

MADRE DE DIOS AMAZON REDD PROJECT



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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed project activity consists of sustainable forest management in the certified timber concessions “Maderera Río Acre S.A.C. and Maderera Río Yaverija S.A.C.” in Madre de Dios department, South East of Peru, in the Peruvian Amazon.

Both timber concessions have signed long term concession contracts¹ with the Peruvian State in May 2002 for 40 years and for a total area of 98.932 hectares (49.376 hectares for Maderacre and 49.556 hectares for Maderyja), which explicitly give Maderacre and Maderyja legal rights to the whole concession area and to all the environmental services included in it. No current or future conflicts regarding the use of the land have been detected within the concessions and no people are currently living within the concessions area. According to the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project², the two forest concessions, Maderacre and Maderyja, have the exclusive rights to the environmental services within the project area, including forest carbon.

The project area is located less than 30 km to the side of the new inter-oceanic road that will unite Brazil with the Peruvian ports, in the region that belongs to the Vilcabamba-Amboró Conservation Corridor in the Peruvian Amazon, one of the world biodiversity hotspots.

The area of influence of the Interoceanic road is characterized for still having areas of forests of great importance for their biodiversity and the environmental services they offer.

The area is different from other areas next to roads, where its presence has notoriously impacted in the landscape and natural resources.

However, the presence of the inter-oceanic road represents a great risk due to a major pressure of population from rural Andes regions that will migrate looking for lands, and the economical activities that will consequently be established. In this sense, it is relevant to consolidate the sustainable management of the area, as it is the case of forestry concessions with timber and non timber destination, private areas and protected natural areas.

¹ Both contracts will be available to the auditors.

² SCS Final CCBA Project Validation Report Madre de Dios Amazon REDD Project, Puerto Maldonado, Peru, December 2009, at www.climate-standards.org/projects/files/madre_peru/CCB_Greenoxx_MM_RPT_FINAL_ValidationReport_with_VCS_Comments_011510.pdf

In addition, these areas are under permanent risk mainly because of illegal loggers who are attracted by the abundance of forestry species of high commercial value, as mahogany. Illegal logging, even though it does not necessarily deforest, will affect the value of the forest and open roads that make accessibility easier, creating the conditions to future deforestation.

An environmental study of the Vilcabamba-Amboró Conservation Corridor was recently carried out by the Peruvian NGO AIDER³, which had as one of its objectives the identification of potential avoided deforestation projects to be implemented in the area.

The conclusion of this analysis was that obtaining revenue for the environmental services that the rainforest offers was the only way to preserve these areas. As a result of the abovementioned selection of projects with greater potential in the area of study, this project was identified.

The Madre de Dios Amazon REDD Project will dramatically reduce deforestation by increasing surveillance in the rainforest and benefiting local communities. The project has been validated on 2nd December 2009, according to the Climate, Community & Biodiversity Alliance (CCB Standards) by Scientific Certification Systems (SCS), which guarantees its social and environmental sustainability and validates that carbon calculations have been done following appropriate methodologies. This is furthermore enhanced by the fact that the project has obtained the maximum status within the CCB Standard: Gold.

According to the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project, the project is designed around the impending effects of a new trans-Amazonian, inter-oceanic road from Brazil to the Pacific Ocean and Peruvian ports. According to the public information provided by the the Ministry of Transport and Communication of Peru⁴ (in Spanish Ministerio de Transportes y Comunicaciones), in the period 2008-2009 the following segments of the Inter-oceanic road were completely paved with the help of private investment:

- * Segment 2 of the IIRSA (South Inter-oceanic road), 167 km paved (Cusco). Beneficiary population: 1,328,980.
- * Segment 3 of the IIRSA, 390 km paved (Madre de Dios). Beneficiary population: 112,814.
- * Segment 4 of the IIRSA, 183 km paved (Puno). Beneficiary population: 1,432,800.

³ Recavarren Estares, Percy; Torres Padilla, Jorge; Sánchez Santiváñez, Marioldy: "Identificación de potencialidad de proyectos de secuestro de carbono en las zonas de influencia de la Carretera Inter-oceánica Sur", Informe Final, AIDER NGO, Junio 2007.

⁴ <http://www.mtc.gob.pe/portal/logros.htm>

It is also important to mention that, taking into account the abovementioned, there has been a significant reduction of 5 hours on average in travel times through the Inter-oceanic road. This situation will facilitate the immigration of new settlers into the region and the immigrant population is predicted to subsist by agricultural and agricultural livestock activities. Deforestation and forest degradation are a result of these activities. These effects are already visible in Brazil where the trans-Amazonian road has been completed for some time”.

In relation to the effects of the Interoceanic Highway (Interoceanic road) on the Madre de Dios region in Peru , on 22nd February 2011 an article was published, developed by Barbara Fraser for The Daily Climate (a publication for Environmental Health Sciences), which states the following:

- A newly paved road –and soaring gold prices- have triggered a Klondike-style gold rush in Peru’s rain forest, choking waterways with sediments and threatening the country’s ability to preserve the forest via profitable carbon-offset deals.
- In the Amazon forest of south-western Peru, where the government has only a tenuous grip on law and order, Klondike-style gold frenzy has met the internal combustion engine. One of the world’s most biologically diverse forests is at stake.
- Peru’s Environment Ministry hopes to conserve the country’s forests by peddling its rich carbon stocks on international markets. The gold fever luring as many as 200 people a day to the remote Madre de Dios region threatens to bury those plans under meters of mercury-laden mud.
- Heavily forested Madre de Dios, Peru’s top nature tourism destination, is a prime target for carbon-trading schemes such as REDD, or Reduction of Emissions from Deforestation and forest Degradation, and REDD+, which includes forests not necessarily threatened. But those schemes, which took a step forward in the United Nations climate talks in Cancún in December, are being overtaken by mining and other developments.
- The newly paved Interoceanic Highway is stymieing the goal of zero net deforestation by 2021 announced by the Ministry of Environment in 2008. Satellite images and other data suggest carbon emissions from deforestation rose by more than 60% between 2006 and 2010, coinciding with increased mining and the resurfaced highway. The stretch from Madre de Dios to the Andean highlands, virtually impassable in the rainy season just half a dozen years ago, is now a long day trip.

- Satellite images show deforestation increasing along the route. From the air the region looks like a vast, mottled carpet of green, but gaps are opening along the highway as farmers clear land and the mining boom accelerates. The paved highway makes it easier to bring backhoes and bulldozers into the region. Additionally, officials say mining, which now trumps agriculture as the Nº 1 cause of deforestation, has led to the clearing of some 150,000 hectares of forest in the past quarter century.
- The heavy rains that make the east slope of the Andes so rich in plant life also wash gold-bearing sediment onto the Amazonian plain, where meandering rivers disperse it. The miners are mainly migrants from the highlands, who earn far more from mining than they can from farming. Nearly all lack the required environmental certification, and some do not even formally stake claims. As one area plays out, the miners move on. They recently invaded the buffer zone of the Tambopata Natural Reserve, fending off police who tried to dislodge them. The mining is so unregulated that no one knows exactly how much gold is extracted, what it is worth, or how much tax goes unpaid. With gold priced at more than \$1,300 an ounce, however, it is hard for other economic activities to compete.
- Mining and development along the highway pose special problems, says André da Silva Dias of the World Wildlife Fund's Amazon Network Initiative in Brazil. Where illegal mining occurs, there's a sense that land rights aren't clear, he says. At the very least, there's a lack of enforcement.

In this sense, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project states that the project is designed around the impending effects of a new trans-Amazonian, inter-oceanic road that is nearly complete from Brazil to the Pacific Ocean and Peruvian ports. The remaining stretch of the new road is scheduled for completion in 2009 and the completed road system will facilitate the immigration of new settlers into the region. The immigrant population is predicted to subsist by agricultural and agricultural livestock activities. Deforestation and forest degradation are a result of these activities. These effects are already visible in Brazil where the trans-Amazonian road has been complete for some time.

It also mentions that the validation of the deforestation as the most likely land-use scenario in the absence of the project hinges, partially, on the projected population growth in the region surrounding the project area because population growth is the main driver for deforestation in the project area. Also, under the climate criteria, the projected population growth directly affects the projected deforestation and net climate benefit.

The Madre de Dios Amazon REDD Project seeks to reduce the pressure for lands by the local population in the project area and its buffer zone and to guarantee the sustainable forestry management of both timber concessions through the implementation of an avoided deforestation project that helps to generate higher commercial resources for the management of the area.

Additionality is unquestionable since current resources are not enough to cover the management of the whole area and therefore no adequate control and surveillance is being carried out. The presence of the new road will undoubtedly increment the migratory movement. If the companies do not achieve a greater presence in their concession, these areas could be invaded by migratory farmers and illegal loggers, losing as a consequence big areas of forest.

The sale of carbon credits in the international markets is the only alternative for obtaining economical resources to finance control and surveillance actions. In this sense, this additional revenue from carbon credits will be employed to contribute to the sustainable development of rural producers and indigenous people living in the buffer area through the financing of environmentally friendly productive projects and to reduce the vulnerability of the project area from external factors of deforestation and degradation through in field patrolling and satellite monitoring.

As stated in the the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project, the projected cost of protecting the forests from impending immigration will strain the financial resources of Maderacre and Maderyja; project activities such as surveillance, community technical assistance and education are too expensive without a supplemental revenue source. Project activities will be subsidized by the sale of carbon offset credits and will likely have measurable climate, community and biodiversity benefits.

Moreover, the management of this rainforest is done under FSC Certification which is a major and additional guarantee of the sustainability of the project and its long term permanence. All this process has been also supported by international NGOs such as WWF, CESVI, ProNaturaleza and Aider. It is important to mention that one of the main reasons for obtaining said certification was the intention of generating carbon credits. In this sense, 96% of the area of both concessions is intended for forest production, while the remaining 4% of the area is set aside for protection.

Both timber concessions have the rights to the use of their wood for sawing and secondary transformation in their own industry and also for third parties.

In both concessions a polycyclic management system is developed based on natural regeneration to maintain the productive capacity of the forest as well as ecosystem stability. The cutting cycle is 20 years. Around 2-11 different timber species are being harvested annually at a rate of 2 m³.

As it was previously mentioned, the forest where the project is located is very important in terms of biodiversity conservation since it provides the habitat to four endangered rainforest species and eleven endangered wildlife species, as follows: Cedar (*Cedrela odorata*), Mahogany (*Swietenia macrophylla*), Wild fig tree (*Ficus anthelmintica*), Leche caspi (*Galactodendron utilisima*), Jaguar (*Panthera onca*), Red howler monkey (*Alouatta seniculus*), Giant anteater (*Myrmecophaga tridactyla*), Giant armadillo (*Priodontes maximus*), Lowland tapir (*Tapirus terrestris*), Red-and-green macaw (*Ara chloropterus*), Scarlet macaw (*Ara macao*), Blue-throated Piping-guan (*Pipile cumanensis*), Razor-billed Curassow (*Mitu tuberosum*), Sanborn's squirrel (*Sciurus sanborni*), Amazon dwarf squirrel (*Sciurus ignitus*).

From a social point of view, the project will contribute to the sustainable development of rural producers and indigenous communities (Yine and Huitoto tribes, indigenous people in voluntary isolation of Mashco Piro, Yora and Amahuaca tribes and other tribes not yet identified) living in the nearby areas.

In summary and according to the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project, the “without project” scenario is deforestation and degradation, while the “with project” scenario is sustainable forest management. As demonstrated by project proponents, avoided deforestation and degradation clearly have positive climate and biodiversity impacts. Moreover, project activities are specially designed to achieve positive community impacts in addition to avoiding deforestation and degradation.

As it was previously mentioned, the Madre de Dios Amazon REDD Project has been validated on 2nd December 2009 according to the CCB Standards, obtaining the maximum status Gold. In addition to this, it is important to also highlight that the results of the first monitoring report of the project, which has been already elaborated and submitted to the CCBA, are included in the correspondent items of this document. However, it must be taken into account that until now there have been only small sales of the carbon credits generated by the Madre de Dios Amazon REDD Project and therefore only a preliminary implementation of the monitoring plan has been carried out. In order to achieve a full implementation of said monitoring plan, higher sales of carbon credits are needed, for which it is essential to obtain the approval of the project by the VCS.

1.2 Sectoral Scope and Project Type

According to the sectoral scopes under the VCS Program⁵, the Madre de Dios Amazon REDD Project falls under the sectoral scope 14 Agriculture, Forestry and Other Land Use and according to the VCS AFOLU Requirements⁶ it falls under the definition of a Reduced Emissions from Deforestation and Degradation Project (REDD). Taking into account the definitions provided in the VCS AFOLU Requirements, the Madre de Dios Amazon REDD Project can also be broadly categorized as an Avoiding Unplanned Deforestation and Degradation (AUDD) Project (reduce net GHG emissions by stopping deforestation and/or degradation of degraded to mature forests that would have occurred in any forest configuration, can occur as a result of socio-economic forces that promote alternative uses of forest land and the inability of institutions to control these activities). In addition to this, the project occurs in a frontier deforestation, regarding the definition included in the VCS AFOLU Requirements which states that the frontier deforestation and/or degradation pattern can result from the expansion of roads and other infrastructure into forest lands; roads and other infrastructure can improve forest access and lead to increased encroachment by human populations, such as subsistence farming and fuelwood gathering on previously inaccessible forest lands.

In addition to this and as required by the REDD-MF Module⁷ of the applied REDD Methodology Modules, the following decision tree was used to identify the type of VCS-eligible REDD project activity:

Is the forest land expected to be converted to non-forest land in the baseline case?			
YES ⁸		NO	
Is the land legally authorized and documented to be converted to non-forest?		Is the forest expected to degrade by fuelwood extraction or charcoal production, in the baseline case	
YES ⁹	NO	YES	NO
Avoided planned deforestation	Avoided unplanned deforestation	Avoided forest degradation	Proposed project is not a VCS REDD ¹⁰ activity currently covered by the module framework

⁵ http://www.v-c-s.org/sectoral_scopes.html

⁶ Agriculture, Forestry and Other Land Use Requirements (AFOLU), VCS Version 3, Requirements Document, 8 March 2011, v3.0.

⁷ According to the document: "Informe de emisiones totales en el Proyecto Madre de Dios Amazon REDD", Bosques Amazónicas Technical Area, application of the REDD-MF Module of the approved VCS REDD Methodology Modules, March 2011, which will be available to the auditors.

When asked if the forest land is expected to be converted to non-forest land in the baseline case, the answer is YES, and when asked if the land is legally authorized and documented to be converted to non-forest the answer is NO. Therefore, deforestation is unplanned and the Madre de Dios Amazon REDD Project is a VCS Avoided Unplanned Deforestation project activity.

This project is not a grouped project.

1.3 Project Proponents

Maderera Río Acre S.A.C. (Maderacre), Maderera Río Yaverija S.A.C. (Maderyja) and Greenoxx NGO

Maderacre and Maderyja Forest Concessions: Private companies specialized in timber harvesting and processing. The forest concession has been given by the Peruvian State to the company in 2002, in the framework of a public auction convoked by INRENA (National Office responsible of the conservation of the natural resources).

Maderacre and Maderyja are two forestry companies, which until the first quarter of 2008 had constituted the Maderacre & Maderyja group that owned the forestry concessions for timber production of a 98,932 ha area in the region “Madre de Dios”. Since then, Maderyja was sold to a group of Chinese investors.

Although currently both timber concessions belong to different companies, they are still managed in an almost identical manner. Furthermore, the General Forestry Management Plan and most of the other tools used for the company decision making are still the same for both timber concessions.

It is considered that the companies that have the best conditions to develop this type of projects are those which count with FSC Certification, since this guarantees that management will be sustainable, preserving the biodiversity of the forest. In this sense it is important to mention that both companies, Maderacre and Maderyja, have achieved the Forest Stewardship Council Certification in January 2007. One of the reasons for obtaining FSC certification was the generation of carbon credits.

Both, Maderacre as Maderyja timber concessions, have the following clearly defined entrepreneurial vision: “We are an entrepreneurial strength that contributes to the development of our dreamed Tahuamanu”.

Additionally, Maderacre & Maderyja are both leader companies recognized at the regional, national and international level for the quality of their wood products, characterized by the diversity of their timber and non-timber species and for the sustainable management of their forests, working under the highest forestry certification standards. They are also recognized for their contribution to improve the welfare and quality of life of their partners, workers and people in general, reinvesting some part of their profits in research and technology for the improvement of their entrepreneurial development.

Among their entrepreneurial values, it should be highlighted: leadership in quality, costs and caring for the environment; responsibility and discipline; honesty and loyalty; social responsibility and solidarity; commitment to the environmental sustainability.

- **Maderacre managing staff**

Considering the Maderacre point of view, there are four key areas of responsibility in the structural organization of the concessions: the General Manager, the Forestry Manager, the Social Responsibility Manager and the Financing Manager.

The structural organization of Maderacre SAC is presented below.

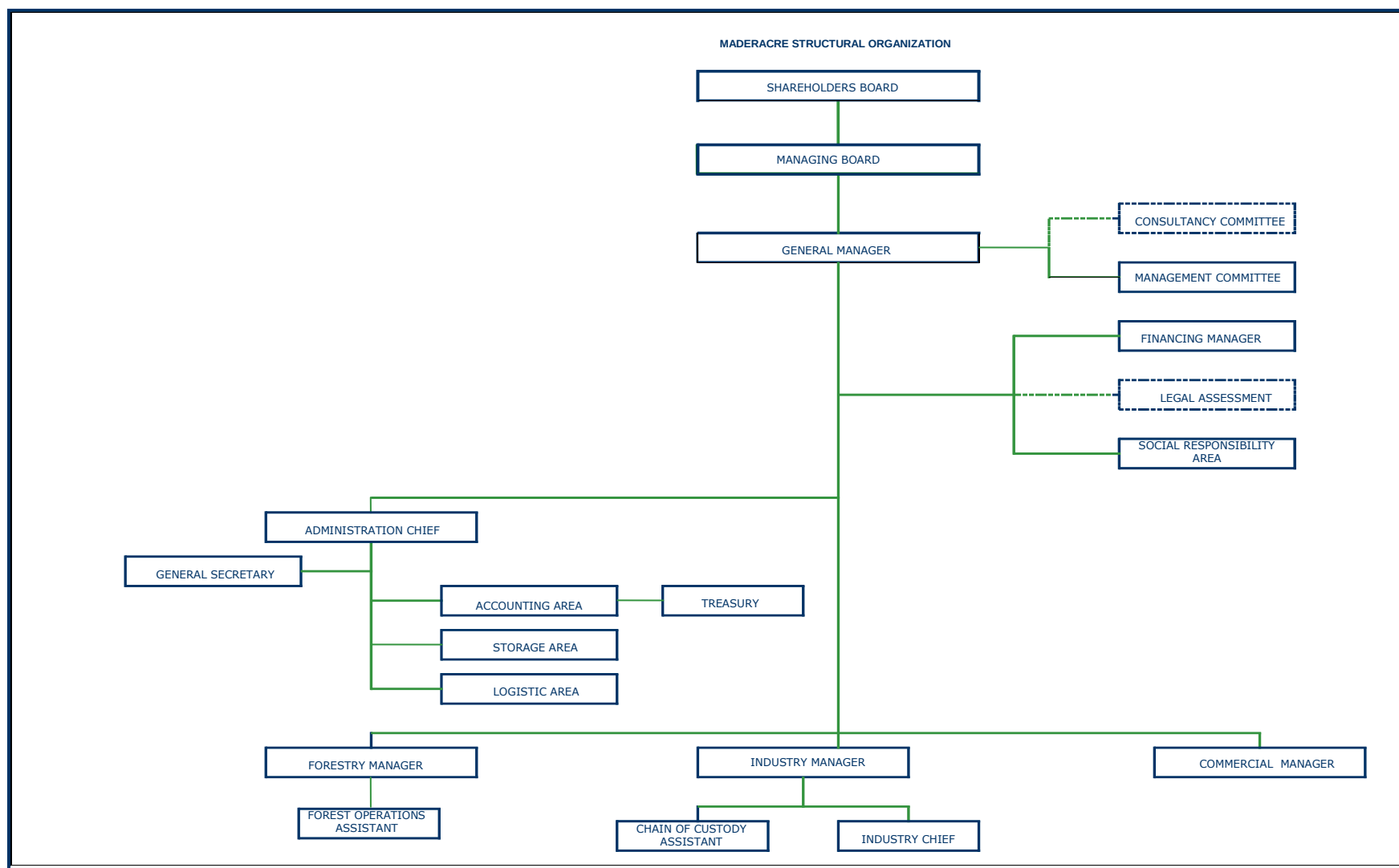


Fig. 1: Maderacre structural organization

Following, a brief description of the main responsibilities of each Manager of Maderacre timber concession and their technical profile is presented.

* **General Manager:** José Luis Canchaya

Main responsibilities:

- ~ Elaborate the Strategic Plan and the Management Plan of the enterprise for the medium term, to be approved by the Board of Shareholders.
- ~ Elaborate the Annual Operative Plan with the definition of the entrepreneurial goals, to be approved by the Board of Shareholders.
- ~ Direct the execution of the Annual Operative Plan of the company.
- ~ Responsible for the selection, hire and lay off of the directive staff and permanent staff.
- ~ Supervise the financial health of the company.
- ~ Determine performance standards for the personnel and evaluate their work periodically. Make quarterly evaluations of the working plans of the different areas.
- ~ Responsible for the signature of any kind of contracts between the company and other institutions or organizations.
- ~ Negotiate and subscribe cooperation agreements with state and private institutions which are committed, as well as Maderacre timber concession, with the sustainable management of the forestry resources.
- ~ Represent and negotiate all the company issues before INRENA and other public institutions.
- ~ Implement mechanisms of control for the different areas of the company.
- ~ Has the administrative, commercial, technical and legal representation of the company before the different entities, private and public, national and international organisms.
- ~ Buy, sell, rent or donate all the company properties, subscribing the required private or public documents.

Profile: Economist of the Pacific University of Peru. He is currently pursuing a dual MBA degree: Catholic University of Peru and Tulane University, USA. He has been Maderacre's financial manager since 2005 and from November 2008 he is the current General Manager. He has demonstrated experience in the economic development of timber concessions, as well as in strategic planning, administrative and financing management of enterprises. He has also experience in researching and consultancies applied to the forestry sector. He has strong knowledge on strategic planning, financing, administration and commercialization issues, as well as on forestry management and other timber businesses.

* **Forestry Manager:** Nelson Kroll Kohel

Main responsibilities:

- ~ Elaborate the General Forestry Management Plan and execute the defined activities.
- ~ Elaborate the Annual Operative Seasonal Plan and execute the defined activities.
- ~ Design and supervise the execution of the Forestry Plan.
- ~ Design and supervise the execution of the Custody Plan of the concession.
- ~ Lead the development and implementation of agreements and projects related with forestry activities, researching and carbon dioxide sequestration with public and private institutions.
- ~ Design and implement the rulebooks, manuals and any other regulations that act as a framework for the adequate development of the forestry operations.
- ~ Organize and supervise all the forestry operations of the concession.
- ~ Responsible for the maintenance of the FSC Certification, which is a priority for the concessions since, as it was previously mentioned, one of the reasons for obtaining said certification was the generation of carbon credits.
- ~ Design and supervise the execution of the Environmental-Forestry Monitoring Program, which includes the monitoring of the forest dynamics, the natural regeneration, the changes in the composition and structure of the forest, the quality and efficiency of all the forestry operations and the environmental impacts caused by them.
- ~ Monitor the work of all the hired companies in charge of some forestry operations, specifically in relation with the application of the rules defined in the company manuals.
- ~ Guarantee the chain of custody of the whole timber production of the concession.
- ~ Design and supervise the implementation of all the defined rules and proceedings related with the personal security, equipments and heavy machinery.
- ~ Elaborate the correspondent annual reports of the forestry area of the concession.

Profile: Forestry Engineer of the National Agrarian University La Molina of Peru. He has an experience of more than 8 years in forestry management under the FSC standards. He acts also as an auditor in FSC certification and auditing processes.

* **Permanent Advisor:** Abraham Cardozo Mouzully

Main responsibilities:

- ~ Advise the General Manager on the strategic plan and managing plan of the company.
- ~ Design business opportunities for Maderacre.
- ~ Advise on the negotiation of commercial agreements.
- ~ Advise on the negotiation of institutional agreements.

- ~ Represent the company in all the actions that the General Board or the General Manager delegates on him.

Profile: He was the General Manager of Maderacre since 2003 until November 2008. He is a professor and was former Lieutenant Major of Iñapari Province and also former consultant of the Peruvian Republican Congress. He has vast experience in entrepreneurial management and communitarian development and strong knowledge of the socioeconomic reality of the province and the region. He also has knowledge on strategic business planning and negotiation tools.

* **Responsible of the Social Responsibility Area:** Claudia Canchaya

Main responsibilities:

- ~ Design and development of the Relationship with the Community Plan as part of their Social Responsibility Program. It includes: stakeholders mapping, analysis of the stakeholders-enterprise impact, analysis of the leadership of each detected stakeholder, definition of the policies for each defined stakeholder, programs for each stakeholder, acting protocols.
- ~ Design and development of the protocol to undertake any conflictive situation among the company and its surrounding communities as Belgian Native Community and the neighbor concessionaires. With the Belgian Native Community an agreement on said protocol content was signed.
- ~ Design and development of social programs. In this sense, the concessions with the advisory of the Consultative Committee have prioritized their social investment on health and educational subjects. At this time, the terms of an agreement between the concessions and the Iñapari's school are being evaluated, in order to improve the education in sustainable management of the forests subjects. Visits to the concessions nursery and woods are also considered within this agreement.
- ~ Be part of the Consultative Committee on the Relationship with the Community, as its Technical Secretary.
- ~ Monitor and evaluate the fulfillment of the defined objectives of the Social Responsibility Plan of Maderacre, through the indicators determined in the Community Monitoring Plan.
- ~ A Dissemination Plan is being developed by the Social Responsibility Manager, which will include the internal and external communication strategy of the concessions. In this sense, the following formal lines of communication are taking into account:

- Internal: shareholders meetings; meetings with the workers; mural journal and informative bulletins.
- External: website; virtual bulletins; working meetings; participation in activities of territorial coordination.

Profile: Sociology degree from the Pontifical Catholic University of Peru. She has a vast experience in the design and implementation of development projects and communication strategies applied to small, medium and big size enterprises, as well as native communities. She has also strong knowledge on monitoring and evaluation systems.

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- **Maderyja managing staff**

The structural organization of Maderyja SAC is presented in the following figure:

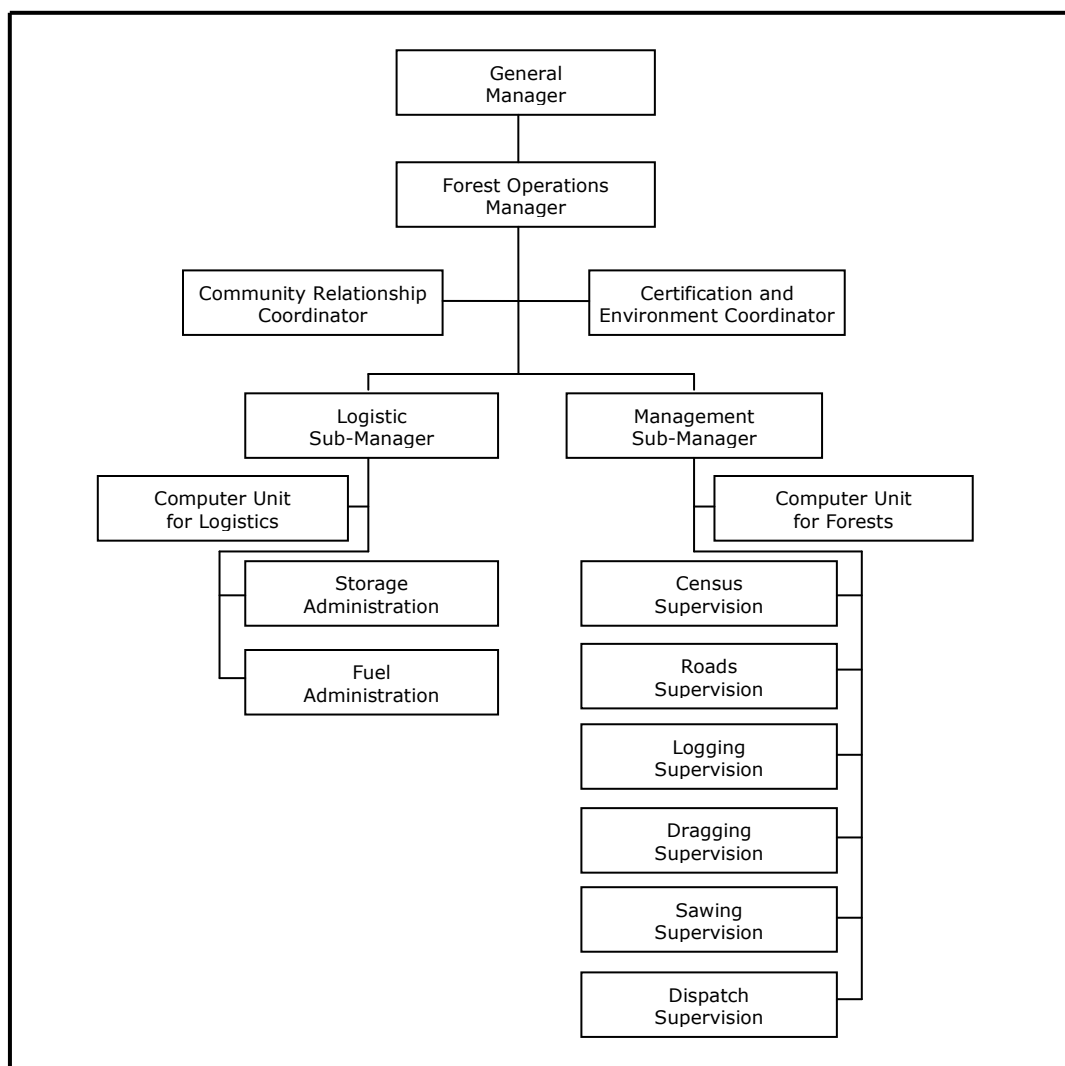


Fig. 2: Maderyja structural organization

* **General Manager:** Wen Chengzhou

The General Management Area is the highest level unit of executive body in the company. It is directly responsible for the control, monitoring and compliance of all the production and development policies outlined by the company, which are implemented through the Forest Operations and Industry Operations Areas.

Main responsibilities:

- ~ Legal representation of the company for legal matters, agreements and contracts.
- ~ Approval of annual plans and budgets for entrepreneurial management.
- ~ Hiring of the direction staff of the company.

- ~ Financial management of the budget for annual operations.
- ~ Commercial management of the timber production of the company.
- ~ Evaluation of the direction staff of the company.

Profile: He worked for the Chinese government in Peru from 2006. Until July 2007, he lived in St. Martin and was responsible for the management of A&A in Pucallpa. He is currently the Manager of Maderyja SAC timber concession.

* **Forest Operations Manager:** Liu Yong Liang

The Forest Operations Area is a unit of executive management reporting directly to the General Manager. It has the highest level authority of the company for forest operations. It is directly responsible for the compliance of the production and development policies outlined by the company, which are implemented through the Logistic and Management Sub-Managers.

Main responsibilities:

- ~ Direct and supervise the compliance of the administration and production goals of the company, according to the forest management rules and forest certification.
- ~ Propose to the General Manager the production plans and operation budgets.
- ~ Report to the General Management the production progresses, inventories, financial performance, among others, that are under his responsibility.
- ~ Constantly supervise the forest operations.
- ~ Maintain a permanent coordination among the Sub-Managers.
- ~ Propose to the General Manager the annual budget for human, material and financial resources to meet production goals.
- ~ Issue periodic reports on progress of physic and financial targets.
- ~ Propose to the General Manager improvements on the operation systems in order to reduce its costs.

Profile: Industrial Technicial, graduated from the Technological Institute of Huanan, China. He has a six year experience in international commerce and four year experience in the timber industry in Peru, as the administration manager of A y A Peru. Since 2009 he is the Forest Operations Manager of Maderyja SAC.

- **Community Relationship Coordinator:** Manuel Via Lima

The coordination of communal relationships is a support body for the company, reporting directly to the Operations Manager. It performs its functions in permanent coordination with the Logistic and Management Sub-Managers.

Main responsibilities:

- ~ Implement the Relationship with the Community Plan.
- ~ Establish cooperation relationships with the local population within the concession scope and its area of influence.
- ~ Coordinate with public institutions internship training programs for local communities.
- ~ Execute social productive and health programs for local communities.
- ~ Monitor the performance of the social FSC indicators of the company.

Profile: Forestry Engineer, graduated from the National University of Ucayali, specializing in forest management under FSC Certification and social responsibility management of timber companies. He has experience in technical assistance, training and forestry executive functions in public and private institutions of Ucayali and Madre de Dios: since 2005 in the Regional Government of Ucayali, FONDEBOSQUE, Forestal Venao, A y A Peru and since 2009 in MADERYJA SAC.

- **Certification and Environment Coordinator:** David Perez Salinas

The certification and environment coordination is a support body for the company, reporting directly to the Operations Manager. It maintains permanent coordination with the Logistic and Management Sub-Managers with the aim to ensure the compliance with all the FSC principles and criteria and the Peruvian standards of Forest Certification.

Main responsibilities:

- ~ Planning and implementation of training activities related to responsible forest management in all the functional areas of the company.
- ~ Monitor the performance of the financial and environmental FSC indicators of the company.
- ~ Qualification of the staff performance and the compliance with certification standards.
- ~ Periodically report to the Operations Manager the compliance status with the certification standards and recommend the necessary corrective actions.

Profile: Computer Technician, graduated from the Antonio Raimondi Institute, Pucallpa. He has experience in the implementation and operation of computing systems for monitoring and chain of custody of certified forests since 2006, in the Consorcio Forestal Amazónico and MADERYJA SAC.

- **Logistic Sub-Manager:** Su Zhi Quiang

The Logistic Area is one of the executive direction bodies of the company, reporting directly to the Operations Manager. It maintains permanent coordination with the Management Sub-Manager and is in charge of consolidating the acquisition and supply of the necessary requirements for all the working areas within the company. It implements its functions through two administrations: the storage and the fuel administrations.

