental: es decir, en las Yungas Peruanas. Los osos prefieren como hábitat los bosques húmedos entre los 1900 y los 2350 msnm y los bosques espinosos de la Costa cuando encuentran agua disponible; también, los pastizales altoandinos son utilizados en forma estacional. El oso de anteojos es típico de los bosques nublados y enanos de las Yungas Peruanas y se considera especie emblemática en campañas de conservación de los bosques nublados Andinos.

Rol Ecológico: Es de costumbres nocturnas y diurnas, terrestres y parcialmente arborícolas. A pesar de pertenecer al orden Carnívora, su dieta es principalmente vegetariana, una escasa proporción está relacionada con material animal, entre insectos y roedores principalmente, el resto lo conforman bayas, cortezas, corazones de bambú, peciolo de hojas de palmera, bromelias, cactus y frutos. Es considerada una especie muy importante para la diseminación del polen y dispersión de semillas de varias especies botánicas.

Amenazas: El oso es cazado para obtener sus patas y pelo para usos en medicina tradicional; por ejemplo, en el mercado de herbolarios de la ciudad de Chiclayo es frecuente encontrar puestos de venta donde se ofrecen esos productos provenientes de las montañas nubladas de San Martín, Amazonas y Cajamarca. Los osos también son eliminados por los campesinos cuando estos destruyen los cultivos; es frecuente, por ejemplo, el ingreso del oso a los campos de maíz. Por otro lado se considera que esta especie está perdiendo hábitat debido al establecimiento de agricultura y ganadería de vacunos en desmedro del bosque; esto último conlleva a la fragmentación y disminución de la productividad del hábitat y, posteriormente, al aislamiento paulatino de las poblaciones de oso.

Mono Nocturno Andino*Aotus miconax*

Aspectos Generales: Mono nocturno del grupo "cuello rojo". Pesa aproximadamente 1 kg. Longitud de cabeza y cuerpo: 24 a 27 cm; cola (no prensil): 9 cm. El estatus taxonómico de esta especie es incierto, ya que solo se conocen especímenes antiguos, a pesar de ello actualmente se reconoce como una especie válida.

Distribución: Endémico del Perú. Departamentos de San Martín, Huánuco, Amazonas. Esta especie es solo conocida por pieles y cráneos colectados en el río Chinchao (departamento de Huánuco) en 1922 por E. Heller (depositados en el Field Museum of Natural History de Chicago) y por otros restos depositados en el Museo de Historia Natural de la Universidad Mayor de San Marcos (Lima) colectados en 1948 en el río Cayumba (departamento de Huánuco); sin embargo, coincidentemente, varios autores consideran su rango de distribución en términos muy similares a lo que son las Yungas del departamento de San Martín y el norte del departamento de Huánuco. El CDC-UNALM ha registrado en dos ocasiones (sin colección) *Aotus* sp. en los Andes Peruanos 1992 y 1997.

Hábitat: Bosques de neblina de la región centro-oriental del Perú, encima de los 800 msnm, compartiendo hábitat (simpatria) con *Lagothrix flavicauda* y *Callicebus oenanthe*, otros dos primates endémicos del país.

Rol Ecológico: Arborícola y nocturno. No se conoce mucha información sobre sus hábitos; sin embargo, se sabe que es principalmente frugívoro, aunque se alimenta también de insectos y néctar de flores.

Amenazas: Raramente es cazado para subsistencia debido a su escaso peso corporal; pero sí está perdiendo hábitat debido al establecimiento de agricultura y ganadería de vacunos; sufre también captura de individuos para mascotas.

Gallito de las Rocas*Rupicola peruviana*

Aspectos Generales: Tiene un tamaño aproximado de 30 cm. El macho y la hembra presentan cresta, la cual casi llega a cubrir el pico; el macho es de color rojizo anaranjado con alas y cola negra; la hembra es marrón rojiza. Es considerada el ave nacional del Perú.

Distribución: Se distribuye desde el noroeste de Venezuela hasta Bolivia. En el Perú se distribuye en la vertiente oriental de los andes.

Hábitat: Habita las selvas nubladas densas y húmedas (500 a 2400 msnm), cerca de ríos y riachuelos con acantilados rocosos y precipicios.

Rol ecológico: Se alimenta de frutas e insectos.

Amenazas: Esta ave está perdiendo hábitat natural debido al establecimiento de agricultura y ganadería de vacunos en desmedro del bosque; sin embargo, pareciera que es una especie que puede adaptarse a hábitats perturbados, habiéndose registrado en bordes de chacra o ecotonos bosque-chacra. El gallito de las rocas es eventualmente cazado para obtener especímenes disecados con fines ornamentales o para uso en medicina tradicional; por ejemplo, en el mercado de herbolarios de Chiclayo puede encontrarse puestos de venta donde se ofrecen animales disecados provenientes de las montañas nubladas de San Martín, Amazonas y Cajamarca.

Loro Mejillas Doradas <i>Leptosittaca branickii</i>	
	Aspectos Generales: Lorito o cotorra mediana (30 a 35 cm) y de cuerpo delgado, lo que lo asemeja a un guacamayo pequeño; es de color general verde, tiene una franja amarilla delgada desde el lores hasta los cobertores de oídos, abdomen naranja.
	Distribución: Regiones Andinas húmedas de Colombia, Ecuador y Perú. En Perú reportado desde Amazonas-San Martín hasta Junín-Cuzco. Su localidad tipo es Maraynioc, departamento de Junín 3240 msnm.
	Hábitat: Bosque de neblinas, ocasionalmente visita el páramo; altitudes entre 2400 y 3400 msnm, incluso de la línea de bosque (timberline, es decir el límite superior hasta donde llega el bosque), eventualmente llega a 1400 msnm.
	Rol Ecológico: Se alimenta de semilla y frutos (Moráceas, Podocarpaceas), por lo que debe ser un dispersor de semillas y polen.
	Amenazas: Esta ave es rara y sólo se ubica en localidades fragmentadas. Ha perdido hábitat natural debido sobre todo al establecimiento de agricultura y ganadería de vacunos; sin embargo, algunos autores sugieren que el incremento de áreas de cultivo (sobre todo de maíz) en su área de distribución natural podría favorecer a este lorito.

A2.4.2.d. Other rare and valuable species

The forest in the project area is very important in terms of biodiversity conservation since it is conformed by important populations of the specie *Swietenia macrophylla* (mahogany), and *Cedrela odorata* (cedar), which have been incorporated respectively to the Appendix II and III of CITES for being considered endangered and vulnerable species.

A2.5 Areas that provide critical ecosystem services

A2.5.a. Regulation and water supply

The concession El Breo itself covers approximately 9% of the Huayabamba River subwatershed, including the middle and lower basins of the Breo and Cordoncillo rivers and complements the Conservation concession for Alto Huayabamba in the regulation of water sources that descend abruptly from the 4400-4600 meters to 600 meters in just 60 km horizontal projection. Thus, the role of forest cover is essential to prevent erosion and regulating base flow that would otherwise be discharged as a stream in a short period of the year. This is based on the hydrological study of the San Martin region by Maco, J. (2005), which indicates that during the dry season river flow exceeds Huayabamba Huallaga river at the point of intersection. In this sense we can say that water environmental services provided by the concession area for Conservation El Breo have a regional scope, directly benefiting the population living in the middle and lower sub Huayabamba river as well as indirectly to that established in the middle basin of the Huallaga River, which now represents the valley's most populous and largest development and production of the San Martin.

Protect and preserve vegetation and waterways in the area will allow the maintenance of water environmental services associated with it, thus contributing to the regulation of water flows as well as storage and water retention that makes it possible the efficient supply (in terms of quality and quantity) of this vital resource in the watershed, reservoirs and aquifers, allowing fresh drain into the populations in its

area of influence, both for human consumption for drinking and for use in agriculture, aquaculture, industry and transportation.

It is important to note that the contribution of CC water regulation contributes to a certain extent with the maintenance of the hydroelectric potential of the basins of Huayabamba and Huallaga Central, which is related to the strong flows and waterfalls that are normally therein, which may be exploited for the installation of small hydro power plants which supply power to the local populations, thus contributing to the use of renewable energy do not depend on fossil fuels, apart from being expensive, pollute the environment.

A2.5.b. Erosion control and sediment retention

The project area soils are shallow and located in areas of steep slopes. This indicates that the associated vegetation is extremely fragile to changes of use. Deforestation can lead to irreversible processes of soil loss due to erosion by wind and rain would be faster than the soil formation processes. Therefore, the presence of vegetation in that area increases soil retention within the ecosystem, controlling the accumulation of sediment in lakes and wetlands downstream.

A2.5.c. Carbon sequestration and regulation of the microclimate

At this point in the negotiations for the mechanism of the Kyoto Protocol is undoubtedly the role of deforestation in the contribution of greenhouse gases. Keep the primary forests of the lease has an undeniable advantage over other forms of land use due to high carbon stored. Thus, this project is an opportunity to add to inventory forests that Peru can offer as permanent stocks of forests (avoided deforestation).

In addition to the benefits of carbon sequestration, forest area contributes to the regulation of local and regional temperature because in this area are the building blocks of cold air, having high density, lower to medium and low areas of the basins, mixing with the hot air produced in these zones and thus regulating temperature. Also, this air flow contributes to the regulation of rainfall and other climatic processes biologically mediated locally and regionally.

A2.5.d. Habitat for fish reproduction

The lower parts of the requested area is located on the river Huayabamba are recognized by local people and sites that contain a high concentration of hydro-biological resources, among them outstanding tarpon (*Brycon cephalus*) and boquichico (*Prochilodus nigricans*). The observations conducted by the evaluation team and the stories of the people to infer that the riparian forests in the lower area are temporary refuge habitats during the rainy season or spawning areas. There is a local consensus that commercial fishing in these areas should be prohibited, especially in the Martin Sagrado and El Breo waterfall sites. These are sites that are depending on subsistence fisheries and trade conducted along the lower reaches of Huayabamba.

A2.5.e. Pollination and dispersal of species of commercial value

The CC El Breo is adjacent to the Zone 2 Permanent Production Forest (BPP) of San Martín (0549-2002 RM-AG). Healthy populations of pollinators and dispersers within the concession emerge as an important safeguard to maintain the processes of natural regeneration of commercial species within Zone 2 of the BPP. Thus, logging units located in southwestern sector have an important source of seeds and pollinators DC The Breo. Similarly, the CC would favor Breo commercial plantations carried out in the vicinity, including local production of cocoa, bananas and citrus. CC Forests Breo source would be acting as pollinators, dispersers and core or a barrier for biological pest control.