Main responsibilities:

- ~ Consolidate the material and human requirements for all the working areas of the company.
- ~ Check the entry and outgoing of materials and supplies from the different stores.
- ~ Carry out regular physical inventories for verifying the goods and supplies stocks within the stores.
- ~ Consolidate the personnel assignments in the different working areas.
- ~ Maintenance of the access roads.
- ~ Reception and dispatch to Iñapari of the wood that arrives to intermediate pre-stocking areas.
- ~ Issue regular reports correspondent to its area.
- ~ Others responsibilities that are assigned to him.

Profile: Business Administration, graduated from the Guan Dong University, China. He has 2 years experience in the timber industry as the sawmill chief of A&A Peru SAC in Yurimaguas and plant chief of MADERYJA SAC in Iñapari.

- **Management Sub-Manager:** Liu Yong Liang

The Management Area is one of the executive direction bodies of the company, reporting directly to the Operations Manager. It maintains permanent coordination with the Logistic Sub-Manager and is directly responsible for directing and supervising the compliance of the production goals of the company, according to the forest management rules and forest certification.

It implements its functions through 6 supervisions: commercial census, forest roads, logging, dragging, sawing in the forests and dispatch, with the support of a computer unit for forests.

Main responsibilities:

- ~ Propose to the Operations Manager the production plans and operation budgets.
- ~ Report the production progresses, inventories, financial performance, among others, that are under his responsibility.
- ~ Constantly supervise the different forest operations.
- ~ Maintain permanent coordination with the superior bodies.
- ~ Supervise the compliance of the outlined goals of the different areas under his responsibility.
- ~ Propose to the Operations Manager the budget requirements for human, material and financial resources necessary to meet the production goals.
- ~ Issue regular reports on the progresses of the physical and financial targets.
- ~ Propose to the Operations Manager the improvements on the operation system for the reduction of its costs.

Profile: Industrial Technician, graduated from the Technological Institute of Huanan, China. He has a six year experience in international commerce and a four year experience in the timber industry in Peru, as the administration manager of A y A Peru and Maderyja SAC.

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Regarding this item, the SCS Final Madre de Dios Amazon REDD Project Validation Report states that the management capacity is appropriate to the scale of the project as demonstrated by the list of project activities, size of management and experience of management. The concessions also employ and designate specific people in capacity to implement the community-based project activities. These attributes clearly demonstrate that management capacity is appropriate to the scale of the project.

It is stated also that based on the evidence provided and collected during the site visit, the technical skill set appears to be adequate to successfully implement the project.

GREENOXX NGO

Greenoxx's role in the project is that of project developer and seller of the carbon credits. Greenoxx also owns, as per the agreement with Maderacre and Maderyja the owner of 30% of the certificates of the project.

The Greenoxx Global Environmental Program is an environmental and forestry program created in 2003 by engineer Rocco Cheirasco and engineer Silvia Gomez Caviglia. Both are forestry engineers, specialized in environment and commercial strategy and marketing, with vast experience in the Kyoto Protocol and the Voluntary Markets.

GGEP integrates Forestry and Avoided Deforestation projects to the different markets such as the Clean Development Mechanism (CDM) of the Kyoto Protocol, regulated Voluntary Markets such as the Chicago Climate Exchange (CCX) and non regulated Voluntary Markets such as the CCB Standard, the VCS Standard, OTC, among others.

Greenoxx has been declared of National Interest by the Presidency of the Republic of Uruguay and of Ministerial Interest by the Ministry of Livestock, Agriculture and Fisheries and the Ministry of Foreign Affairs.

This innovative program has developed different areas, which carry out different activities such as Greenoxx Consulting and Greenoxx NGO. Greenoxx NGO is a non-governmental organization dedicated to combat Climate Change, an integrant of the Ammado Foundation, based in Dublin, Ireland, a network of more than 1800 non-profit organizations worldwide and a participant in the network of non-governmental organizations of the sustainable community, Wiser-Earth.

Greenoxx NGO was a Member of the Chicago Climate Exchange-CCX during its whole period of existence, being able to act as Offset Aggregator. As Offset Aggregator, Greenoxx NGO was responsible for the elaboration and registration of projects eligible for the CCX, as well as of submitting them for approval before the CCX Forestry Committee. It was also responsible for the presentation of annual reports and submission of the corresponding information to CCX officially approved verifiers. As Official Trader or Offset Aggregator, Greenoxx NGO was officially authorized to execute sales on the CCX Trading Platform on behalf of project owners.

At the same time, Greenoxx NGO integrates the CCX Forestry Committee, whose main responsibilities were the approval of commercial forestry and offset projects during Phase I and II, the technical revision of the quantification methodologies and the making of appropriate rule changes both in Phase I and II and for the future protocols that CCX is starting to elaborate. The Forestry Committee, integrated by Greenoxx NGO, did pioneering work in establishing new standards and protocols, being the first voluntary market which came operative worldwide.

Also, Greenoxx NGO was invited to integrate the CCX Technical Advisory Committee for Crediting Forest Conservation Projects. This technical advisory committee elaborated a protocol for crediting carbon preserved in forest conservation projects.

Likewise, Greenoxx NGO is developing REDD Projects (Reduced Emissions from Deforestation and Degradation) in different areas of the Amazon region.

In December 2009, the Madre de Dios Amazon REDD Project was approved according to the CCB Standards (Climate, Community and Biodiversity). Due to its high social and environmental sustainability the project obtained Gold Level, being one of first REDD projects worldwide to achieve said status. Madre de Dios Amazon REDD Project has been selected as pioneering and innovative project within the voluntary market and therefore has been chosen to integrate the reports elaborated by Amazon Conservation and Sustainable Development Institute – Idesam and The Nature Conservancy, which have been published during COP15. The project also integrates reports elaborated by Conservation International, the UNFCCC REDD web platform and the Woods Hole Research Center. The Madre de Dios Amazon REDD Project also counts with FSC Certification which constitutes a requirement, in this case of Greenoxx NGO, for the development of this type of projects.

Currently Greenoxx NGO is developing two other REDD projects in Peru and Brazil.

The main objectives of Greenoxx NGO are the following:

- The promotion, development, encouragement, research and support in all its forms of the development of activities related to the Environment, Sustainable Development, Climate Change, Clean Development Mechanism of the Kyoto Protocol, Mitigation of Greenhouse Effect Gases and Ecology in General.
- Contribute to the research, studies and projects in all its stages, to make feasible the obtaining of the previously stated objects.

- Make possible an adequate technical training in different areas of these subjects, by means of courses, events, seminars, post-graduate courses of all kinds in Uruguay as well as abroad.
- To provide any tools needed for the specific training which allow placing environmental products abroad.
- To encourage a permanent updating in the environmental - commercial area, so as to understand in an adequate way the best possibilities to enter into the international market of carbon credits and others of similar characteristics.
- To foster and make feasible the study of greenhouse gases neutralization mechanisms, as is the case of forestry. To foster and make feasible studies which tend to decrease emissions of greenhouse gases, through new technologies.
- To promote and make feasible the holding of forums, seminars, symposiums, events, meetings and all kinds of actions related to the previously mentioned items.
- To make possible all kinds of actions which directly or indirectly promote improvements in life conditions of present and future generations.

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1.4 Other Entities Involved in the Project

- **BOSQUES AMAZONICOS SAC (BAM)**

BAM's role in the project: technical development of the deforestation modeling.

BAM is a private company whose mission is to maximize the value of the forests through their conservation, recovering and sustainable management, in order to generate tangible benefits to local communities and our shareholders, while contributing to biodiversity conservation.

BAM developed a reforestation project in Ucayali, which has recovered 1000 hectares with native species, having obtained VCS and CCBA Gold Validation. In this same region, BAM has conserved 25000 additional hectares of primary forests.

In Madre de Dios, BAM is carrying out three REDD projects, together contributing to protect more than one million hectares; one of them in two Natural Protected Areas, another with chestnut concessionaires and the third with small timber concessionaires.

In all cases, the strategy is to give added value to their principal products (nuts, wood) in order to improve or increase the value of the standing forest in comparison to its alternative use. The three projects have their VCS and CCBS PDDs concluded and are in the process of initiating their validation processes.

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- **AIDER NGO**

AIDER's role in the project: technical assistance in its development.

AIDER NGO has been founded in 1986 with 17 years of experience in design, execution and evaluation of development projects.

Its mission is to contribute to the improvement of life quality of rural population in harmony with the environment conservation, by means of sustainable proposals that rely on the applied research, the political action and the recovery of local knowledge, establishing inter-institutional synergies. At the present time, is executing eight projects in five regions of Peru, with financial resources from international cooperation, public and private entities.

AIDER team is multidisciplinary, integrated by professionals of forest, social, biological, economic and administrative sciences. AIDER human resources are 33 professionals, 10 technical personnel and 11 administrative officers in 4 offices located on Piura, Tumbes, Pucallpa and Puerto Maldonado cities.

AIDER expertises is in community forest management, FSC forest certification, degraded lands recovery and reforestation, carbon sequestration and REDD, agro forestry, sustainable business organizational enforcement and project planning, monitoring and evaluation.

AIDER action lines are (i) Sustainable forest management and Certification; (ii) Natural protected areas management; (iii) Environmental services; (iv) Degraded lands recovery, (v) Eco business; (vi) Human rights and natural resources; (vii) Research and; (viii) Political action for environment.

AIDER promoted the first FSC forest certification in Peru with timber production purposes in five indigenous communities from Ucayali - Peru and designed and implemented the first forest management plan for dry forests in a peasant community in Piura - Peru.

AIDER designed the first CDM forest project in Peru, with validation process concluded and on the way to be registered. Also has design and implemented a reforestation project in Peruvian Amazon degraded lands, with VCS validation process concluded. At the present time, AIDER is designing a REDD project in Tambopata National Reserve and Bahuaja Sonene National Park, as one of the activities of the contract that have subscribed with the Peruvian State, for

the administration of biological monitoring, research and environmental services components of both protected natural areas.

AIDER is member of the International Union for Conservation of Nature - IUCN, is accredited by the United Nations Convention to Combat Desertification and is the National Focal Point of the International NGOs Network on Desertification and Drought (RIOD). Also is member of the Peruvian Environmental Network, the National Forestry Chamber, the National Center Association and the REDD Peruvian Group.

AIDER's institutional policy is to establish strategic alliances for maximizing the impacts of its actions, its main partners are the Peruvian Catholic University (PUCP), Sustainable Forestry Management (SFM), Wildlife Conservation Society (WCS), GFA Consulting Group and the National Environment Fund (FONAM).

AIDER's main recognitions are the CAMBIE 2005 Prize to the Environmental Conservation, granted by the Scientific University of the South, in the category " Conservation of Wild Areas", the Sustainable Development 2006 Prize granted by the National Council of the Environment- CONAM, the Bio commerce 2009 Prize granted by the Environment Ministry and the nomination as finalist of the Equatorial Prize 2006 promoted by the Program of the United Nations for the Development (UNDP).

AIDER staff has participated in environmental services training courses like the CDM Projects Design in CATIE - Costa Rica), Economic Tools for Conservation in Stanford University, CDM Projects Design First and Second International Course organized by the National Environmental Fund, Standard Procedures for carbon baseline by Winrock International and in REDD national and regional seminars and workshops organized by the Andean Community (CAN), WWF, TNC and CCBA.

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Maderacre and Maderyja have also signed cooperation agreements⁸ with other institutions, which are indirectly involved in the development of the present project, providing their technical knowledge and assessment and in consequence improving the management capacity of the timber concessions. Said institutions and agreements are detailed below:

- **CESVI and WWF (World Wildlife Fund Inc.)**

CESVI's and WWF's role in the project: technical assistance in the process of carrying out environmental impact studies.

The Cooperation Agreement between Maderacre and Maderyja forest concessions and CESVI and WWF was signed in April 2005 with the main objective of working together to achieve the FSC Certification for both timber concessions. It is important to highlight that said objective was fully met and the FSC Certification was achieved with the technical and economical support of both organizations. Although this agreement was completely executed, following some details of its contents and the activities carried out are presented.

CESVI is an independent humanitarian association, founded in 1985, which works for the worldwide solidarity and social justice through humanitarian actions that contribute to consolidate the human rights.

WWF is one of the largest environmental organizations worldwide and its hard work to make a healthy, happy, thriving, living and ultimately diverse and wonderful world is globally well-known.

Hereunder, a summary of the activities that were carried out by the signing parties of the agreement is presented:

- Participate in chain of custody diagnostic evaluations within the forests and the saw-mill and give the needed logistic support for the development of said actions.
- Implement the suggested corrective actions as a result of the aforementioned diagnostic evaluations within the established deadlines and designing the adequate personnel of the concessions to do that.

⁸ The cooperation agreements will be available to the auditors.

- Design the contracts to be signed with any third party, in which all the obligations of each party are clearly defined.
- Comply and make others comply with the internal rules of the concessions in relation with the sustainability of the forestry management. In this sense, an internal rulebook must be developed and implemented.
- Participate actively in the accomplishment of the Organization's Handbook, which includes posts, proceedings and responsibilities.
- Cooperate in all the training courses that will be given to Maderacre & Maderyja staff on the process of implementation of the certification and its importance for the concessions.
- Acquire and give the needed security equipments for all Maderacre & Maderyja personnel, according to the work they have to develop. In this sense, Maderacre and Maderyja commit themselves to train and make their personnel comply with all the rules related to prevention and to the use of the adequate security equipment.
- Implement the correspondent corrective actions suggested by the WWF experts with respect to the needed improvements in terms of health services and camping sites of the concessions.
- Identify all the social actors neighboring the operations areas and how are they affected by them. Develop, in cooperation with CESVI and WWF, a relationship strategy with all of them and especially with the Native Community Belgium. To this end, a diagnostic evaluation, consultation, mapping and census of the neighbor population will be carried out, in order to identify and give priority to the social actors related with the forestry operations.
- Participate actively in the design and execution of the exploratory inventories. To this end, Maderacre and Maderyja commit themselves to give the needed logistic support for the infield operations and to designate the adequate key personnel to assure the internalization of these proceedings by the concessions.
- Participate in the development of the General Plan for Forestry Management of the concessions.

- Participate in the execution of the forestry census and in the setting up of the permanent plots.
- Support and participate in the training courses on directed harvesting, designing the adequate personnel to carry them out. With this purpose, Maderacre and Maderyja should provide the needed logistic support for the whole infield operations and workshops to be developed.
- Implement an accountant registry for all the operative costs of each activity (planning, construction of roads, felling of trees, extraction, transport, etc.). A responsible should be designed to be trained in handling said registry.
- Carry out an accountant registry for each production unit, with the aim to use the data from the accountant registries in the budgetary planning.
- Implement the mitigation measures as a result of the fauna evaluation that will be carried out by WWF and CESVI, and include them within the General Plan for Forestry Management of the concessions.
- Cooperate with WWF and the correspondent authorities in decreasing the occurrence of illegal activities from third parties as illegal logging, non-authorized occupation, land use changes, illegal commercialization of fauna and flora and illegal cultures of “coca” leaves.
- Respect to the native and rural communities: the signing parties recognized the importance of the mutual respect between the concessions rights and the rights and costumes of the neighbor native communities and local populations. Said mutual respect implies the development of actions that promote a healthy and proactive interaction between them.

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- **World Wildlife Fund Inc. (WWF)**

WWF's role in the project: agreement for the participation of the concessions on the Global Forest Trade Network of Peru, program managed by WWF.

The Participation on the Global Forest Trade Network (GFTN) of Peru Agreement between Maderacre and WWF was signed in August 2006 and in August 2007 for Maderyja. As the forest concession changed their owners last year (2008) both of them updated their commitments on April 2009.

Among WWF main goals in the framework of this agreement, it should be highlighted:

- ✓ to combat and eliminate all illegal logging activities in the forests;
- ✓ to promote the sustainable and responsible purchasing of forest products.

From WWF's point of view, the sustainable and responsible purchasing of forest products may play a substantial role in the extinction of illegal logging activities and in the promotion of a better management of forestry resources. Due to that, WWF has established a GFTN, which will enhance commercial relationships between companies that are voluntarily committed with the sustainable and responsible forest management. GFTN will also state some market requirements looking after the conservation of the forests in the whole world. GFTN considers the independent forest certification as an extremely useful tool to achieve these objectives.

The Global Forest Trade Network (GFTN - Peru) is part of the GFTN and is managed as a WWF Program. The participation on the GFTN is voluntary and is open to all productive, processing and commercial enterprises who participate in Peru market and which have the capacity of getting significant benefits, through their business framework, on forest conservation in the most affected areas.

Maderacre and Maderyja have signed this participation agreement with WWF and they both comply with GFTN - Peru regulations. Therefore both concessions are participants of the GFTN - Peru. As a GFTN - Peru participant, Maderacre and Maderyja have committed to:

- ✓ State policies and practices to promote the sustainable and responsible purchasing of forest products in all its operations and activities.
- ✓ Design a strategic plan with clearly defined objectives within the project duration, stating the steps to follow in order to assure that all the produced or bought wood or wood

products are from responsible managed sinks and also due to achieve forest certification or chain of custody certification.

- ✓ Develop said strategic plan, monitoring the achievement of the defined objectives within the project duration.
- ✓ Assign one person responsible for the fulfillment of this agreement.
- ✓ Report annually to GFTN - Peru the progress of the strategic plan and some other required information.

As a GFTN - Peru participant, Maderacre and Maderyja have the rights to:

- ✓ Participate on the GFTN - Peru and thus on the GFTN.
- ✓ Access to demand and supply and market trends information, training courses and technical support are also available for GFTN - Peru and GFTN participants.

Undoubtedly, WWF is one of the largest environmental organizations worldwide and its hard work to make a healthy, happy, thriving, living and ultimately diverse and wonderful world is globally well-known. As a result of that, any agreement signed with them implies sustainable and responsible management of the natural and human resources.

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- **Rainforest Alliance, Inc. (RA)**

RA's role in the project: memorandum of understanding for the support on the promotion of sustainable forest management and certification as a tool for forest conservation and improving livelihoods; achieve greater efficiency and added value to timber products; reach better market opportunities.

This Memorandum of Understanding was signed in August 2009 between Maderacre SAC and Rainforest Alliance, Inc and in July 2009 between Maderyja SAC and Rainforest Alliance.

Objective:

Promote sustainable forest management and certification as a tool for forest conservation and improving the quality of life of workers and residents who depend on them. Likewise, the two involved organizations seek for a greater efficiency and added value to timber products aiming at reaching better market opportunities for them.

Activities:

- **Rainforest Alliance:**

- * Contribute to the development of the study in the Plant of primary processing of wood.
- * Advice in the installation process of the Plant of primary processing of wood.
- * Support in the searching of market niches in line to the certified supply of the concession.
- * Support in the process of identification of loans and investment opportunities to fund the medium and long-term plan of Maderacre concession.
- * Facilitate the participation of Maderacre in training and/or dissemination activities for complying with the FSC Standards.

- **Timber concessions (Maderacre SAC and Maderyja SAC):**

- * Determine those responsible for the communication and implementation of this Memorandum of Understanding.
- * Perform all necessary actions to maintain its Chain of Custody and Forest Management FSC Certification.
- * Cover the cost of raw materials, processing and shipment of samples and prototypes required by potential buyers identified by the Rainforest Alliance.
- * Manufacture the products agreed together with Rainforest Alliance, ensuring their quality.
- * Participate actively in the analysis of the installed capacity and develop and implement a marketing strategy.
- * Respond promptly to the requests for certified forest products, in coordination with Rainforest Alliance.
- * Comply with the guidelines established by Rainforest Alliance with other partners involved in the production chain.

- * Support, with technical and logistical capabilities, the development of workshops, courses or events deemed necessary by both involved organizations.
- * Regularly provide information required by Rainforest Alliance.
- **Both organizations:**
 - * Joint effort in the searching for market niches appropriate to the certified supply, especially for low grade wood and lesser-used species.
 - * Regular meetings to share experiences and learning and facilitate the dissemination of better business practices and added value to regional and national partners.
 - * Dissemination of information on emerging opportunities for collaboration with other donors and/or entities to leverage the resources invested by the parties to this agreement.
 - * Coordination of new initiatives to strengthen the process of added value and marketing in the region.

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• **National Forestry Chamber**

National Forestry Chamber's role in the project: bilateral cooperation agreement aiming at promoting, organizing and strengthening the creation of productive chains and promoting the production and marketing of timber products that consumers demand, taking into consideration the potential of the forest, according to the Forest Management Plans of producers through training and technical assistance.

This cooperation agreement was signed in February 2009 between the National Forestry Chamber and Maderyja SAC.

It has as background the PD Project 421/06 "Strengthening of the Productive Chain of Timber from Forest Concessions and Other Forests Under Forest Management", which is carried out by the National Forestry Chamber since December 2007 to May 2010, with financial support

from the International Tropical Timber Organization (ITTO) and the collaboration of the National Institute of Natural Resources (INRENA), which aims to strengthen the productive chain forestry-industry-consumer to consolidate a system of formal production and transparency for people linked to the forest sector and the national economy.

The scope of said project corresponds to the Central and Southern economic corridors in the country. The first covers the regions of Ucayali, Huanuco, Pasco, Junin and Lima, being the axis road the Central Highway; and the second, the regions of Madre de Dios, Cuzco, Puno, Arequipa, Moquegua and Tacna, being the axis road the Interoceanic road.

It promotes the articulation of the productive activity of forest managers with the various economic agents directly involved in the production, processing and transport of forest products to the market, through productive chains that benefit all the actors involved. The forest-industry-consumer productive chain refers to the interrelated set of activities that incorporate value to timber products, from the extraction of wood from managed forests, through the processing industry, to the product that is purchased by domestic consumers or intended for export, which implies the participation of several companies, each consisting of a chain link.

Objective:

Join efforts to establish effective collaboration in order to promote the development of legal timber production activities.

Activities:**• National Forestry Chamber:**

- * Support Maderyja concession to be integrated in one or more timber productive chains.
- * Identify companies related with the forest activity interested in establishing and/or strengthening productive chains.
- * Organize meetings and promote and/or consolidate the productive chains, trying to involve as many related actors with each productive chain as possible.
- * Provide technical assistance and/or training, prior identification of productive hot spots or bottlenecks that prevent or hamper the development of the productive chain.

- **Maderyja SAC:**

- * Joint at least one of the timber productive chains.
- * Carry out all forest operations according to the approved Forest Management Plans supervised by the correspondent authorities.
- * Make the best efforts to maintain good relationships with other members of the production chain.
- * Implement the recommendations proposed by the consultants and trainers.
- * Do not carry out illegal logging or illegal trade of wood activities.
- * Subscribe and follow the Code of Conduct.
- * Provide the information required by the Chamber.
- * Allow free access to the forests and other production facilities for personnel designated to the field visits.
- * Actively participate in training programs, information events and other meetings when they are invited.
- * Submit the report of logging trees from the plot of annual harvesting, forest transport guides, bills, buying guides, certificates and/or other documents of timber movement, to ensure known provenance.
- * Design a Coordinator.

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- **University of Leeds – School of Geography**

School of Geography's role in the project: cooperation agreement for the development of a transaction and monitoring cost analysis of a REDD Project and a scientific research on the relationship between biomass and structural variables of the Peruvian Amazon trees.

This cooperation agreement was signed in March 2010, between Maderacre SAC and the School of Geography of the University of Leeds.

General Objectives:

- * Carry out a transaction and monitoring cost analysis of a REDD Project as part of the “Capacity Building for Payments for Environmental Services - Carbon and Biodiversity in the Peruvian Amazon” Project.
- * Conduct a collaborative study of the relationship between biomass and structural variables (i.e. diameter, height) of trees in the Peruvian Amazon as part of the “Estimation of carbon stock in the Peruvian Amazon: improving the allometric equations” Project.

Specific Objectives:

- * Create a partnership between Maderacre and The School for research and development of the REDD issue in Peru.
- * Make possible a comparative analysis of different projects in design and/or being implemented within the Peruvian territory.
- * Create the first tree biomass database (directly measured) within the Peruvian Amazon.
- * Develop allometric equations for estimating carbon stocked in trees and forests of the Peruvian Amazon.
- * Facilitate the exchange of information, documents and research reports between the parties and related to climate change and the REDD issue.

Activities:

• School of Geography:

- * Comply with all laws in force in Peru for the development of scientific research.
- * Make the discussion with Maderacre and other members of the research team, analysis of information as well as the development of research results.
- * Disseminate the conducted research through publications.
- * Ensure confidentiality when required.
- * Train the Maderacre staff in the use of the tools generated under the project, so that study results are applicable to the company and the REDD project being implemented.
- * Provide to Maderacre delivery or access to information, documents and research reports related to climate change and REDD that have been developed by the School and the University of Leeds.

School representative: Dr. Tim Baker and Ms. Rosa Goodman

- **Maderacre SAC:**

- * Provide information on the REDD Project that is being implemented, both its description as the cost data available.
- * Facilitate the biomass study of trees felled in the concession, including collaboration in planning the study and providing logistic support so as to facilitate the infield work of the researchers to measure the biomass of trees. Support in the advancement of the research.

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- **La Molina Agrarian National University - Management Forest Department (MFD)**

MFD's role in the project: agreement for the development of a research study on *Swietenia macrophylla* populations in order to enhance the knowledge of this species in the Madre de Dios region as well as in the country, which will allow the concessions to have updated and accurate information about *Swietenia macrophylla* dynamics and therefore make better decisions related to their forest operations and the sustainable management of their forests.

The Cooperation Agreement between Maderacre and the Management Forest Department (MFD) of La Molina Agrarian National University was signed in May 2007. Although this agreement was completely executed to date, it was extremely significant in terms of scientific research on *Swietenia macrophylla* populations, thus some of its details and activities are presented following.

The MFD is an educational institution of public service which carries on some social activities and projects, i.e. technical assessment of private and public enterprises, and therefore collaborates in the development of the whole country.

The MFD has conducted research studies on *Swietenia macrophylla* populations in Madre de Dios region. In order to get accurate data, they needed to measure and evaluate periodically the selected individuals of said species within the Maderacre concession area.

The main goal of this Cooperation Agreement was to share institutional strengths due to enhance the knowledge on *Swietenia macrophylla* in Peru.

With the aim to achieve said goal, Maderacre allowed free access to the technical team of MFD for the in-field measurement and evaluation of the species within the concession area and MFD provided technical and financial support for the collection and subsequent processing and evaluation of the data.

Two Coordinators were assigned on the agreement, one for each party. The MFD Coordinator was Eng. Ignacio Lombardi, Forestry Engineer and Main Professor of La Molina University. The Maderacre Coordinator was Eng. Nelson N. Kroll, responsible for the forest management of the timber concession.

As a result of this agreement, Maderacre obtained updated and accurate information about *Swietenia macrophylla* dynamics, one of the most valuable species in terms of productivity and biodiversity. This knowledge resulted in a better decision making and planning of all forest activities and in consequence in a more sustainable management of Maderacre's forests.

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- **University of the Pacific - Faculty of Economy (FEUP)**

FEUP's role in the project: agreement for the development of useful research studies by FEUP students in order to apply in practice all the knowledge and skills learned during their studies, which, in turn, represents an extremely useful technical support for the concessions in relation with varied economic and financial issues.

The Cooperation Agreement between Maderacre and the Faculty of Economy of the University of the Pacific was signed in May 2007.

The University of the Pacific is a private educational and non-profitable institution, specialized in economics and management studies, aiming at contributing to the development of Peru in the new extremely competitive global context. Through its Faculty of Economy they pretend to give their students appropriate leadership skills, which would help them in the construction and development, on solid basis, of the companies for which they will work for. The FEUP also puts emphasis on the education of ethical and moral principles as justice and honesty.

FEUP students are required to make a professional research study for the Economic Research Subject (compulsory subject of the Economy degree) and Forestry is considered as an area of interest for FEUP to develop said study. At the same time, Maderacre requires any type of economic studies in order to enhance not only their management capacity, but also the responsible management of their woods.

The main goal of this Cooperation Agreement is to share institutional strengths and to make possible the development of useful research studies for the concession by FEUP students, in which they would be able to apply all the knowledge and skills learned during their University studies. The FEUP will support them through the whole process.

Two Coordinators were assigned on the agreement, one for each party. The University of the Pacific Coordinator is Prof. Juan Francisco Castro, Coordinator of the Economic Research Subject. The Maderacre Coordinator is Mr. José Luis Canchaya Toledo, Financing Manager.

As a result of this agreement, Maderacre would receive technical support by the students and their supervisors in relation with varied economic and financial issues, thus a permanent adjustment of their procedures and operations should be made in order to optimize all Maderacre resources.

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It is important to mention that until Maderyja concession was sold to the Chinese investors, all of the aforementioned agreements were signed by Maderacre & Maderyja as a group. As can be inferred from the above, currently most of the agreements are valid for both concessions, with the exceptions stated above.

In conclusion, each one of the aforementioned agreements and institutions will contribute somehow in the improvement of the management capacity to undertake this Project. The combination of technical skills, knowledge, research and experience that each one of the involved institutions will provide for the development of the Project are a concrete demonstration of that.

1.5 Project Start Date

The project activity started in the 31st May 2006, according to the FSC certification⁹ process starting date. It is important to highlight that the timber concessions decided to start said FSC certification process regarding the generation of carbon credits.

1.6 Project Crediting Period

Crediting period start date: 1st January 2007.

Crediting period end date: 31st December 2046.

Project crediting period: 40 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	
Mega-project	X

⁹ The FSC Certificates of Maderacre and Maderyja timber concessions will be available to the auditors.

Chart 1: Estimated GHG emission reductions or removals of the Madre de Dios Amazon REDD Project

Years	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 2007	1,359,915.43
Year 2008	874,615.75
Year 2009	1,081,795.10
Year 2010	474,403.83
Year 2011	1,393,791.60
Year 2012	1,326,013.86
Year 2013	856,016.30
Year 2014	1,246,907.26
Year 2015	1,210,266.45
Year 2016	1,097,435.61
Year 2017	705,138.91
Year 2018	1,717,713.51
Year 2019	1,199,679.39
Year 2020	932,788.26
Year 2021	995,869.49
Year 2022	2,200,660.01
Year 2023	980,574.08
Year 2024	1,610,496.23
Year 2025	981,183.69
Year 2026	778,898.52
Year 2027	932,164.75
Year 2028	577,477.46
Year 2029	1,273,413.26
Year 2030	620,726.19
Year 2031	739,299.57
Year 2032	349,842.02
Year 2033	901,121.67
Year 2034	507,736.65
Year 2035	816,695.04
Year 2036	310,520.77
Year 2037	372,168.58
Year 2038	311,144.28
Year 2039	236,228.96
Year 2040	678,924.52

Year 2041	390,396.40
Year 2042	513,097.54
Year 2043	191,747.10
Year 2044	230,444.84
Year 2045	623,206.35
Year 2046	294,773.10
Total estimated ERs	33,895,292.34
Total number of crediting years	40
Average annual ERs	847,382.31

The estimated total amount of emission reductions of the Madre de Dios Amazon REDD project over the crediting period is 33,895,292.34 tCO₂e, as is shown in the previous chart, thus classifying the project as a “mega-project” under the VCS Standard¹⁰.

1.8 Description of the Project Activity

The project will achieve the expected GHG emission reductions through:

- The development of the specific project activities in order to achieve the project’s main goals.
- The Sustainable Forest Management system that has been applied since the start day of the project within the concessions.
- The maintenance of the FSC Certification through permanent reviews and audits.
- The commitment with the responsible trade of forest products, being part of the Global Forest Trade Network, program managed by WWF.

Each of the different items mentioned above, through which the project will achieve its expected emission reductions, are explained in detail below:

a) REDD Project activities aiming at reducing deforestation

The climate project has two main goals:

- a) to reduce the pressure for lands with agricultural and cattle ranching purposes by the local population in the project area and its buffer zone;

¹⁰ VCS Standard, VCS Version 3, Requirements Document, 8 March 2011, v3.0.

- b) to guarantee the sustainable forestry management of both timber concessions through the implementation of an avoided deforestation project that helps to generate higher economical resources for the management of the area.

The strategy to achieve these goals is supporting the development of environmentally friendly productive initiatives that will help the families to improve their livelihood conditions.

The activities considered to achieve these goals are the following:

Outcome 1: Contribute to the sustainable development of rural producers living in the buffer zone of the project.

- 1.1 Socialization and dissemination of the project goals.
- 1.2 Identification and selection of proposals for the environmentally friendly productive projects.
- 1.3 Development of the skills and capacities of the members of the associations linked to the selected projects.
- 1.4 Design of the project profiles of the selected projects.
- 1.5 Look for financing and/or co-financing for the approved profiles (funding).
- 1.6 Support on the implementation of the approved projects.
- 1.7 Monitoring of the projects.

This productive initiative is being implemented with the different groups located within the buffer area around Iñapari. With these measures, what is sought is that these actors replace their traditional productive activities towards these new sustainable activities or, in any case, that they introduce technical innovations which reduce the level of impact of these traditional activities.

The support to productive initiatives with local inhabitants seeks also to improve their income level and consolidate the land tenure regime of the population. Although the ability of the project developers to change public policies related to land use and the ability of the correspondent authorities to ensure their compliance are not possible to control, there is a permanent communication with the competent authorities, thus expected to improve coordination.

The villages that are part of the target groups who will benefit from this activity are: Santa Rosa, La Vuelta, Villa Primavera, Nueva Esperanza and Noaya sectors of the Iñapari District. These villages were identified as the buffer area for the implementation of the project activities.

Given the fact that the Madre de Dios Amazon REDD Project activities are already being implemented, hereunder a summary of their progress, the specific actions carried out during 2010 and the results obtained in relation to this outcome is presented¹¹:

- * In the framework of the Relationship with the Community Advisory Committee, the Madre de Dios Amazon REDD project's objectives and results were spread.
- * In the framework of the Cooperation Agreement with Scotiabank, the dissemination of the Madre de Dios Amazon REDD Project through print press and a video in their service channels nationwide is being carried out.
- * Information about the Madre de Dios Amazon REDD Project is freely available to anyone on the website of the timber concessions.
- * The Madre de Dios Amazon REDD Project is also disseminated as a pioneering experience in skilled and unskilled forums to which the concessions are invited.
- * All the activities related to the environmentally friendly productive projects are currently in its first stage of implementation: social baseline of the project's surroundings (completed), registration of farmers and villagers of the area of influence and development of the "Environmentally Friendly Productive Projects" Program. The successive stages of the Program will be implemented opportunistically.

¹¹ According to the "2010 Monitoring Report of the Madre de Dios Amazon REDD Project", already submitted to the CCBA.

Outcome 2: Reduce the vulnerability of the project area from external factors of deforestation and degradation.