A2.6. Areas that are fundamental for meeting the basic needs of local communities (e.g., for essential food, fuel, fodder, medicines or building materials without readily available alternatives)**A2.6.a. Food provisions gathered by hunting**

The population located inside the zone and on the outskirts is benefiting from hunting wildlife migrating from the surrounding forests. Large mammals and birds have almost disappeared from grocery nuclei populated in the lower basin of Huayabamba. However, in nearby towns, it is still possible to access game animals that ensure to maintain healthy populations and eventually migrate from the high forests of the requested area (source). Thus, the forest of the area requested has been contributing steadily to the local diet. This environmental service be maintained only if it maintains the integrity of the forest and implement measures to regulate the rational use of this fauna.

A2.6.b. Unique landscapes with opportunities for recreation

The area also features ecotourism attractions as the Falls of El Breo, Velo de Novia and Chambirillo Falls, Cajaanahui canyon, among others; in addition to forests in good condition and riparian landscapes of crystal clear waters inhabited by fish tame that invite contemplation and appreciation of nature in its pristine form. Because of its location in a transition zone between the lowlands and Andean highlands, the area allows the expression of many types of landscapes that differ from the familiar Amazon floodplain. The landscapes in the area of the region have always intrigued locals and travelers, we believe that these attractive landscapes should be protected to be shared with future generations.

A2.7. Areas that are critical for the traditional cultural identity of communities (e.g., areas of cultural, ecological, economic or religious significance identified in collaboration with the communities).

The projet zone is an area of great archaeological wealth of pre-Hispanic ancestors. There is no research before our first archaeological field work (Schjellerup 1997). There are remains of the Chachapoyas culture (800-1470), in the form of rounded structures of stone and many funeral homes are built on the slopes of the rocks with red paint and architectural ornaments symbol. The symbols were significant ethnic and social value, the use of symbols offered a demonstration of potential for local identity, which was maintained through the Inca period.

East of the Cordillera Oriental are many Inca sites (1470-1532), such as buildings in drywall or along the banks of Huabayacu (Schjellerup 1997). An Inca trail comes from Bolívar and unites with another way Hornopampa, where the Inca trail follows the river Huabayacu, crossing a mountain range and Continual north to the province Rodríguez de Mendoza. Near La Morada are the remains of a fortress and rectangular structures (Rangrapata and Hornopampa) and a site with masonry style Inca Cuzco. The farms currently in the Morada and surrounding area is the remains of stone terraces, which is being destroyed by the settlers.

**APPENDIX 3 : DESCRIPTION OF SOCIO-ECONOMIC CONDITIONS IN
PARTICIPATING COMMUNITIES**

In this chapter we develop the socioeconomic characteristics of the project zone (provinces of Mariscal Cáceres, Huallaga) through information collected by Amazonia Viva, by the INEI, the district municipality, the municipal delegate of Dos de Mayo, the Human Development Report of UNDP and obtained from surveys conducted in the field (AMPA, 2008; Amazonia Viva, 2010-2011).

A3.1 Presentation of the participating communities**Communities within the project area**

There are three communities living within the project area: La Morada, Canaan, and Anazco Pueblo. They mainly rely on livestock and coffee farming. As fuel they only use wood for cooking and mostly candles for light (70 to 95%) while solar energy is developing.

The three communities are typical examples of towns founded by a group of migrants, who originally came from the mountains to the jungle. The early years after establishment have been dedicated to the exploration of the environment, without interest for the protection of biodiversity. They slowly built up over 5 to 10 years some experience on the impact of mismanagement of resources.

They are located in the Eastern Andes, in the department of San Martin, on the slopes of the mountains oriented northeast above the river Huabayacu. However they depend politically on Chuquibamba in the department Amazonas. There are no roads to the villages, only paths from the district of Chuquibamba (2 to 3 days), and from the province of Bolivar (2 days). There is a proposal for the construction of a road by the Regional Government of Cajamarca, in order to facilitate the transport of forest products from Saposoa in the province of Huallaga, department of San Martin to Celendín department of Cajamarca.

- **La Morada**

Gathering 80 families, there are 150 students in the village, a kindergarten, a primary and secondary school. La Morada activity is based on livestock with a herd of about 500 animals. Community health is ensured by a medical post, a nursery and medicinal plants.

- **Canaan**

There is a kindergarten, a primary and a secondary school, 130 families and as many students in this village, 3 days walk away from the closest town. Their main income depends on livestock and coffee with 100 hectares of cocoa cultures and 400 animals. Both coffee and livestock products are sold outside of the village. Community health is also ensured by a medical post, a nursery and medicinal plants.

- **Anazco Pueblo**

Smallest community of the area, Anazco Pueblo gathers 15 families, representing 70 people in total, 22 students and 1 professor. There is only a primary school. Also relying on cocoa cultures and livestock, their herd is smaller with 100 animals and 20 hectares for farming. Community health is ensured only by medicinal plants.

Additional information on these 3 communities, collected during field trips to Chuquibamba, is available on request.

Communities within the project zone, in the provinces of Mariscal Cáceres and Huallaga*Major partners for REDD project:*

- **Dos de Mayo** is the most populated village (898 inhabitants). They are considered as a “minor populated center” and have a delegated mayor. 59% of the inhabitants are men and 41% are women. 48% of the area (680 ha) are dedicated to cocoa production, with an average yearly production of 700kg/ha. The villagers also cultivate corn, plaintain, cotton and oranges and have around 100 cattle animals. 10.34% of the villagers are illiterated, 48.28% have a primary education, 34.48% have a secondary education and 6.9% have a higher education. There is a medical center in the village. A technical study is under process to evaluate the opportunity to implement a drinking water system. The Association de Proteccion de bosques Comunales Dos de Mayo owns the concession El Breo and is strongly involved in the REDD project since the beginning
- **Santa Rosa:** on the bank of the Huayabamba river, Santa Rosa is constituted by ~40 cocoa farmers, majority of the area is dedicated to cocoa production, with average yields of 1200 kg/ha. As part of the REDD project, they are developing a botanical garden to value floral biodiversity, and want to develop a guesthouse for visitors to come and visit the conservation area. Strongly involved in the project since the beginning, Santa Rosa is now sollicitating a concession for conservation of 10 000 ha.
- **Pucalpillo:** located a little more downstream on the bank of Huayabamba river, 30% of the area (60 ha) are dedicated to cocoa production, with an average yearly production of 800kg/ha. The villagers also cultivate corn, plaintain, cotton and oranges and have around 40 cattle animals. 56% of the inhabitants have a primary education, 36% have a secondary education, 6% are illiterate and 2% have a higher education (no university). There is no medical center in the village. Strongly involved in the project since the beginning, the asociacion of productores agropecuarios de Pucalpillo (APAP) is now sollicitating a concession for conservation of 20 000ha.
- **Huicungo :** located on the banks of the Huayabamba river, only 10km before the junction with Huallaga river, it is a major populated centers, with a municipality. Major incomes come from cocoa production, with some farmers members of ACOPAGRO cooperative, while others (~130 farmers) are joining the newly created Asociacion de Prodcutores Agropecuarios de Huicungo (APAHUI), whose aim is to develop as a complete cocoa cooperative. APAHUI is the organization sollicitating the concession for conservation Monte Cristo, part of the project area.

Other communities of the project zone :

- **Marisol** is the last populated community upstream on the banks of the Huayabamba River, on the historical and natural path to the inner areas of the project area. They mostly rely on cocoa production. There is primary education in the village and use hydroelectrical (mainly) and solar power for electricity generation.
- **Pizarro:** 35% of the area (80 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plaintain, cotton and oranges and have around 60 cattle animals. 2% of the villagers are illiterated, 68% have a primary education, 24% have a secondary education and 6% have a higher education (no university). There is a medical center in the village.
- **Mojarras:** 32% of the area (70 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plaintain, cotton and oranges and have

around 30 cattle animals. 84% of the villagers have a primary education (complete) and 16% have a higher education. There is no medical center in the village.

- **Santa Ines:** 29% of the area (70 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plaintain, cotton and oranges and have around 100 cattle animals. 2% of the villagers are illiterate, 76% have a primary education, 20% have a secondary education and 2% have a higher education. There is a medical center in the village.
- **Gran pajaten:** 25% of the area (10 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plaintain, and cotton and have around 20 cattle animals. 10.35% of the villagers are illiterate, 48.27% have a primary education, 34.48% have a secondary education and 6.90% have a higher education. There is no medical center in the village.
- **San Juan de Pajaten:** 7% of the villagers have a higher education, 73.33% have a primary education, 13.34% have a secondary education and 6.33% of the villagers are illiterate. There is no medical center in the village.
- **Nueva Esperanza:** 25% of the area (25 ha) are dedicated to cocoa production, with an average yearly production of 400kg/ha. The villagers also cultivate corn, plaintain, cotton and organges and have around 30 cattle animals. 7% of the villagers are illiterate, 73% have a primary education, and 20% have a secondary education, 6.67% of the villagers are illiterate. There is a medical center in the village.
- **Primavera:** 31% of the area (45 ha) are dedicated to cocoa production, with an average yearly production of 700kg/ha. The villagers also cultivate corn, plaintain, cotton and organges and have around 30 cattle animals. 4.08% of the villagers have a higher education, 81.64% have a primary education, and 14.28% have a secondary education. There is no medical center in the village.
- **Luz del Oriente:** located at the northern tip of Martin SAgrado concession, at the boarder with Amazonas region, Luz del Oriente is a community depending on Rodriguez de Mendoza in Amazonas region. It is accessible by dust road from Mendoza up to 10km from the community.

Communities outside the project zone, though related to the project

- **Chuquibamba**, municipilaty located in Amazonas region, in the Andes, is the access point and political center for the 3 communities located within the Martin SAgrado project area (Canaan, La Morada, Anazco Pueblo). As such, it is implicated in the conservation project. It is accessible by dust road coming along the Maranon river bed.
- **Comunidad Campesina de Leymebamba**, located in Leymebamba, Amazonas region, in the Andes. Leymebamba is another access point to the 3 communities located within the Martin SAgrado project area (Canaan, La Morada, Anazco Pueblo). Also, the Community has sollicitated a concession for conservation in Amazonas region whose demarcation goes up to Martin SAgrado project area. As such, coordination with this community is interesting for the sake of both conservation projects.

ACOPAGRO cooperative

On top of local communities and community associations of local producers, the project is developed with a strong partner, owner of the Martin Sagrado concession within the project area: the ACOPAGRO cooperative

ACOPAGRO cooperative was created in 1997, as part of a United Nations program to substitute coca plantations with cocoa and other alternative crops in the San Martin region. It now counts 2000 members, small-scale producers of cocoa and sugar cane having 5 hectares of land each, with an average 2.2 ha of cocoa fields. Most of the farmers were coca planters in the past.

The organization is FLO and Organic certified (standards EU et NOP) and is very successful, both on its commercial activities (ACOPAGRO has become in ten years Peru's first cocoa exporter) as well as towards its compliance to fair trade principles. ACOPAGRO can be considered as a model organization and has been certified under Alter Eco Gold Standards in 2009 by SGS.

3 000 hectares of cocoa fields have already been planted and are harvested, the equivalent of 3 millions cocoa trees. Cocoa trees need 40 % shade to give their best potential, hence producers are willing to plant native trees in combination with their cocoa trees. As well, the small scale producers dispose of many areas of degraded land and pastures, because of the former coca plantations or food crop plantations, that they are willing to reforest with native trees for forestry activities.

To help the farmers to achieve these objectives, ACOPAGRO and PUR PROJET set up a reforestation program in 2008 called Alto Huayabamba. The plantation started in April 2008 and the project is now fully operational with 1 million trees planted (December 2011) and was validated according to the VCS standard. The objective is to plant 2 million trees over 2300 hectares (depending on plantation of models between agro-forestry and forestry only plantations), of degraded land and cultivated land, practicing agro-forestry combining native trees species with cocoa trees and forestry plantations. The project is funded via the sales of environmental services (trees certificates) and of ex-ante carbon credits (VCUS).

Carbon offset is very complimentary with Fair Trade and organic production, the Internal Control System is already in place for organic production, and producers very well trained on traceability. The climatic conditions are very favourable for vegetation growth, hence for carbon offset. ACOPAGRO has already proved its capacity to plant and secure a sustainable plantation. The need of the area is very large, both for coca producers, and much as for the damaged environment of the region.

A3.2 Population

This particular region has been quite recently populated, with a significant growth of the population dating back to the 1940's. The participants in the project are the second or third generation, the majority of them discovered cacao farming recently. Their parents and grand-parents came in the region thanks to colonization programs. Consequently, the traditional love of the land that is obvious when it has been transmitted from generation to generation does not really exist.

It explains why it has been easier for the producers to slash and burn the land as they did not have the culture of protecting the land and the species. This is changing with the co-operative thanks to the agricultural trainings. This is also changing with the reforestation program and the understanding that biodiversity is an essential process.

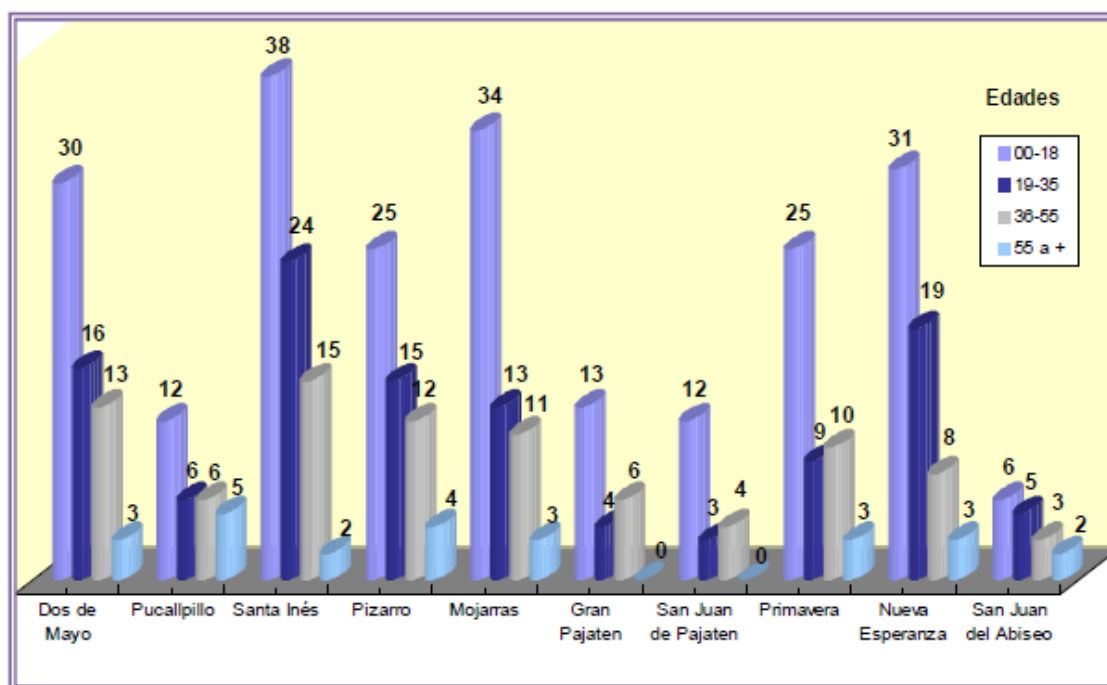
The producer's pride to be members of ACOPAGRO or other association of producers, the cohesion and solidarity, the strong will to integrate more producers in the development process, the awareness and understanding of the deforestation issue strengthen the organization and improve the results in terms of sustainable development.

Table 36 : *Population distribution according to age group*

Community	Age groups / Percentage								Sample (hab)
	00-18	%	19-35	%	36-55	%	55 a +	%	
Dos de Mayo	30	48.39	16	25.81	13	20.97	3	4.84	62
Pucallpillo	12	41.38	6	20.69	6	20.69	5	17.24	29
Santa Inés	38	48.10	24	30.38	15	18.99	2	2.53	79
Pizarro	25	44.64	15	26.79	12	21.43	4	7.14	56
Mojarras	34	55.74	13	21.31	11	18.03	3	4.92	61
Gran Pajaten	13	56.52	4	17.39	6	26.09	0	0.00	23
San Juan de Pajaten	12	41.38	3	10.34	4	13.79	0	0.00	19
Primavera	25	53.19	9	19.15	10	21.28	3	6.38	47
Nueva Esperanza	31	50.82	19	31.15	8	13.11	3	4.92	61
San Juan del Abiseo	6	37.50	5	31.25	3	18.75	2	12.50	16
Total	226		114		88		25		453

Fuente: AMPA. Socioeconomic study. 2008.

Figure 28 : *Population distribution according to age group*



Fuente: AMPA. Encuesta socioeconómica. 2008.

A3.3 Housing, sewage, energy, subsistence

The majority of the families part of the Martin Sagrado project have houses and residences are generally made of wood with roofs made of palm thatch.

None of the communities except Huicungo has a basic sanitation system, potable water service or trash collection. Organic trash is deposited naturally on the ground surrounding the residences or in the fields and is incorporated into the soil. The non-organic trash is separated and burned.

The population has access to potable water resources directly from water sources such as Huayabamba river, the river Jelache and the river Abiseo, as well as the various creeks and tributaries in the zone. As for sewage, this service is also inexistant so it is common to find latrines built by the villagers themselves. On the other hand, the Dos de Mayo Town Center has a technical file which was developed by USAID / PDA, to install a water system. Currently, this record is being complemented sewer service for submission to the District Municipality of Huicungo.



Energy: Except for Huicungo, most of the communities along the Huayabamba river are not connected to the grid. The community of Dos de Mayo has established an alternative service using a generator that runs on gasoline. The municipality of this community provides this service to its population over 4 hours from 6pm. S/.25.00 is the monthly fee per family served. The community of Marisol relies on hydroelectrical power. Some families in other communities are slowly testing small solar panels to charge batteries. Most of the need for lighting is covered with candles and kerosene lamps. On the other hand, almost all of the population uses firewood for cooking, as well as the kitchens are rustic stone or clay.

All of the communities depend on subsistence agriculture (platanos and fruit production) and extractive activities, such as fruit collection, fishing and hunting to supplement their diets. Usually, subsistence practices are used when fishing and hunting, with fish providing the major source of protein in the communities.

A3.4 Education and health

It's the least supplied area, most of these people only have health promoters, with an incipient implementation. Only in Huicungo and in the communities of Dos de Mayo, Nueva Esperanza and Santa Inés are medical centers where residents come from other communities. However, the lack of resources and medical supplies to people forced to move to the city of Juanjui in emergencies and in the case of La Morada y Los Chilchos toward Bolívar or Leymebamba.

In Alto Huayabamaba, going to school may be hard (20 minutes walk from Santa Rosa, but some producers are further away along the river) because of the isolation of the area and the access only by boat. The good point about schooling is that many of the producers interviewed succeeded to send their children to university thanks to the cocoa revenues. This shows a great progress in the standard of living of producers and their family. Students of different levels compose the school classes, what makes the teacher's work more difficult, since she must teach all the students at the same time in the same classroom.

There is no organized system of health care provided by formally trained medics. Basic emergency assistance (first aid) is provided by community members and is based on traditional knowledge or training provided by the local municipality. The most common health problems and illnesses are malaria, diarrhea,

verminosis, malnutrition, flu and hypertension. The treatment of more serious problems requires transportation to the hospital in the city of Novo Aripuanã in “rabetas” (wooden canoes with small outboard motors).

Table 37 : Educative infrastructures in participating communities

comunidad	Infraestructura Educativa		Nº	Niveles		
	Si	No		I	P	S
Dos de Mayo	X		00420	X	X	X
Santa Inés	X		00639	X	X	
Pucallpillo	X		00462		X	
Mojarras	X		0002		X	
Nueva Esperanza	X		0004		X	
Gran Pajaten	X					
Pizarro	X		00421	X	X	X
Primavera	X		00005	X	X	
San Juan de Pajaten	X	X				
San Juan de Abiseo	X	X				
La Morada	X				X	X

Fuente: AMPA. Encuesta socioeconómica. 2008.

Table 38 : Population distribution according to educational level

Community	Instruction level			
	Primary	Secondary	Superior No University	Analphabet
Dos de Mayo	48.28%	34.48%	6.90%	10.34%
Santa Inés	76.00%	20.00%	2.00%	2.00%
Pucallpillo	56.00%	36.00%	2.00%	6.00%
Mojarras	84.00%	0.00%	16.00%	0.00%
Nueva Esperanza	73.33%	20.00%	0.00%	6.67%
Gran Pajaten	48.27%	34.48%	6.90%	10.35%
Pizarro	68.00%	24.00%	6.00%	2.00%
Primavera	81.64%	14.28%	4.08%	0.00%
San Juan de Pajaten	73.33%	13.34%	7.00%	6.33%
San Juan de Abiseo	66.50%	22.50%	5.00%	6.00%

Source: AMPA. Socioeconomic study. 2008.