- 2.1 Review and update of the custody plan.
- 2.2 Installation of control posts PCA 5 Maderacre.
- 2.3 Delimitation of 100% of the concessions boundaries.
- 2.4 Installation of “Hitos” in the concessions vertexes.
- 2.5 Improve the signaling within the concessions.
- 2.6 Periodic and annual patrolling within vulnerable sectors.
- 2.7 Annual monitoring of possible invasions using satellite images.
- 2.8 In-field verification of sectors identified as potential points of invasion (due to deforestation).
- 2.9 Development and implementation of mechanisms for the dissemination of environmental education among children, adolescents and communities involved in the project.

As it can be seen, the custody of the concessions is being strongly improved through the implementation of the REDD project activity and, therefore, the resulting income by means of the carbon credits generated by this project is be the only available option to achieve the preservation and conservation of the forest.

Said activities are supposed to contribute to the reduction of the real deforested area, not only within the area of the project but in the buffer zone too, at least in a 80% rate as it is estimated in Peru that the 80% of the deforested area is caused by agriculture (slash & burn practices).

Hereunder a summary of the progress of these activities, the specific actions taken during 2010 and the results obtained in relation to this outcome is presented¹²:

¹² According to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, already submitted to the CCBA.

- * The custody plan of the Madre de Dios Amazon REDD project area has been reviewed and updated. For this review, the current vulnerability of the different sectors of each concession was analyzed through the study of the correspondent cartography as well as the identification of those sites more easily accessible by roads and waterways and the reports of violation of the boundaries of both concessions.
- * It is being coordinated with the Belgium Native Community the joint installation of a control post on the eastern boundary of the community, on its access road and which connects the PCA 5 of Maderacre and Maderyja concessions. Since this is a common access point, the control post to be installed will meet the same objectives of the post to be installed in the PCA 5. This coordination will continue and if the installation is not materialized in the medium term, both concessions will install a control post at the access to the PCA 5.
- * Approximately 70% of the project area boundaries are natural (permanent water courses). In turn, 75% of the non-natural limits have been limited with pedestrian trails. During the present period, the perimeter trails laid on the boundaries and authorized in advance have been maintained.
- * The maintenance of existing “hitos” and the installation of new ones is planned for the 2011 period.
- * In this period, three new signs have been installed:
 - ~ 1 on the prohibition of hunting, fishing and illegal logging within the concessions boundaries.
 - ~ 1 on the starting point of the Maderyja concession.
 - ~ 1 to define the boundary between Maderyja and Maderacre concessions.
- * Two patrolling actions to the vulnerable sectors identified within the Custody Plan of the concessions were conducted:
 - ~ 1 river patrol to the Acre River sector to the level of Cashuera Uku, carried out in February 2010.
 - ~ 1 land patrol over the eastern boundary, limit with the Pumaquiro SAC concession, being this sector one of the highest threats because of its proximity to the Inter-oceanic road. Carried out in July 2010.
 - ~ None of the patrols reported the violation of boundaries or evidence of invasion.

- * The report of the analysis of satellite imagery, for this period, does not report the occurrence of invasions within the Madre de Dios Amazon REDD project area. Meanwhile, the patrolling in the areas of highest risk showed no invasion or violation of the boundaries.
- * There is a program which includes the planning for the dissemination of environmental education among children, adolescents and communities involved in the Madre de Dios Amazon REDD Project. Said program is in process of validation.

In particular, a list of the Madre de Dios Amazon REDD Project highlights and its benefits due to the implementation of the project activities is presented below:

- The Madre de Dios Amazon REDD project contributes to mitigate climate change substantially through avoided deforestation:
 - * In the absence of the Madre de Dios Amazon REDD Project, the CO₂ from the atmosphere would increase by 11 million tonnes in 10 years.
 - * In the absence of the Madre de Dios Amazon REDD Project, the CO₂ from the atmosphere would increase by 34 million tonnes in 40 years.
 - * In addition to increased pollution and its effect on climate change, the land use change that would occur in the absence of the Madre de Dios Amazon REDD Project (conversion to agriculture and livestock) would lead to soil degradation and deforestation by illegal loggers.
 - * The effects of the Inter-oceanic highway were verified by crossing the border into Brazil, where the road and its effects have already been present for several years and where it can be verified an abysmal contrast to the conditions of biodiversity in the project area.
- The Madre de Dios Amazon REDD Project will contribute to the sustainable development of indigenous communities living in the area of influence of the project:
 - * The Madre de Dios Amazon REDD project's main objective is to provide alternatives to the immigrants who settle in the areas of influence of the project that do not imply destroying the forest.

- * Conservation of the habitat and livelihood of indigenous communities settled in the area of influence of the project: Yine, Mascho Piro and other tribes not yet identified in voluntary isolation conditions.
- * The Madre de Dios Amazon REDD Project will increase local employment opportunities. In this sense, there has been an increase of 8 workers in 2006 to 30 from the second year, which meant an increase of almost 400%, giving priority to local workers. Additionally, during the 2010 period, the number of permanent workers went from 14 people in 2009 to 18 in 2010, while in the case of temporary workers it rose from 8 people in 2009 to 24 in 2010. For Maderyja concession, and for 2011, the staff on the payroll already exceeds 50 employees, reaching 100 temporary workers in forest operations. The permanent staff is 30 employees.
- * Special involvement of the Yine tribe, members of the Belgium Native Community (70 people, distributed in 16 families) and immigrant indigenous communities in all project activities.
- * The Madre de Dios Amazon REDD Project on the border of the Madre de Dios Territorial Reserve, established to protect local indigenous populations in voluntary isolation conditions of the Mascho Piro tribe and other tribes not yet identified, whose population is estimated in 600 people. Given the ignorance of the characteristics of these communities, the initiation of contact should be decided by themselves and according to the rules established for their defense. This REDD project will be crucial to maintaining their isolation conditions, protect the integrity of the reserve until they themselves decide to join the society of the region. Likewise, contact protocols are developed for the case these tribes enter the project area, since they know no geographic boundaries, taking into account their particular vulnerability to disease.
- * Dynamism of regional and local economy, increasing local consumption by 100%.
- * Identification, selection and support in the implementation of environmentally friendly productive projects.
- * Implementation of a training plan on leadership, organization and sustainable productive activities, giving priority to female personnel.

- * Implementation of the Relationship with the Community Plan, with the aim at strengthening social organizations and their interactions.
 - * Improving early childhood education through curriculum enrichment and school activities within the project area, as well as in the school belonging to the Belgium Native Community.
 - * Technical training courses to young people in the community.
 - * Courses and programs on the principles of inter-culturalism and respect for local communities for all the people involved in the project.
- Contribution to the conservation of the Vilcabamba-Amboró Conservation Corridor in the Peruvian Amazon, one of the world biodiversity hotspots:
 - * Reduction in the loss and degradation of forest genetic variability as a result of the implementation of a custody system which avoids the deforestation caused by encroachment.

In this sense, according to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, during the 2010 period, the custody plan of the Madre de Dios Amazon REDD project area has been reviewed and updated and the patrolling to the most vulnerable sectors and areas of highest risk showed no invasion or violation of the boundaries. In addition to this, the report of the analysis of satellite imagery also did not report the occurrence of invasions within the project area.

- * Monitoring of the entire area, adequate control and surveillance through the delimitation and signaling of 100% of the project boundaries and the installation of control posts in each of the vulnerable access points with two guards in each.

In this sense, according to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, during the 2010 period and with the aim of updating the custody plan of the concessions, the current vulnerability of the different sectors of each concession was analyzed through the study of the correspondent cartography as well as the identification of those sites more easily accessible by roads and waterways and the reports of violations of the boundaries of both concessions.

The installation of a control post on the eastern boundary of the Belgium Native Community, on its access road and which connect the PCA 5 of Maderacre and

Maderyja concessions is being coordinated with said Community. Also, 75% of the unnatural limits have been limited with pedestrian trails and the perimeter trails laid on the boundaries have been maintained. In addition to this, three new signs have been installed: the first on the prohibition of hunting, fishing and illegal logging within the concessions boundaries, the second on the starting point of the Maderyja concession and the third to define the boundary between Maderyja and Maderacre concessions.

- * Minimizing the risk of loss of coverage and changes in the process of regeneration as a result of the deforestation caused by encroachment.

In this regard, all the aforementioned actions related to the review and update of the custody plan of the concessions, as well as the patrolling and surveillance actions carried out, seek, among others, to minimize the risk of loss of coverage and changes in the process of regeneration as a result of the deforestation caused by encroachment.

- * Minimizing the risk of extinction of local population of endangered timber species as is the case of Cedar (*Cedrela odorata*), Mahogany (*Swietenia macrophylla*), Leche caspi (*Galactodendron utilisima*) and Wild fig tree (*Ficus anthelmintica*).

In relation to this and according to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, during the 2010 period, the percentage of remaining individuals post-harvesting of *Swietenia macrophylla* species in Maderacre concession is 40% (DBH > Minimum Harvesting Diameter) and in Maderyja concession is 16.67%. In the case of *Cedrela odorata* species, the percentage of remaining individuals post-harvesting is 80.36% in Maderacre concession and 59.18% in Maderyja (DBH > MHD). This amount of remaining trees in each species, together with the individuals with lower diameter classes, ensures the health of their populations, as well as the fulfillment of their ecological roles in the forest.

- * Minimizing the risk of extinction of local populations of endangered wildlife as is the case of Giant anteater (*Myrmecophaga tridactyla*), Giant armadillo (*Priodontes maximus*), Red howler monkey (*Alouatta seniculus*), Jaguar (*Panthera onca*), Lowland tapir (*Tapirus terrestris*), Sanborn's squirrel (*Sciurus sanborni*), Amazon dwarf squirrel (*Sciurus ignitus*), Blue-throated Piping-guan (*Pipile cumanensis*), Razor-billed Curassow (*Mitu tuberosum*), Red and green macaw (*Ara chloropterus*), Scarlet macaw (*Ara macao*).

In relation to the protection of these endangered wildlife species, it is important to mention that according to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, during the 2010 period there were no hunting events registered or reported within the Madre de Dios Amazon REDD project area.

Additionally, the Madre de Dios Amazon REDD Project was developed according to the following technical specs:

REDD Standard CCB Level Registry GHG Validation and Verification Sustainable Management Certification	CCB Gold Markit Environmental Scientific Certification Systems (SCS) Forest Stewardship Council (FSC)
NGOs support	WWF, CESVI, ProNaturaleza, AIDER
Awards	Innovative “Eco-Initiative” by Eco-Index and Rainforest Alliance
Selected as a model project to integrate reports	Idesam The Nature Conservancy Conservation International UNFCCC REDD Wood Hole Research Center The Forest Carbon Portal REDD Plus & Biodiversity Newsletter

The Madre de Dios Amazon REDD Project has been validated according to the CCB Standards (Climate, Community & Biodiversity Standards) and due to its high social and environmental sustainability has obtained the highest rating: Gold Level. The project is also registered with the Markit Environmental Registry platform.

Madre de Dios Amazon REDD Project was developed and funded by Greenoxx NGO, Maderacre SAC and Maderija SAC, and was awarded as “Innovative Eco-Initiative” by Eco-Index, a service of Rainforest Alliance. The project was the first in the carbon market category awarded by said institution.

It has also been selected to integrate reports from the Institute for Conservation and Sustainable Development of the Amazon (Idesam) and The Nature Conservancy, both published during the COP15 (Conference of the Parties in Copenhagen, December 2009), Conservation International, the web platform REDD UNFCCC, the Woods Hole Research Center, The Forest Carbon Portal and the REDD-plus & Biodiversity e-Newsletter published by the Convention on Biological Diversity (CBD).

In relation to project outcomes and activities, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project mentions that there are two feedback mechanisms for management actions and monitoring programs. The first feedback is in the form of annual work plans which contain information about project activities, project outcomes, measures of success and lessons learned. The implementation and feedback on management actions and monitoring programs are updated and documented in the annual work plan on a yearly basis. The second feedback mechanism in community feedback provided through community meetings, part of the community plan. This mechanism is related to the annual work plan because community feedback is incorporated into the annual work plan. Together, both of these feedback mechanisms are reliable and improve the project outcomes.

Additionally, it states that the project design is made flexible through the evolution of the annual work plan. The annual work plan contains information about project activities, project outcomes, measures of success and lessons learned. Potential changes are accommodated through the annual work plan, a process that has been established to adjust project activities as needed.

It also mentions that the relevant and applicable lessons learned will be documented in the annual work plan which is updated on a yearly basis. The annual work plan contains information about project activities, project outcomes, measures of success and lessons learned. Additionally, Aider in conjunction with Maderacre and Maderija intend to publish a paper on different aspects of REDD projects, including lessons learned.

Furthermore, said Report adds that the dissemination of the information to encourage replication of successful practices will be achieved at a variety of levels and by a variety of means. During the site visit, the project proponents outline dissemination at four levels: through the promotion of the project as an example; participation of students and researchers; community meetings; and publicity in newspapers and on television. AIDER will promote the project as an example to the Peruvian roundtable on REDD, a think-tank of national and international REDD experts.

Through this roundtable, the information will be disseminated both inside and outside Peru. AIDER and project-associated researchers plan to disseminate many technical aspects of the project as well through publication and presentation, including modeling procedures.

Lastly, the transparency of Maderacre and Maderyja allows information to disseminate for the replication of successful practices.

b) FSC Certification

The process of preparing for FSC certification was carried out by the concessions with the technical support of CESVI, WWF and ProNaturaleza for the development of the necessary environmental impact studies, all of them well-known and internationally recognized NGOs.

The FSC auditing process was developed by Smartwood (Rainforest Alliance), with the aim to determine the ecological, economic, silvicultural and social performance of the forest management system applied by both timber concessions. The Certificate was obtained for the entire concessions area, concluding that the management system is being implemented uniformly in all areas of the forests and meets all the requirements of the certification criteria.

Additionally, in order to maintain the FSC Certification, a group of experts from SmartWood will permanently review performance and compliance with FSC criteria by means of annual audits and/or random visits.

As it was previously mentioned, it is important to highlight that both timber concessions have achieved voluntarily the FSC Certification for the 100% of their forests in January 2007 and that one of the main reasons for obtaining said certification was the generation of carbon credits.

It is considered that the companies that have the best conditions to develop this type of projects are those which count with FSC Certification, since these guarantees that management will be sustainable, preserving the biodiversity of the forest and that their actions are carried out respecting their management plans as well as the local populations and the environment.

The concessions were able to certificate its operations thanks to the funding from international cooperation and other sources. It is important to highlight that this sources are not sustainable over the time and could threaten the viability of holding the FSC Certification which allows a good control on the concession and a reduced impact logging of the forest. Thus, the generation of carbon credits is the only option to continue and permanently improve the sustainable management of the whole forests within the project area.

c) Sustainable Forest Management (SFM)

The Sustainable Forest Management (SFM)¹³ that is already applied by both timber concessions and certified by the FSC, is based on the following characteristics:

- * A minimum diameter is required for a tree to be selected for harvesting.
- * Harvesting intensity is determined depending on: diametric structure, abundance of each species, market requirements, ecological characteristics and rotation. According to this, the whole forested area is divided into annual harvesting plots.
- * The main criteria to determine the trees to be harvested is the replacement, which means that there is a certain volume of annual cut that is determined as the most suitable for maintaining forest carbon stocks (only what the forest will produce for the next cycle is allowed to be cut and in consequence the productive capacity of the woods is maintained and the stability of the ecosystem is forwarded).
- * The harvesting method is direct felling, which implies selective harvesting with low impact technologies and with a very well-planned construction of roads based on the distribution of the remaining trees. With this harvesting method, the tree falling direction is determined in order to protect the status of the remaining trees, giving priority to the protection of the most valuable timber species as mahogany, cedar, shihuahaco, estoraque and azúcar

¹³ The Forestry Management Plans of both timber concessions will be available to the auditors, as well as their Annual Operational Plans.

huayo and ecological species (i.e. for fauna species) as those from Sapotaceae, Moracea, Lecythidaceae, Bombacaceae and Leguminosae families. This harvesting method also allows the protection of any fauna species during the felling of trees.

Applying said Sustainable Forest Management system, positive impacts on biodiversity conservation and the development of local populations are generated, such as permanent work post generation and income for the region and the country.

Additionally, all the environmental impacts produced by the forest management were identified through environmental impact studies and appropriate mitigation measures were defined and implemented (see section 5 of this PD Template).

Besides the SFM system aforementioned, both concessions have also designed other measures to protect the environment, such as:

- * Definition of strict conservation areas, in order to protect habitats, vulnerable species and flora species important for the development of native fauna (i.e. collpas, hollow trees).
- * The fiscal zone of 50 m over both banks of any open river or stream within the concessions is protected.

d) Responsible Trade

One of the agreements signed between the concessions and WWF is related to the participation on the Global Forest Trade Network (GFTN – program managed by WWF). Said agreements were signed in 2006 for Maderacre and in 2007 for Maderyja and updated on April 2009.

The main goals of the agreement are: to combat and eliminate all illegal logging activities in the forests and to promote the sustainable and responsible purchasing of forest products. GFTN will enhance commercial relationships between companies that are voluntary committed with the sustainable and responsible forest management and will state some market requirements looking after the conservation of the forests worldwide. Therefore, being part of the GFTN assures the responsible trade and helps to reduce deforestation.

In addition to the four items mentioned above, it is important to also mention that the current Forest Management Plan (FMP) of the concessions, carried out by their team of forestry specialists¹⁴, has started in May 2006 and finishes in May 2042. Additionally it will be periodically re-assessed according to the current forestry regulations in the country.

The specific objectives stated in said FMP are the following:

a) For Maderacre timber concession:

- * Timber harvesting for lumber for its own industry.
- * Timber harvesting for lumber for third parties.
- * Timber harvesting for laminated wood for its own industry.
- * Timber harvesting for laminated wood for third parties.
- * Use of logs and round wood (sale of logs, poles, etc.).
- * Harvesting for firewood and/or coal.
- * Use of other forest products for own consumption.
- * Use of non-timber forest products for commercialization.
- * Management and use of the forest and the landscape for eco-tourism purposes
- * Management and use of forest environmental services, including mitigation of emissions and carbon and other greenhouse gases sequestration, as well as other environmental services that the forest provides.

b) For Maderyja timber concession:

- * Timber harvesting for lumber and secondary transformation for its own industry.
- * Timber harvesting for lumber and secondary transformation for third parties.
- * Management for the environmental service of reducing carbon emissions from deforestation and degradation (REDD).

¹⁴ General Forest Management Plan of Maderacre and Maderyja timber concessions: Eng. Roberto Kometter Mogrovejo (WWF), Oscar Melgarejo Lizama and Nelson Kroll Kohel (Forestry Manager of Maderacre); Eng. Manuel Francisco Salirrosas Vásquez (Maderyja). These documents will be available to the auditors.

Forest Management

- **Management System**

The management system consists of a polycyclic system based on natural regeneration.

The Sustainable Forest Management system is based on the minimum harvesting diameter (minimum diameter for a tree to be selected for harvesting), applying a harvesting intensity depending on the diametric structure, density and abundance of species, market potential, ecological characteristics and the harvesting cycle, according to which the whole forested area is divided into annual harvesting plots, which regulates the production based on the annual productive area.

The main criteria to determine the trees to be harvested is the replacement, which means that there is a certain volume of annual harvest that is determined as the most suitable for maintaining forest carbon stocks and the stability of the ecosystem (only what the forest will produce for the next cycle is allowed to be harvested and, in consequence, the productive capacity of the forest is maintained as well as the stability of the ecosystem).

The harvesting method is selective and applies reduced impact technologies, direct felling and road network planning based on the distribution of the trees to be harvested. The number and distribution of seedling trees to leave is also planned as well as the protection of all future harvest and threatened species individuals.

- **Harvesting cycle (rotation)**

The harvesting cycle is 20 years.

The harvesting cycle should be long enough to ensure the sustainability of the forest in terms of its natural regeneration capacity.

A harvesting cycle of 20 years was established, applying an average annual diametric increment of 0.5 cm, data which will be verified with the establishment of evaluation and monitoring systems of natural regeneration.

According to this, the trees will grow on average 10 cm of DBH during the cycle, which determines a flow rate of increase of 1.0, which means that 100% of the trees of a diametric class go to the following class. On this basis, the Minimum Harvesting Diameters and Harvesting Intensity have been calculated for each species that is projected to be harvested in the next years.

Based on the above information, a simulation with the Harvesting Model MYRLIN # 3¹⁵ to determine if the cutting cycle of 20 years is appropriate has been carried out.

According to the results of the simulation, it is observed that the cutting cycle of 20 years is appropriate and that the harvesting level is stabilized at about 100 years.

- **Species to be harvested and minimum harvesting diameter**

A list of the species to be harvested in the second five-yearly period, its use, minimum harvesting diameters and harvesting intensity are included in this section of the FMP.

For the calculation of the Minimum Harvesting Diameter and the Harvesting Intensity, the following premises are taken into account:

Average Annual Diametric Increment: 0.5 cm

Harvesting Cycle: 20 years

Flow rate of increase: 1.0

Only what can be replaced is harvested.

Maximum Goal Diameter: 90 cm

Every year, within the correspondent Annual Operative Plan and taking into consideration data from the forestry census and market information, the real market possibilities of economic exploitation of each of the species included in the abovementioned list will be assessed. This is because market conditions may change from year to year and it would be inappropriate to harvest a species that cannot be sold.

- **Species to be protected**

A list of the species to be protected and its justification is included in this section of the FMP.

¹⁵ Alder, D., Baker, N., Wright, HL. (2002) MYRLIN: Methods of Yield Regulation with Limited Information. Oxford University, Oxford Forestry Institute. <http://www.myrlin.org>

- **Administrative division of the forest**

- * **Five-yearly blocks**

According to the Forest Management Plans, the forestry area of the concessions is divided into four five-yearly blocks. The following charts show the area (ha) of each type of forest in said blocks.

Chart 2: Productive forestry area (PFA) in the five-yearly blocks of the Madre de Dios Amazon REDD Project

Block	Type of forest	PFA Maderacre		PFA Maderyja	
		Ha	%	Ha	%
I	Low terrace forest	53	0.5	466	4.0
	Low hill forest highly dissected	10712	99.5	10930	96.0
	Total PFA of Block I	10765	22.7	11396	24.0
II	Low terrace forest	93	0.8	----	----
	Low hill forest highly dissected	11755	99.2	12129	100.0
	Total PFA of Block II	11848	25.0	12129	25.0
III	Low hill forest highly dissected	12636	100.0	7916	69.0
	Low hill forest highly dissected with “paca”	----	----	3580	31.0
	Total PFA of Block III	12636	26.7	11496	24.0

Block	Type of forest	PFA Maderacre		PFA Maderyja	
		Ha	%	Ha	%
IV	Low terrace forest	501	4.1	1366	11.0
	Low hill forest highly dissected	11600	95.9	7658	61.0
	Low hill forest highly dissected with “paca”	----	----	3523	28.0
	Total PFA of Block IV	12101	25.6	12547	26.0
Total	Total PFA of Blocks I – IV	47350	95.9	47568	96.0
	Total non productive areas	2026	4.1	1988	4.0
	Total area of the Madre de Dios Amazon REDD Project	49376*	100.0	49556*	100.0

* 49,376 has + 49,556 has = 98,932 has, total number of hectares according to the concession contracts between the concessions and the State. This information was generated by the Center of Forest Statistical Information (CIEF - Peru Digital), which was the source employed in 2002 when the concessions were granted.

* **Plots of annual harvesting**

Chart 3: Productive forestry area (PFA) in the Plots of Annual Harvesting (PAH) of the second five-yearly block of both timber concessions

PAH	Type of productive forest	PFA Maderacre		PFA Maderyja	
		Ha	%	Ha	%
6	Low hill forest highly dissected	2481	20.9	2468	20.0
7	Low hill forest highly dissected	2334	19.7	2465	20.0
8	Low hill forest highly dissected	2531	21.4	2485	21.0
9	Low hill forest highly dissected	2287	19.3	2424	20.0
10	Low terrace forest	93	0.8	----	----
	Low hill forest highly dissected	2122	17.9	2287	19.0
Total	Total Block II	11848	100.0	12129	100.0

Source: Forest Management Plans of Maderacre and Maderyja concessions

* **Harvesting fronts and return to the plots of annual harvest**

The activities are planned considering a single harvesting front (terrestrial), taking into account that preferably the wood extraction is carried out by paths and roads. Taking into account the possibility of an anticipated rainy season and increased water courses into the concessions, the fluvial system will be considered as a second option for wood extraction. In this regard, tributaries of the Acre River will be used for such operations. This need will be justified in the correspondent Annual Operative Plans.

The concessions consider the possibility of re-entry into a PAH already harvested, in order to harvest the remaining trees that were approved in the correspondent Annual Operative Plan and volumes of non-censed species. The possibility of re-entry will be analyzed and decided in each Annual Operative Plan in accordance with the advantages offered and taking into consideration the potential environmental risks. For the re-entry to a PAH, the following considerations should be taken into account:

- a) It will be only requested to re-entry to the PAH of the last four harvests or years, as applicable, except for safety reasons and if duly justified.
- b) The maximum number of PAH that would be requested to re-entry during a harvest or year is two.

- c) Each PAH will be re-entered only once during a harvesting cycle.
- d) When re-entering a PAH, remaining trees of censed species and volumes of non-censed species may be harvested. For the case of non-censed species, they must be included within the current FMP. If not, the possibility of reformulation of the FMP should be analyzed.
- e) It will not be accepted in any way to re-enter a PAH for the use of remaining forest resources of mahogany species (*Swietenia macrophylla*) and cedar (*Cedrela odorata*).
- f) The volume of wood to be extracted during the re-entry plus the volume that was extracted in the original harvest should not exceed the maximum total volume per hectare and per species, as requested in Directive N° 017-2003-INRENA-IFFS or its eventual replacement.
- g) Seedling trees will be respected.
- h) The infrastructure of main and secondary roads that already exist will be used. In the case of harvesting new species, new secondary roads will be considered only if necessary.
- i) Harvesting operations will be carried out considering reduced impact techniques.
- j) The re-entry to a PAH exploited during the four last harvests or years will be proposed in the correspondent Annual Operative Plan.

* **Annual allowable harvest**

The average commercial volume per hectare of each species and each five-yearly block are included in this section of the FMP, as well as the annual allowable harvest of the second five-yearly block.

* **Specifications on the harvesting system**

This section of the FMP includes a description of the infrastructure available for harvesting and wood transportation, the tree felling and dragging operations and the labor necessary for performing said operations. In relation to the tree felling and dragging operations, the following is stated:

~ **Tree felling**

Directed felling: guide the falling tree to protect seeding trees, trees for future harvest, remnants and protected species.

Maximize the use of the volume of the tree making a low cut, guiding the fall to avoid cracks in the stem, as well as setting up a maximum of 15 trees per day to be harvested by each brigade. Felled trees will be left in proper position and comfortable condition for dragging.

This technique can provide safety and protection to the personnel in charge, who will also be equipped with safety helmet, gloves, ear protection, wedges and first aid kit.

Trimming: it refers to the activities of branching (side branches) and trimming (apical branches) to obtain the ideal logs (good quality). Chainsaws and machetes are used.

Bucking: it consists of sectioning the stems of the felled trees into logs of optimum length for dragging, transporting and processing. Long sword chainsaws are used.

~ **Tree dragging**

Mechanized dragging is applied, with articulated wheeled skidder to collect the logs in storage yards and/or loading yards. The maximum dragging distance is 1 km (this may be larger depending on the density of roads and dispersion of individuals to harvest). The dragging is carried out by lifting one end of the log with the hoist of the tractor.

* **Specifications on silvicultural practices**

A Silvicultural Plan is implemented based on the data achieved in studies such as the Exploratory Inventory and the Diagnostic Sampling¹⁶. This plan presents the strategy employed to ensure the regeneration and recovering populations of timber species harvested during the implementation of the FMP and the Annual Operative Plans. The Silvicultural Plan is being carried out since August 2009 and initially has a five-year scope and proposes guidelines to be progressively refined and projected to the entire duration of the operations within the concession's forests.

In this sense, it defines the species of interest, taking into consideration stocks, diameter distribution, ecological requirements, population dynamics, current demand, current price and projected future market. It also justifies the harvesting rate by species and proposes activities to promote the seed production, seedling growth and mortality reduction during the life cycle of trees. In addition to this, it proposes monitoring activities of the effectiveness of the proposed actions.

The Silvicultural Plan was developed as a complementary document to the FMP and presented before the DGFFS (General Direction of Forestry and Wildlife, Dirección General Forestal y de Fauna Silvestre in Spanish). Additionally and to ensure the planned execution of the Silvicultural Plan, as well as the monitoring of the management system, the concessions have developed a series of internal tools that define the directive for the implementation of silvicultural practices and monitoring, such is the case of:

- ~ Plan for monitoring the growth of timber species of interest through the installation of a system of "Plot Trees".
- ~ Plan for monitoring the dynamics and structure of the forest through the installation of Permanent Sample Plots.
- ~ Plan for monitoring natural regeneration.
- ~ Methodological Guidance for the installation of Forestry Seedlings.

Following, a summary of the results of the silvicultural requirements analysis included within the Silvicultural Plan is presented:

¹⁶ Study carried out by the staff of Maderacre and Maderya timber concessions with the technical support of WWF-MDD team. Said document will be available to the auditors.

* **Need and design of silvicultural interventions**

The need for application of silvicultural operations is analyzed from the results of the Exploratory Inventory and the Diagnosis Sampling carried out within the PAH exploited during the first five-year period. The main silvicultural treatments considered are cleaning and cutting of lianas and release, to allow increased income lighting, and enrichment of species with poor ability for natural regeneration, either because of low seedling production or high mortality of latizales and/or brinzales.

The results of the Diagnostic Sampling show that no releasing treatments are needed because a high proportion of the fustales have no competition for light, in other words they have an acceptable level of lighting. However, the brinzales and latizales situations must also be considered. At the same time, the Diagnostic Sampling concludes that infestation by lianas and bejucos is low, however, the cutting of lianas on censed commercial individuals before their harvest is a silvicultural operation that will be applied annually, this because it facilitates proper growth of the tree and the formation of good quality wood, besides facilitating the felling, reducing the risk of accidents during the operation, avoiding losses of wood through cracks and minimizing the impact on natural regeneration.

The need of applying releasing and enrichment treatments is analyzed in detail in the FMP.

Complementary and to define the requirement of silvicultural treatments, the diametric distribution of the species of interest was analyzed in order to classify them into any of the following categories:

- a) Rare species (ESC – escasas in Spanish): within this group are included those species that have in average less than 0.33 individuals/ha with DBHs bigger than 10 cm and therefore require special management to ensure its regeneration and restoration. The exploitation is possible, with the necessary care not to further reduce its density.
- b) Species without large trees (SIG – sin árboles grandes in Spanish): the species of this group have less than 0.1 trees/ha larger than 50 cm of DBH. Some of these species do not grow to diameters larger than 50 cm of DBH, thus it is necessary to work with lower Minimum Cutting Diameters. In this sense, a study is needed to determine which species will never reach large diameters.

- c) Species without regeneration (SIR – sin regeneración in Spanish): those species with a clear lack of individuals in the lower classes (10 to 30 cm of DBH).
- d) Species with irregular diametric distribution (IRE): species that have one or more intermediate classes with no or few individuals. This is important if the diameter class with few individuals is the class preceding the Minimum Cutting Diameter.
- e) Species with good diametric distribution (NOR): species whose diameter distribution follows more or less the j-inverted.

Based on the abovementioned classification of species, some type of silvicultural treatment can tentatively be recommended, as shown in the following chart:

Chart 4: Proposed silvicultural treatment by species

Species	Species classification					Proposed treatment	
Azucar huayo	ESC			SIG		Enrichment	
Caoba	ESC	SIR	IRE			Enrichment	
Catuaba	ESC	SIR	IRE	SIG		Enrichment	
Pumaquiro	ESC	SIR	IRE	SIG		Enrichment	
Copaiba		SIR				Enrichment	
Cedro			IRE	SIG		Release	Sanitation
Ishpingo			IRE			Release	Sanitation
Quillabordon			IRE			Release	Sanitation
Requia			IRE	SIG		Release	Sanitation
Itauba				SIG		Release	Sanitation
Moena				SIG		Release	Sanitation
Zapote				SIG		Release	Sanitation
Ana caspi					NOR	Release	Sanitation
Capirona					NOR	Release	Sanitation
Catahua					NOR	Release	Sanitation
Estoraque					NOR	Release	Sanitation
Huayruro					NOR	Release	Sanitation
Huimba					NOR	Release	Sanitation
Lupuna					NOR	Release	Sanitation
Manchinga					NOR	Release	Sanitation
Oje					NOR	Release	Sanitation
Palo baston					NOR	Release	Sanitation
Species	Species classification					Proposed treatment	
Pashaco					NOR	Release	Sanitation
Quinilla					NOR	Release	Sanitation
Shihuahuaco					NOR	Release	Sanitation
Tahuari					NOR	Release	Sanitation
Yacushapana					NOR	Release	Sanitation
Yerno prueba					NOR	Release	Sanitation

Comparing these results with those of the Diagnostic Sampling and the analysis of Basal Area lost by harvesting, it can be inferred that the species that require releasing and/or sanitation treatments, after harvesting would not require it any more because the canopy will be open enough to meet their lighting needs.

In the case of species requiring enrichment treatments, although the Diagnostic Sampling indicates that they will be well lit after harvesting, its abundance in the lower diameter classes is not sufficient to ensure their proper recovering in order to maintain a sustainable harvesting in the following cutting cycles.

In this sense and preliminary, the enrichment of the species of interest that are “rare” and/or “without regeneration” should be implemented. This is a decision to be taken in each Annual Operative Plan with further detailed information that will result from the census and depending on the species that will be harvested. It should be highlighted that these results should be corroborated by the assessment of natural regeneration.

In summary, to apply silvicultural treatments the following is contemplated:

- ~ Selective logging of selected tree species over the Minimum Harvesting Diameter and respecting the Harvesting Intensity established for each species. This, at the same time, allows more light to the lower strata of the forest.
- ~ Selection and protection of trees designated as seedling trees (10% of the population above the Minimum Harvesting Diameter by species) to ensure the supply of seeds for the natural regeneration of the forest. In the specific case of mahogany and cedar species, the proportion of seedling trees is 20%.
- ~ Annual cut of lianas and bejucos on censused individuals of those species of commercial interest.
- ~ Enrichment with induced regeneration of those species of interest that are “rare” and/or “without regeneration” and that are contemplated in the harvesting portfolio of a corresponding harvesting period and according to the results of the assessment of natural regeneration.

Time frame for the proposed project activity

A time frame for the proposed project activity was set in order to determine when the different activities will be carried out within the project duration. This time frame is presented below.