A3.5 Gender issues

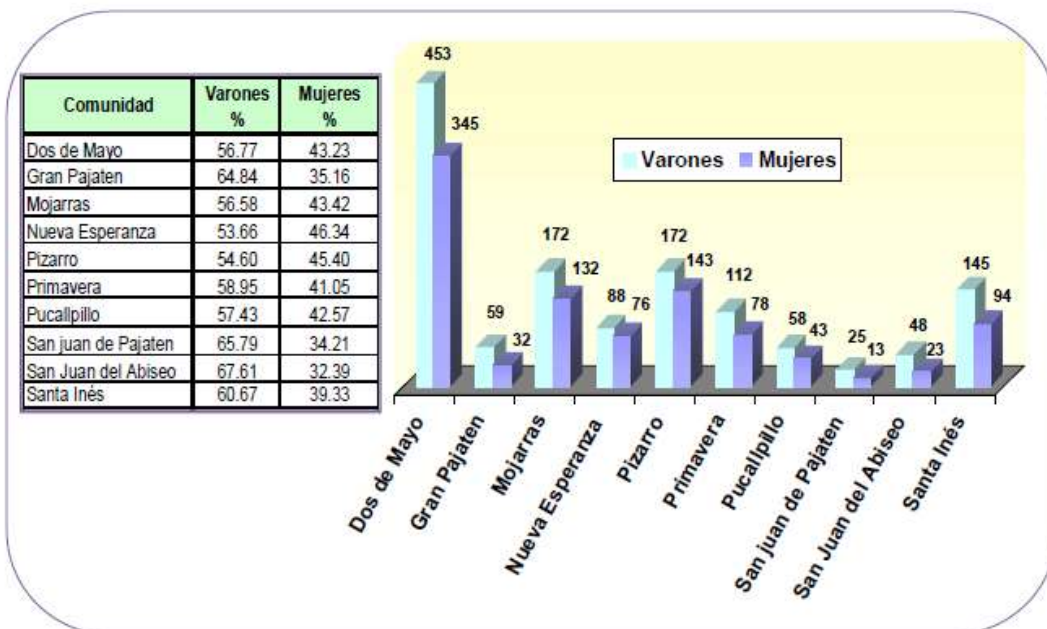
Majority of members are male but there are women as well. Women interviewed declared to be well accepted and felt like any other member. It is interesting to note that during all the meetings with producers, men requested women to participate, what they refuse to do most of the time, nevertheless requesting their participation is a start in the emancipation process.

There are also many women employees at the coop level as well, with very good spirit apparently at the offices and at the producer level and good integration of women, in Peru which is traditionally quite male dominant

Table 39 : Homes, houses and population by gender

Comunidad/Anexo	Hogares	Viviendas	Varones	Mujeres	Total
Dos de Mayo	211	211	453	345	798
Arica	3	3	4	4	8
Atun rumi	10	10	20	14	34
Chilin	1	1	1	1	2
Chorro	3	3	3	4	7
Gran Pajaten	27	27	59	32	91
La Quinta	3	3	3	4	7
Llano	6	6	15	11	26
Mojarras	74	86	172	132	304
Monte Bravo	1	1	1	1	2
Nueva Esperanza	43	43	88	76	164
Oro Mina	1	1	2	1	3
Pizarro	91	92	172	143	315
Primavera	50	50	112	78	190
Pucallpillo	28	28	58	43	101
San Juan de Pajaten	13	13	25	13	38
San Juan del Abiseo	31	31	48	23	71
Santa Inés	64	64	145	94	239
La Morada - Chilchos	89	89	167	155	322
Total	749	762	1548	1174	2722

Source: District Municipality of Huicungo. 2008. & AMPA. 2008.

Figure 29 : Distribution of population by gender

Elaboración AMPA. Fuente: Encuesta socioeconómica. 2008.

A3.6 Economy and Income

The participants are poor but their living conditions are acceptable, except regarding nutrition, education and health. People have access to drinkable water and food from their fields. They own 2 to 5 hectares of land, of which 0,5 to 3 are planted with cocoa trees. They earn an average 3000 to 5000 Euros a year of sales.

As shown in the UNODC (United Nations Organization against Drug and Crime), the revenues of the producers have increased steadily and the ACOPAGRO Fair Trade project can be considered successful. All producers interviewed declared they were really happy with the project since they started. They used to be coca growers but now earn as much with cocoa



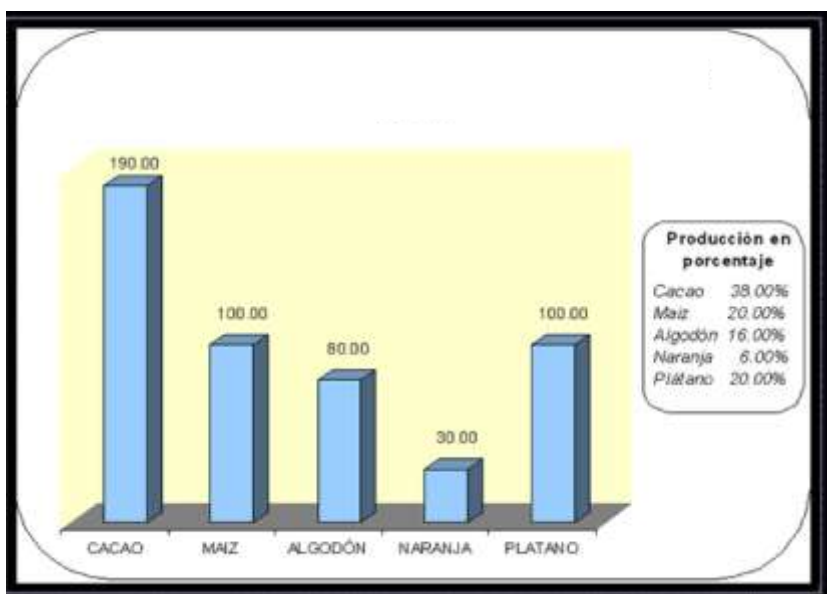
There is more land available to buy and convert from monoculture (coca, sugar cane,...) to consortium fields (cocoa + native forest). This gives producers the opportunity to develop their sales, the objective is to bring them from an average 1,5 hectares of cultivated cocoa trees to a minimum of 5 hectares, for them to reach a decent revenue and be in capacity to develop even more their farm. The area is quite isolated, especially for Alto Huayabamba accessible only by boat, but on the other hand, there is land there to buy and to plant.

The most important economic activities are the cultivation and sale of cocoa and sugar cane. Most of the families raise chickens for domestic consumption and others raise cows on a small scale.

According to the data provided by the Agricultural Cooperative Cocoa - ACOPAGRO, agricultural production is estimated by community, is as follows:

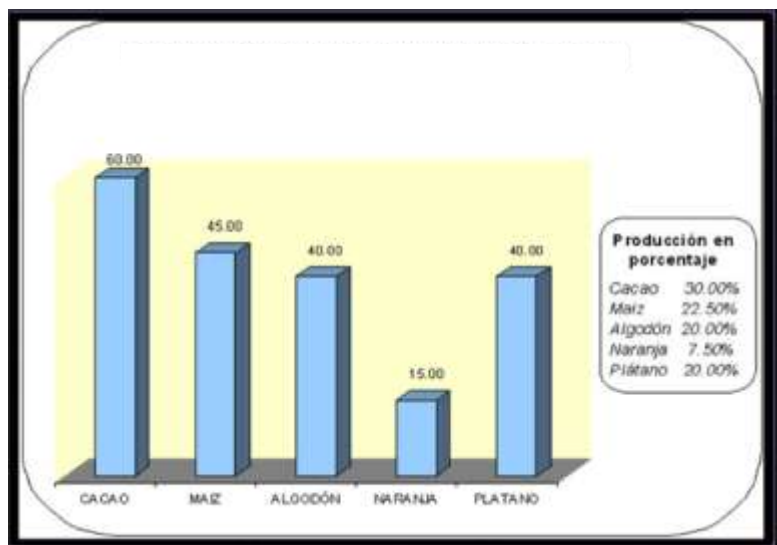
Dos de Mayo: 38% (190ha) is cocoa, with an average production of 400kg/ha year and the sale price is S / . 6.4 kg. 20% (100ha) corresponds to a maize and banana cultures, respectively. The average maize production is 2000 kg / ha and the sale price is S/.0.70kg. The average production of banana is 10 MT / ha and the price is S/.0.50 kg. The 16% is cotton, is 80 ha, with an average production of 1200 kg / ha.year and the sale price is S/.1.20kg. The 6% corresponds to the orange crop, ie 30 ha with average yield of 40TM/ha. The sale price is S/.0.20kg. In the Commonwealth of Dos de Mayo, there are approximately 100 head of cattle, being the selling price per head S/.700.00.

Figure 30 : Estimated agricultural production - Dos de Mayo Community



Fuente: AMPA. Socioeconomic study. 2008.

Pucallpillo: 30% (60 ha) is cocoa, with an average production of 400 kg / ha year and selling price per kilogram of S / . 6.4. 22.5% (45 ha) is corn. The average production is 2000 kg / ha and the sale price is S/.0.70kg. 20% (40 ha) is made of cotton and banana crops. The average production is 1200 kg / ha and the price is S/.1.20kg. The average production of banana is 10 MT / ha and the sale price is S/.0.50 kg. 7.5% (15 h) corresponds to the orange crop, with production and 40TM/ha average selling price per kilogram of S/.0.20. Also, there are approximately 40 head of cattle. The selling price per head is S/.700.00

Figure 31 : Estimated agricultural production - Pucallpillo Community

Fuente: AMPA. Socioeconomic study. 2008.

Gran Pajaten: In this community, each culture is represented by 25% each, ie 10 ha are used for the production of cocoa, 10 ha for maize, 10 ha to 10 ha for cotton and bananas. The sales prices per kg are: Cocoa S / 6.4; S/0.70 Corn, Cotton and Banana S/.1.2 S/0.50. The production amounts to 4TM cocoa 20TM corn, 12 tons of cotton and banana 100TM. Also in this community there are approximately 20 head of cattle. The selling price per head is S/.700.00.

Mojarras: The 31.82% is cocoa (70ha), with an average production of 400 kg / ha year and the sale price is S / 6.4 kg. The 22.73% is maize (50 ha), with an average production of 2000 kg / ha. The sale price of corn is S/.0.70kg. The 18.18% (40 ha) is made of cotton and banana crops, respectively. The average production of cotton is 1200 kg / ha and the price is S/.1.20kg. The average production of banana is 10 MT / ha and the sale price is S/.0.50 kg. The 9.09% (20 ha) is orange crop, with production averaging 40TM/ha. The sale price is S/.0.20kg. Also, there are about 30 head of cattle.