As it can be seen said time frame was set for the first 20 years of the project duration. For the second 20 years period a new time frame will be set taking into account all the lessons learned during the first 20 years of the project.

Chart 5: Time frame for the proposed project activity

Outcomes / Activities	1*	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Outcome 1 - Contribute to the sustainable development of rural producers living in the buffer zone																				
Socialization and dissemination of the project goals																				
Identification and selection of proposals for the environmentally friendly productive projects																				
Development of the skills and capacities of the members of the associations linked to the selected projects																				
Design of the project profiles of the selected projects																				
Look for financing and/or co-financing for the approved profiles																				
Support on the implementation of the approved projects																				
Monitoring of the projects																				
Outcome 2 - Reduce the vulnerability of the project area from external factors of deforestation and degradation																				
Review and update of the custody plan																				
Installation of control posts PCA 5 Maderacre																				
Delimitation of 100% of the concessions boundaries																				
Installation of "Hitos" in the concessions vertexes																				
Improve the signaling within the concessions																				
Periodic and annual patrolling within vulnerable sectors																				
Annual monitoring of possible invasions using satellite images																				
In-field verification of sectors identified as potential points of invasion (due to deforestation)																				
Development and implementation of mechanisms for the dissemination of environmental education among children, adolescents and communities involved in the project																				

* Each of these numbers corresponds to a year, beginning in 2006 (1) to 2025 (20).

1.9 Project Location

The project is located in the hydrographic basin of the Acre River, Iñapari district, Tahuamanu province in the Madre de Dios department, South East of Peru, in the Peruvian Amazon, in the boundary with Bolivia and Brazil.

The area is located 28 km to the side of the new inter-oceanic road that will join Brazil with the Peruvian ports, in the region that belongs to the Vilcabamba-Amboró Conservation Corridor in the Peruvian Amazon, one of the world biodiversity hotspots.

The following figures show the location of the Madre de Dios Amazon REDD Project.



Fig. 3: General location of the Madre de Dios Amazon REDD Project

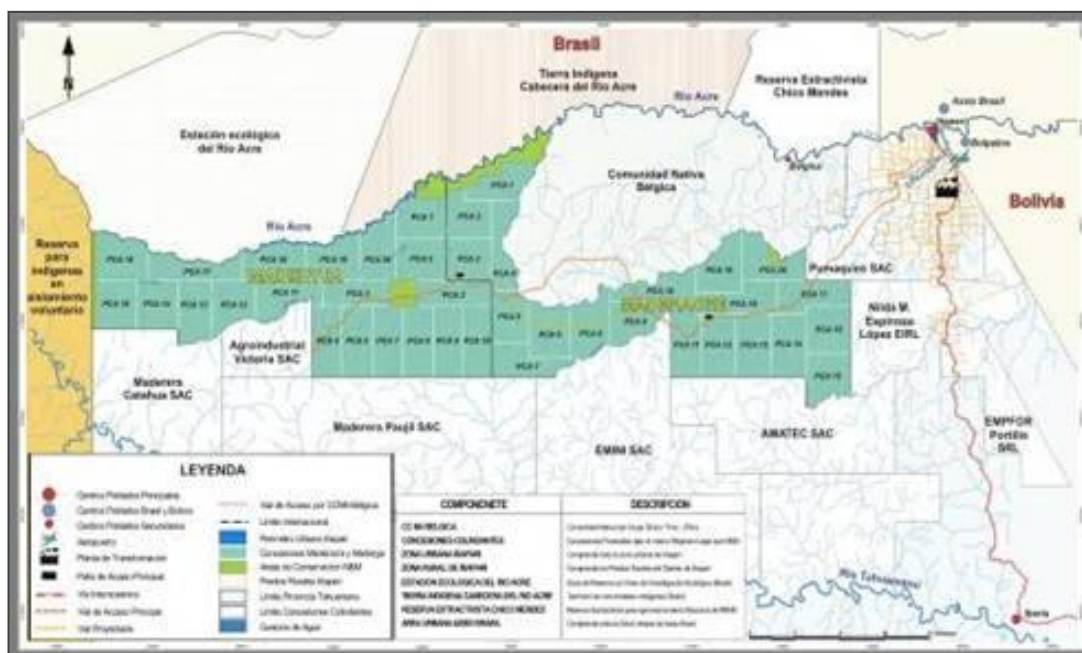


Fig. 4: Location of the Madre de Dios Amazon REDD Project and its boundaries

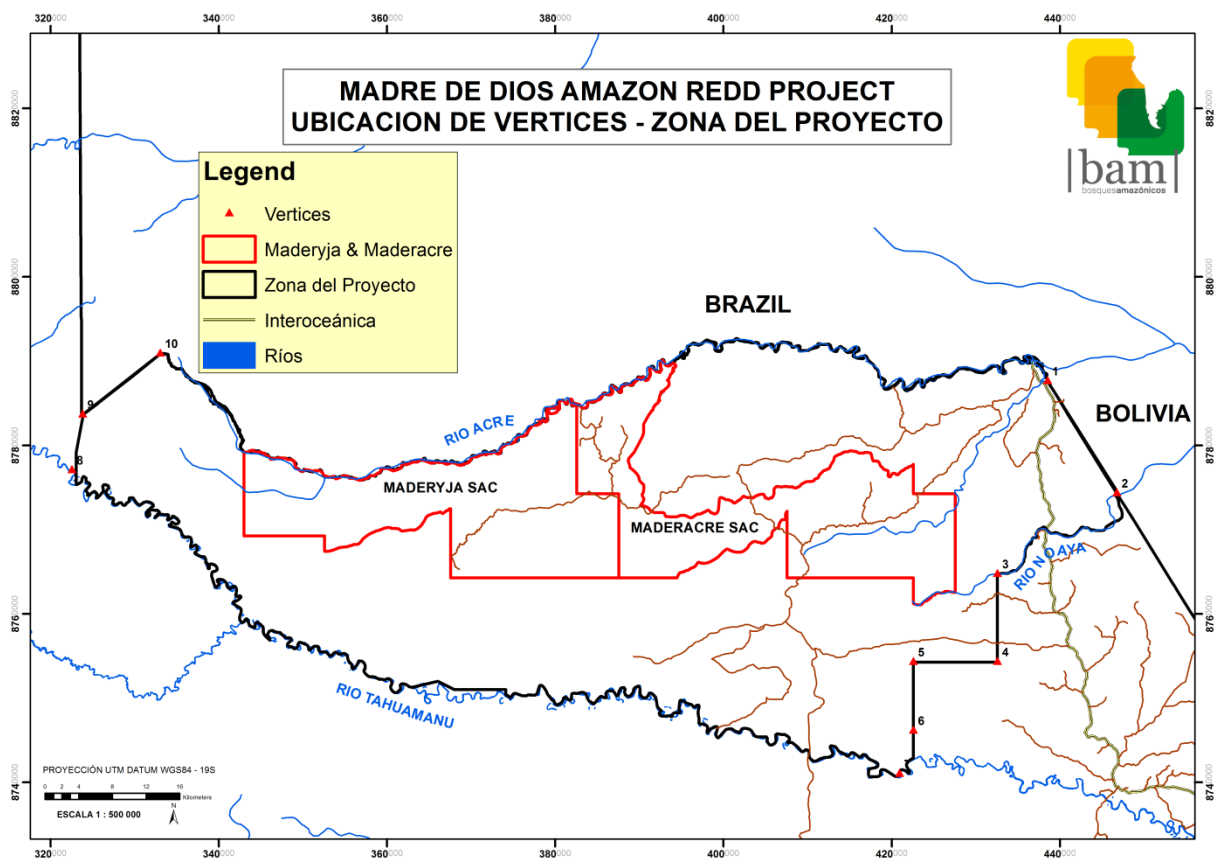


Fig. 5: Map of the project area and location of the vertexes of the project zone (RRL)

In the following chart, the GPS coordinates of each polygon vertex is presented:

Chart 6: Polygon vertexes of the project area

Vertex	East	North
1	438521	8787582
2	446766	8774269
3	432562	8764691
4	432562	8754249
5	422557	8754249
6	422557	8746086
7	420910	8740962
8	322540	8777024
9	323813	8783623
10	333038	8790865

Total area of project, leakage belt and reference region (Project Zone):

Chart 7: Project area and project zone

Project Area (ha)			Project Zone (ha)		
Concessions	Official *	Processed	Areas	Official	Processed
Maderacre	49,377.89	48,738.62	Project Area	98,927.38	95,030.90
Maderyja	49,549.49	46,292.28	Leakage Belt	268,038.77	254,015.6324
Total	98,927.38	95,030.90	Project Zone	366,966.15	349,046.53

The determination was carried out taking into account the requirements of the BL-UP Module of the REDD Methodology Modules. See page 135 of this template for a detailed description and explanation of the project area, leakage belt and project zone determination.

1.10 Conditions Prior to Project Initiation

a) Vegetation

The area of the project is completely covered by different rainforest types, mainly low hill highly dissected forests, as it is show in the following chart:

Chart 8: Types of rainforest covering the project area

Type of rainforest	Maderacre	Maderyja	TOTAL	%
Low terrace forest	647	1,832	2,479	3%
Low hill forest highly dissected	46,703	38,633	85,336	86%
Low hill forest highly dissected with "paca"		7,103	7,103	7%
Protected forests	2,026	1,988	4,014	4%
Total area of the concession	49,376	49,556	98,932	100%

It is remarkable that the whole area does not have degraded or deforested zones, thanks to the action of the project. Notwithstanding, it is not reliable that this situation could be maintained considering the imminent conclusion of the inter-oceanic road.

The following chart shows the status of the forest in the concessions:

Chart 9: Status of the forest in the concessions

Status of the forest	Maderacre	Maderyja	TOTAL	%
Forestry production forest	47,350	47,568	94,918	96%
Protected forest (Conservation)	2,026	1,988	4,014	4%
Intervened forests (degraded or secondary = purma)	-	-	-	0%
Other forest formations (aguajales, pacaes etc.)	-	-	-	0%
Protected areas (i.e. wetlands, cochas, steep slopes)	-	-	-	0%
Deforested areas (including areas with crops or grasslands)	-	-	-	0%
Total	49,376	49,556	98,932	100%

According to the FSC Certification, the forests in the project area are wet subtropical forests with the following characteristics:

Low terrace forest: it develops on terrains closet of the rivers Acre and Yaverija, with a relative height over the level of the river lower than 10 meters, they are relatively plain with some depressions, with regular to bad drainage. It consists of a forest with not very vigorous trees, with a not very developed canopy, with a superior stratum that may reach 20 meters height. The crowns of the dominant trees reach diameters between 5 and 10 meters. Their volumetric content does not surpass 80m³.

Low hill forest, strongly dissected: it is developed in areas of tectonic origin but all the same modeled by hydric erosion, fact that accidented even more its topography, with slopes up to 70%, with a relative height of the hills that could reach 80 meters. It consists of a forest with medium size trees, a canopy of average development, and a superior stratum that could reach up to 35 meters height. The crowns of the dominant trees reach diameters between 15 and 20 meters and have an average volumetric content between 100 and 150 m³.

Besides this type of forests, Maderyja also presents low hill forests, strongly dissected with “paca”. These develop in similar terrains to those of low hill forests, strongly dissected and are forests with a canopy with presence of “paca” (*Guadua* sp.) and medium vigor trees. The “paca” represents 25% of the forest cover, which makes difficult a free access and causes a strong competition among trees, in some sectors, to win space. The upper canopy is conformed by trees that may surpass the 30 meters height. The estimated volume of the trees with a DBH bigger than 30 cm is variable and may be between 80 and 140m³/ha.

It must be mentioned that some parts of the forests have suffered selective logging, mainly of high value timber species like mahogany or cedar. Since the starting date of the project, around 2-11 different timber species are being harvested annually at a rate of 2 cubic meters per hectare under a management plan that has determined a 20-year logging cycle and is using reduced impact extraction techniques. The timber species are spread out all over the project area, varying in volume and frequency depending on the different types of forest involved. The timber potential of these forests is enormous. Besides the wood production, they would also offer a variety of other products of high economic value as medicines, oils, aromatic substances, textile fibers, gums, resins, inks, tannins, among others.

With the objective to know the timber potential of both concessions, an Exploratory Inventory was carried out in each one of them, based on a systematic unrestricted sampling design, with an allowable sampling error above the mean of approximate 10% and a probability of 95%. Taking into account the results of this evaluation, the Forestry Management Plans for the concessions are developed, as well as the silvicultural system to be applied based on the requirements of the forests and the species selected to be managed.

As a result of the exploratory evaluation of the forests, more than 126 tree species were reported¹⁷. This large amount of tree species found within the project area, gives an idea of the great amount of species of other flora categories as palms, herbaceous, shrubs, lianas, bromelias and orchids that exist in the forests within the Madre de Dios Amazon REDD project. Said flora groups are distributed along the different strata of the forests.

From this large group of tree species, both concessions have selected a portfolio of 29 species to be managed in the framework of the project. In the following chart, a list showing the amount of commercial trees by hectare and the merchantable cubic meters per hectare of each of the species selected for the first five years considered within the Forestry Management General Plans.

Chart 10: Tree species selected to be managed by the concessions

Species		DMC cm	IC%	Maderacre		Maderya	
Common name	Scientific name			Nº trees/ha	Vcp (m³/ha)	Nº trees/ha	Vcp (m³/ha)
Ana caspi	<i>Copaifera sp.</i>	70	70	0.148	1.038	0.109	0.451
Azucar huayo	<i>Hymenaea oblongifolia</i>	70	80	0.064	0.510	0.050	0.233
Caoba	<i>Swietenia macrophylla</i>	75	80	0.030	0.253	0.044	1.141
Capirona	<i>Calycophyllum spruceanum</i>	70	80	0.024	0.151	0.213	2.144
Catahua	<i>Hura crepitans</i>	80	80	0.197	2.109	0.181	1.998
Catuaba	<i>Qualea sp.</i>	60	50	0.015	0.037	0.022	0.118
Cedro	<i>Cedrela odorata</i>	70	50	0.030	0.148	0.016	0.063
Copaiba	<i>Copaifera reticulata</i>	70	50	0.073	0.666	0.134	1.086
Estoraque	<i>Myroxylon balsamum</i>	60	50	0.142	0.640	0.094	0.311
Huimba	<i>Ceiba samauma</i>	50	50	0.155	1.510	0.063	0.159
Huayruro	<i>Talissia sp</i>	80	80	0.112	0.533	0.297	2.061
Ishpingo	<i>Amburana cearensis</i>	70	50	0.097	0.688	0.075	0.525
Itauba	<i>Caesaria decandra</i>	70	50	0.045	0.190	0.031	0.092
Lupuna	<i>Bombacaceae</i>	80	80	0.648	7.047	0.472	6.912
Manchinga	<i>Brosimum lactescens</i>	80	80	0.345	2.794	0.253	1.924
Misa	<i>Eschweilera coriacea</i>	70	80	0.024	0.084	0.025	0.028
Moena	<i>Lauraceae</i>	50	70	0.127	0.253	0.066	0.145
Oje	<i>Ficus maxima</i>	80	75	0.086	0.683	0.242	1.935
Palo baston	<i>Crepidospermum goudotianum</i>	50	80	0.167	0.828	0.175	0.609
Pashaco	<i>Fabaceae</i>	70	70	0.297	1.789	0.109	0.641
Pumaquiro	<i>Aspidosperma macrocarpon</i>	60	50	0.012	0.039	0.038	0.373

¹⁷ Detailed information about this species and their abundance and dominance in the forest can be appreciated in Annex 3 of the Forestry Management General Plans of both concessions that will be available to the auditors.

Species		DMC cm	IC%	Maderacre		Maderya	
Common name	Scientific name			Nº trees/ha	Vcp (m³/ha)	Nº trees/ha	Vcp (m³/ha)
Quillabordon	<i>Aspidosperma parvifolium</i>	50	50	0.061	0.146	0.075	0.384
Quinilla	<i>Manilkara bidentata</i>	80	75	0.086	0.873	0.069	0.350
Requia	<i>Ruagea insignis</i>	80	50	0.015	0.041	0.016	0.075
Shihuahuaco	<i>Dipteryx sp.</i>	80	70	0.552	5.550	0.350	3.370
Tahuari	<i>Tabebuia serratifolia</i>	55	80	0.085	0.229	0.172	0.865
Yacushapana	<i>Terminalia oblonga</i>	60	80	0.048	0.222	0.047	0.172
Yerno en prueba	<i>Dipterix alata</i>	60	70	0.042	0.161	0.088	0.589
Zapote	<i>Quararibea cordata</i>	60	65	0.121	0.834	0.066	0.126
TOTAL				3.848	30.046	3.592	28.880

Hereunder, a brief description of the most important timber species managed by the concessions, developed by the forestry team of them, is presented.

- *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. Species 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/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.



Fig. 6: *Swietenia macrophylla* (mahogany)



Fig. 7: *Swietenia macrophylla* (mahogany)



Fig. 8: Mahogany tree



Fig. 9: Mahogany tree



Fig. 10: Mahogany tree

- *Cedrela odorata* - Cedar
 - * Habitat: sites with high rates and persistent rainfall but also in areas with a remarkable dry season. Species 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/Mortality rate: 2-4cm/year is the average growing rate; reaching 4-5m of height in 7-11 years respectively. This species has showed a good survival rate in the in-field tests carried out by the concessions (70%).



Fig. 11: Cedar tree



Fig. 12: Cedar tree trunk



Fig. 13: *Cedrela odorata*

- *Manilkara bidentata* – Quinilla
 - * Habitat: sites with high rates and persistent rainfall. Species 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 species has a good germination rate, but on the other hand its germination power is low, reaching only a 20% and losing it in 1 or 2 months.
- * 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.



Fig. 14: Quinilla tree trunk

- *Dipteryx spp.* – Shihuahuaco
 - * Habitat: sites with high rates and persistent rainfall, but also in areas with a remarkable dry season. Species 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/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.

Fig. 15: *Dypterix spp.* treeFig. 16: *Dypterix spp.*

- *Amburana cearensis* - Ishpingo
 - * Habitat: sites with high rates and persistent rainfall, but also in areas with a remarkable dry season. Species 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.
 - *



Fig. 17: Ishpingo tree

- *Eschweilera coriacea* - Misa
 - * Habitat: sites with high rates and persistent rainfall. Species 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/Mortality rate: slow growing rate; volumetric increases of about 1000m³/ha/year.

- *Apuleia leiocarpa* - Ana caspi
 - * Habitat: sites with high rates and persistent rainfall, but also in areas with a remarkable dry season. Species 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%.



Fig. 18: Ana caspi tree trunk



Fig. 19: Ana caspi tree

- *Aspidosperma parvifolium* - Quillobordón
 - * Habitat: sites with high rates and persistent rainfall. Species 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/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%.
- *Brosimum lactescens* - Manchinga
 - * Habitat: sites with high rates and persistent rainfall. Species 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 fallen fruit. Among them, it should be highlighted *Mozama americana*, *Tayassu spp.* 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/Mortality rate: the survival rate is medium, around 52% in-field and 55-73% under shadow.



Fig. 20: *Brosimum lactescens*

- *Ruagea insignis* - Requia
 - * Habitat: sites with high rates and persistent rainfall but also in areas with a remarkable dry season. Species 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 species and Black-faced Spider Monkeys (*Ateles spp.*) eat said fruits and therefore participate in the seed dispersion.
 - * Germination: reaching 40-58% of germination power in fresh seeds.
- *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/Mortality rate: Costa Rica registers state a diametric increase of 13cm and a height increase of 12m in a 14 year plantation of Yacushapana.



Fig. 21: Yacushapana tree



Fig. 22: Yacushapana tree trunk

- *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 (90%).



Fig. 23: Copaiba tree



Fig. 24: Copaiba tree trunk

- *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/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%.



Fig. 25: Estoraque



Fig. 26: Estoraque tree trunk



Fig. 27: Estoraque

b) Endangered fauna species

The forest where the project area is located are very important in terms of biodiversity conservation since they are 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. For this reason, their use and commercialization should be rigorously supervised, allowing their use only in sustainable managed forests as the case of Maderacre and Maderyja timber concessions, both of them internationally accredited by their Managed Forest and Chain of Custody FSC Certificates.

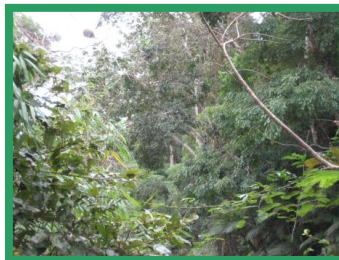
Chart 11: Fauna species to be protected

Species to be protected	Justification
Cedar (<i>Cedrela odorata</i>)	Law 27308, Forestry and Native Fauna Law (appendix III – CITES).
Mahogany (<i>Swietenia macrophylla</i>)	Law 27308, Forestry and Native Fauna Law (appendix II – CITES).
Leche caspi (<i>Galactodendron utilisima</i>)	Ministerial Resolution N° 01710-77-AG/DGFF
Wild fig tree (<i>Ficus anthelmintica</i>)	Ministerial Resolution N° 01710-77-AG/DGFF

Following, some pictures of the flora species within the project area are enclosed:



Figs. 28, 29, 30 and 31: Flora species



Figs. 32 to 34: Flora species within the Madre de Dios Amazon REDD project area

In this regard, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project states that there is a list of fauna species that have to be protected within the concessions area. Flora species in this list are also protected by national laws and CITES, such as *Cedrela odorata* and *Swietenia macrophylla*. Both the PDD and each of the concession forest management plans establish that these species are to be protected. During the concessions field visit this information was confirmed with the workers interviewed.

It states also that all species used in the project area (trees) have been identified in the PDD and are native and non-invasive. Enrichment of Maderacre and Maderyja forests will be done using *Swietenia macrophylla*, *Cedrela odorata* and *Dipteryx odorata* / *Dipteryx micrantha*. Only Brazil nuts and rubber are mentioned as species to be used in the buffer zone for future project activities such as agroforestry, ecotourism, non-timber forest products and fish farming. From the interviews, it can be inferred that focus of the environmentally friendly productive projects will be on common crops in the area such as rice, corn, yucca, beans, grass, papaya and bananas, which are non-invasive.

Additionally, said Validation Report mentions that according to the PDD, tree species used to generate carbon credits are native to the area, thus they are not genetically modified organisms.

c) Physical parameters

Following, a brief description of the environmental conditions of the project area and its surroundings is presented¹⁸:

¹⁸ According to the document: "Aspectos Biofísicos de la Concesión Forestal de la Empresa Maderacre SAC" ("Biophysical Aspects of the Maderacre SAC Timber Concession"), Iñapari Province, Región de Madre de Dios, Peru, April 2008.

Physiography

The current topography of the Madre de Dios region is characterized for presenting two main biophysic units: the Cordillera Oriental Subandean Strip and the Madre de Dios Valley.

These units are different due to their lithologic characteristics, earth shapes, pedogenetic development, height and types of vegetative cover. Accordingly with this type of topography, the main morpho-dynamic processes that most affect the area are land-slides, sliding and floods. The project area correspond to the Low Hills component of the Madre de Dios Valley unit, the more extensive of the region and developed to the east of the mountainous subandean alignment between 176 and 500 meters.

It is characterized by a soft and undulated topography, where the alluvial plain dominates (complex of borders and terraces) and the High Hills from the Quaternary, where the main rivers of the region are born: Las Piedras river, Los Amigos river and Tahuamanu river (Barrios, 2008).

Climate

An analysis of the climatic elements or parameters has been carried out in the area, based on the data obtained from the Iberia and Iñapari meteorological stations in Peru, which comprehends variable periods of registration from 1954-1974 for temperature and 1952-1974 for rainfall; and the Assis and Brasilea stations in Brazil.

Temperature

According to the information obtained, the average medium annual temperature varies between 22°C and 26°C, with very low variation during the year, obtaining the highest average monthly registries during the months comprehended between September and April, while the lowest average monthly registries occur between May and August.

The hottest months are September and October and the coldest is July, also the driest month of the year. However, the registries of the highest absolute temperature have values of 41°C in Iberia (22/08/59), 39°C in Iñapari (31/03/70) and 38°C in the Assis-Brasil Station.

At the same time, the minimum absolute temperatures have values of up to 6°C in Iberia (22/07/57); 6.4°C in Iñapari (27/07/74) and 6°C in the Assis-Brasil Station. Thermal decreases are produced due to the occurrence of cold air invasions from the Antarctic polar mass, which determine in this area the phenomenon called “Friaje” or “Surazo” that generally appears between the months of May and September (Barrios, 2008).

Rainfall

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 Iñaparí and to 1641 mm in the Iberia Station.

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. During the richest period, from October to April, 75 to 80% of the total annual rainfall occurs. Medium rainfall in the area amounts to approximately 1800 mm annually. Rain tends to increase from the Southeast to the Northeast (Barrios, 2008).

Climatic classification

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 (Barrios, 2008).

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 in the high terraces of the Madre de Dios River, soils present a franca texture in the superficial layer and an accumulation of clay in the subsoil, consequently they are very susceptible to erosion. This degradation is aggravated by deforestation, especially in the most dissected areas. Soils are moderately well drained, have low fertility and generally their saturation with aluminum is high (Barrios, 2008).

d) Wildlife

d.1) Endangered wildlife species

In addition to the endangered flora species mentioned before, there are fauna species catalogued as vulnerable and with viable populations within the project area and for this reason both are considered as High Conservation Value Forests (HCVF).

Additionally, the Maderyja concession is next to the buffer area of the Manu National Park, one of the Peruvian and worldwide most important conservation areas. In the following chart the flora and fauna species that must be protected within the project area are presented.

Chart 12: Wildlife species to be protected

Species to be protected	Justification
Giant anteater (<i>Myrmecophaga tridactyla</i>)	D. S. No 034-2004-AG, 22nd September 2004
Giant armadillo (<i>Priodontes maximus</i>)	D. S. No 034-2004-AG, 22nd September 2004
Red howler monkey (<i>Alouatta seniculus</i>)	D. S. No 034-2004-AG, 22nd September 2004
Jaguar (<i>Panthera onca</i>)	D. S. No 034-2004-AG, 22nd September 2004
Lowland tapir (<i>Tapirus terrestris</i>)	D. S. No 034-2004-AG, 22nd September 2004
Sanborn's squirrel (<i>Sciurus sanborni</i>)	D. S. No 034-2004-AG, 22nd September 2004
Amazon dwarf squirrel (<i>Sciurus ignites</i>)	D. S. No 034-2004-AG, 22nd September 2004
Blue-throated Piping-guan (<i>Pipile cumanensis</i>)	D. S. No 034-2004-AG, 22nd September 2004
Razor-billed Curassow (<i>Mitu tuberosum</i>)	D. S. No 034-2004-AG, 22nd September 2004
Red and green macaw (<i>Ara chloropterus</i>)	D. S. No 034-2004-AG, 22nd September 2004
Scarlet macaw (<i>Ara macao</i>)	D. S. No 034-2004-AG, 22nd September 2004



Fig. 35: *Myrmecophaga tridactyla*



Fig. 36: *Priodontes maximus*



Fig. 37: *Alouatta seniculus*

Fig. 38: *Panthera onca*Fig. 39: *Tapirus terrestris*Fig. 40: *Mitu tuberosum*Fig. 41: *Ara chloropterus*Fig. 42: *Ara macao*

In relation to this, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project states that there is a list of fauna species that have to be protected within the concessions area. Fauna species listed are under the categories of vulnerable and almost endangered, according to the national law, which is based on the IUCN Red List. Both the PDD and each of the concession forest management plans establish that these species are to be protected. During the concessions field visit this information was confirmed with the workers interviewed, making it clear that they are told not to touch any fauna species.

d.2) Present biodiversity conditions

Hereunder, a summary¹⁹ of the existent biodiversity conditions within the project area at the starting date of the Madre de Dios Amazon REDD Project, as well as the conditions in its immediate surroundings defined by the leakage belt determined in the present Madre de Dios Amazon REDD Project is presented. It is based on the results of a series of studies related to the biophysical and biodiversity conditions of the area.

Said documents represent a joint effort made by the concessions with the aim to achieve the sustainable management of their forests, using the accumulated knowledge of the biodiversity component of the project. They have participated in the achievement of said goal, as well as local international collaborating institutions as the NGOs WWF, CESVI and ProNaturaleza.

¹⁹ Based on the Technical Document "Current Biodiversity Scenario within the Maderacre and Maderya Concessions Area and their Surroundings", Nelson Kroll, 2009.

- **Wildlife in the Madre de Dios Amazon REDD Project surroundings**

During the infield work, carried out as part of the Diagnosis for the Economic and Ecological Zoning of Yaco-Iñapari and Iberia study, diverse species of mammals, birds, reptiles and amphibians were observed, as well as numerous species of invertebrates.

It should be mentioned that within Iberia and Iñapari over 160 mammal species, 324 bird species, 106 reptile species, 123 amphibian species exist, as well as many other species of invertebrates. Although the highest concentration occurs in the upper areas of the river beds to the western zone of the Iberia and Iñapari cities, they also occur in the areas bordering Brazil and Bolivia.

Among the most representative species present in the Madre de Dios Amazon REDD Project surroundings, the following should be highlighted: lowland tapir (*Tapirus terrestres*), red brocket deer (*Mazama americana*), spotted paca (*Agouti paca*), brown agouti (*Dasyprocta variegata*), tapeti or forest rabbit (*Sylvilagus brasiliensis*), giant anteater (*Myrmecophaga tridactyla*), giant armadillo (*Priodontes maximus*), nine-banded Armadillo (*Dasypus novemcinctus*), puma (*Felis concolor*), jaguar (*Panthera onca*), tayra (*Eira barbara*), short-eared dog (*Atelocynus microtis*), pygmy marmoset (*Cebuella pygmaea*), white-lipped tamarin (*Saguinus labiatus*), musmuqui or Nancy Ma's night monkey (*Aotus nancymaeae*), black spider monkey (*Ateles paniscus*), as well as dangerous reptiles as shushupe (*Lachesis muta*), coral snake (*Micrurus sp*), mantona (*Boa constrictor*) and “quelónidos” as the yellow footed tortoise (*Geochelone denticulada*), taricaya (*Podonemis sp*), birds as the Harpy Eagle (*Harpia harpia*), King Vulture (*Sarcoramphus papa*), scarlet macaw (*Ara macao*), razor-billed Curassow (*Mitu tuberosa*), toucan (*Ramphastos cuvieri*), Undulated Tinamou (*Crypturellus undulatus*), Spix-Guan (*Penelope jacquacu*) and Speckled Chachalaca (*Ortalis guttata*) (Barrios,2008).

- **Current biodiversity scenario within the Madre de Dios Amazon REDD project area**

With the objective of evaluating the status of wildlife populations within the project area, as well as to obtain preliminary information about the location of important sites for wildlife inside it, an “Evaluation of Native Fauna”²⁰ was carried out by WWF NGO in 2005.

²⁰ The complete “Evaluation of Native Fauna within Maderacre & Maderyja concessions”, carried out by Javier Barrio, consultant of WWF-PPO, will be available to the auditors.

As a result, a current characterization of the wildlife and thus the baseline for future evaluations was obtained. Likewise, an approach to the degree of usage of the native fauna by the human population was obtained and the presence or absence of bird species within the more sensitive taxonomic families regarding environmental disturbances was identified and will be used as indicators for the monitoring and surveillance system of both concessions.

Taking into account the statement that fauna species have positive influence in forest regeneration processes and thus are fundamental for the long-term sustainability of the woods, the concessions have as one of their purposes to include the information, conclusions and recommendations of said study in their forestry management plan and monitoring system.

Following, a summary²¹ of the Rapid Evaluation of Native Fauna Process within the project area is presented:

In order to evaluate the impact of forestry activities over large wildlife, a baseline of indicators related to the presence of native fauna species was established, as well as to the abundance of some of the species found. Said baseline will be used in the future to make a comparison with equal evaluations that will be carried out every 5 years, after the forestry exploitation activities.

Considering that the type of forests existent in the concessions are exactly the same, as well as the forestry associations and habitats and that they are also under the same exploitation intensity, the baseline for both concessions was established over the Central and East area of the Maderya concession. A total area of 271.1 km was evaluated during 13 days. Said area was covered with two independent brigades and two local guides that helped in moving through the paths and in the location of the native fauna. The methodological criteria used in the aforementioned evaluation are presented following:

*** Estimation of sampling percentages**

The following chart shows the sampling data within the evaluated areas

²¹ Based on the document "Summary of the Rapid Evaluation of Native Fauna Process within the Maderacre and Maderya Concessions", 2009.

Chart 13: Sampling data within the evaluated areas

Net evaluation days	13
Total days including rainy days and settling and leaving the camping site	23
Total number of evaluations	51
Average length of each trail	5,315 m
Total added length of transects evaluated	271.1 Km
Total approximate evaluated length (without repetitions)	75 Km
Theoretical width of evaluation	50 m
Approximate evaluated area (without repetitions)	375 ha
Forestry managed area within evaluated plots (ACP 2, 3, 6, 7, 19, 20)	15,000 ha
Approximate evaluated percentage within managed area	2.5%

Due to the existence of few transects systematically arranged within the area, some existent trials were included in the assessment to avoid, where possible, evaluating the same transects. The calculation of the evaluated length without repetitions is approximate considering that in many occasions small sections of a transect were repeated. While this length without repetition may seem insufficient, given the homogeneity of forest types throughout the area, it can be assured that said length is representative of all the plots evaluated.

The evaluated area is also approximate and is based on the evaluated length without repetitions (75 km), not in the total evaluated length (271.1 km). It means that only the sum of transects is considered, without including the repetitions (Barrio, 2005).

Transects were evaluated within six harvesting plots, two of them already harvested (harvesting plots 2 and 3) and the other four not harvested yet (harvesting plots 6, 7, 19 and 20). In general, so that the information is highly reliable, the area to be directly evaluated by the transects should cover approximately 5% of the area to be sampled (Buckland et al. 1993, appointed by Barrio, 2005), which in this case (2.5%) was not surpassed considering the 6 harvesting plots included in the evaluation.

Nonetheless, the evaluation showed high homogeneity in the distribution of species of wild fauna, even in the already harvested plots. Harvesting plot 3 had already been harvested and some of its extraction roads were used for the evaluation.

The rate of encounter of most of the native fauna species was even higher in this harvested plot than in the non harvested ones, due to the increased visibility provided by the extraction roads in comparison with the trials of the exploratory inventory. Only in the case of harvesting plot 3, the evaluated area did surpass the suggested 5%, assessing about 5.4% of said plot (Barrio, 2005).