Nueva Esperanza: The 25% is cocoa and corn (25ha), respectively. The average production of cocoa is 400 kg / ha year and the sale price is S / 6.4 kg. The average maize production is 2000 kg / ha and the sale price is S/.0.70kg. The 20% is cotton and banana (20 ha), respectively. The average production of cotton is 1200 kg / ha and the sale price is S/.1.20kg. The average production of banana is 10TM/ha and the sale price is S/.0.50 kg. 10% corresponds to the cultivation of orange (10 ha), which on average produce 40TM/ha. The sale price is S/.0.20kg. In this community there are approximately 30 head of cattle and selling price per head is S/.700.00.

Pizarro: The 34.78% (80 ha) is cocoa, with an average production of 400 kg / ha year and selling price per kilogram of S / 6.4. The 17.39% (40 ha) is maize and banana cultures, respectively. The average maize production is 2000 kg / ha and the sale price is S/.0.70kg. The average production of banana is 10 MT / ha and the sale price is S/.0.50 kg. The 21.74% (50 ha) is cotton. The average production is 1200 kg / ha and the price is S/.1.20kg. The 8.70% (20 ha) is orange crop, with production averaging 40TM/ha. The sale price is S/.0.20kg. Also, there are approximately 60 head of cattle, whose selling price per head is S/.700.00.

Primavera: The 31.03% (45 ha) is cocoa, with an average production of 400 kg / ha year and selling price per kilogram of S / 6.4. The 20.69% (30 ha) is corn and banana cultures, respectively. The average maize production is 2000 kg / ha and the sale price is S/.0.70kg. The average production of banana is 10

MT / ha and the sale price is S/.0.50 kg. The 17.24% (25 ha) is cotton. The average production is 1200 kg / ha and the price is S/.1.20kg. The 10.34% (15 ha) is orange crop, with production averaging 40TM/ha. The sale price is S/.0.20kg. Also, there are approximately 30 head of cattle.

San Juan de Pajaten: 25% (10 ha) is cocoa, corn, cotton and banana, respectively. The average production of cocoa is 400 kg / ha year and selling price per kilogram of S / . 6.4. The average maize production is 2000 kg / ha and the sale price is S/.0.70kg. The average production of banana is 10 MT / ha and the sale price is S/.0.50 kg. The orange is not a cash crop in this community. In San Juan del Abiseo, there are approximately 20 head of cattle.

San Juan del Abiseo: 40% (80 ha) is cocoa, with an average production of 400 kg / ha year and selling price per kilogram of S / . 6.4. The 17.78% (40 ha) is growing corn, cotton and banana cultures, respectively. The average maize production is 2000 kg / ha and the sale price is S/.0.70kg. The average production of cotton is 1200 kg / ha and the price is S/.1.20kg. The average production of banana is 10 MT / ha and the sale price is S/.0.50 kg. The 6.67% (15 ha) is orange crop, with production averaging 40TM/ha. The sale price is S/.0.20kg. In this community there is no cattle.

Santa Ines: The 29.17% (70 ha) is cocoa, with an average production of 400 kg / ha year and selling price per kilogram of S / . 6.4. The 20.83% (50 ha) is growing corn, cotton and banana cultures, respectively. The average maize production is 2000 kg / ha and the sale price is S/.0.70kg. The average production of cotton is 1200 kg / ha and the price is S/.1.20kg. The average production of banana is 10 MT / ha and the sale price is S/.0.50 kg. The 8.33% (20 ha) is orange crop, with production averaging 40TM/ha. The sale price is S/.0.20kg. Also, there are approximately 100 head of cattle.

A3.7 Remoteness and accessibility

Juanjui is 2 to 3 hours drive away from Tarapoto city and airport. Tarapoto is already in an isolated area of Peru, not easily accessible by road (20 to 30 hours drive from Lima). Alto Huayabamba producers are even more remote and only accessible by boat, 3 to 4 hours boat drive from Juanjui. This means transport has to be by boat to Juanjui.

During heavy rain season, Alto Huayabamba area is hardly accessible by boat as rough waters make it hard to go upstream. Producers are widespread along the river, each quite isolated on his field and without any motorized boat. To reach Juanjui, producers wait for the "taxi-boats" to take them and their cocoa.



Producers bring their goods and cocoa to the Juanjui market by “taxi-boat”

The taxi-boat cost 20 soles from Juanjui to Santa Rosa (when the minimum wage in the region is approximately 500 soles per month), it stops at every village three times a day. The more isolated producers have to reach those meeting points first.

To go downstream, the common use is to take rafts or rubber rings. It takes nine hours in raft to go from Santa Rosa to Juanjui where the main office of the cooperative and services are located. This is a regular trip for the communities' representatives.

APPENDIX 4 : ANALYSIS OF AGENTS, DRIVERS AND UNDERLYING CAUSES OF DEFORESTATION

Project assessments, interviews and participatory rural appraisals indicate that at least nine threats of deforestation and six agents of deforestation have been and continue to be active in the San Martin Province.

Note that the identified active threats of deforestation are not, by any means, an exhaustive or complete representation of the deforestation threat in Peru or even within the San Martin Province. These threats represent the most prevalent threats that have been active in the past and will continue to be active in the future.

Table 40 : **Threats of deforestation and agents**

Drivers - deforestation and degradation practices / Land-Use	Agents of deforestation						Total
	Local communities	Migrants	Mine/Oil dealers	Illegal dealers	Loggers	Government	
1. Conversion to croplands, pastures and housing	17%	28%		25%			70%
2. Conversion to settlements / infrastructure (Roads, water and electricity)	5%	7%				3%	15%
3. Selective logging of high-value species for commercial sales	1%	1%			8%		10%
4. Timber harvesting for local use (housing and infrastructures)	0,5%	0,5%					1%
5. Fuelwood gathering	0,5%	0,5%					1%
6. Uncontrolled fires	1%	1%					2%
7. Intentional fires (Paths opening and fires for hunting)	0,5%	0,5%					1%
8. Mining and Hydrocarbon activities encroachment			0%			0%	0%
9. Economic land concession (timber and agriculture)						0%	0%
Total	25,5%	38,5%	0,0%	25,0%	8,0%	3,0%	100%

A4.1. Deforestation agents

The deforestation agents are the following:

A4.1.1 Local rural communities

A socio-economic description of the communities in the project buffer zone, their sources of incomes and living conditions, is available in the Appendix 3.

Expansion of agricultural land: Most of the communities live from agriculture, both from permanent crop (cacao, orange, cotton) as well as annual crops (corn, banana, etc.) cultivated in cyclic slash and burn practices, with fallow cycles getting longer as the soil fertility decreases. Most of the time, when a parcel is not productive enough anymore, farmers tend to clear another parcel of forest to implement new parcels for their annual crops, leading to higher areas deforested per family.

Population increase: The rural population average increase rate is at 4,7 % for San Martin. (Source: GORESAM and IIAP, Instituto de Investigaciones de la Amazonia Peruana, 2005). With the rural population expanding at a rate of 5 % per year (33 498 more people each year), demand for farmland will require an additional 67 000 to 160 000 hectares annually based on 2 to 5 hectares for each household.

As the demography expands, local communities are experiencing overpopulation and also require an increasing amount of farmland as children marry and establish independent farms. Traditionally, village elders have been responsible for identifying forest areas that are suitable for rain fed corn and paddy fields. Young families or migrants requiring land approach the elders to request a farmland allocation. Usually a 2 to 5 hectares plot with good soil moisture is selected within the forest. Many committees are accepting these plots on the basis that the “owner” agrees not to expand the existing fields.

A4.1.2 Migrants

Since 1940's, San Martin has been characterized by many waves of migrants coming mostly from the Andes, looking for better farming conditions and better climatic conditions. Coca production was.

The proportion of migrants went from 7.7 % of migrants installed in 1940, up to 28,7% (209 418 persons) of total population in 2007 (Source: INEI, Perfil Sociodemográfico del Departamento de San Martín, 2009). Census figures show that 67 947 persons migrated from 2002 to 2007 to San Martin region, (i.e. 13600 persons/year, approx. 2,1% of population). Socio-economic surveys conducted by the project team in the participating communities have shown even higher migration rates (2% to 15% population increase per year depending on the communities). Communities do not all have internal policies to control migration of and integration of new families to the communities. This has led to an increasing pressure on deforestation for agricultural activities.

A4.1.3 “Land dealers”

While migrants may participate in forest clearing for future land sales, land speculation is often driven by business-people, officials, and local villagers who seek to claim and clear forest land for sale in San Martin. According to reports, “power men” hire migrants or local villagers to fell and burn off forest cover for \$50 to \$100 per hectare. Small huts are constructed to indicate residence, although these are frequently not occupied. This pattern reflects attempts to grab available public forest land and hold it until it can be resold at a higher price. While these actions are usually illegal, letters from local officials are used to create an appearance of legitimacy. Once one plot is opened it appears to encourage other migrants to open forests in neighbouring areas. In some cases, poor migrants may sit on the plot for one to two years waiting for land values to rise. These plots are then sold to a “consolidator” or businessman who buys a number of them to form a larger plot.

The province has no budget to protect, rehabilitate or develop these lands and so they often are either leased as large Economic Land Concession or reclaimed by migrants.

A4.1.3 Loggers

The Timber sector in the San Martin region accounts for 8 % of the Peruvian national official production of wood. There are officially 216 Timber companies and an estimated 350 additional ones not legally formalized. There is very little data about actual wood production and a large part may be exploited without legal record, being illegal logging for most of it.

Forest in the project area and reference region boasts high value timber species (Tornillos, Caobas, Ishpingo, etc.) with very old and valuable specimens. Timber companies as well as individual illegal loggers contribute to forest degradation by conducting selective removal of high-value species.

However, to a smaller extent, loggers can also contribute to deforestation in areas where timber removals require clearing of land for extraction.

There are zones designated as Forests of Permanent Production (FPP, BPP in Spanish: Bosques de Produccion Permanente) in the San Martin Region for a total of 1 501 291 ha (RM N° 0549 – 2002 – AG, 2002). Of which 576 192 ha are in areas of protection, 750 336 ha in areas of protection associated with timber production and 237 614 ha in areas of recuperation.

A4.1.4 Government

To a lesser extent, government infrastructure projects such as expansion of roads, electrical network, water network, etc. lead to a small amount of deforestation.

Additionally, the government has the possibility to deliver new Economic Land Concessions to companies for timber or agriculture purposes for example. This threat is mentioned here solely for the purpose of keeping track of it, however the regional government in charge of land concessions has for now embarked on a policy targeted more to conservation in the project reference region and has signed and published in October 2010 an “Ordenanza Regional” stating that the government would not deliver mining, oil, timber or agriculture concessions in that area. However, it is a political decision that could be reversed as the government change. It is therefore important to identify this threat, also it is considered here to have no contribution to deforestation

A4.1.5 Mining / Oil companies

Mining and oil potential have already been identified in the project zone and reference region, with 10 mining concessions in the project area that had already been solicited by the mining companies to the regional government.

As described above, the “Ordenanza Regional” now forbids the development of mining/oil activities in the project area and reference region. This agent group is therefore considered to have no contribution to deforestation but are mentioned here for the purpose of keeping track of the evolution of the situation.

A4.2. Deforestation drivers

For each deforestation threats, non-spatial (quantity of deforestation) and spatial drivers (location of deforestation) have been identified and summarized in the following table.

Table 41 : Summary of deforestation threats, agents, drivers, and underlying causes

s of deforestation ing/Oil Land plante	Land drivers	Loggers	Governme nt	Total	Causes - Drivers of deforestation	
					Non spatial	Spatial
	25%			70%	- Population density increase (demography + immigration) - Good revenues from agriculture; development of cocoa industry in San Martin Region - Soil fertility - Historical use of cattle as patrimony	- Further exploration of rivers u - Projects of roads construction
			3%	15%	- Population density increase (demography + immigration) - Cocoa fermenting / drying facilities - Schools - Football fields - "Hostels"	- Development of economic act - Further exploration of rivers u - Projects of roads construction
		8%		10%	- Some species with high value (timber/ medicinal) : e.g., - torillos, cacao	- Logging concessions on left ba - Huapabamba (East). Possible er - crossing of rivers is easy - On-site wood cutting, close to - extraction, lack of accessibility.
				1%	- Population density increase (demography + immigration) - Wood used for construction, fencing	
				1%	- Population density increase (demography + immigration) - Wood used for cooking	
				2%	- Traditional slash and burn practices for agriculture	
				1%	- Population density increase (demography + immigration) - Hunting practice - Provoque rainfall (local belief)	
			0%	0%	POTENTIAL RISKS - Mining potential identified / Metal and Oil rich soil	
%	25.0%	8.0%	3.0%	100%		

Main non-spatial deforestation drivers are:

- Population increase, through demography and immigration : this driver has already been described in the description of agents.

- Attractiveness of agriculture : The region boasts good climatic and soil conditions for agriculture (see Appendix 1), in particular cacao keeps growing as a profitable secure and long-term crop, favoured by the establishment of strong, growing, and well-known producers organizations and cooperatives (Acopagro, Naranjillo, Tocache, Apahui, etc). These organizations offer attractive conditions for the producers : a secured market, guaranteed prices (with fairtrade premium for some of them), organizational structures, loans, etc.. Additionally, orange is a growing market with increasing local demand, and banana and corn are historical crops that have had a good local market.

- Presence of high-value tree species in the forest : As described in Appendix 2, the forest is the habitat for many high-value timber species which have a very good local (and/or international for some species, e.g. mahogany, cedar, etc.) market, as well as excellent features for local use in construction. Targeted species include: Mahogany, Cedar, Tornillo, Ishpingo, among others.

Main spatial drivers are

- Accessibility: presence of roads, navigable rivers, reasonable slopes. Deforestation will tend to happen first in most accessible areas. Historical analysis of deforestation show that populations are progressing deeper in the forest along the rivers, and settling further away from the road. Also,

- Slope : In the western part of the reference region, terrain is in some place rugged with very steep slopes, cliffs, etc. which limit the settlements and farming, although farmers traditionally are able to cultivate crops in terrains with significant slope (up to 70%)

- Proximity of populated centre or economic activity : migrants will gather and settle around economic or populated centers, or close to economic activities development (mining, oil centers)

Impact and significance of drivers on deforestation is further detailed in section A4.4 hereafter, for each specific deforestation threat.

A4.3. Underlying causes of deforestation

For each deforestation threats, underlying causes to drivers described above have been identified and summarized in the table 38 above.

Main underlying causes are:

- Bad economic perspectives / living conditions in the Andes: The main cause driving migration of populations from the Andes to the lower regions in San Martin is the difference existing between living and farming conditions in the Andes and in the lower forest. Climate, soils are poorer in the Andean regions, and communities are typically more isolated, further away from markets. Due to isolation, Andean communities also have less access to health support or higher education. Populations (an especially younger generations) tend to migrate to find better living conditions

- Demography: Although global Peruvian fertility rate has decreased over time to reach 2,5 in 2009, there is a great disparity over the country. According to INEI (2002), fertility rate in urban areas in Peru was 2,4, whereas it reached 4,8 in rural areas. Communities of the project are rural communities with high fertility rates (socio-economic surveys conducted show a number of children per women of 3 to 5 in the communities involved), which means a growing population with increasing younger generations. In the project area and reference region, most of the population arrived in the 1980's during the boom of coca cultivation. They were families with young kids. The generation of settlers' children has just become in the recent years in age of creating their own families and settle with their own land. The demographic pressure is therefore only getting stronger in the area close to the project area.

- Lack of clear land tenure/property: Clear land property / land tenure does not always exist in the reference region. Before settlement of farmers, there is no identified land property / tenure for the forested land. Once settled in a new place, farmers can claim the property title for the land they've occupied and cultivated for at least 5 years. This policy drives a lot of new settlements in forested areas. In reality, only less than 20% of the farmers have a legal land title or recognition of land tenure considering that the proceedings for titling the land are not simple and expensive. Forested areas remain free of defined property status and remain open to migration and new settlements. Additionally, communities usually don't have clear rules for migrants acceptance, and cannot enforce them anyhow. This explains why legal activities and definition of land property / rights (through the claim for concessions for conservation purposes, or titling of individual farms, etc.) is critical in the project, as well as helping the communities to better define rules for immigration. The grand majority of land to date in the reference region remains free of any property or concession claim, open to migration and settlements.

Impact and significance of underlying causes on deforestation is further detailed in section A4.4 hereafter, for each specific deforestation threat.

A4.4. Chain of events leading to deforestation / Detailed analysis of each deforestation threat**A.3.4.1. Forest clearing for conversion to croplands and pastures**

The population of San Martin is estimated at 669 973 people (San martin Region, 2005), which represents 2.6 % of Peru and 20 % of the population living in the Amazon rainforest in Peru. Majority of population is urban (65.3 %). Density is at 13.07 people / km² but if considering only potential productive lands, it is at 60 people / km².

Forest clearing for land sales and conversion to croplands is mainly driven by local population, migrants, and illegal dealers.

Migrants

San Martin is characterized by many waves of migrants coming into the region (for crops and coca production) since 1940. It went from 7.7 % of migrants installed in that year, up to 31.7 % of total population (175 363 people) in 1993 (Source: GORESAM and IIAP: Instituto de Investigaciones de la Amazonia Peruana, 2005). This has led to an increasing pressure on deforestation for agricultural activities.

“Land dealers”

While migrants may participate in forest clearing for future land sales, land speculation is often driven by business-people, officials, and local villagers who seek to claim and clear forest land for sale in San Martin. According to reports, “power men” hire migrants or local villagers to fell and burn off forest cover for \$50 to \$100 per hectare. Small huts are constructed to indicate residence, although these are frequently not occupied. This pattern reflects attempts to grab available public forest land and hold it until it can be resold at a higher price. While these actions are usually illegal, letters from local officials are used to create an appearance of legitimacy. Once one plot is opened it appears to encourage other migrants to open forests in neighbouring areas. In some cases, poor migrants may sit on the plot for one to two years waiting for land values to rise. These plots are then sold to a “consolidator” or businessman who buys a number of them to form a larger plot.

The province has no budget to protect, rehabilitate or develop these lands and so they often are either leased as large Economic Land Concession or reclaimed by migrants.

Local population

The rural population average increase rate is at 5 % for San Martin. (Source: GORESAM and IIAP, Instituto de Investigaciones de la Amazonia Peruana, 2005).

With the rural population expanding at a rate of 5 % per year (33 498 more people each year), demand for farmland will require an additional 67 000 to 160 000 hectares annually based on 2 to 5 hectares for each household. In addition, the Provincial Governor has proposed the development of new settlements for migrants. Aside from migrant pressures on forest clearing, local communities are experiencing overpopulation and also require an increasing amount of farmland as children marry and establish independent farms. In the past, village elders were responsible for identifying forest areas that are suitable for rain fed corn and paddy fields. Young families or migrants requiring land approach the elders to request a farmland allocation. Usually a 2 to 5 hectares plot with good soil moisture is selected within the forest. Many committees are accepting these plots on the basis that the “owner” agrees not to expand the existing fields.

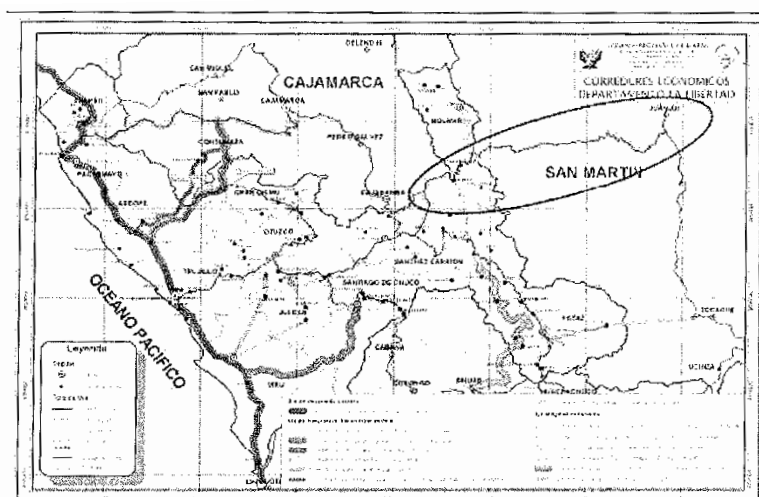
Causes leading to deforestation

Population density increase (demography + immigration), Good revenues from agriculture, development of cocoa industry in San Martin Region, Soil fertility, Historical use of cattle as patrimony.

Improved accessibility through the opening of roads, paths is a major cause leading to migration and increased deforestation.