The described evaluation will be repeated periodically every 5 years and thus a temporal series which enables a comparison and shows the continuous impact of the forestry harvesting activities will be obtained. Said comparison will allow the determination of the impact of the forestry extraction over wildlife in an ex-ante-ex-post design and therefore the correspondent adjustments and adaptations of the management plan can be done.

The weakness of this design relies in the difficulty of determining certain population changes not related to logging or hunting that may occur in some species. Theoretically, during the years following harvesting, the evaluations should find a decline in wildlife within the harvested area, caused mainly by the disturbances of the exploitation activities or by the increase in hunting of fauna species. This can be explained considering that any change on the ecosystem will result in a change on how the species are used in said ecosystem (Meijaard et al. 2005, appointed by Barrio, 2005), which will also result in an inevitable impact.

Nevertheless, if the structural damage is slight (well directed selective logging) and the hunting is limited to those less susceptible species, the impact on wildlife will be small, and thus the populations of the affected species would recover in the short term (Barrio, 2005).

* **Evaluation of fauna abundance**

Transects of evaluation were covered along established roads, partly including transects opened for the exploratory forestry inventory, partly following stream courses and partly including roads utilized for moving. The observations along the different ways described above were similar and even apparently lower within the inventory transects due to the difficulty to observe the superior stratum of the forest and the greater amount of obstacles found while walking.

The structural differences or vegetation differences between the evaluated areas were very minor and thus it was not necessary to take them into account for the abundance analysis of any of the species (Barrio, 2005).

For the analysis of the information on abundance, the “Distance” Program was used (Buckland et al. 1993, appointed by Barrio, 2005) with the objective of estimating the densities of those species with a high number of sights.

In this methodology, the necessary data for each species is the perpendicular distance from the transect to each individual or group of individuals sighted. In the case of species with few sights, the number of sights every 10 km travelled is used as an abundance indicator. The densities of the most abundant species and the number of sights for each species were analyzed. Said results will be compared with those of the same areas evaluated a period of time after logging has occurred (Barrio, 2005).

* **Additional observations**

Reproductive data of some of the native fauna species found were taken. Observations were also made for food consumption, especially fruit, thus determining some important tree species for wildlife diet. However, we did not find a species that was more important than others, having found more than one species in fructification status and not having found a preference for any of them (Barrio, 2005).

Additionally, information on some wildlife species of interest for conservation was registered. Said species are based on the list of threatened species of the International Union for the Conservation of Nature (IUCN, 2004) and on the list of the National Institute of Natural Resources (Instituto Nacional de Recursos Naturales INRENA, 2004).

During the evaluation, critic sites for fauna species were identified and “collpas”, water sources, fruit trees of great production and caves or holes in trees were sought.

All these formations are key to the existence of some wildlife species and, with their identification and conservation, the concessions seek to reduce the negative effects of habitat alteration caused by logging. To preserve certain formations within the forest can be crucial to the survival of some wildlife species (Barrio, 2005).

In addition to this, during the evaluation and based on the experience of the specialist in charge on the conservation status of the species within the evaluated area and also regarding the available literature data, some species or groups of species whose better evaluation would reflect the fauna changes due to logging activities were identified.

Said species or groups of species have been proposed as indicators to be used for the monitoring of the quality of the forestry operations for both concessions. Among the proposed groups, primates and bats could be highlighted among mammals, and also numerous families of birds.

Within native fauna species, birds are among the best indicators of the status of the forests (Andrade y Rubio-Torgler 1994, appointed by Barrio, 2005). Bird families composed by insectivorous, mainly terrestrial and of intermediate level, are very affected by changes in the structure of the forests due to logging activities (Meijaard et al. 2005, appointed by Barrio, 2005).

Among bird families with the aforementioned characteristics, which make them very susceptible, Furnariidae (horneros, pijuis), Thamnophilidae (hormigueros) y Formicariidae (long-legged) could be highlighted. Another bird family affected by the changes in the forest structure is Picidae (woodpeckers). This last family is further composed of species that are essential for the reproduction of other species, because woodpeckers build nests that are used for nesting and abandoned after a time, being afterwards used by certain groups of birds and mammals that are seed dispersers. In this way, the species of Picidae family are vital to forest regeneration and to the adequate functioning of the entire ecosystem (Barrio, 2005).

*** Results of the Evaluation of Native Fauna**

Within the project area, traces of 37 mammal species were observed and identified and 172 bird species were determined during the evaluation.

~ Mammals

Chart 14: Mammal species registered within the Madre de Dios Amazon REDD project area boundaries

ORDER	FAMILY	Scientific name	Common name
MARSUPIALIA	DIDELPHIDAE	<i>Philander opossum</i>	Gray four-eyed opossum
XENARTHRA	MYRMECOPHAGIDAE	<i>Tamandua tetradactyla</i>	Collared anteater
XENARTHRA	MYRMECOPHAGIDAE	<i>Myrmecophaga tridactyla</i>	Giant anteater
XENARTHRA	BRADYPODIDAE	<i>Bradypus variegatus</i>	Brown-throated three-toed sloth
XENARTHRA	DASYPODIDAE	<i>Cabassous unicinctus</i>	Southern Naked-tailed Armadillo
XENARTHRA	DASYPODIDAE	<i>Priodontes maximus</i>	Giant armadillo
XENARTHRA	DASYPODIDAE	<i>Dasyurus novemcinctus</i>	Nine-banded armadillo
CHIROPTERA	EMBALLONURIDAE	<i>Rynchonycteris naso</i>	Proboscis bat
PRIMATES	CALLITRICHIDAE	<i>Saguinus fuscicollis</i>	Saddlebacked tamarin
PRIMATES	CALLITRICHIDAE	<i>Saguinus imperator</i>	Emperor tamarin
PRIMATES	CEBIDAE	<i>Callicebus brunneus</i>	Brown titi
PRIMATES	CEBIDAE	<i>Saimiri boliviensis</i>	Black-capped Squirrel Monkey
PRIMATES	CEBIDAE	<i>Cebus apella</i>	Brown capuchin
PRIMATES	CEBIDAE	<i>Cebus albifrons</i>	White-fronted Capuchin
PRIMATES	CEBIDAE	<i>Ateles chamek</i>	Peruvian spider monkey
PRIMATES	CEBIDAE	<i>Alouatta seniculus</i>	Red howler monkey
PRIMATES	CEBIDAE	<i>Aotus sp.</i>	Owl monkey
CARNIVORA	CANIDAE	<i>Speothos venaticus</i>	Bush dog
ORDER	FAMILY	Scientific name	Common name
CARNIVORA	PROCYONIDAE	<i>Potos flavos</i>	Kinkajou
CARNIVORA	PROCYONIDAE	<i>Nasua nasua</i>	Coati
CARNIVORA	MUSTELIDAE	<i>Eira barbara</i>	Tayra
CARNIVORA	MUSTELIDAE	<i>Lontra longicaudis</i>	Neotropical River Otter
CARNIVORA	FELIDAE	<i>Felis pardalis</i>	Ocelot
CARNIVORA	FELIDAE	<i>Felis concolor</i>	Cougar or Mountain lion
CARNIVORA	FELIDAE	<i>Panthera onca</i>	Jaguar
PERISSODACTYLA	TAPIRIDAE	<i>Tapirus terrestris</i>	Lowland tapir
ARTIODACTYLA	TAYASSUIDAE	<i>Tayassu pecari</i>	White-lipped peccari
ARTIODACTYLA	TAYASSUIDAE	<i>Tayassu tajacu</i>	Collared Peccari
ARTIODACTYLA	CERVIDAE	<i>Mazama americana</i>	Red Broom deer
RODENTIA	SCIURIDAE	<i>Sciurus spadiceus</i>	Southern Amazon Red Squirrel
RODENTIA	SCIURIDAE	<i>Sciurus cf. pyrrhinus</i>	Junín Red Squirrel
RODENTIA	SCIURIDAE	<i>Sciurus sanborni / ignitus</i>	Sanborn's squirrel / Bolivian squirrel
RODENTIA	SCIURIDAE	<i>Sciurillus pusillus</i>	Neotropical pygmy squirrel
RODENTIA	DASYPROCTIDAE	<i>Agouti paca</i>	Lowland paca
RODENTIA	DASYPROCTIDAE	<i>Dasyprocta variegata</i>	Brown Agouti
RODENTIA	DASYPROCTIDAE	<i>Myoprocta pratti</i>	Green Acouchi
RODENTIA	ECHYMIDAE	<i>Dactylomys dactylinus</i>	Amazon bamboo rat

Hereunder, pictures of some mammal species within the project area:



Fig. 43: Mammal species

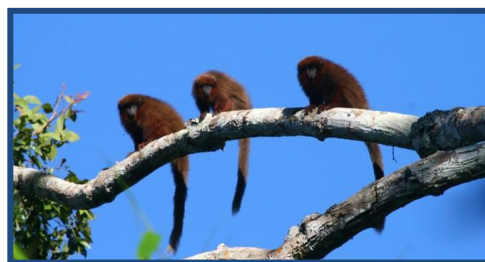


Fig. 44: Mammal species

~ Birds

The following chart shows the bird species found more frequently during the evaluation:

Chart 15: Bird species registered within the Madre de Dios Amazon REDD project area boundaries

ORDER	FAMILY	Scientific name	Common name
TINAMIFORMES	TINAMIDAE	<i>Tinamus major</i>	Great Tinamou
TINAMIFORMES	TINAMIDAE	<i>Tinamus guttatus</i>	White-throated Tinamou
TINAMIFORMES	TINAMIDAE	<i>Crypturellus cinereus</i>	Cinereous Tinamou
TINAMIFORMES	TINAMIDAE	<i>Crypturellus soui</i>	Little Tinamou
TINAMIFORMES	TINAMIDAE	<i>Crypturellus undulatus</i>	Undulated Tinamou
ANSERIFORMES	ANHIMIDAE	<i>Anhima cornuta</i>	Horned Screamer
ANSERIFORMES	ANATIDAE	<i>Cairina moschata</i>	Muscovy Duck
GALLIFORMES	CRACIDAE	<i>Ortalis guttata</i>	Speckled Chachalaca
GALLIFORMES	CRACIDAE	<i>Penelope jacquacu</i>	Spix's Guan
GALLIFORMES	CRACIDAE	<i>Pipile cumanensis</i>	Blue-throated Piping-guan
GALLIFORMES	CRACIDAE	<i>Mitu tuberosum</i>	Razor-billed Curassow
GALLIFORMES	PHASIANIDAE	<i>Odontophorus gujanensis</i>	Marbled Wood Quail
CICONIIFORMES	THRESKIORNITHIDAE	<i>Mesembrinibis cayennensis</i>	Green Ibis
CICONIIFORMES	CATHARTIDAE	<i>Cathartes melambrotus</i>	Greater Yellow-headed Vulture
CICONIIFORMES	CATHARTIDAE	<i>Coragyps atratus</i>	Black Vulture
CICONIIFORMES	CATHARTIDAE	<i>Sarcoramphus papa</i>	King Vulture
FALCONIFORMES	ACCIPITRIDAE	<i>Chondrohierax uncinatus</i>	Hook-billed Kite
FALCONIFORMES	ACCIPITRIDAE	<i>Elanoides forficatus</i>	Swallow-tailed Kite
FALCONIFORMES	ACCIPITRIDAE	<i>Rostrhamus sociabilis</i>	Snail Kite
FALCONIFORMES	ACCIPITRIDAE	<i>Harpagus bidentatus</i>	Double-toothed Kite
FALCONIFORMES	ACCIPITRIDAE	<i>Ictinia plumbea</i>	Plumbeous Kite
FALCONIFORMES	ACCIPITRIDAE	<i>Leucopternis albigollis</i>	White Hawk
FALCONIFORMES	ACCIPITRIDAE	<i>Buteogallus urubitinga</i>	Great Black Hawk

ORDER	FAMILY	Scientific name	Common name
FALCONIFORMES	ACCIPITRIDAE	<i>Buteo magnirostris</i>	Roadside Hawk
FALCONIFORMES	ACCIPITRIDAE	<i>Harpia harpyja</i>	Harpy Eagle
FALCONIFORMES	ACCIPITRIDAE	<i>Spizastur melanoleucus</i>	Black-and-white Hawk-Eagle
FALCONIFORMES	FALCONIDAE	<i>Daptrius ater</i>	Black Caracara
FALCONIFORMES	FALCONIDAE	<i>Ibycter americanus</i>	Red-throated Caracara
FALCONIFORMES	FALCONIDAE	<i>Micrastur gilvicolis</i>	Lined Forest Falcon
GRUIFORMES	PSOPHIIDAE	<i>Psophia leucoptera</i>	Pale-winged Trumpeter
GRUIFORMES	RALLIDAE	<i>Aramides cajanea</i>	Gray-necked Wood-Rail
GRUIFORMES	HELIORNITHIDAE	<i>Heliornis fulica</i>	Sungrebe or American Finfoot
GRUIFORMES	EURYPYGIDAE	<i>Eurypyga helias</i>	Sunbittern
CHARADRIIFORMES	SCOLOPACIDAE	<i>Tringa solitaria</i>	Solitary Sandpiper
COLUMBIFORMES	COLUMBIDAE	<i>Claravis pretiosa</i>	Blue Ground Dove
COLUMBIFORMES	COLUMBIDAE	<i>Patagioenas subvinacea</i>	Ruddy Pigeon
COLUMBIFORMES	COLUMBIDAE	<i>Leptotila rufaxilla</i>	Grey-fronted Dove
PSITTACIFORMES	PSITTACIDAE	<i>Ara ararauna</i>	Blue-and-gold macaw
PSITTACIFORMES	PSITTACIDAE	<i>Ara macao</i>	Scarlet macaw
PSITTACIFORMES	PSITTACIDAE	<i>Ara chloropterus</i>	Red and green macaw
PSITTACIFORMES	PSITTACIDAE	<i>Ara severus</i>	Chestnut-fronted macaw
PSITTACIFORMES	PSITTACIDAE	<i>Aratinga leucophthalma</i>	White-eyed Parakeet
PSITTACIFORMES	PSITTACIDAE	<i>Aratinga weddellii</i>	Dusky-headed Parakeet
PSITTACIFORMES	PSITTACIDAE	<i>Brotogeris cyanoptera</i>	Cobalt-winged Parakeet
PSITTACIFORMES	PSITTACIDAE	<i>Brotogeris sanctithomae</i>	Tui Parakeet
PSITTACIFORMES	PSITTACIDAE	<i>Pionites leucogaster</i>	White-bellied Parrot
PSITTACIFORMES	PSITTACIDAE	<i>Pionus menstruus</i>	Blue-headed Pionus
PSITTACIFORMES	PSITTACIDAE	<i>Amazona farinosa</i>	Macaw Mountain Bird
OPISTHOCOMIFORMES	OPISTHOCOMIDAE	<i>Opisthocomus hoazin</i>	Hoatzin
CUCULIFORMES	CUCULIDAE	<i>Coccyzus americanus</i>	Yellow-billed Cuckoo
CUCULIFORMES	CUCULIDAE	<i>Coccyzus melacoryphus</i>	Dark-billed cuckoo
CUCULIFORMES	CUCULIDAE	<i>Piaya cayana</i>	Squirrel Cuckoo
CUCULIFORMES	CUCULIDAE	<i>Piaya melanogaster</i>	Black-bellied Cuckoo
CUCULIFORMES	CUCULIDAE	<i>Crotophaga major</i>	Greater Ani
STRIGIFORMES	STRIGIDAE	<i>Lophotrix cristata</i>	Crested Owl
STRIGIFORMES	STRIGIDAE	<i>Glaucidium brasilianum</i>	Ferruginous Pygmy-owl
CAPRIMULGIFORMES	NYCTIBIIDAE	<i>Nyctibius griseus</i>	Common potoo
CAPRIMULGIFORMES	CAPRIMULGIDAE	<i>Nyctiphrynus ocellatus</i>	Ocellated Poorwill
APODIFORMES	APODIDAE	<i>Chaetura sp. (brachyura?)</i>	Swift
APODIFORMES	TROCHILIDAE	<i>Glaucis hirsutus</i>	Rufous-breasted Hermit

ORDER	FAMILY	Scientific name	Common name
APODIFORMES	TROCHILIDAE	<i>Phaethornis ruber</i>	Reddish Hermit
APODIFORMES	TROCHILIDAE	<i>Phaethornis</i> sp.	Hermit
APODIFORMES	TROCHILIDAE	<i>Thalurania furcata</i>	Fork-tailed Woodnymph
TROGONIFORMES	TROGONIDAE	<i>Trogon curucui</i>	Blue-crowned Trogon
TROGONIFORMES	TROGONIDAE	<i>Trogon melanurus</i>	Black tailed trogon
CORACIIFORMES	ALCEDINIDAE	<i>Chloroceryle americana</i>	Green Kingfisher
CORACIIFORMES	MOMOTIDAE	<i>Electron platyrhynchum</i>	Broad-billed Motmot
CORACIIFORMES	MOMOTIDAE	<i>Baryphthengus ruficapillus</i>	Rufous capped motmot
CORACIIFORMES	MOMOTIDAE	<i>Momotus momota</i>	Blue-crowned Motmot
GALBULIFORMES	GALBULIDAE	<i>Galbalcyrhynchus leucotis</i>	White-eared Jacamar
GALBULIFORMES	GALBULIDAE	<i>Brachygalba (goeringi?)</i>	Jacamar
GALBULIFORMES	GALBULIDAE	<i>Brachygalba</i> sp.	Jacamar
GALBULIFORMES	GALBULIDAE	<i>Galbula albirostris</i>	Yellow billed jacamar
GALBULIFORMES	GALBULIDAE	<i>Galbula tombacea</i>	White chinned jacamar
GALBULIFORMES	BUCCONIDAE	<i>Notharchus macrorhynchos</i>	White necked puffbird
GALBULIFORMES	BUCCONIDAE	<i>Malacoptila</i> sp.	Puffbird
GALBULIFORMES	BUCCONIDAE	<i>Monasa nigrifrons</i>	Black fronted nunbird
GALBULIFORMES	BUCCONIDAE	<i>Monasa flavirostris</i>	Yellow-billed Nunbird
GALBULIFORMES	BUCCONIDAE	<i>Chelidoptera tenebrosa</i>	Swallow winged puffbird
PICIFORMES	CAPITONIDAE	<i>Eubucco</i> (male as <i>bourcierii</i>)	Red-headed Barbet
PICIFORMES	RAMPHASTIDAE	<i>Ramphastos tucanus</i>	Channel-billed Toucan
PICIFORMES	RAMPHASTIDAE	<i>Ramphastos vitellinus</i>	Channel-billed Toucan
PICIFORMES	RAMPHASTIDAE	<i>Aulacorhynchus prasinus</i>	Emerald Toucanet
PICIFORMES	RAMPHASTIDAE	<i>Pteroglossus azara</i>	Ivory-billed Aracari
PICIFORMES	RAMPHASTIDAE	<i>Pteroglossus castanotis</i>	Chestnut-eared Aracari
PICIFORMES	PICIDAE	<i>Melanerpes cruentatus</i>	Red fronted woodpecker
PICIFORMES	PICIDAE	<i>Veniliornis passerinus</i>	Little woodpecker
PICIFORMES	PICIDAE	<i>Celeus flavus</i>	Cream coloured woodpecker
PICIFORMES	PICIDAE	<i>Celeus torquatus</i>	Ringed woodpecker
PICIFORMES	PICIDAE	<i>Campephilus rubricollis</i>	Red- necked Woodpecker
PICIFORMES	PICIDAE	<i>Campephilus melanoleucos</i>	Crimson crested woodpecker
PASSERIFORMES	DENDROCOLAPTIDAE	<i>Sittasomus griseicapillus</i>	Olivaceous Woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	<i>Xiphocolaptes promeropirhynchus</i>	Strong billed woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	<i>Xiphorhynchus picus</i>	Straight-billed Woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	<i>Xiphorhynchus guttatus</i>	Buff-throated Woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	<i>Lepidocolaptes albolineatus</i>	Lineated Woodcreeper

ORDER	FAMILY	Scientific name	Common name
PASSERIFORMES	TYRANNIDAE	<i>Mionectes oleagineus</i>	Ochre-bellied Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Tolmomyias sp.</i>	Flatbill
PASSERIFORMES	TYRANNIDAE	<i>Colonia colonus</i>	Long-tailed Tyrant
PASSERIFORMES	TYRANNIDAE	<i>Myiozetetes similis</i>	Vermilion-crowned Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Myiozetetes granadensis</i>	Gray-capped Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Pitangus sulphuratus</i>	Great Kiskadee
PASSERIFORMES	TYRANNIDAE	<i>Myiodynastes maculatus</i>	Streaked Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Empidonomus varius</i>	Variegated Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Tyrannus melancholicus</i>	Tropical Kingbird
PASSERIFORMES	TYRANNIDAE	<i>Tyrannus savana</i>	Fork-tailed Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Sirystes sibilator</i>	Sirystes
PASSERIFORMES	TYRANNIDAE	<i>Myiarchus tuberculifer</i>	Dusky-capped Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Myiobius barbatus</i>	Sulphur-rumped Flycatcher
PASSERIFORMES	TYRANNIDAE	<i>Ramphotrigon ruficauda</i>	Rufous tailed flatbill
PASSERIFORMES	COTINGIDAE	<i>Tityra cayana</i>	Black-tailed Tityra
PASSERIFORMES	COTINGIDAE	<i>Pachyrhamphus minor</i>	Pink throated becard
PASSERIFORMES	COTINGIDAE	<i>Lipaugus vociferans</i>	Screaming Piha
PASSERIFORMES	COTINGIDAE	<i>Gymnoderus foetidus</i>	Bare necked fruitcrow
PASSERIFORMES	PIPRIDAE	<i>Lepidothrix coronata</i>	Blue-crowned Manakin
PASSERIFORMES	VIREONIDAE	<i>Cyclarhis gujanensis</i>	Rufous browed pepper shrike
PASSERIFORMES	VIREONIDAE	<i>Vireo olivaceus</i>	Red-eyed Vireo
PASSERIFORMES	HIRUNDINIDAE	<i>Atticora fasciata</i>	White-banded swallow
PASSERIFORMES	HIRUNDINIDAE	<i>Stelgidopteryx ruficollis</i>	Southern Rough-winged Swallow
PASSERIFORMES	TROGLODYTIDAE	<i>Troglodytes aedon</i>	House Wren
PASSERIFORMES	TROGLODYTIDAE	<i>Campylorhynchus turdinus</i>	Thrush-like Wren
PASSERIFORMES	TROGLODYTIDAE	<i>Henicorhina leucosticta</i>	White-breasted Wood-Wren
PASSERIFORMES	TROGLODYTIDAE	<i>Cyphorhinus arada</i>	Musician Wren
PASSERIFORMES	POLIOPTILIDAE	<i>Polioptila plumbea</i>	Tropical Gnatcatcher
PASSERIFORMES	TURDIDAE	<i>Turdus sp.</i>	-----
PASSERIFORMES	THRAUPIDAE	<i>Cissopis leverianus</i>	Magpie Tanager
PASSERIFORMES	THRAUPIDAE	<i>Lamprospiza melanoleuca</i>	Red-billed Pied Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tachyphonus luctuosus</i>	White-shouldered Tanager
PASSERIFORMES	THRAUPIDAE	<i>Lanio versicolor</i>	White-winged Shrike-tanager
PASSERIFORMES	THRAUPIDAE	<i>Ramphocelus carbo</i>	Silver-beaked Tanager
PASSERIFORMES	THRAUPIDAE	<i>Thraupis episcopus</i>	Blue-grey Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara chilensis</i>	Paradise Tanager

ORDER	FAMILY	Scientific name	Common name
PASSERIFORMES	THRAUPIDAE	<i>Tangara schrankii</i>	Green-and-gold Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara gyrola</i>	Bay-headed Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara cayana</i>	Burnished-buff Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara callophrys</i>	Opal-crowned Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tersina viridis</i>	Swallow Tanager
PASSERIFORMES	THRAUPIDAE	<i>Cyanerpes caeruleus</i>	Purple Honeycreeper
PASSERIFORMES	DENDROCOLAPTIDAE	<i>Campylorhamphus procurvoides</i>	Curve-billed Scythebill
PASSERIFORMES	FURNARIIDAE	<i>Furnarius leucopus</i>	Pale-legged Hornero
PASSERIFORMES	FURNARIIDAE	<i>Synallaxis sp.</i>	Spinetail
PASSERIFORMES	FURNARIIDAE	<i>Philydor sp.</i>	Antomolus
PASSERIFORMES	FURNARIIDAE	<i>Philydor ruficaudatus</i>	Rufous-tailed Foliage-gleaner
PASSERIFORMES	THAMNOPHILIDAE	<i>Cymbilaimus lineatus</i>	Fasciated Antshrike
PASSERIFORMES	THAMNOPHILIDAE	<i>Taraba major</i>	Great Antshrike
PASSERIFORMES	THAMNOPHILIDAE	<i>Thamnophilus amazonicus</i>	Amazonian Antshrike
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmotherula brachyura</i>	Pygmy Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmotherula axillaris</i>	White-flanked Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmotherula longipennis</i>	Long-winged Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Microrhopias quixensis</i>	Dot-winged Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmoborus leucophrys</i>	White-browed Antbird
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmoborus myotherinus</i>	Black-faced Antbird
PASSERIFORMES	COTINGIDAE	<i>Tityra cayana</i>	Black-tailed Tityra
PASSERIFORMES	COTINGIDAE	<i>Pachyrhamphus minor</i>	Pink-throated Becard
PASSERIFORMES	COTINGIDAE	<i>Lipaugus vociferans</i>	Screaming Piha
PASSERIFORMES	COTINGIDAE	<i>Gymnoderus foetidus</i>	Bare-necked Fruitcrow
PASSERIFORMES	PIPRIDAE	<i>Lepidothrix coronata</i>	Blue-crowned Manakin
PASSERIFORMES	VIREONIDAE	<i>Cyclarhis gujanensis</i>	Rufous-browed Peppershrike
PASSERIFORMES	VIREONIDAE	<i>Vireo olivaceus</i>	Red-eyed Vireo
PASSERIFORMES	HIRUNDINIDAE	<i>Atticora fasciata</i>	White-banded Swallow
PASSERIFORMES	HIRUNDINIDAE	<i>Stelgidopteryx ruficollis</i>	Southern Rough-winged Swallow
PASSERIFORMES	TROGLODYTIDAE	<i>Troglodytes aedon</i>	House Wren
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PASSERIFORMES	TROGLODYTIDAE	<i>Henicorhina leucosticta</i>	White-breasted Wood-Wren
PASSERIFORMES	TROGLODYTIDAE	<i>Cyphorhinus arada</i>	Musician Wren
PASSERIFORMES	POLIOPTILIDAE	<i>Poliioptila plumbea</i>	Tropical Gnatcatcher
PASSERIFORMES	TURDIDAE	<i>Turdus sp.</i>	Thrush
PASSERIFORMES	THRAUPIDAE	<i>Cissopis leverianus</i>	Magpie Tanager
PASSERIFORMES	THRAUPIDAE	<i>Lamprospiza melanoleuca</i>	Red-billed Pied Tanager

ORDER	FAMILY	Scientific name	Common name
PASSERIFORMES	THRAUPIDAE	<i>Tachyphonus luctuosus</i>	White-shouldered Tanager
PASSERIFORMES	THRAUPIDAE	<i>Lanio versicolor</i>	White-winged Shrike-Tanager
PASSERIFORMES	THRAUPIDAE	<i>Ramphocelus carbo</i>	Silver-beaked Tanager
PASSERIFORMES	THRAUPIDAE	<i>Thraupis episcopus</i>	Blue-grey Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara chilensis</i>	Paradise Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara schrankii</i>	Green-and-gold Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara gyrola</i>	Bay-headed Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara cayana</i>	Burnished-buff Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tangara callophrys</i>	Opal-crowned Tanager
PASSERIFORMES	THRAUPIDAE	<i>Tersina viridis</i>	Swallow Tanager
PASSERIFORMES	THRAUPIDAE	<i>Cyanerpes caeruleus</i>	Purple Honeycreeper
PASSERIFORMES	DENDROCOLAPTIDAE	<i>Campylorhamphus procurvoides</i>	Curve-billed Scythebill
PASSERIFORMES	FURNARIIDAE	<i>Furnarius leucopus</i>	Pale-legged Hornero
PASSERIFORMES	FURNARIIDAE	<i>Synallaxis</i> sp.	Spinetail
PASSERIFORMES	FURNARIIDAE	<i>Philydor</i> sp.	Antmolus
PASSERIFORMES	FURNARIIDAE	<i>Philydor ruficaudatus</i>	Rufous-tailed Foliage-gleaner
PASSERIFORMES	THAMNOPHILIDAE	<i>Cymbilaimus lineatus</i>	Fasciated Antshrike
PASSERIFORMES	THAMNOPHILIDAE	<i>Taraba major</i>	Great Antshrike
PASSERIFORMES	THAMNOPHILIDAE	<i>Thamnophilus amazonicus</i>	Amazonian Antshrike
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmotherula brachyura</i>	Pygmy Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmotherula axillaris</i>	White-flanked Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmotherula longipennis</i>	Long-winged Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Microrhophias quixensis</i>	Dot-winged Antwren
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmoborus leucophrys</i>	White-browed Antbird
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmoborus myotherinus</i>	Black-faced Antbird
PASSERIFORMES	THAMNOPHILIDAE	<i>Hypocnemis hypoxantha</i>	Yellow-browed Antbird
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmeciza atrothorax</i>	Black-throated Antbird
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmeciza hemimelaena</i>	Chestnut-tailed Antbird
PASSERIFORMES	THAMNOPHILIDAE	<i>Myrmeciza hyperythra</i>	Plumbeous Antbird
PASSERIFORMES	THAMNOPHILIDAE	<i>Hylophylax naevius</i>	Spot-backed Antbird
PASSERIFORMES	FORMICARIIDAE	<i>Formicarius colma</i>	Rufous-capped Antthrush
PASSERIFORMES	FORMICARIIDAE	<i>Formicarius analis</i>	Black-faced Antthrush
PASSERIFORMES	TYRANNIDAE	<i>Serpophaga hypoleuca</i>	River Tyrannulet
PASSERIFORMES	THRAUPIDAE	<i>Chlorophanes spiza</i>	Green Honeycreeper
PASSERIFORMES	EMBERIZIDAE	<i>Sporophila castaneiventris</i>	Chestnut-bellied Seedeater
PASSERIFORMES	EMBERIZIDAE	<i>Arremon taciturnus</i>	Pectoral Sparrow
PASSERIFORMES	ICTERIDAE	<i>Psarocolius decumanus</i>	Crested Oropendola

ORDER	FAMILY	Scientific name	Common name
PASSERIFORMES	ICTERIDAE	<i>Psarocolius bifasciatus</i>	Amazonian Oropendola
PASSERIFORMES	ICTERIDAE	<i>Cacicus cela</i>	Yellow-rumped Cacique
PASSERIFORMES	ICTERIDAE	<i>Icterus icterus (jamacaii)</i>	Turpial
PASSERIFORMES	ICTERIDAE	<i>Molothrus oryzivorus</i>	Giant Cowbird
PASSERIFORMES	FRINGILLIDAE	<i>Euphonia sp. (chlorotica?)</i>	Euphonia
PASSERIFORMES	FRINGILLIDAE	<i>Euphonia cyanocephala.</i>	Golden-rumped Euphonia
PASSERIFORMES	FRINGILLIDAE	<i>Euphonia xanthogaster / rufiventris</i>	Orange-bellied Euphonia/ Rufous-bellied Euphonia

Following, pictures of some of the aforementioned bird species within the project area are enclosed:



Fig. 45: Bird species

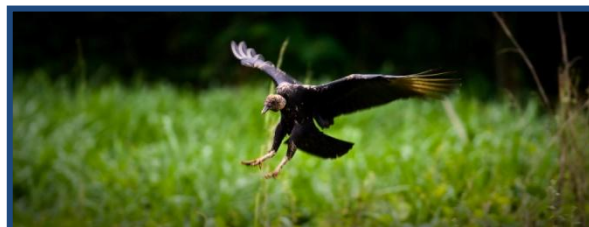


Fig. 46: Bird species

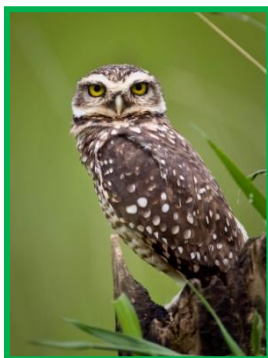


Fig. 47: Bird species



Fig. 48: Bird species



Fig. 49: Bird species

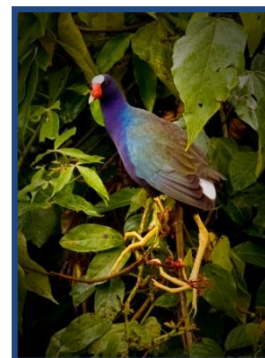


Fig. 50: Bird species

~ Reptiles

Chart 16: Major reptile species registered within the Madre de Dios Amazon REDD project area

ORDER	FAMILY	Scientific name
		<i>Bothriopsis bilineata</i>
		<i>Oxybelis</i>
		<i>Boa constrictor</i>
		<i>Corallus caninus</i>
		PAUCAR MACHACO
		<i>Paleosuchus</i>
SAURIA	TEIIDAE	<i>Kentropyx altamazonicus</i>
CHELONIA	TESTUDINIDAE	<i>Geochelone MOTELO</i>
CHELONIA		<i>Podocnemis TARICAYA</i>
CHELONIA		<i>Podocnemis expansa</i>



Fig. 51: Reptile species



Fig. 52: Reptile species

Hereunder, pictures of some other fauna species within both concessions areas are presented:

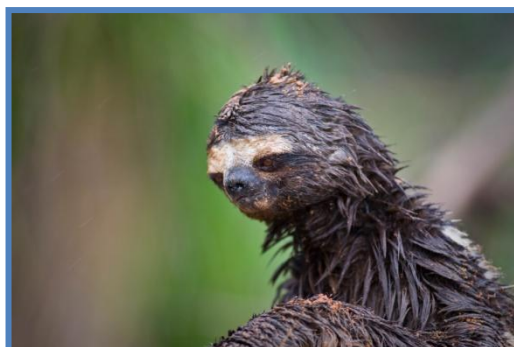


Fig. 53: Other fauna species

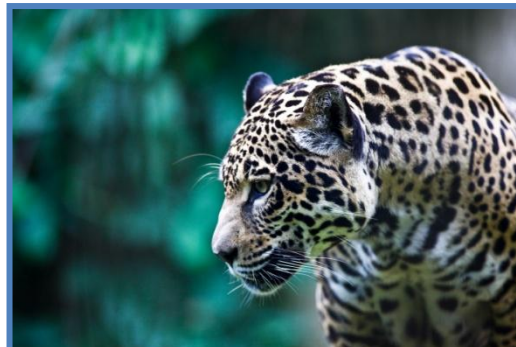


Fig. 54: Other fauna species



Fig. 55: Other fauna species

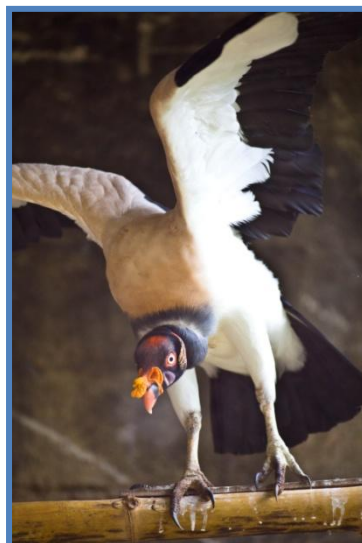


Fig. 56: Other fauna species

Among the observed species the major species were evaluated, which are the most hunted. During the evaluation, 27 mammal species and 13 major bird species were found. Among them, 8 mammal species and 7 bird species were registered in more than 10 opportunities.