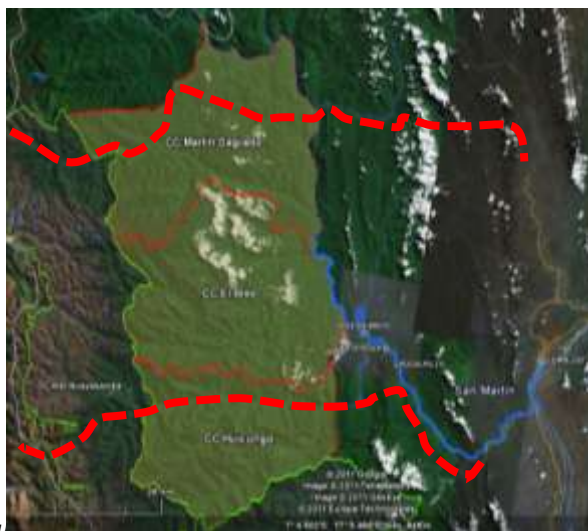
Road construction is one of the most important underlying threat for the area sustainability, as road construction will damage the forest and open the zone to easier illegal invasions. Past road projects show how damaging such constructions may be. In particular, the road project “Salaverry – JuanJui” connecting La Libertad to San Martin region, would cross straight through the project area, along Jelache River. Another road project Chuquibamba - La Morada – Saposoá connecting Amazonas region (Chuquibamba) to San Martin region across the mountains would also cross straight through the project area

Figure 32 : Salaverry – Juanjui road plan



Source: Plan vial departamental participativo La libertad, 2004-expediente tecnico CC el Breo

Figure 33 : Map of the potential road projects crossing project area



Source: Plan Val departamental participativo del municipio de Amazonas

Underlying Causes

Lack of economic activities in the mountains, population pressure, lack of clear land property and titles, country infrastructure development.

We consider this major **driver at 70 % of potential contribution to deforestation**.

A.3.4.2. Conversion to settlements / infrastructure (Roads, water, electricity, buildings)

Throughout the reference region settlements have been expanding rapidly over the past decade (at a comparable rate as population increase at 5 % per year). Settlement growth occurs through the expansion of village boundaries as forests are cleared for roads, houses, shops, and other buildings in the region. In addition, newly created communities are also established by migrants or local families interested in creating new villages. New villages are approved by local government officials but some install their homes without legal authorization (ex: Puerto Mojaras Case, Acopagro visit, 2010 and Alto Shamboyaco Case, 2010). The area likely reflects population growth trends in general.

This driver is assessed at **15% in terms of contribution to deforestation** in San Martín, though this may be further accelerated by private and public sector investment.

Causes

Demographic growth implies the need for new and more infrastructures (schools, roads, electricity, football fields, cocoa modules, etc.)

Underlying causes

Population pressure on environment, lack of clear land tenure, development of the country's infrastructures, lack of education on environmental stakes, a lack of financial means and/or alternatives.

A4.4.3. Selective logging of high-value species for commercial sales

The Timber sector in the San Martin region accounts for 8 % of the Peruvian national official production of wood. There are officially 216 Timber companies and an estimated 350 additional ones not legally formalized. There is very little data about actual wood production and a large part may be exploited without legal record, being illegal logging for most of it.

Local communities and migrants are as well, at a smaller scale, agent of this forest degradation within the reference region and outside.

Illegal logging contributes significantly to forest degradation but is particularly hard to monitor in terms of area. High-value “luxury wood” is selectively felled. Illegal timber smuggling is widespread, often organized by private sector operators who obtain support from local military and police. Armed soldiers are often involved in these activities presenting control problems for weaker Community Forestry Management Committees. Illegal loggers also benefit from the lack of transparency and information on land title and land tenure rights.

There are zones designated as Forests of Permanent Production (FPP, BPP in Spanish: Bosques de Produccion Permanente) in the San Martin Region for a total of 1 501 291 ha (RM N° 0549 – 2002 – AG, 2002). Of which 576 192 ha are in areas of protection, 750 336 ha in areas of protection associated with timber production and 237 614 ha in areas of recuperation. Of these FPPs, divided in 120 parcels, 75 have been already contracted as forest concessions by 28 forestry companies for a total of 472 184 ha. (Source: CIF 2006 & Mediante RM N°0549-2002-2002). Logging concessions are situated on the left bank of rio Huayabamba (East). There are possibilities of encroachments, on-site wood cutting, close to the rivers (difficult extraction, lack of accessibility and material) and the river can be crossed easily.

Hence, there is an additional risk of deforestation leading to partial or total deforestation, giving the very limited control capacity from local authorities on that aspect. Some additional timber concessions could be distributed in the future and the areas extended, hence we consider the **driver at 10 % of potential contribution to deforestation**.

Underlying causes

There is no economic alternative to date more profitable short term than timber sales of high value species.

A4.4.4. Timber harvesting for local use (housing and infrastructures)

Housing in rural settlements is classified as semi-permanent (roofs and walls constructed of temporary materials like bamboo, thatch, grass, reeds, etc.) and permanent (constructed with more durable materials like wood, concrete, etc.). Permanent housing requires the felling of straight timbers to construct residences, businesses, and shops. Semi-permanent housing also requires the harvesting of timber, and their temporary nature often means they are abandoned and their inhabitants move on to other areas, increasing degradation on forestlands and requiring the use of additional forest resources.

Causes:

The demographic growth due to natural population increase and immigration leads to timber harvesting by local stakeholders, conducted to accumulate building materials for construction of lodging and basic infrastructure in settlements. Considering the limited number of families in the area and their very large forests, this driver is marginal, but could increase with the years if population increases and if neighboring communities or additional migrants settle in the area.

Due to the very low density of population within the project area, **timber harvesting for local use is estimated at 1 % of total deforestation drivers**.

Underlying causes:

Population pressure and high prices of other construction materials.

A4.4.5. Fuelwood gathering

Communities participating in the project are mostly dependent upon fuel-wood for their energy needs (although some of them are testing solar or hydroelectrical energy), most of them being too isolated to bring any source of external energy.

The growth of urban centers (e.g. Tarapoto, Juanjui...) and small industry, where charcoal is the fuel source of choice, are stimulating expansion of the charcoal industry. Without the introduction of fuel-efficient stoves as recommended in the project, it is likely that fuel-wood consumption would continue to rise, rather than stabilize.

According to CIEF, fuelwood consumption in the Region of San Martin is evaluated at 1.3 m³ / person / year for people living in rural areas of the San Martin Region (234 000 people in 2007), accounting for 304 200 m³ / year.

A typical household might consume between 1 to 2 MT of fuel wood annually, reflecting a 55 to 110 MT of fuel-wood used in the project area each year, which is quite marginal, but still has to be followed up, since it can gain critical level with population increase of the community or of neighboring communities gathering fuelwood from the Martin Sagrado territory.

Underlying causes:

Demographic pressure, and lack of efficient alternative to fuelwood for cooking

This is a driver with a contribution assessed at less than 1 % to deforestation on the project area.

A4.4.6. Uncontrolled fires due to slash and burn practices

Spontaneous fires in the region have been observed following spread of slash and burn practices, which are carried out when planting a parcel, or after replanting, after a period of 3 to 5 years of cultivation, followed by a period during which the farmer will not use the parcel anymore, for 5 to 10 or up to 20 years. These slash and burn practices are performed by farmers which are not members of ACOPAGRO (this practice is not accepted for organic certification and not practiced by Acopagro members).

Spread of fires from neighboring parcels to the project area is very limited since slashed and burned parcels are usually closely monitored by the farmers, and fires cannot easily migrate from a slashed parcel to a forest area because of humidity of forested areas. It can happen however on a fairly rare basis during dry summers. Children and careless smokers may also start these fires.

This is a driver with a contribution estimated to be of 2%.

A4.4.7. Intentional fires (Paths opening and fires for hunting)

Forest fires are frequent occurrences in many areas and there are few resources available for local communities or government agencies to control the damage to woodlands or the resulting carbon emissions. In the absence of project, it is likely that ground fires will continue to degrade forests and suppress natural regeneration. The frequency of fires is increasing regularly and they often grow beyond their intended size and spread to other forest lands leading to significant degradation of forests and deforestation. As a result, biomass is lost and regrowth is slowed, at the same time fuel wood and timber is extracted leading to a gradual erosion of vegetative material and forest health.

Causes:

Concerning hunters, forest fires are occasionally started to flush out wild game (wild pigs, turtles, monitor lizards etc.) from heavily forested areas and concentrate the game into smaller parcels, where they are easier to catch. The burning of bunches of leaves and small branches is also practiced with the purpose of producing smoke to drive bees away from their hives to facilitate the collection of honey. Occasionally, this practice is the source of forest fire.

Moreover, in the mountain communities, a local belief according to which provoking fires would lead to increased rainfalls may encourage this practice, although it is very limited.

Underlying causes:

Game animals are typically hunted for subsistence. Increased urbanization, and demand for exotic meat may increase pressures on hunting lands and stimulate the use of hunter-induced forest fires to concentrate animal populations. The project will allow for the protection of forest lands from hunting fires by “social fencing”, patrolling, and fire-prevention activities. Within the project area, hunters induced forest fires is considered very limited and is not used by the local community, this is more a practice outside of the project area. However it is important to consider it as a danger to the forest as it would be hard to prevent a fire to spread to the project area. Migrants may also induce this practice where they settle.

Due to the very low density of population, annual forest fires are estimated at 1 % of total deforestation drivers within the project area.

A4.4.8. Mining and Hydrocarbon activities

The attribution of oil and mining concessions has been suspended in October 2010 in the project area and reference area, following the signature and publication of an “Ordenanza Regional” in which the government commits to avoid the expansion of oil and mining activities in the reference region. Considering this law, oil and mining concessions cannot be considered as a future active deforestation driver for the project area.

However, it is important to keep this threat included in the analysis, bearing in mind the high potential risks it would generate in case the public policy on that matter was to change in the future.

In fact, mining potential has already been identified in the reference region, with 10 mining concession that had already been solicited by the mining companies to the regional government.