Based on the amount of encounters, the density of this 15 species was calculated. The average of sights every 10 km of the evaluated transects travelled was calculated to 39 of the 40 evaluated species.

In addition to this, the density was calculated to those species with at least 10 sights. All this information can be found within the Evaluation of Native Fauna within Maderacre and Maderyja concessions, developed by Javier Barrio in 2005 (WWF - Peru Program Office).

- **Hunting activities within the project area**

High rates of observed species that are rarely found in other Peruvian Amazon areas because of illegal hunting were determined as a result of the evaluation carried out in the project area. Among these species we may highlight the presence of *Ateles chamek* (Black-faced Spider Monkey) and *Mitu tuberosum* (Razor-billed Curassow).

In Maderacre concession big groups of *Tayassu pecari* (white-lipped peccary) and *Tayassu tajacu* (Collared Peccary) were also found, both species with great potential for meat and leather, registering high reproduction rates and largely abundant in the area. For that reason, these species should be eventually managed if a responsible management plan is developed. Nowadays, no one of the concessions is interested in any fauna species management and activities of this type are not included among its entrepreneurial objectives. In Maderyja area said species populations are lower than in Maderacre.

Despite the difficulty of determining the real hunting pressure within the area, it seems to be still low. This must be deducted by the presence of the species that are commonly searched and hunted all along their distribution areas. Among said species it should be highlighted: Razor-billed Curassow (*Mitu tuberosum*), red howler monkey (*Alouatta seniculus*) and Black-faced Spider Monkey (*Ateles chamek*), as well as *Mazama americana* (Red brocket) and *Geochelone sp.* (Giant Tortoise). The presence of other species, as the monkeys of *Cebus* genus (*Cebus paella* or tufted capuchin and *Cebus albifrons* or white-fronted capuchin), also confirms a low hunting pressure both for their abundance and their behavior. *Cebus* populations are abundant in the evaluated areas and they are extremely trustful, behavior that is not observed under high hunting pressure conditions (Barrio, 2005).

The good current status of wildlife within the concessions apparently responds to the prohibition to hunting in both of them, the implementation of low impact exploitation techniques and the adequate surveillance and custody system. It should be highlighted that all hunting activities are strictly forbidden, even stating within the concessions rulebooks and manuals the prohibition of egg collecting, animal harassment and hunting of live specimens for pets. The concessions personnel is trained based on said rulebooks.

Despite the hunting pressure is very low or almost inexistent and the mechanisms of control that both concessions carry out, the availability of roads and paths used for wood extraction within the concession area and the upcoming inter-oceanic road will make easier the access for illegal hunters avid for said species. Moreover, taking into consideration the presence of species that are rarely find in other Peruvian Amazon zones. In consequence, a strong and permanent patrolling and control is and will be required to assure that no illegal hunting activity is or will be developed within the concession area, goal that should be achieved only by means of carbon finance.

- **Identification of critic sites for the development of wildlife species**

Overmature trees of wood species with huge holes in their trunks, as well as hollow felled trees should be refuges or places where birds, mammals and insects make their nests and begin their colonies; being essential species for pollination and dispersion of seeds. For this reason, during the harvesting activities carried out by the concessions staff, it must be taken into account that no one of said identified trees is removed from their place.

In this sense, one of the main exploitation policies of both timber concessions state that only trees of intermediate size and with good quality of their trunks are selected to be harvested.

Additionally to the maintenance of overmature trees with huge holes or hollow trees, important sites for wildlife were identified, areas that have been categorized as areas under conservation and where no wood extraction or forestry operations are allowed.

During the evaluation, collpas²² sites were also localized and defined as protected areas and therefore no wood extraction or forestry operations are allowed into them. Four of them were found on the banks of Sofia stream in Maderyja concession, three belonging to parakeets and macaws and the other one to peccaries, as shown in the the following chart:

Chart 17: "Collpas" sites within the Madre de Dios Amazon REDD project area

Collpa N°	Coordinates	Species found
1	376725 E 8773475 N	<i>Brotogeris cyanoptera</i> "collpeando" and <i>Ara chloropterus</i> and <i>Amazona farinosa</i> Low areas apparently used by <i>Tapirus terrestris</i>
2	376440 E 8771770 N	<i>Brotogeris cyanoptera</i> "collpeando" and <i>Brotogeris sanctithomae</i> and <i>Aratinga weddellii</i> Low areas apparently used by <i>Tapirus terrestris</i>
3	378890 E 8771820 N	<i>Brotogeris cyanoptera</i> "collpeando" and <i>Brotogeris sanctithomae</i> Low areas apparently used by <i>Tapirus terrestris</i>
4	374010 E 8777010 N	Visited by <i>Tayassu tajacu</i> and <i>Mazama americana</i> Is the only collpa important for mammal species

²² Collpa: places used for some fauna species to complement its mineral diet, i.e. eating clay or soil.

In relation to this issue, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project states that a baseline assessment conducted by WWF for Maderacre and Maderyja in 2005 adequately describes the current biodiversity in the project area. Canchanya identified forests with high conservation value according to principle 9 of FSC and national voluntary certification, this means, the main conservation purpose is the use of forests by local human populations (for fishing, hunting, and other economic activities).

It adds that the objectives of the study were to: a) improve the information about the location of important sites to satisfy basic needs of the Native Community Belgica and small towns that make use of the concessions, and b) Get an estimate of the use of flora and fauna by human populations. In this context, forests with high conservation value were found in hunting areas, fishing areas, areas to collect material for pottery, head of flows, flooded forests and cemeteries. In all cases, these areas lie outside the concessions.

It states also that Barrio identified key critical areas for fauna such as: clay walls (collpas), water points, fruit trees, and caves or holes in the trees. The purpose of identifying these areas is to reduce the negative side effects caused by logging. He also did a fauna abundance study in selected transects using the program "Distance" to estimate the density for species with a high spotting value (more than 10 sights). Barrio also identified species or groups of fauna that would best reflect the changes in fauna caused by forest logging (indicator species of intensity of forest logging) in both concessions. In addition, a list of four collpas is shown with its coordinates in the PDD, and also, during the field visit, a sign with a map on the road clearly showed the location of water points such as lakes and flooded areas.

In addition to this, said Report says that hunting of fauna is strictly prohibited within the concessions and the workers are well aware of this. Both studies and the PDD describe the with project scenario. During the field visit on 26th June 2009, auditors saw the following species: birds (3 *Ara chloroptera* – red and green macaws; 10+ *Crypturellus undulates* - Undulated Tinamou); carnivore (1 *Panthera onca* – Jaguar); rodent (3 *Dasyprocta variegata* – Brown Agouti); reptile (1 *Geochelone carbonaria* – Giant Tortoise); and also heard several monkeys within the concessions.

Finally, it states that forest management invariably causes a negative effect on the original forest biodiversity, particularly on big mammals and birds, and has a positive effect on small mammals. However, without the project, negative effects are significantly higher. The without project scenario was shown during the field visit, neighboring plots with cattle grazing, and slashed and burned forest for agriculture. These fields would have supported a low diversity of flora and fauna and promoted the presence.

e) Demonstration that the project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction

First of all, it is important to consider that the case of REDD projects is different from other types of projects in terms of the purposes of its implementation. REDD projects are usually implemented in order to avoid the deforestation caused by a given situation or, which is the same, avoid the deforestation caused by certain factors or drivers of deforestation occurring in the project zone.

In the particular case of the Madre de Dios Amazon REDD Project and as it was previously mentioned, it is located 28 km to the side of the new inter-oceanic road that will join Brazil with Peruvian ports. This inter-oceanic road represents the main driver of deforestation of the project due to a major pressure of population from rural Andes regions that will migrate looking for lands and the economical activities that will consequently be established. Thus, the Madre de Dios Amazon REDD Project was implemented in order to avoid the deforestation caused mainly by the construction of the inter-oceanic road.

In this regard, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project states that the Madre de Dios Amazon REDD Project is designed around the impending effects of a new trans-Amazonian, inter-oceanic road, which was completely paved during the 2008-2009 period, from Brazil to the Pacific Ocean and Peruvian ports. Said completed road system will facilitate the immigration of new settlers into the region.

The immigrant population is predicted to subsist by agricultural and agricultural livestock activities. Deforestation and forest degradation are a result of these activities. These effects are already visible in Brazil where the trans-Amazonian road has been complete for some time.

Additionally, said Validation Report adds that the deforestation as the most likely land-use scenario in the absence of the project hinges, partially, on the projected population growth in the region surrounding the project area because population growth is the main driver for deforestation in the project area. Also, under the climate criteria, the projected population growth directly affects the projected deforestation and net climate benefit.

According to all that was mentioned above, it is clearly demonstrated that the project was not implemented to create GHG emissions for the purpose of its subsequent removal or destruction.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

In relation to this item, it is important to take into account that within the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project it is stated that according to the face-to-face interview with workers and physical evidence shown (contracts, benefits register), employees are aware of their benefits and rights, such as health insurance, retirement benefits, compensation for time of service, school subsidy, etc. In addition, during the field visit, the core stakeholder group, or project proponents, demonstrated a strong knowledge of local customs as well as a commitment to the community and the REDD Project was developed according to local customs and practices.

Said report adds that the companies have demonstrated their concern with the compliance with social and labor laws and regulations and also with their staff welfare and good labor conditions. Relevant documents such as social security (i.e. health insurance), contracts, compensation for time of service, pension registration, were available to the auditors during the field audit. Moreover, training courses on security, first aid and use of adequate protection equipment are given to concessions workers, written procedures and manuals explaining the potential risks of the forestry operations and how to proceed in case of accidents are also available for the workers. These manuals were available to the auditors.

In relation to this, said report states also that all Peruvian regulations related to safety are followed and security equipments are available for all working in any risky operation. In addition, training courses on occupational safety and first aid are given to their personnel. A First Aid Manual was developed by the concessions and is given to all workers and available at the campsites. In order to assure that all the concessions staff knows clearly the main objectives, policies, practices and regulations of the companies, as well as forestry methods and techniques applied in the concessions operations, the Forestry Operations Manual and the Forest Management Practices Rulebook are given to all of them when they join the company. All the issues related with their personnel safety (protection equipments, protection measures, etc.), responsibilities of each one, measures to undertake and penalties in case of not compliance are stated in the Safety Rulebooks of the concessions. It has special items related with care for the environment and relationship with others communities. These documents were available to the auditors during the site visit.

The report mentions also that during the site visit, the project proponents indicated that there are no existing laws or regulations that would have required project activities to be undertaken in any capacity and, in relation to guarantee that no laws will be broken by the project, it states that there are two possible areas where laws could be broken: exclusion of people from the project area and implementation of forest management activities.

The ratified concession contract stipulates full control to Maderacre and Maderyja including the control of people within the project area. This control is evidenced by the establishment of a guard station at the entrance to the forest concession along the major access road. In regard to the implementation of forest management activities, FSC certification requires that all environmental and employment laws be followed. Continued FSC certification guarantees that no laws will be broken during the implementation of forest management activities.

Following, a detailed description of all relevant laws and regulations related to the project and demonstration of compliance with them is presented²³:

a) Current Peruvian Forest Laws

In 2000, Law N° 27.308 of Forestry and Wildlife was enacted. It was regulated in 2001 by Supreme Decree (DS) N° 014-2001-AG, starting its implementation in 2002. The main elements of this regulatory framework, governing timber concessions, are:

- Forests in Peru are classified as follows: local forests, forests in native and peasant communities, protected natural areas, forests in protected lands, forests for future use and production forests. The latter are subdivided into production forests in reserve and permanent production forests (PPF)²⁴, totaling 24,586,458 hectares²⁵.
- Concession contracts for forest exploitation in the PPF, transferable before the Forestry Authority, occur in two ways²⁶:
 - * By Auction, between 10,000 and 40,000 ha for 40 years renewable.

²³ See also Annex 1 of this template which includes a list of the Peruvian Legislation related to the REDD Project.

²⁴ Of the three main forest departments, the PPF of Iquitos are created through R.M. N° 1349-2001-AG, the PPF of Madre de Dios through R.M. N° 1351-2001-AG and the PPF of Ucayali through R.M. N° 026-2002-AG.

²⁵ Source INRENA (2002).

²⁶ Source: Law of Forestry and Wildlife N° 27308, Art. 10; Regulation of the Law of Forestry and Wildlife, Arts. 98 and 103; Bases for the First Contest of Concessions, Ad Hoc Commission RJ 032.2002-INRENA.

- * By Contest, between 5,000 and 50,000 ha for 40 years renewable (this was the way applied by Maderacre and Maderyja timber concessions).

In both cases the development and approval of a General Forest Management Plan updatable and an Operational Plan for each year of operation is required²⁷.

- The right of use is paid per hectare of concession and defined in the adjudication process²⁸.
- There is a promotional regime to promote good forest management (Voluntary Forest Certification)²⁹.

The property of the concession has the character of being exclusive and the characteristic of being transferable. The first aspect delineates the ownership of the area, in the form of concession, to the holder. The second aspect constitutes a legal title on which real rights can be exercised.

In relation specifically to the environmental services, and among them carbon sequestration (which allows the development of the REDD project), the current Law and its regulation state the following:

- Environmental services are defined as “those aimed at soil protection, water regulation, conservation of biological biodiversity, ecosystem conservation and scenic beauty, absorbing carbon dioxide and in general the maintenance of essential ecological processes”³⁰.
- Forests of permanent production, among which Maderacre and Maderyja have been concessioned, are defined as “forest areas which, by their biotic and abiotic characteristics, are suitable for permanent and sustainable production of timber, other environmental goods services; and that have been classified as such by INRENA within the forest zoning”³¹.

²⁷ Regulation of the Law of Forestry and Wildlife, Art. 58 to 66; Bases for the First Contest of Concessions; Ad Hoc Commission RJ 032-2002-INRENA.

²⁸ Regulation of the Law of Forestry and Wildlife, Art. 70; Bases for the First Contest of Concessions; Ad Hoc Commission RJ 032-2002-INRENA.

²⁹ Law of Forestry and Wildlife N° 27308; Regulation of the Law of Forestry and Wildlife, Art. 338 to 343.

³⁰ Law N° 27308. Title I Art. 2 Inc. 2.3.

³¹ Regulation of the Law N° 27308. Title IV Cap. III. Art. 40.

- Among the rights of the forest concessionaires, “the use of other wild flora resources, touristic services and environmental services within the concessioned area” is established³².

At the beginning of 2002, the first timber concessions were awarded under this new model, among them Maderacre and Maderyja.

According to the FSC Certificates, the forestry operations are carried out in the framework of the Peruvian Law of Forestry and Wildlife (Law N° 27308) and its respective Regulation. The government body responsible for monitoring compliance with said law is the INRENA (National Institute of Natural Resources of Peru), which has its respective departments, through which runs the monitoring and control of forest activities.

Finally, taking into account the fact that the Madre de Dios Amazon REDD Project is certified under the FSC as well as the CCB Standards, the compliance with all current laws and regulations is assured.

b) Rights included in the Concession Agreements signed with the Peruvian State

In the framework of the current forest law, Maderacre SAC and Maderyja SAC have signed long term concession agreements with the Peruvian State in May 2002 for 40 years and for a total area of 98.932 hectares: 49.376 hectares for Maderacre and 49.556 hectares for Maderyja (contracts N° 17-TAH/C-J-001-02 and N° 17-TAH/C-J-004-02 respectively).

Among the main aspects of the agreements, the following should be highlighted:

- Maderacre acquires the Right of Timber Concession for the exploitation of the forest resources included within the exploitation units N° 17, 21, 29, 35, 36, 41, 243 and 244, located in the permanent production forest of Madre de Dios, adjudicating to Maderacre a total of 49,376 ha.
- Maderyja acquires the Right of Timber Concession for the exploitation of the forest resources included within the exploitation units N° 1, 4, 5, 10, 13, 15 and 242, located in the permanent production forest of Madre de Dios, adjudicating to Maderyja a total of 49,556 ha.

³² Regulation of the Law N° 27308. Title V. Art. 87.

- Both timber concessions have the right, in addition to timber harvesting and under their responsibility, directly or through third parties, to the use of other resources of the existing native flora and fauna within the concessions area, as well as tourism and environmental services (including carbon credits)³³.
- The extent of each concession is for 40 years. Said contracts may be renewed after that period depending on the approval of five-yearly audits carried out by the DGFFS³⁴.
- An annual fee for the right of use must be paid, during the term of the agreement³⁵. Tourism activities or the use of environmental services that the concessionaire carries out within the concessions area is included in this single annual payment³⁶.
- Both timber concessions, Maderacre and Maderyja, are expected to carry out a sustainable management of the forestry resources within the concession, according to the General Forest Management Plan³⁷ approved by INRENA (National Institute of Natural Resources), now the DGFFS (General Direction of Forestry and Native Fauna / Dirección General Forestal y de Fauna Silvestre). In addition to this, they have to submit their Annual Operating Plan³⁸ annually.

Maderacre and Maderyja have complied in all respects with the requirements of the current forest laws and the concession agreements signed with the Peruvian State. They have even surpassed the standards required for sustainable forest management, having received the Voluntary Forest Certification of the Forest Stewardship Council (FSC) in January 2007³⁹.

c) Approval of the project by the correspondent authority

In relation with the approval of the project by the corresponding authority, it is important to take into account the following:

³³ See the reference in the first clause of the Public Deed of Ratification of the Concession Agreement for the purposes of Use and Management of Forest Resources signed between the Peruvian State and the concessions, hereinafter the "Agreement".

³⁴ See the reference in the Third Clause of the Agreement.

³⁵ See the reference in clause 4.1. of the Agreement.

³⁶ See the reference in clause 4.3 of the Agreement.

³⁷ See the reference in clause 6.1 of the Agreement.

³⁸ See the reference in clause 8.1 of the Agreement.

³⁹ Certificate No. SW-FM/CoC-002176.

- The Forestry Law regulation indicates that the use of environmental services is a right of concessionaires (art. 87 item b), which is an indicative that the forestry authority will approve the project.
- As it was previously mentioned, the concession contracts explicitly state in their item 14.2 the right of the concessionaire of make use of the environmental services, also specifying in item 4.3 that the right to use environmental services is included in the use rights granted in the concession contracts.
- Both concessions have presented their Forest Management Plans adjusted considering the use of the environmental services (carbon credits) to the forestry authority⁴⁰, in order to use the carbon rights.

d) Labor and human rights laws, regulations and agreements

In relation to the compliance with labor laws, regulations and agreements, it is important to mention that both timber concessions have a strict respect of the whole legal framework including laboral and environmental issues, as it has been confirmed for the international certifier company Smartwood (responsible for the evaluation made in order to give Maderacre & Maderyja the FSC certification).

According to the aforementioned FSC Certification, no illegal activities are detected in the concessions and both are totally up to date with all their legal obligations (salaries, payment of the annual rate for the concession rights to the Peruvian State, etc.). Furthermore, the forestry management system of them complies with all the P & C regulations of the FSC.

Additionally, both concessions take special care of the labor conditions of its personnel and its well-being. To this end and according to the FSC Certificates, it must be said that both concessions fulfilled with all the laws and regulations related with human resources rights and duties. Furthermore, the salaries paid by them are into the average range of the regional and national forestry sector.

Furthermore, all Peruvian regulations related with the concession personnel's safety are taken into account and security equipments are available for all the people who work in any risky operation.

⁴⁰ The letters of presentation of the adjusted Forestry Management General Plans to the forestry authority will be available for the auditors.

In addition to this, the statements included within the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project and mentioned above in relation to this specific issue, confirms the Madre de Dios Amazon REDD Project's compliance with all labor and human rights laws, regulations and agreements.

1.12 Ownership and Other Programs

1.12.1 Proof of Title

According to the Peruvian Constitution, the forests are owned by the Peruvian State which gives them in concession to private companies by signing a long-term contract. A 2000 law has changed the terms of reference related with the conditions to access to a forest concession. Before 2000, the State used to give a concession for a specific natural resource, not for a certain area. After said law, the concessions are given for a certain amount of hectares and the concessionaire receives total rights on said area. The concessionaire needs to prepare and get DGFFS's approval of a management plan for each resource that the company is interested in harvest and trade.

In 2002, the Peruvian State launched a public auction to receive proposals to concede forest plots in most of the Peruvian Amazon Regions. Each interested company had to offer the best price to be paid to DGFFS yearly (US\$/hectare) and also to comply with some other requirements explained in the respective terms of reference of the contest.

Specifically, Maderacre and Maderyja timber concessions have signed long term concession contracts with the Peruvian State in May 2002 for 40 years and for a total area of 98.932 hectares: 49.376 hectares for Maderacre and 49.556 hectares for Maderyja (contracts N° 17-TAH/C-J-001-02 and N° 17-TAH/C-J-004-02 respectively). They explicitly give Maderacre and Maderyja the rights on all the environmental services included in the concession. Said contracts were accordingly registered in the Public Registration National Office. Both contracts were completely ratified in May 2006.

In relation with the approval of the project by the corresponding authority, it is important to take into account the following:

- The Forestry Law regulation indicates that the use of environmental services is a right of concessionaires (art. 87 item b), which is an indicative that the forestry authority will approve the project.

- As it was previously mentioned, the concession contracts explicitly state in their item 14.2 the right of the concessionaire of make use of the environmental services, also specifying in item 4.3 that the right to use environmental services is included in the use rights granted in the concession contracts.
- Both concessions have presented their Forest Management Plans adjusted considering the use of the environmental services (carbon credits) to the forestry authority⁴¹, in order to use the carbon rights.

Highlights of the Maderacre and Maderyja Concession Agreements

- Both timber concessions, Maderacre and Maderyja, are expected to carry out a sustainable management of the forestry resources within the concession, according to the management plan annually approved by INRENA (National Institute of Natural Resources), now the DGFFS (General Direction of Forestry and Native Fauna / Dirección General Forestal y de Fauna Silvestre).
- Both timber concessions have the right, according to the concession contract to manage the native flora and fauna resources, as well as tourism and environmental services.
- The Government of Peru retains the concession area.
- The extent of each concession is for 40 years. Said contracts may be renewed after that period depending on the approval of five-yearly audits carried out by the DGFFS.
- The concession contracts were signed on 31st May, 2002 and completely ratified on 31st May, 2006.
- Both concessions have exactly the same contracts.

Something important to take into account is that various concessions were granted by the Peruvian Government in 2006. Most of them have not complied with the agreement or have used the concession to practice illegal logging. Maderacre and Maderyja are one of the few concessions which have complied with the agreement and are doing sustainable management of all their forests.

⁴¹ The letters of presentation of the adjusted Forestry Management General Plans to the forestry authority will be available to the auditors.

In this sense, the FSC Certification determines that both, Maderacre as Maderyja timber concessions, have legal rights on the whole concession area and that no current or future conflicts with respect to the use of the land have been detected. Adjoining Acts with the neighbors are signed.

It is important to mention that no people are currently living within the concessions area, therefore no relocation will be required. In relation with the immigration of people it will be produced as a result of the construction of the new inter-oceanic road but not as a consequence of the proposed project activity. That is the main reason why the carbon finance is strongly needed by the concessions, in order to carry out the required monitoring activities to keep this situation under control and the planning settlement process of new immigrants without threatening the forest concessions.

In addition to this and according to the SCS Final Madre de Dios Amazon REDD Project Validation Report, socially and legally the land tenure at the project site is undisputed and belongs to Maderacre and Maderyja.

1.12.2 Emissions Trading Programs and Other Binding Limits

N/A

1.12.3 Participation under Other GHG Programs

As it was previously mentioned, this project was validated against the CCB Standards First Edition⁴² by Scientific Certification Systems (SCS) and approved on 2nd December 2009. SCS has been accredited by the Climate, Community & Biodiversity Alliance (CCBA) to perform such validation audits. The conclusion of the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project was that “The Greenox Global Environmental Program Madre de Dios Amazon REDD Project conforms to the CCB Project Design Standards (First Edition) at the Gold Level”.

⁴² “Madre de Dios Amazon REDD Project”, Project Design Document, at www.climate-standards.org/projects/files/madre_peru/Madre_de_Dios_Amazon_REDD_Project_REVISED.pdf

In addition to this, the SCS Statement of CCB Standards Compliance⁴³ for the Madre de Dios Amazon REDD Project states the following: “Validation Opinion: Based on the results of our validation activities, it is our opinion that the project meets the quality standard defined by CCBA. The Madre de Dios Amazon REDD Project conforms to the 15 Required CCB Criteria. The project also conforms to a total of 8 Optional CCB Criteria qualifying the project for Gold Level”.

According to the Climate, Community and Biodiversity Project Design Standards⁴⁴, the CCB Standards have become the most widely used and respected international standard for the multiple-benefits of land-based carbon projects.

The CCB Standards are playing a role to stimulate project and market development to channel carbon market investments to areas where funding is most greatly needed for sustainable development, improved livelihoods and biodiversity conservation.

The relatively large number of REDD projects reflects the high potential for multiple benefits associated with REDD and the growing interest in this project type in response to the increasingly favorable international policy environment.

Additionally, the CCB Standards are making important contributions towards their goal of catalyzing a robust carbon market for multiple-benefit forest carbon projects.

According to all what was mentioned above, the environmental, biodiversity and social benefits of the Madre de Dios Amazon REDD project activity are absolutely guaranteed. Complying with the CCB Standard criteria was fundamental in improving the social and environmental co-benefits of this project. Through the application of the social and biodiversity requirements of the standards and regarding the projected monitoring of social and biodiversity variables, the social and environmental co-benefits of this project are assured.

It is important to also mention that the CCB Standard does not issue or register any type of carbon certificates.

⁴³ SCS Statement of CCB Standards Compliance, February 2009, at www.climate-standards.org/projects/files/madre_peru/CCB_Greenoxx_MM_StatementofCompliance_120209.pdf.

⁴⁴ CCBA. 2008. Climate, Community & Biodiversity Project Design Standards Second Edition. CCBA, Arlington, VA. December, 2008. At: www.climate-standards.org.

1.12.4 Other Forms of Environmental Credit

N/A

1.12.5 Projects Rejected by Other GHG Programs

N/A

1.13 Additional Information Relevant to the Project

Eligibility Criteria

N/A

Leakage Management

The development of activities that prevent leakage is considered:

- * Training in Agroforestry and Silvopasture to Iñapari District residents and the Belgium Native Community. These trainings will not generate GHG emissions, taking into account that the work will be done with said residents and staff of the area previously trained. Thus, it will not involve the transportation of skilled staff.
- * Training in sustainable alternative activities such as Ecotourism, Shiringa Management, Fish Farms, etc., that encourages the rational use of resources other than wood in the project zone.

Commercially Sensitive Information

- Cash flow under with and without Madre de Dios Amazon REDD Project scenario.

Such information pertains to the additionality assessment of the project.

Further Information

All relevant information about the Madre de Dios Amazon REDD Project, except the commercially sensitive information, was included in the correspondent items of this PD Template.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Approved VCS Methodology VM0007 / Version 1.0

REDD Methodology Modules

Approved on 03 December 2010

Developed by Avoided Deforestation Partners

2.2 Applicability of Methodology

The Madre de Dios Amazon REDD Project is subject to the following applicability conditions:

- **All activity types:**

- * All types of forest within the Madre de Dios Amazon REDD project area are classified as forest since 10 years before the project start date.
- * Within the Madre de Dios Amazon REDD project area there are no forested wetlands, thus this methodology is applicable.
- * The Madre de Dios Amazon REDD Project proponents are able to show control over the project area, which are areas of forest concession granted by the State by Ministerial Resolution.
- * The Madre de Dios Amazon REDD Project baseline deforestation falls within the unplanned deforestation category.
- * The Madre de Dios Amazon REDD Project baseline will be renewed every 10 years after the start of the project.
- * Within the project area there are no other carbon trading schemes. Once the Madre de Dios Amazon REDD Project is approved by the VCS, carbon credits will be traded.

- * The Madre de Dios Amazon REDD project area consists of forests under sustainable forest management and FSC Certification. In a without project scenario, these areas will be converted to an alternative land use (agriculture-livestock) and will continue to be use for these land uses.
 - * Within the Madre de Dios Amazon REDD project area, the post-deforestation land use constitutes agriculture and livestock. Reforestation does not constitute a post-deforestation land use of the project.
 - * Leakage avoidance activities do not include agricultural lands flooded to increase production and intensifying livestock production.
- **Unplanned deforestation:**
 - * The Madre de Dios Amazon REDD Project baseline agents of deforestation are: small-scale farmers and livestock producers, who do not have rights to deforest nor to use the land for these activities and they are residents or migrants from the reference region.
 - * As it was previously mentioned, definitely the post-deforestation land use of the Madre de Dios Amazon REDD Project does not constitute reforestation. Deforestation agents have agricultural and livestock customs.
 - * Within the Madre de Dios Amazon REDD project boundaries, unsustainable fuelwood collection is not occurring.

2.3 Project Boundary

a. Geographical boundaries

According to the Peruvian definition, the project area qualifies as forest.

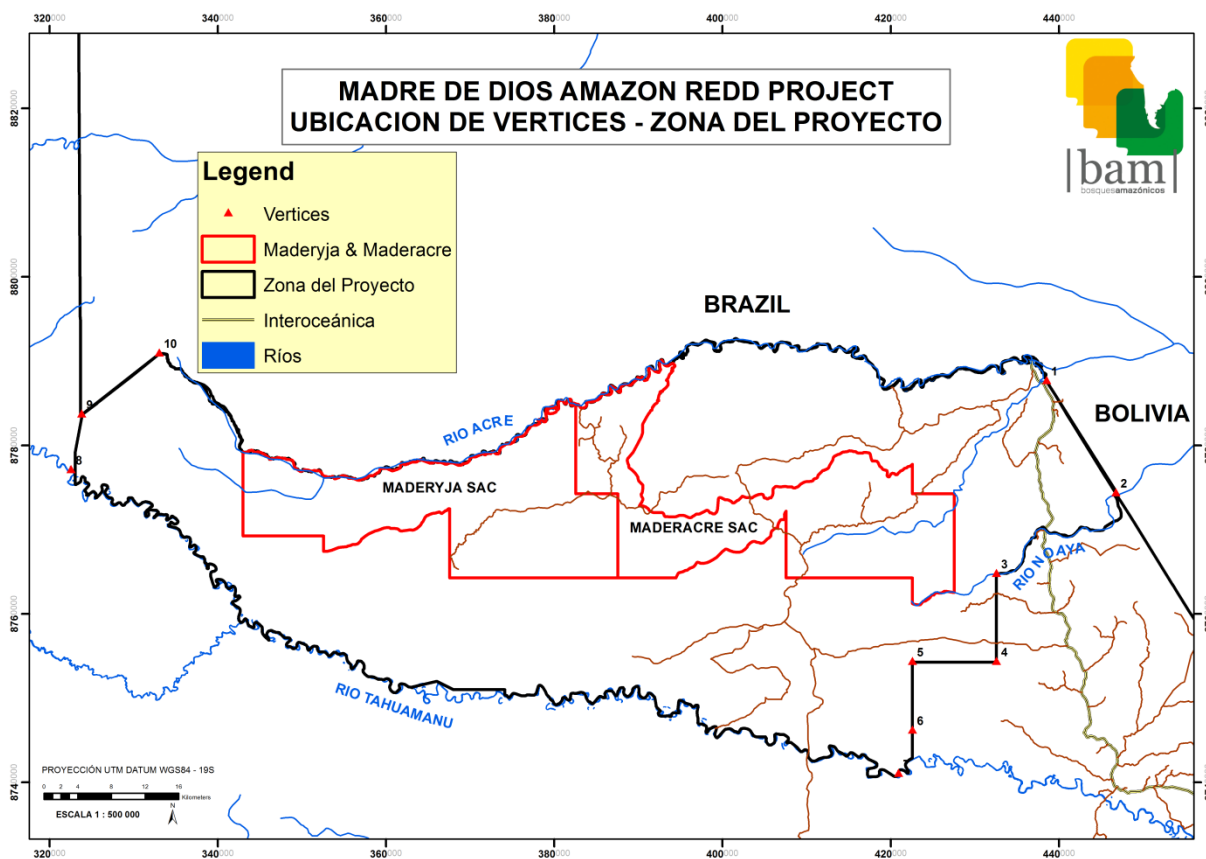


Fig. 57: Map of the project area and the location of the vertexes of the project zone (RRL)

- **Geographical coordinates of each polygon vertex**

Chart 18: Polygon vertexes of the Madre de Dios Amazon REDD project area

Vertex	East	North
1	438521	8787582
2	446766	8774269
3	432562	8764691
4	432562	8754249
5	422557	8754249
6	422557	8746086
7	420910	8740962
Vertex	East	North
8	322540	8777024
9	323813	8783623
10	333038	8790865

- **Project area, leakage belt and reference region (Project Zone)**

Chart 19: Madre de Dios Amazon REDD project area and project zone

Project Area (ha)			Project Zone (ha)		
Concessions	Official	Processed	Areas	Official	Processed
Maderacre	49,377.89	48,738.62	Project Area	98,927.38	95,030.90
Maderyja	49,549.49	46,292.28	Leakage Belt	268,038.77	254,015.6324
Total	98,927.38	95,030.90	Project Zone	366,966.15	349,046.53

All the aforementioned were determined according to the requirements of the BL-UP Module⁴⁵ of the approved VCS REDD Methodology Modules.

- **Rights to land and forest**

The Madre de Dios Amazon REDD project area corresponds to Maderacre SAC and Maderyja SAC timber concessions.

b. Temporal boundaries

- **Start date and end date of the historical reference period**

The SIMAMAZONIA Model has used the historical trend registered from 1997 up to 2002 in order to project deforestation.

- **Start date and end date of the project crediting period**

- * Crediting Period Start date: 1st January 2007
- * Crediting Period End date: 31st December 2046
- * Duration of crediting period: 40 years

⁴⁵ "Estimación de los cambios en stocks de carbono en la línea de base y emisiones de gases de efecto invernadero para la deforestación no planeada del Proyecto Madre de Dios Amazon REDD", Bosques Amazónicos Technical Area, application of the BL-UP Module of the approved VCS REDD Methodology Modules, March 2011, which will be available to the auditors.

As it was mentioned previously, the Madre de Dios Amazon REDD project activity started in the 31st May 2006, according to the FSC certification process starting date. The project crediting period covers the period between 2007 and 2046. The REDD project activities started in 2006, thus being 2006 the year zero of the project.

- **Date at which the project baseline will be revisited**

The Madre de Dios Amazon REDD Project baseline will be revisited every 10 years.

- **Duration of the monitoring periods**

The duration of the monitoring period is determined by the parameters to be monitored, as specified in the Monitoring Plan of the project.

c. Carbon pools

- In the baseline scenario, the following carbon pools have been considered: aboveground biomass, belowground biomass, dead-wood, litter and harvested wood products
- In the project scenario it has been considered that there would be no change in carbon stocks from deforestation or degradation within the Madre de Dios Amazon REDD project area. Activities aiming at protecting the project area from deforestation agents and avoiding leakage are established.

Chart 20: Carbon pools included in the Madre de Dios Amazon REDD Project

Carbon pools	Included / Excluded	Justification
Aboveground biomass	Included	Carbon in aboveground biomass and palms was estimated in similar strata of the project area within the Madre de Dios region and in strata of the project area in a pre-deforestation scenario. Carbon stock in biomass post-deforestation was estimated.
Belowground biomass	Included	Significant in tropical forests
Dead-wood	Included	Included in carbon inventories
Harvested wood products	Included	Included in the baseline scenario
Litter	Included	Included in carbon inventories
Soil organic carbon	Excluded	There is no in-field information for the last five years, being this one of the requirements of the methodology in its Module VMD004 CP-S Soil. Therefore, it was decided to be conservative and not include this pool.

d. Sources of Greenhouse Gases

- In the baseline scenario, other Greenhouse Gases (CH₄ and N₂O) have been considered due to biomass burning: forest biomass (aboveground biomass: tree, litter and dead-wood) and from the nitrogen incorporation in grasslands and agricultural and livestock areas.
- In the project scenario, the emission of other Greenhouse Gases (CH₄ and N₂O) has not been considered due to the fact that no agricultural, grassland or livestock activities will be carried out within the area. Therefore, the area will remain as forest land under sustainable management. The forest will be used for selective logging under sustainable forest management.
- The estimation of emissions from fossil fuels combustion was not considered because it is uncertain how many machines and tools as a result of post-deforestation activities will be incorporated during the baseline. Hence, it was not estimated in the baseline scenario.

Chart 21: Sources of other Greenhouse Gases emissions

Source		Gas	Included?	Justification/Explanation
Baseline	Agriculture	CO ₂	No	Included as carbon stock change
		CH ₄	Yes	Due to burning of agricultural residues
		N ₂ O	Yes	Due to burning of agricultural residues and incorporation of nitrogen fertilizer
		Other		
	Livestock	CO ₂	No	Included as carbon stock change
		CH ₄	No	
		N ₂ O	Yes	Incorporation of nitrogen fertilizer
		Other		
	Biomass burning	CH ₄	Yes	Due to burning of forest aboveground biomass for the development of post-deforestation activities
		N ₂ O	Yes	Due to burning of forest aboveground biomass for the development of post-deforestation activities
Project	Source 1	CO ₂		In a project scenario, there would not be deforested areas and thus no post-deforestation activities which emit Greenhouse Gases will be carried out
		CH ₄		
		N ₂ O		
		Other		
	Source 2	CO ₂		
		CH ₄		
		N ₂ O		
		Other		

e. Sources of leakage

The application of the LK-ASU Module of the approved VCS VM0007 REDD Methodology Modules was considered⁴⁶, leakage due to displacement of unplanned deforestation.

⁴⁶ See item 3.3. of this document including a detailed description of leakage estimation for the Madre de Dios Amazon REDD Project.

2.4 Baseline Scenario

In a scenario where the Madre de Dios Amazon REDD project activities are not implemented, the forest use and forest production by concessionaires would remain initially the same, with sustainable forest management under FSC. The payoff would be good during the early years, however, and given the improvement of the Interoceanic road and the migration of people into the area, there would be major deforestation agents and the concessions areas would be cleared by illegal loggers and settlers to develop agricultural activities. As the opportunity cost scenario and migration are different, these forests are more accessible by the paved road and without an effective surveillance and monitoring system in the project area and project zone, the concessions are invaded by migrant farmers for planting subsistence crops or livestock grazing and illegal loggers. Finally, deforestation within the concessions will be explosive, and by 2046 approximately 86% (81,764.21 ha) of the original forests in the project area would be lost.

Said baseline is based on the projection of the deforestation that would occur within the Madre de Dios region, according to the developed model of SIMAMAZONIA. The deforested areas would be converted to areas with different land uses such as: agriculture, livestock and grasslands. These land uses have been established according to the study developed by CDC and the La Molina Agrarian University in the "Monitoring of land use between Puerto Maldonado and Iñapari, corresponding to the segment 3 of the Interoceanic road for the years 1990, 2000 and 2005", carried out in October 2007. The percentages of land use for agricultural, livestock or agricultural and livestock activities determined for the year 2005 have been used to develop the baseline.

The emission of other GHGs that would occur in the baseline due to the burning of aboveground biomass has been considered due to the fact that the forest is burned by deforestation agents in half of its area before using the land. The agricultural crop that is mainly cultivated in the zone is maize and Brachiaria grass. The incorporation of nitrogen fertilizer is also considered in 100 kg/ha (conservative value as experts and literature indicate between 150 to 200 kg/ha).

a. APPLICATION OF THE BL-UP MODULE OF THE REDD METHODOLOGY MODULES⁴⁷**PART 1: DEFINITION OF BOUNDARIES****Step 1.1.: Definition of the spatial and geographical boundaries**

The area of the Madre de Dios Amazon REDD Project is located in the Madre de Dios department, Tahuamanu province and Iñapari district. It is geographically limited by the Tahuamanu River to the south; by other timber concessions to the east, following the course of the Noaya River; by the Bolivian border to the north-east; by the Acre River to the north, which is the natural border between Peru and Brazil; and by the Alto Purus Reserved Zone to the west. The reference points of the boundaries of the project appear in Chart 22 below, clockwise and in correlative order, based in the georeferenciation of the main vertexes.

Chart 22: Polygon vertexes of the Madre de Dios Amazon REDD project area

Vertex	East	North
1	438521	8787582
2	446766	8774269
3	432562	8764691
4	432562	8754249
5	422557	8754249
6	422557	8746086
7	420910	8740962
8	322540	8777024
9	323813	8783623
10	333038	8790865

⁴⁷ According to the document: "Estimación de los cambios en los stocks de carbono en la línea de base y emisiones de gases de efecto invernadero para la deforestación no planeada del Proyecto Madre de Dios Amazon REDD", Bosques Amazónicos Technical Area, application of the BL-UP Module of the approved VCS VM0007 REDD Methodology Modules, March 2011, which will be available to the auditors.

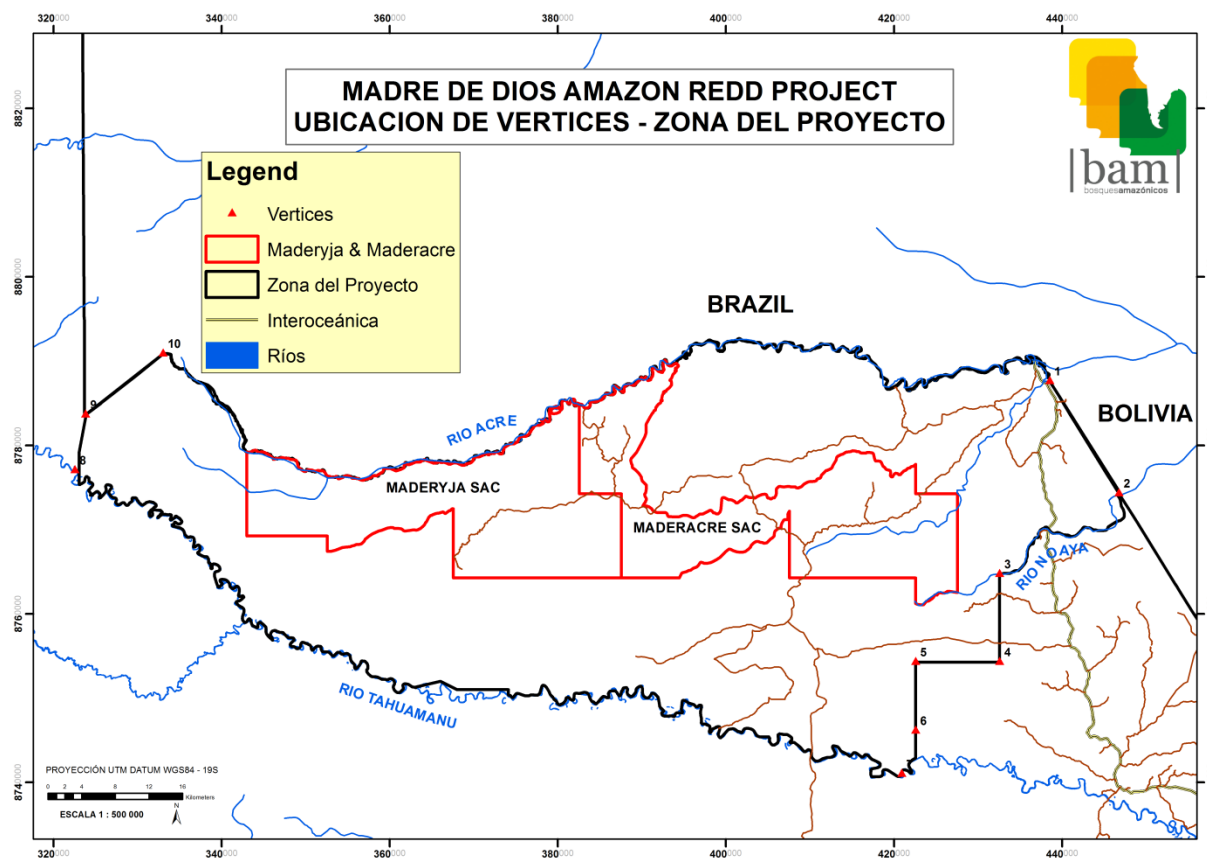


Fig. 58: Location of the vertexes of the project zone (RRL)

1.1.1. Reference region

1.1.1.1. Reference region for projecting deforestation rate (RRD)

The prediction model for deforestation developed by SIMAMAZONIA⁴⁸ has been used. This model will be used until the results of projected deforestation for the Madre de Dios region are obtained and available. This regional model of deforestation is being developed by the Regional Government of Madre de Dios and other public and private entities, but it is still in its initial stages of development.

SIMAMAZONIA model simulates deforestation in the Amazon basin and incorporates the main paved roads. The study establishes 47 subregions throughout the Amazon basin, four of which are located in Peru, one of them in the Madre de Dios region, covering an area of 84,861 km².

⁴⁸ <http://www.csr.ufmg.br/simamazonia/>

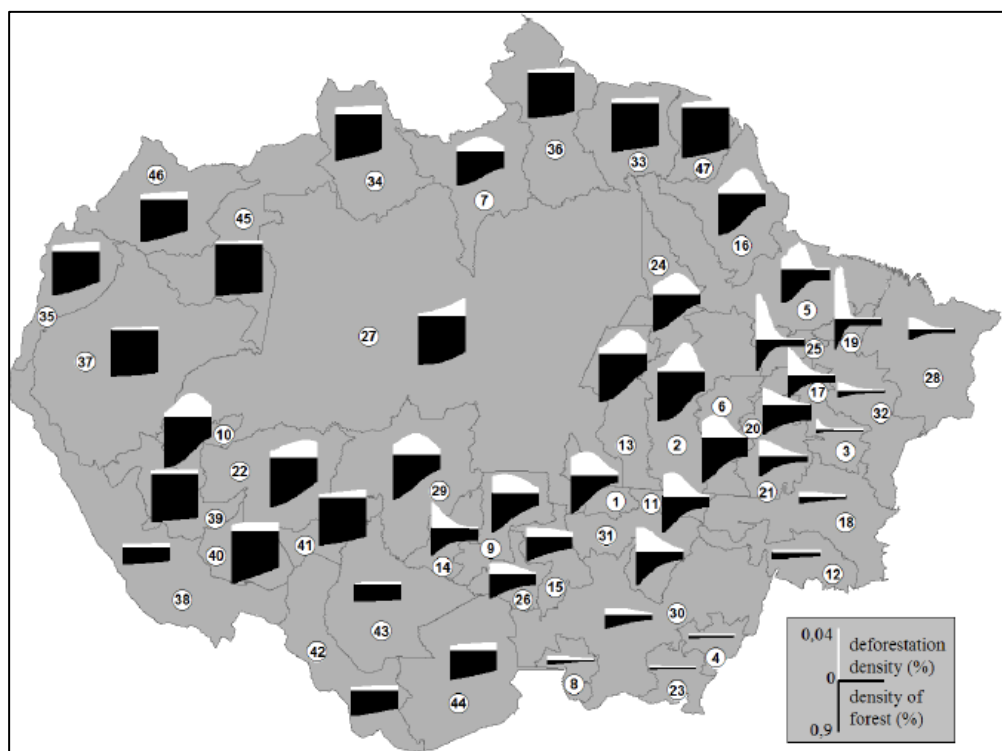


Fig. 59: Stratification of the Amazon basin, subregion 40 corresponds to the Madre de Dios department. Source: SIMAMAZONIA

1.1.1.2. Reference region for projecting location of deforestation (RRL)

According to the criteria established by the REDD Methodology Modules⁴⁹ for the delimitation of the project zone, the following formula must be used to determine its minimum size:

$$\text{MREF} = \text{RAF} \times \text{PA} \quad (1)$$

$$\text{RAF} = 7500 \times \text{PA}^{-0.7} \quad (2)$$

Where:

MREF Minimum size of reference region (ha)

PA Project area (ha)

RAF Reference area factor (dimensionless)

⁴⁹ Approved VCS Module VM0007, Version 1.0, REDD Methodological Module: Estimation of the baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP), Sectoral Scope 14, developed by Avoided Deforestation Partners.

For the Madre de Dios Amazon REDD Project:

$$\text{RAF} = 7500 * (\text{PA})^{-0.7}$$

	Official data	Processing data
PA	98,927.38	95,030.90
RAF	2.39	2.46
MREF	236,404.76	233,571.97
ZONE	366,966.15	349,046.53

In order to estimate the minimum area required as the project zone, the calculations have been made according to the VMD0007 BL-UP Module of the approved VCS REDD Methodology Modules. In this sense, two different data were used, the official data and the processing data. In both cases, the areas determined exceed the minimum required according to the VMD0007 BL-UP Module. As it was previously explained, for all the calculations areas that are different from the official ones have been used, due to the fact that the SIMAMAZONIA shapes that are used for the deforestation modeling do not cover the entire official areas. These new areas are called processing areas and are those that will be used for subsequent calculations⁵⁰. The information of the SIMAMAZONIA model has been used, which projects deforestation in the subregion 40 (corresponding to Madre de Dios region). This information has been extracted to a smaller area established as the project zone and determined based on the methodology developed by IDESAM, Sustainable Amazon Foundation and Carbon Decisions, taking into account the following criteria:

- * The main rivers near to the project area, because they represent geographical barriers to deforestation, have defined the boundaries of the zone (Tahuamanu, Acre and Noaya Rivers).
- * The border with Brazil, because it represents an administrative and legal barrier, is a natural boundary of the zone.
- * Timber concessions, agricultural concessions (small scale) and urban areas adjacent to the project area.

⁵⁰ Further information can be found in Annex 1 of the document "Estimación de los cambios en los stocks de carbono en la línea de base y emisiones de gases de efecto invernadero para la deforestación no planeada del Proyecto Madre de Dios Amazon REDD", Bosques Amazónicos Technical Area, application of the BL-UP Module of the approved VCS VM0007 REDD Methodology Modules, March 2011, which will be available to the auditors.

For the determination of the project zone, the proportionality ($\pm 20\%$) of the units of forest types, physiography and soil types between the project zone and project area has been maintained, according to the requirements of the REDD Methodology Modules, so as to maintain similar conditions that influence deforestation.

Hereunder, charts including forest types, soils and physiography and their percentage areas in the project area and the project zone are presented. As it can be seen, the required proportionality of $\pm 20\%$ has been maintained.

Chart 23: Similarity of forest types between the project zone and project area

Forest Types	Code	Hectares Zone (ha)	Percentage Zone (%)	Hectares Area (ha)	Percentage Area (%)
Intervened areas – Deforestation	AI	18,957.46	5.43	808.86	0.85
Low hill forest with “paca”	BPCB	223,416.64	64.01	73,841.24	77.70
Low hill forest with “paca” and shiringa stands	BPCB	8,746.03	2.51	3,617.58	3.81
High terrace forest with “paca”	BPT	25,019.12	7.17	7,774.31	8.18
High terrace forest with “paca” and shiringa stands	BPT	88.68	0.03		-
Low terrace flooded forest with “paca”	BTI	9,382.62	2.69	1,200.72	1.26
Medium terrace forest with “paca”	BPT	677.42	0.19		-
Low hill forest	BCB	35,877.33	10.28	163.71	0.17
Low hill forest with shiringa stands	BCB	1,532.96	0.44	36.50	0.04
High terrace forest with shiringa stands	BT	11,476.15	3.29		-
Low terrace flooded forest	BTI	103.17	0.03		-
Medium terrace forest	BT	283.52	0.08		-
Water courses	NB	367.57	0.11	1.32	0.00
Low hill “Pacal”	P	3,837.45	1.10	2,504.58	2.64
High terrace “Pacal”	P	6,510.07	1.87	4,698.31	4.94
Low terrace flooded “Pacal”	P	466.82	0.13	383.75	0.40
Swamp with trees	PA	2,303.51	0.66		-
Total		349,046.54	100.00	95,030.88	100.00

Chart 24: Similarity of physiography between the project zone and project area

Physiography	Hectares Zone (ha)	Percentage Zone (%)	Hectares Area (ha)	Percentage Area (%)
Strongly dissected low hills	77,808.01	22.29	5,952.40	6.26
Slightly dissected low hills	96,082.54	27.53	23,871.04	25.12
Moderately dissected low hills	83,680.57	23.97	38,126.22	40.12
Water courses	367.57	0.11	1.32	0.00
Hills	24,579.60	7.04	12,950.03	13.63
Strongly dissected high terraces	43,618.97	12.50	12,545.45	13.20
Slightly dissected high terraces	1,090.20	0.31		0.00
Moderately dissected high terraces	6,368.84	1.82		0.00
Low terraces with good to moderate drainage	9,313.31	2.67	1,027.49	1.08
Low terraces with imperfect to poor drainage	2,381.88	0.68		0.00
Medium terraces with good to moderate drainage	40.35	0.01		0.00
Medium terraces with imperfect to poor drainage	475.35	0.14		0.00
Moderately dissected medium terraces	874.54	0.25		0.00
Valleys of streams	2,364.81	0.68	556.98	0.59
Total	349,046.54	100.00	95,030.93	100.00

Chart 25: Similarity of soil types between the project zone and project area

Soil Types	Hectares Zone (ha)	Percentage Zone (%)	Hectares Area (ha)	Percentage Area (%)
Water courses	367.57	0.105	1.32	0.001
Fluvaquentic Eutrochets	2,381.88	0.682		0.000
Typic Dystrudepts	37,548.25	10.757	2,899.61	3.051
Typic Dystrudepts – Typic Rodhudepts	183.14	0.052		0.000
Typic Epiaquepts – Typic Epiaquepts	475.35	0.136		0.000
Typic Hapludalfs	2,285.43	0.655		0.000
Typic Hapludults	1,693.83	0.485	861.10	0.906
Typic Hapludults – Typic Hapludalfs	288,008.17	82.513	90,241.41	94.960
Typic Udifluvents – Aquic Dystrudepts	454.19	0.130		0.000
Typic Udifluvents – Typic Udifluvents	8,859.12	2.538	1,027.49	1.081
Ultic Hapludalfs	6,789.61	1.945		0.000
Total	349,046.54	100	95,030.93	100

1.1.2. Project area and leakage belt determination

The Madre de Dios Amazon REDD Project includes a total area of 98,927.38 hectares. The official leakage belt of the project is the difference between the project zone (RRL) and the project area and for the case of the Madre de Dios Amazon REDD Project includes a total area of 268,038.77 hectares (see chart 26 below).

The processing areas used for the calculations are: 95,030.9 ha for the project area and 254,015.6324 ha for the leakage belt (see chart 26 below).

As it was previously mentioned, the project is located in the Acre River basin, Iñapari district, Tahuamanu province.

Chart 26: Madre de Dios Amazon REDD project area, leakage belt and project zone

Project Area (ha)			Project Zone (ha)		
Concessions	Official	Processed	Areas	Official	Processed
Maderacre	49,377.89	48,738.62	Project Area	98,927.38	95,030.90
Maderyja	49,549.49	46,292.28	Leakage Belt	268,038.77	254,015.6324
Total	98,927.38	95,030.90	Project Zone	366,966.15	349,046.53

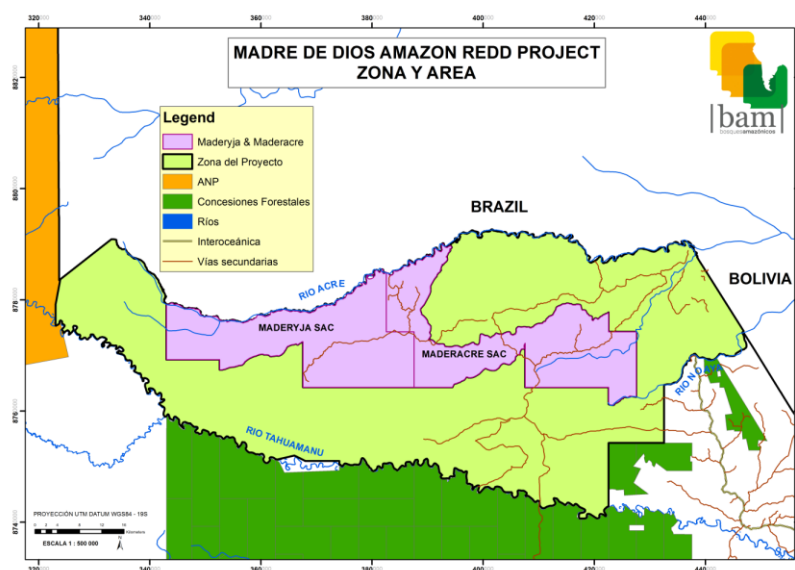


Fig. 60: Location of the project area and project zone

Step 1.2.: Temporal boundaries

- **Start date and end date of the historical reference period**

The SIMAMAZONIA Model has used the historical trend registered from 1997 up to 2002 in order to project deforestation.

- **Start date and end date of the project crediting period**

- * Crediting Period Start date: 1st January 2007
- * Crediting Period End date: 31 December 2046
- * Duration of crediting period: 40 years

As it was mentioned previously, the Madre de Dios Amazon REDD project activity started in the 31st May 2006, according to the FSC certification process starting date. The project crediting period covers the period between 2007 and 2046. The REDD project activities started in 2006, thus being 2006 the year zero of the project.

- **Date at which the project baseline will be revisited**

The Madre de Dios Amazon REDD Project baseline will be revisited every 10 years.

PART 2: ESTIMATION OF ANNUAL AREAS OF UNPLANNED DEFORESTATION

Step 2.1.: Analysis of historical deforestation

The SIMAMAZONIA model individualized deforestation rates, calculating them for each subregion. Deforestation rates were estimated through historical trends (from 1997 up to 2002) resulting from deforestation maps based on satellite images. The proximity of paved roads is the main driver of these deforestation rates. Increased proximity to paved roads accelerates the deforestation within the subregion to a turning point where the forests, without considering protected areas, begin to be scarce.

2.1.1. Collection of appropriate data sources and calculation of the historical deforestation rate

The data used to determine the location and amount of deforestation within the project area is that determined by SIMAMAZONIA in its deforestation model. Said data has been taken from the region 40 of the study, a region corresponding to the Madre de Dios department where the Madre de Dios Amazon REDD Project is located. The input data for each subregion consists of the deforestation rate and its annual mean derivatives, as well as the extent of the remaining forests, deforested lands and

protected areas⁵¹. For subregion 40, correspondent to the Madre de Dios Amazon REDD Project area, the following data was presented:

Chart 27: Data for the subregion 40 of SIMAMAZONIA Model

Country	Subregion	Area	Forest 2001	Deforest. 2001	Non-Forest	2001 Gross Deforest.	2001 Net Deforest.	Annual Variation (%)	Protected Forest	Prot. Forest + ARPAS
Peru	40	84.861	80,865	1,246	2,751	331	0.41%	2.96%	40,603	40,603

In the subregion 40, corresponding to Madre de Dios, the annual rates of deforestation and its variation were assigned through the application of the numbers of those Brazilian subregions that were considered similar in the frontier deforestation type.

The PRODES data (Project of Estimation of Amazon Deforestation) for three time periods (1997-2000, 2000-2001 and 2001-2002) were used to obtain the deforestation rate of the period 2001-2002. For the case of Peru, the annual deforestation rates and their variations were assigned through the application of the numbers of those Brazilian subregions which were considered similar.

The model of deforestation projection was carried out using the VENSIM software. This model is designed to project the cutting of trees in each subregion, processing of historical deforestation data, roads paving and existing and proposed protected areas. Therefore, it generates the deforestation scenarios at a “t” time and is calculated as follows:

$$deforestation_t = forest_t * fd_t$$

forest_t is considered as the remaining forest in each subregion and fd_t is the net deforestation rate at a “t” time, such that:

$$fd_t = fd_{t-1} (1 + \Delta fd_t * (1 + acc\_f * ddratio_t) * sat_t)$$

⁵¹ From Supplementary information to “Amazon Conservation Scenarios”, page 11; <http://www.csr.ufmg.br/simamazonia/apresenta/suppl.pdf>

The net deforestation rate ($fd_{2001/2002}$) is obtained by dividing the deforestation between the years 2001-2002 of the remaining forest in 2001. The Δfdt term represents the annual average of the deforestation rate derivatives; acc_f is a constant, between 0 and 1, to impose a delay in the adjustment of the deforestation rates in response to the increasing pressure coming from the paving of the road, as it is represented by $ddratio$ in the previous equation.

Thus, the estimation of the net deforestation has been designed to incorporate a lag between the completion of road paving within a subregion and the deforestation that is simulated⁵².

Step 2.2.: Estimation of the annual areas of unplanned deforestation in the project zone

The deforestation simulated by SIMAMAZONIA for subregion 40 projects for the year 2010 in the project zone a total of 54,944.25 deforested hectares and for the year 2046 275,379.8 deforested hectares.

In the following chart, the annual areas of deforestation by stratum in the project zone are shown. The swamp with trees stratum (PA) at the beginning does not present any deforestation, however from 2011 begins to lose biomass. The methodology for stratification and the determined strata are presented in Part 4 of this chapter.

⁵² From <http://www.csr.ufmg.br/simamazonia/apresenta/suppl.pdf>, page 12.

Chart 28: Projected deforestation in the Madre de Dios Amazon REDD project zone, for the period 2006-2046, in each stratum (forest type)

Project year t	Año	Stratum i in the reference region								Total RR annual accumulated $ABSLRR_t$ ha
		BPCB	BPT	BTI	BCB	BT	P	PA	AI	
		$ABSLRR_{it}$ ha	$ABSLRR_{it}$ ha	$ABSLRR_{it}$ ha	$ABSLRR_{it}$ ha	$ABSLRR_{it}$ ha	$ABSLRR_{it}$ ha	$ABSLRR_{it}$ ha	$ABSLRR_{it}$ ha	
0	2006	14,018.31	1,411.24	188.17	752.66	2,728.40	-	-	7,338.44	26,437.22
1	2007	19,757.35	2,257.98	282.25	1,034.91	3,198.81	94.08	-	8,561.52	35,186.90
2	2008	23,896.99	2,634.31	282.25	2,069.82	3,857.39	376.33	-	9,408.26	42,525.35
3	2009	28,507.03	2,728.40	470.41	2,540.23	4,139.64	376.33	-	10,066.84	48,828.88
4	2010	32,364.42	3,010.64	846.74	3,481.06	4,515.97	376.33	-	10,349.09	54,944.25
5	2011	37,821.21	3,951.47	940.83	4,515.97	4,798.21	1,411.24	94.08	11,289.91	64,822.93
6	2012	46,194.57	6,303.54	1,599.40	5,833.12	5,644.96	1,411.24	94.08	12,701.15	79,782.06
7	2013	50,804.62	6,868.03	1,787.57	6,773.95	6,021.29	1,411.24	94.08	13,736.06	87,496.84
8	2014	57,014.07	8,185.19	2,163.90	7,902.94	6,397.62	1,599.40	94.08	14,394.64	97,751.85
9	2015	61,059.62	9,031.93	2,352.07	9,031.93	6,585.78	1,787.57	94.08	15,147.30	105,090.29
10	2016	65,951.92	10,066.84	2,352.07	10,443.17	6,962.11	1,881.65	94.08	16,464.46	114,216.30
11	2017	69,338.89	11,101.75	2,352.07	11,289.91	6,962.11	2,069.82	94.08	16,746.71	119,955.34
12	2018	74,701.60	12,701.15	2,446.15	12,230.74	7,056.20	2,822.48	376.33	16,840.79	129,175.44
13	2019	78,841.24	13,453.82	2,822.48	13,641.98	7,056.20	3,292.89	376.33	17,311.20	136,796.13
14	2020	82,980.87	14,582.81	2,916.56	13,736.06	7,526.61	3,292.89	470.41	17,499.37	143,005.59
15	2021	87,402.76	15,241.38	3,198.81	13,924.23	7,997.02	3,669.22	470.41	17,593.45	149,497.29
16	2022	93,047.71	15,899.96	3,575.14	14,018.31	8,279.27	4,045.55	470.41	17,781.62	157,117.98
17	2023	97,093.27	16,182.21	3,857.39	14,488.72	8,279.27	4,327.80	470.41	17,781.62	162,480.69
18	2024	102,644.14	16,558.54	3,857.39	14,582.81	8,279.27	4,798.21	470.41	18,063.86	169,254.64
19	2025	106,689.69	16,746.71	4,045.55	15,899.96	8,561.52	5,268.63	470.41	18,346.11	176,028.59
20	2026	111,581.99	16,746.71	4,139.64	17,123.04	8,561.52	5,456.79	470.41	18,440.19	182,520.29
21	2027	117,132.87	17,593.45	4,233.72	18,063.86	8,843.77	5,550.87	470.41	18,628.36	190,517.31
22	2028	122,119.25	18,252.03	4,610.05	18,816.52	8,843.77	5,550.87	470.41	18,816.52	197,479.43
23	2029	127,670.12	18,628.36	4,798.21	19,663.27	8,843.77	5,550.87	658.58	18,910.61	204,723.79
24	2030	130,680.76	19,192.86	4,986.38	20,321.85	8,843.77	5,644.96	658.58	18,910.61	209,239.75
25	2031	136,419.80	19,286.94	4,986.38	20,510.01	8,843.77	5,833.12	846.74	18,910.61	215,637.37
26	2032	140,747.60	19,381.02	5,174.54	21,262.67	8,843.77	6,021.29	846.74	19,098.77	221,376.41
27	2033	147,145.22	19,381.02	5,268.63	22,485.75	8,937.85	6,209.45	940.83	19,098.77	229,467.52
28	2034	151,002.61	19,569.19	5,550.87	23,991.07	8,937.85	6,303.54	940.83	19,098.77	235,394.72
29	2035	156,365.32	19,945.52	5,739.04	24,743.73	8,937.85	6,585.78	1,034.91	19,192.86	242,545.00
30	2036	160,034.54	20,133.68	5,927.21	25,025.98	8,937.85	6,585.78	1,034.91	19,192.86	246,872.80
31	2037	163,891.93	20,227.76	6,021.29	25,778.64	9,126.01	7,150.28	1,034.91	19,192.86	252,423.68
32	2038	166,808.49	20,415.93	6,303.54	26,343.13	9,126.01	7,150.28	1,034.91	19,192.86	256,375.15
33	2039	170,759.96	20,604.09	6,491.70	27,189.88	9,220.10	7,338.44	1,223.07	19,192.86	262,020.11
34	2040	176,593.08	20,698.18	6,491.70	27,848.46	9,220.10	7,526.61	1,223.07	19,192.86	268,794.05
35	2041	180,920.88	21,168.59	6,491.70	29,447.86	9,784.59	7,714.78	1,223.07	19,192.86	275,944.33
36	2042	185,530.93	21,450.84	6,962.11	31,423.60	10,160.92	7,902.94	1,223.07	19,192.86	283,847.27
37	2043	188,635.66	21,639.00	7,056.20	32,082.17	10,160.92	7,902.94	1,223.07	19,192.86	287,892.83
38	2044	192,587.13	21,639.00	7,244.36	32,740.75	10,160.92	8,279.27	1,223.07	19,192.86	293,067.37
39	2045	197,761.67	21,733.09	7,526.61	33,399.33	10,160.92	8,279.27	1,223.07	19,286.94	299,370.91
40	2046	199,172.91	21,733.09	7,620.69	33,963.83	10,160.92	8,655.60	1,223.07	19,286.94	301,817.06
										275,379.8

Step 2.3.: Estimation of the annual areas of unplanned deforestation in the project area

In the following chart, the annual areas of deforestation in the project area are shown, based on the model developed by SIMAMAZONIA. For the year 2046 an accumulated deforestation of 81,764.21 hectares is estimated. The terrace forest (BT) and swamp with trees (PA) strata do not occur in the project area.