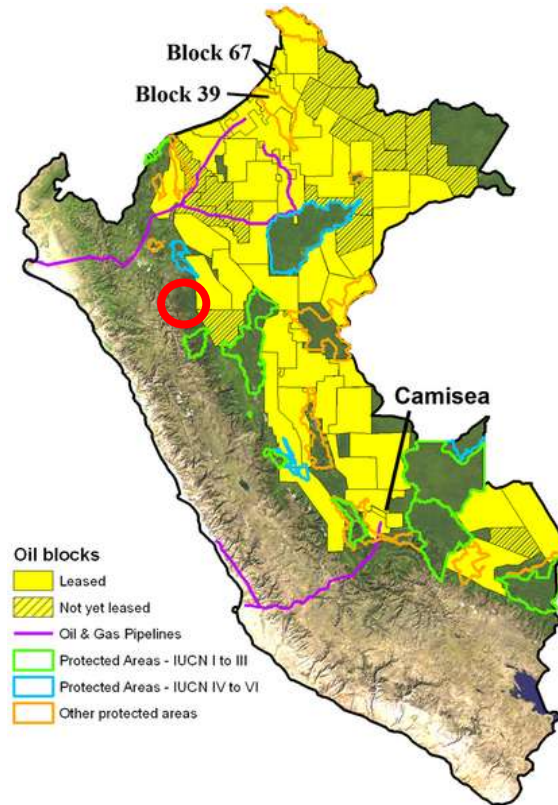
Table 42 : Information on the mine sites identified and concessions solicited to the government in the Biocorredor Martin Sagrado reference region

Nombre Petitorio	Ha	Clasificación	Titular	Fecha de presentación	Fecha Doc INRENA	Publicación
VM222	1000,000	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	18/11/2008	06/12/2008
VM267	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	27/08/2008	18/11/2008	06/12/2008
VM224	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	27/11/2008	20/12/2008
VM220	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	27/11/2008	20/12/2008
VM225	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	27/11/2008	20/12/2008
VM237	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	30/12/2008	04/01/2009
VM239	400.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	22/12/2008	04/01/2009
VM223	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	30/12/2008	04/01/2009
VM221	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	30/12/2008	04/01/2009
VM219	1000.00	Metálica	VOTORANTIM METAIS CAJAMARQUILLA S.A.	07/08/2008	17/12/2008	04/01/2009

Mining activities would not only imply encroachment in the project area but would also contribute to strong pollution of the tributaries of the Huayabamba river, therefore impacting all depending communities downstream.

Hydrocarbon potential in the reference region is also strong:

Figure 34 : Map of the leased block for hydrocarbon exploration and exploitation



The above map shows the current and potential future status of land lease to oil companies in Peru.

One can see that the project area is directly threatened by oil exploration since the land next to the reference region has been already leased for this activity. A Decree of January 15th 2000 (Mediante Decreto Supremo 002-2000-EM) was signed with the Perupetro and Advantage Resources, Selva LLC (Burlington) for the exploration of the Lot n° 87.

Martin Sagrado project area is located in the lot n°153, and although not leased yet, there is a risk in case of change of public policy that future participatory or authoritative decisions will allow against this activity to develop.

Hence, the risk is high, both for deforestation but as well pollution of the rivers of the area, the Huayabamba River, among others.

Causes:

In case of oil exploitation, we can envision a driver of 33 % for deforestation and degradation potential of the area, with the complementary development of such activities (blasts for additional seismic studies road and settlement constructions, additional migration of population, etc...). Former cases have proven heavy direct and indirect impacts on the environment after installing such activities. The very rapid expansion of oil concessions: multiplied by 6 since 2003, up to 41 % of forest area in Peru in 2009 and bound to reach 70 % of forest areas in Peru, justifies this Driver as being the main one.

Underlying causes :

Large economical stakes for the Peruvian government, on a national and international scale. In that sector, lobbying is extremely strong, as well as direct or indirect international pressures, which could lead to a change in the government's policy.

Given the current position of the government on the attribution of new oil and mining concessions in the San Martin province, this driver is considered to have a nil impact on baseline deforestation. However, this is a threat that needs to be monitored and included again in case of policy changes.

A4.4.9. Economic Land Concession (timber and agriculture)

Over 769 079 ha (14.90 % of the Area) has been designated as production areas by the San martin government (Source: ZEE, Gobierno Regional San Martin / IIAP, 2005). These concessions are currently being cleared of forest for rice, papaya, corn and other commercial crops cultivation.

Similarly as for oil and mining concessions, position of regional government is not to attribute new ELCs in the Huayabamba river basin, considered by the regional government as an area for protection. However, lobby and strong underlying drivers may render ELCs again more attractive in the future and this threat should be kept in the analysis.

Underlying causes:

It is important to understand the economic and political dynamics driving the issuance of concessions. Some government planners maintain that underutilized lands need to be developed to generate revenues for the state however critics argue that past timber and other leases have produced minimal income for the country. Large ELCs are being criticized, for a failure to follow through on their commitment to implement management plans. There is some speculation that some business interests seek ELCs simply to harvest high value luxury wood, with no intention or financial capacity to invest in the development of their land.

Considering the current position of the government on the attribution of ELCs in the project region, this driver is considered to have a nil impact on baseline deforestation. However, this is a threat that needs to be monitored and included again in case of policy changes.

APPENDIX 5 : ANALYSIS OF SOCIOECONOMIC IMPACTS

The project is designed as a community project, developed and implemented by the communities, with the overall objective of maximizing socioeconomic benefits for the populations, on several dimensions: revenue increase and diversification, Access to property, Education and Training, Empowerment and Emancipation, Happiness and Well-being.

A4.1. Revenue increase and diversification

Socio-economic surveys show that 40% of the population earns less than 1200€ per year per family, and 80% less than 2400€ per family per year. 97% of the population lives from Agriculture and Breeding.

The project will allow the population to

> **Secure and increase revenues from main agriculture activity**, thanks to agroforestry systems and preservation of good farming conditions (preservation of hydrological cycle, soils, organic matter, rainfalls, etc). A comparison of cocoa yields for Acopagro members between farmers with still decently forested land, cocoa in agroforestry systems, and close to the forest) and farmers in deforested areas allow to estimate a yield increase of 100% (multiplied by 2) by implementation of agroforestry models. Preserving the forest in the project area also directly impacts agriculture production, very sensitive to available water resources, soil quality, soil stability, organic matter from natural ecosystems, etc.

Whereas in the baseline scenario it can be expected that cocoa yields would decrease overtime as the forest cover decreases, in the project scenario, yields would be maintained or even increased thanks to agroforestry and better environment management

> **Develop alternative sources of revenues and diversify their revenues**, through the implementation of non-forest valuation activities, as described in the global activities plan. This will also help them reduce their dependency to one main crop only.

A number of activities with significant revenues for the population have been identified, among which:

- Bee heaving is estimated to increase revenues of a farmer by 10% per hive, and activity development has been proof-tested with Oro Verde farmers in Lamas area.

- Ecotourism will generate revenues in local communities through services of accommodation, food, guides, tours.

- Patrolling / forestguards: Protection of the Project area requires patrolling and intervention of forest guards. These guards are farmers that work on patrolling in a rotational pattern. In total for the project, it is 25 full time jobs that will be necessary for patrolling and control activities. As farmers will work on rotations, almost 120 farmers will benefit from the payments for this job.

- Sales of natural medicinal products (e.g. Sangre de grado, Una de gato, etc.). There is a high identified demand for natural products in Peruvian cities, with identified laboratories ready to buy products from the communities. As an example, one tree of "Sangre de Grado" is estimated to be able to increase farmer's annual revenue by 15%.

- Recollection of seeds and sale of seedlings / seeds : There is a high demand for seeds from high-value native species, which cannot be found elsewhere anymore. The project area is a potential reserve for seeds from high-value species. Several buyers have already been identified for certified quality seeds. Additionally, communities can develop their local tree nurseries and sell the seedlings to individuals or reforestation projects. There is a growing demand as, since 2008 and the beginning of Pur Projet A./R project in the region, more individuals or organizations are interested in replicating this model to other areas.

An example of tree nursery already developed within the project estimated to generate 10 000€ per year for a community organization of 15 persons, which means an increase of 25 to 40% of farmers' revenues

- Fish breeding: Given the high quality of water in water streams from the project area buffer zone, there is a high demand in the cities (e.g. Juan Jui) for the fishes coming from this area. As the communities preserve their environment, the forest, and therefore the quality of the water, they will be able to develop small fish breeding activity in the rivers and sell the products in town.

- Essential oils, flowers, etc. are other forest products that can be produced and sold in town. All of these products have identified markets in town.

Models of revenue increases are available for some of the activities, as they are being implemented.

A4.2. Access to property / land titles

Almost 90% of the farmers in the project leakage belt don't have legal land titles, and can therefore not

Clear land property / land tenure does not always exist in the reference region. Before settlement of farmers, there is no identified land property / tenure for the forested land. Once settled in a new place, farmers can claim the property title for the land they've occupied and cultivated for at least 5 years. This policy drives a lot of new settlements in forested areas. In reality, only less than 20% of the farmers have a legal land title or recognition of land tenure considering that the proceedings for titling the land are not simple and expensive.

Farmers lack a legal recognition of their patrimony for them to value it right, transmit it to their children, sell their land, or sell timber products from their land (for example timber sales from planted trees on their land is not legal without a legal title for the land)

As part of legal activities of the project, the Foundation Amazonia Viva and Acopagro will work with the government authority for the titling of the participating farmers. Under the coordination with Pur Projet and Amazonia Viva, ACOPAGRO already has a signed agreement for the titling process of all Acopagro farmers and participating farmers in the A/R project Alto Huayabamba.

100 property titles were already given to 100 Acopagro farmers, an additional 400 titles are expected by the end of the year, and 800 titles in 2013.

In parallel, Amazonia Viva will develop in a similar way another project with government authority for titling of all farmers participating to REDD project matching the conditions for a land title.

A4.3. Education and training

Most of the farmers have no more than primary education, sometimes secondary. They don't have knowledge to develop higher-value added activities such as the ones described above, or be able to evolve to higher responsibility activities.

Also, farmers usually lack understanding of the environmental stakes, the benefits of preservation of the environment for their crops, the relation between deforestation and living conditions, pollution, etc.

The project will train and educate the population with regards to environmental stakes, health, non-agriculture activities, and other higher-level topics such as accounting, management, marketing, etc. for people interested in getting involved in the development and management of community activities.

A first diagnosis of the socioeconomic situation, level of education and understanding was completed in 2012, allowing for the definition of a long-term education, sensibilisation, and training plan.

A4.4. Empowerment and emancipation

Population has traditionally been composed of farmers acting rather individually, with no group awareness nor organizational structure, and therefore no recognition or weight at institutional level.

One objective of the project is to give communities the capabilities to organize themselves, build associations at different levels (community, area, district, etc) and be able to develop and implement activities that require higher level coordination than individual behaviour.

The project will support the creation of fair and transparent community associations, helping population through trainings, workshops, planning, etc. to reach a level of higher and more solid organization. The project builds on most advanced communities who already have a community association, reinforce these structures and use them as promoters in the less advanced communities.

Since the beginning, the main project achievement in terms of organizational structure, recognition, and political weight has been the creation of the Fundacion Amazonia Viva, which gathers most active community associations and cooperatives. The foundation gives the communities a unique opportunity to act at a higher-level, with more effectiveness and efficiency, to channel funds that would be inaccessible otherwise, and get political, institutional weight at regional and national level : Presence of the Foundation at the regional mesa REDD, influence on administration at regional level, signed agreement with DEVIDA (national public institution for the replication of agroforestry and conservation projects in the whole country), conferences and workshops at regional and national level to promote sustainable community management and regeneration of forests.