Chart 29: Projected deforestation in the Madre de Dios Amazon REDD project area, for the period 2007-2046, per each stratum (forest type)

Project year t	Año	Stratum i of the reference region in the project area								Total PA annual
		BPCB	BPT	BTI	BCB	BT	P	PA	AI	
		$ABSLPA_{i,t}$	$ABSLPA_{i,t}$	$ABSLPA_{i,t}$	$ABSLPA_{i,t}$	$ABSLPA_{i,t}$	$ABSLPA_{i,t}$	$ABSLPA_{i,t}$	$ABSLPA_{i,t}$	$ABSLPA_t$
		ha	ha	ha	ha	ha	ha	ha	ha	ha
0	2006	7,056.75	-	470.45	-	-	-		188.18	7,715.38
1	2007	10,161.72	94.09	470.45	-	-	94.09		188.18	11,008.53
2	2008	11,761.25	94.09	470.45	188.18	-	376.36		282.27	13,172.60
3	2009	14,395.77	94.09	470.45	188.18	-	376.36		282.27	15,807.12
4	2010	15,336.67	94.09	470.45	188.18	-	564.54		282.27	16,936.20
5	2011	17,406.65	658.63	470.45	188.18	-	1,223.17		282.27	20,229.35
6	2012	19,758.90	1,317.26	564.54	188.18	-	1,317.26		376.36	23,522.50
7	2013	21,734.79	1,317.26	564.54	188.18	-	1,411.35		376.36	25,592.48
8	2014	24,181.13	1,693.62	564.54	188.18	-	1,599.53		376.36	28,603.36
9	2015	26,251.11	2,258.16	658.63	188.18	-	1,787.71		376.36	31,520.15
10	2016	28,038.82	2,728.61	658.63	282.27	-	2,069.98		376.36	34,154.67
11	2017	29,167.90	3,104.97	658.63	282.27	-	2,258.16		376.36	35,848.29
12	2018	32,084.69	3,481.33	658.63	282.27	-	3,010.88		470.45	39,988.25
13	2019	33,590.13	4,139.96	658.63	282.27	-	3,669.51		470.45	42,810.95
14	2020	35,660.11	4,234.05	658.63	282.27	-	3,763.60		470.45	45,069.11
15	2021	37,259.64	4,516.32	658.63	282.27	-	4,234.05		470.45	47,421.36
16	2022	41,493.69	4,986.77	658.63	282.27	-	4,798.59		470.45	52,690.40
17	2023	43,375.49	5,174.95	752.72	282.27	-	4,986.77		470.45	55,042.65
18	2024	46,856.82	5,174.95	752.72	282.27	-	5,363.13		470.45	58,900.34
19	2025	48,362.26	5,739.49	752.72	282.27	-	5,645.40		470.45	61,252.59
20	2026	50,244.06	5,739.49	752.72	282.27	-	5,645.40		564.54	63,228.48
21	2027	52,219.95	5,927.67	752.72	282.27	-	5,739.49		564.54	65,486.64
22	2028	53,443.12	6,115.85	752.72	282.27	-	5,739.49		564.54	66,897.99
23	2029	56,265.82	6,398.12	752.72	282.27	-	5,739.49		564.54	70,002.96
24	2030	57,677.17	6,398.12	846.81	282.27	-	5,739.49		564.54	71,508.40
25	2031	59,276.70	6,492.21	846.81	282.27	-	5,833.58		564.54	73,296.11
26	2032	60,029.42	6,492.21	940.90	282.27	-	5,833.58		564.54	74,142.92
27	2033	62,005.31	6,492.21	940.90	282.27	-	6,021.76		564.54	76,306.99
28	2034	63,134.39	6,492.21	940.90	282.27	-	6,115.85		564.54	77,530.16
29	2035	64,922.10	6,586.30	940.90	282.27	-	6,209.94		564.54	79,506.05
30	2036	65,486.64	6,680.39	1,034.99	282.27	-	6,209.94		564.54	80,258.77
31	2037	65,957.09	6,680.39	1,034.99	282.27	-	6,586.30		564.54	81,105.58
32	2038	66,615.72	6,680.39	1,129.08	282.27	-	6,586.30		564.54	81,858.30
33	2039	66,992.08	6,774.48	1,129.08	282.27	-	6,680.39		564.54	82,422.84
34	2040	68,309.34	6,774.48	1,223.17	282.27	-	6,868.57		658.63	84,116.46
35	2041	68,967.97	6,962.66	1,223.17	282.27	-	6,962.66		658.63	85,057.36
36	2042	69,720.69	7,150.84	1,411.35	282.27	-	7,056.75		658.63	86,280.53
37	2043	70,191.14	7,150.84	1,411.35	282.27	-	7,056.75		658.63	86,750.98
38	2044	70,755.68	7,150.84	1,411.35	282.27	-	7,056.75		658.63	87,315.52
39	2045	72,072.94	7,244.93	1,411.35	282.27	-	7,150.84		658.63	88,820.96
40	2046	72,355.21	7,244.93	1,411.35	282.27	-	7,527.20		658.63	89,479.59
										81,764.21

Step 2.4.: Analysis of deforestation constraints

2.4.1. Identification of land-use constraints

Most of the project area and project zone has no constraints for changing land-use and developing agriculture and livestock activities. The project zone and project area can be deforested by different internal and external agents. The deforestation model projects a total of 81,764.21 deforested hectares for the year 2046 within the project area and 275,379.8 hectares within the project zone.

The physiography of the area is not a real constraint for the access and the deforestation of forested areas, taking into account that the project area does not present a rugged topography or significant elevations. Likewise, deforestation agents in similar forested areas near to the project have entered said areas and developed within them activities other than forestry.

By 2046, according to the modeling, the deforested areas would include flooded areas and areas with hills and terraces. The main dynamic processes that affect the project zone would be landslides and flooding that could be exacerbated by the removal of tree biomass.

With respect to rainfall, in general terms, the area is characterized by the presence of abundant rainfall during most 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. It can be appreciated that the less intense rainfall occurs during the months of May to September, where between 20 and 25% of the total annual rainfall occurs. During the richest period, from October to April, 75% to 80% of the total annual rainfall occurs. Average annual rainfall is approximately 1800 mm (Barrios, 2008). This pattern has a significant influence on the development of vegetation in the zone and may define the “vigor” of forests in terms of primary productivity. Likewise, the seasonal behavior limits the access of the deforestation agents into the zone because the development of forest extraction activities, logging, and burning, which cause deforestation, are circumscribed to the dry season.

In the upland forests within the project area, soils are poor in nutrients due to the nature of the lithology, weathering (caused by high temperatures and humidity) and nutrient leaching due to heavy rains during most of the year. This is a barrier to the implementation of agricultural and livestock activities in this forest types, which do not occur in alluvial or floodplain forests that do have natural fertility due to the nutrient input from rivers in their area of influence.

2.4.2. Identification of forest land that is suitable for deforestation

According to the Ecological-Economic Zoning Map, the areas defined as “Area of potential use”, other than forestry, can be seen. The ecological-economic zoning (IIAP, 2009) determines them as potential areas for grazing, agriculture or other uses than forestry, although these areas are covered by forests. The remaining area of the project zone, as it was previously described, may be used or misused for other purposes other than forestry by deforestation agents, although this map identifies them as “areas of potential forestry use”. Therefore, although there is a map that determines those areas that are suitable for deforestation, this is not a constraint for deforestation agents to expand their activities to larger areas of forest, as shown by the SIMAMAZONIA model.

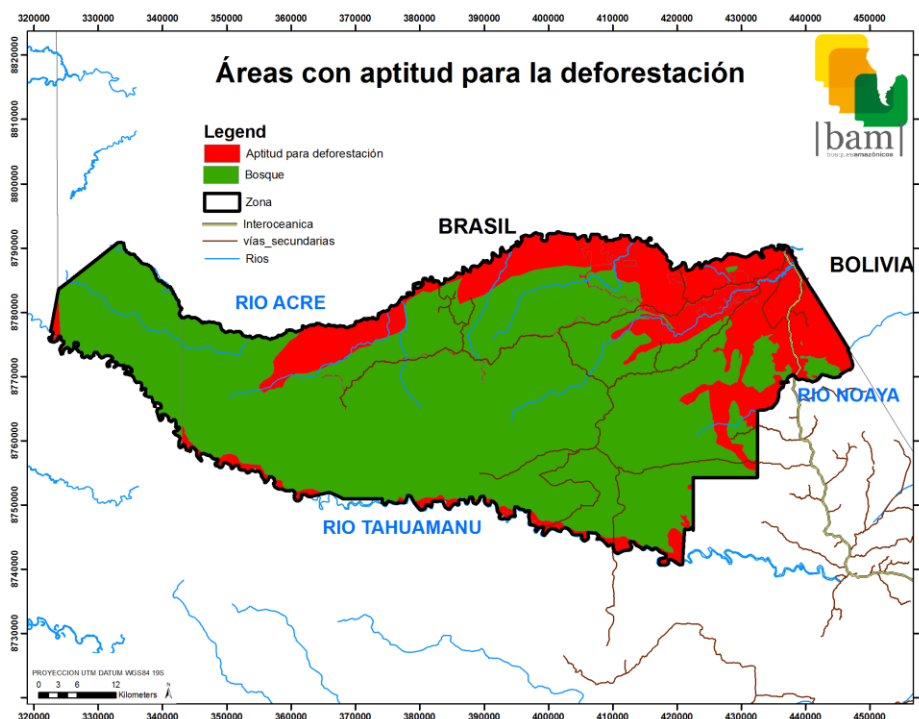


Fig. 61: Suitability for deforestation based on the ecological-economic zoning

In the following picture, map of deforestation modeling, according to the SIMAMAZONIA Deforestation Model, the 275,379.8 deforested hectares within the project zone can be seen.

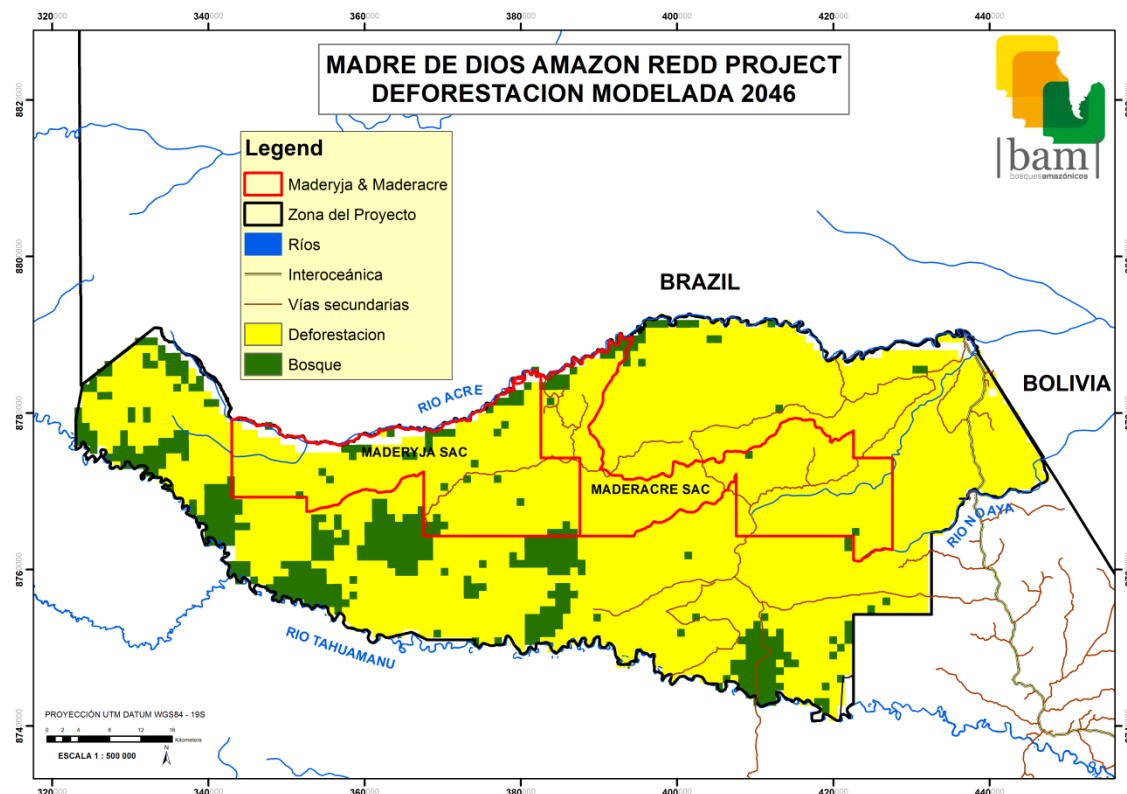


Fig. 62: Deforestation modeled by SIMAMAZONIA by the year 2046 for the project area

PART 3: LOCATION AND QUANTIFICATION OF THREATS OF UNPLANNED DEFORESTATION

Step 3.0.: Location analysis

The configuration of deforestation in the project zone corresponds to an analyzed and frontier deforestation, thus a location analysis is required.

The spatial distribution of deforestation within the Amazon region is simulated, with custom parameters for each subregion, as explained in the model. These assign the deforestation based on their empirical relationships with proximity to roads, rivers and villages, the land-use zoning and biophysical characteristics.

Step 3.1.: Preparation of data sets for spatial analysis**3.1.1. Requirements of the spatial models**

The deforestation modeling takes into account the development of new transport infrastructure to determine the negative pressure on natural resources.

Madre de Dios with the Interoceanic road will improve its transport connectivity between Brazil, Peru and Bolivia. The future of Madre de Dios, then, will depend on the relations with its geographical neighbors. The Interoceanic road will open international markets and facilitate the movement between regions that were historically isolated. It will also change the economic incentives, political pressure, identities and the relative weights of the main social agents of the region (Fernández Felipe-Morales, 2009).

The Interoceanic road will contribute to reduce transport costs, to improve communication, articulate markets and promote the development of the region, as well as facilitate the extraction of forest resources in an unsustainable manner (Fernández Felipe-Morales, 2009). The stability improvement of the road networks will benefit the transportation industry to offset the huge losses due to costly repairs of the road (Bonifaz and Urunaga, 2006).

Deforestation is a direct consequence of the agricultural expansion and small and large scale animal husbandry. The improvement of the road will make these activities to be more profitable. Land trade is now a growing activity along the Interoceanic road since prices have doubled and even tripled. Buyers tend to be foreign and regional governmental proposals are intensive crops such as sugar cane and soy (Dourojeanni, 2006b).

3.1.2. Preparation of spatial datasets

In order to incorporate the expected influence of the simulations by the paving of the Interoceanic road, a timetable of likely dates in which the paving will be completed has been established. These dates have been based on the analysis of governmental documents and discussions with governmental officials. The completion of the paving activities have been scheduled for the next three decades (see chart 30). All the roads have an effect on deforestation, not only by increasing regional rates, but also initiating new deforestation frontiers.

As shown in chart 30, the Cuzco-Puerto Maldonado and Puerto Maldonado-Asis (Brazil-Acre) segment of the Interoceanic road has been considered in this analysis.

Chart 30: Road paving Program in the Amazon

key	code	road name	tracks to be paved	paving completion
1-1'	BR-230	Transamazônica	from <i>Araguatins</i> (TO) to <i>Inupiranga</i> (PA)	2008
2-2'	BR-230	Transamazônica	from <i>Inupiranga</i> (PA) to BR-163	2012
3-3'	BR-230	Transamazônica	from TO-040 to GO-118 and associated tracks in MA and TO	2025
4-4'	BR-163	Cuiabá-Santarém	from intersection to <i>Colider</i> (MT) to BR-230 (Transamazônica)	2008
5-5'	BR-163	Cuiabá-Santarém	from BR-230 (Transamazônica) to <i>Santarém</i>	2008
6-6'			between <i>Alta Floresta</i> (MT) and BR-364, near <i>Ariquemes</i> (RO)	2025
7-7'	BR-319	Manaus-Porto Velho	from 160 km south of BR-174 southwards	2012
8-8'	BR-319	Manaus-Porto Velho	from 195 km south of BR-174 southwards	2018
9-9'	BR-210		from kilometer 75 to kilometer 175	2008
10-10'	BR-210		from kilometer 175	2025
11-11'	BR-401		from <i>Bomfim</i> (RR) to <i>Queenstown</i> (Guyana)	2012
12-12'	BR-156	Cayenne-Oiapoque	from 150km north of <i>Santana</i> (AP) to <i>Matoury</i> (French Guiana)	2018
13-13'			east of BR-158 southwards <i>Vila Rica</i> (MT)	2008
14-14'	BR-158		between 220km north of <i>Nova Xavantina</i> (MT) and 250km south of <i>Redenção</i> (PA)	2008
15-15'			east of BR-158, from 220km north of <i>Nova Xavantina</i> (MT)	2008
16-16'	MT-130		from 23km north of <i>Primavera do Leste</i> (MT) to the intersection of MT-110	2008
17-17'	BR-364		from <i>Chapada dos Guimarães</i> (MT) to BR-174;	2012
18-18'			from 85km east of MT-170 northwards	2012
19-19'			from 90km west of MT-170 northwards	2018
20-20'		Cáceres-Santa Cruz	between <i>Montero</i> and <i>San Matias</i> (Bolivia)	2012
21-21'	GO-255		from <i>Paraná</i> (TO) to TO-280	2008
22-22'	TO-280		from GO-255 to TO-040	2008
23-23'	5 N		from 10km west of <i>Vila Rica</i> eastwards <i>Tingo Maria</i> (Peru) to 16 N intersection	2018
24-24'	26 B	Interoceanica	from <i>Cuzco</i> to <i>Puerto Maldonado</i> (Peru) and from there to <i>Assis-Brasil</i> , Acre	2008
25-25'	3 S		from 100km to 300km westwards <i>Cuzco</i> (Peru)	2008
26-26'	BR-364, 16B, 5N		from <i>Cruzeiro do Sul</i> (AC) to <i>Mayobamba</i> (Peru)	2018
27-27'	BR-364		from 90km north of <i>Senador Guimard</i> (AC) to <i>Feijó</i> (AC);	2008

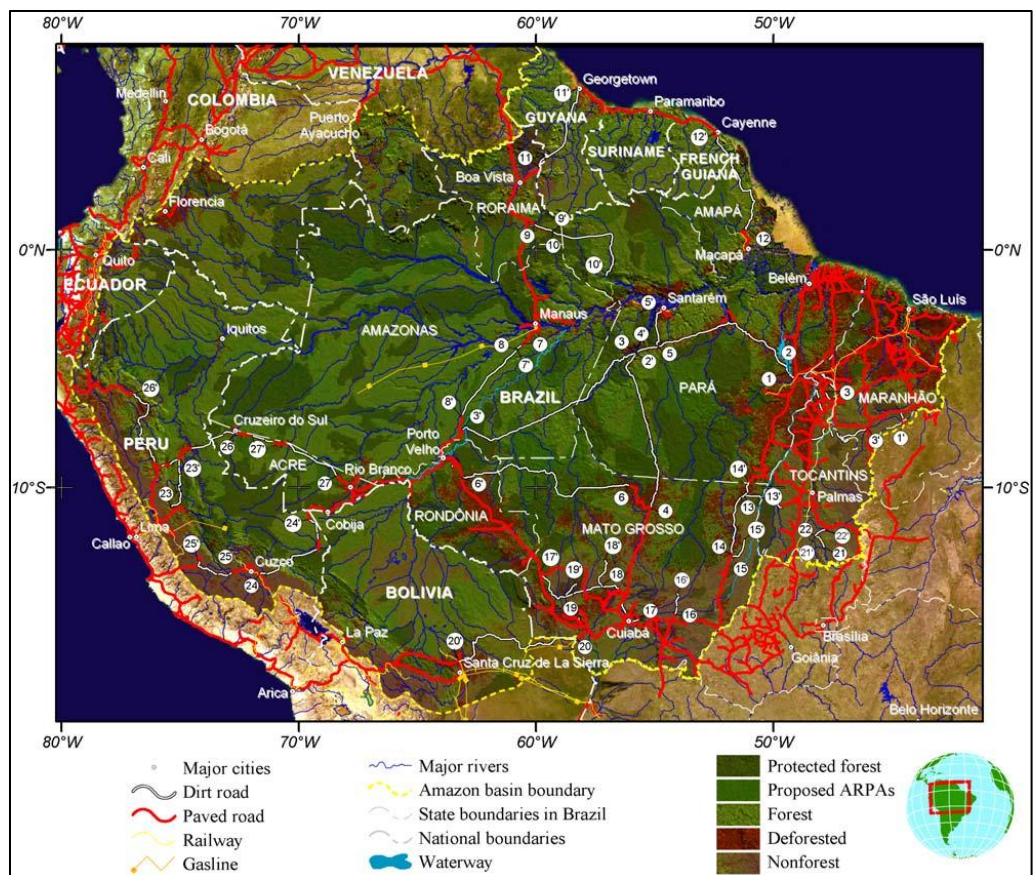


Fig. 63: Amazon Basin, its main cities, paved roads and secondary roads, existing and proposed protected areas. The numbers show the roads to be paved according to the previous chart 30.

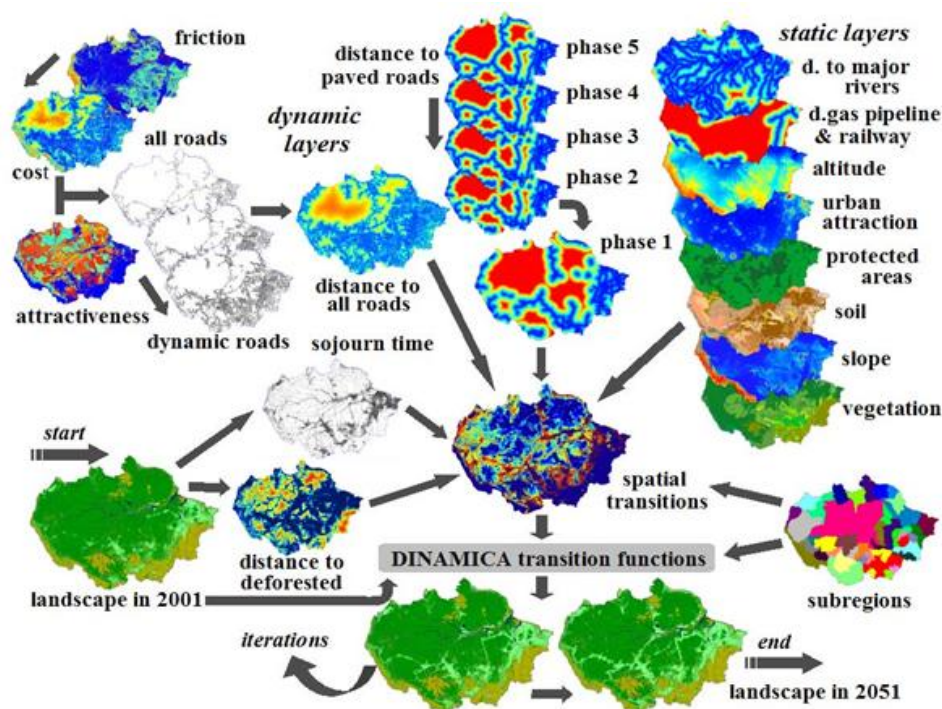
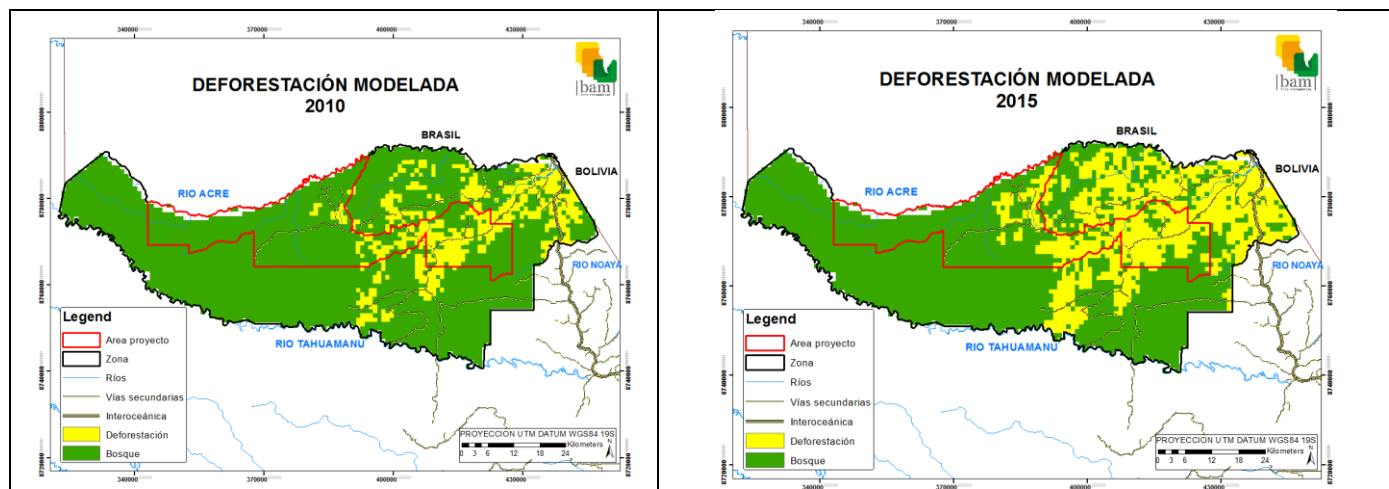


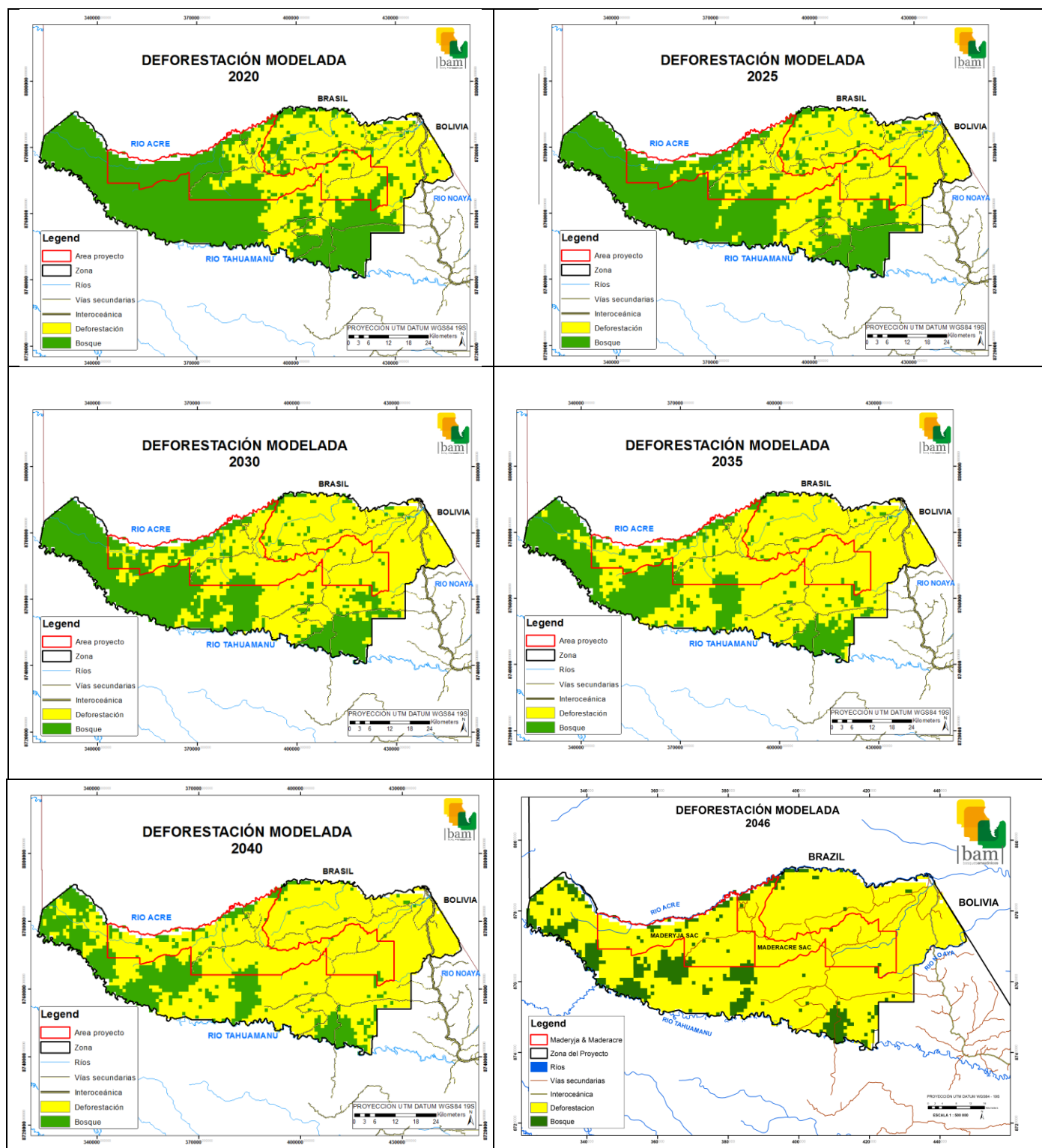
Fig. 64: Spatial datasets to run the SIMAMAZONIA model

Step 3.2.: Location of projected deforestation

According to the deforestation model projected by SIMAMAZONIA, the future deforestation in the project zone and project area of the Madre de Dios Amazon REDD Project is spatially distributed as is shown in the following sequence of maps (presented in five-year periods).

Fig. 65: Sequence of maps showing the projected deforestation in the Madre de Dios Amazon REDD project zone





PART 4: ESTIMATION OF CARBON STOCK CHANGES AND GREENHOUSE GAS EMISSIONS

Step 4.1.: Stratification

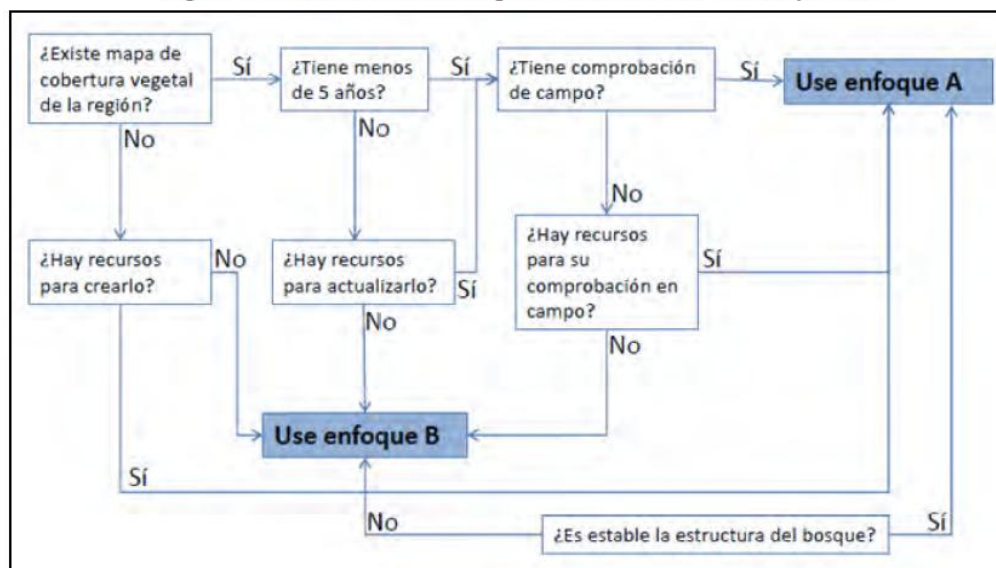
Regarding forest inventories, stratification consists of grouping forest areas into homogeneous groups in terms of carbon stocks, taking into account stratification factors (such as forest type / vegetation, soil type / geology, management) which could affect carbon stocks, so less sample plots are required in order to achieve a certain accuracy level.

For the stratification of the project zone, the forest map of the Ecological-Economic Zoning (EEZ) study of Madre de Dios (IIAP, 2009) was used, which is a multidimension model with physiographic, floristic, physiognomic and ecological variables.

This forest map of the EEZ study was selected because it represents the vegetation and ecosystems occurring in the project zone and also meets the criteria of the decision tree of the stratification method of the REDD Sourcebook (see Fig. 66 below), according to the following criteria:

- It was developed one year ago (specifically the map was developed in 2009 together with the EEZ).
- Said forest map has been officially used for forest inventories and censuses and variation coefficients exist for Madre de Dios.
- The working scale is acceptable (1:100,000).
- It considers non-forest units: “deforestation” and “others”.
- The studies to be developed may be comparable at a national level, because it is a coverage which is included in all Ecological-Economic Zonings and there is a national forest map.
- Its model integrates several elements that can influence the biomass (flora, physiography, physiognomy or structural and ecological).

Figura 1: Árbol de Decisión para el Método de Estratificación



Fuente: REDD Sourcebook

Fig. 66: Stratification criteria

As a result of this process, a stratification chart was obtained, which simplifies and groups the forest types. This chart also presents the calculation of areas and the percentage of each stratum. Additionally, a stratification map for the Madre de Dios Amazon REDD project zone and project area is obtained.

Chart 31: Stratification in the Madre de Dios Amazon REDD project zone

ID	Type of Forest and Use	Area	%	Stratum	Code	Stratum Area	Stratum %
0	Water courses	367.57	0.11	Non-forest	NB	1.32	0.001
1	Intervened areas - Deforestation	18,957.46	5.43	Intervened Areas	AI	808.86	0.85
2	Low hills forest with "paca"	223,416.64	64.01	Forest with "Paca"	BPCB	77,458.82	81.51
2	Low hills forest with "paca" and shiringa stands	8,746.03	2.51				
3	High terrace forest with "paca"	25,019.12	7.17	Terrace Forest with "Paca"	BPT	7,774.31	8.18
3	High terrace forest with "paca" and shiringa stands	88.68	0.03				
3	Medium terrace forest with "paca"	677.42	0.19				
4	Low flooded terrace forest with "paca"	9,382.62	2.69	Flooded Forest with "Paca"	BTI	1,200.72	1.26
4	Low flooded terrace forest	103.17	0.03				
5	Low hills forest	35,877.33	10.28	Low Hills Forest	BCB	200.21	0.21
5	Low hills forest with shiringa stands	1,532.96	0.44				
6	High terrace forest with shiringa stands	11,476.15	3.29	Terrace Forest	BT	0.00	0.00
6	Medium terrace forest	283.52	0.08				

ID	Type of Forest and Use	Area	%	Stratum	Code	Stratum Area	Stratum %
7	Low hills "Pacal"	3,837.45	1.10	Pacales	P	7,586.64	7.98
7	High terrace "Pacal"	6,510.07	1.87				
7	Low flooded terrace "Pacal"	466.82	0.13				
8	Swamp with trees	2,303.51	0.66	Swamp with trees	PA	0.00	0.00
Total		349,046.51 *	100.00			95,030.88	100.00

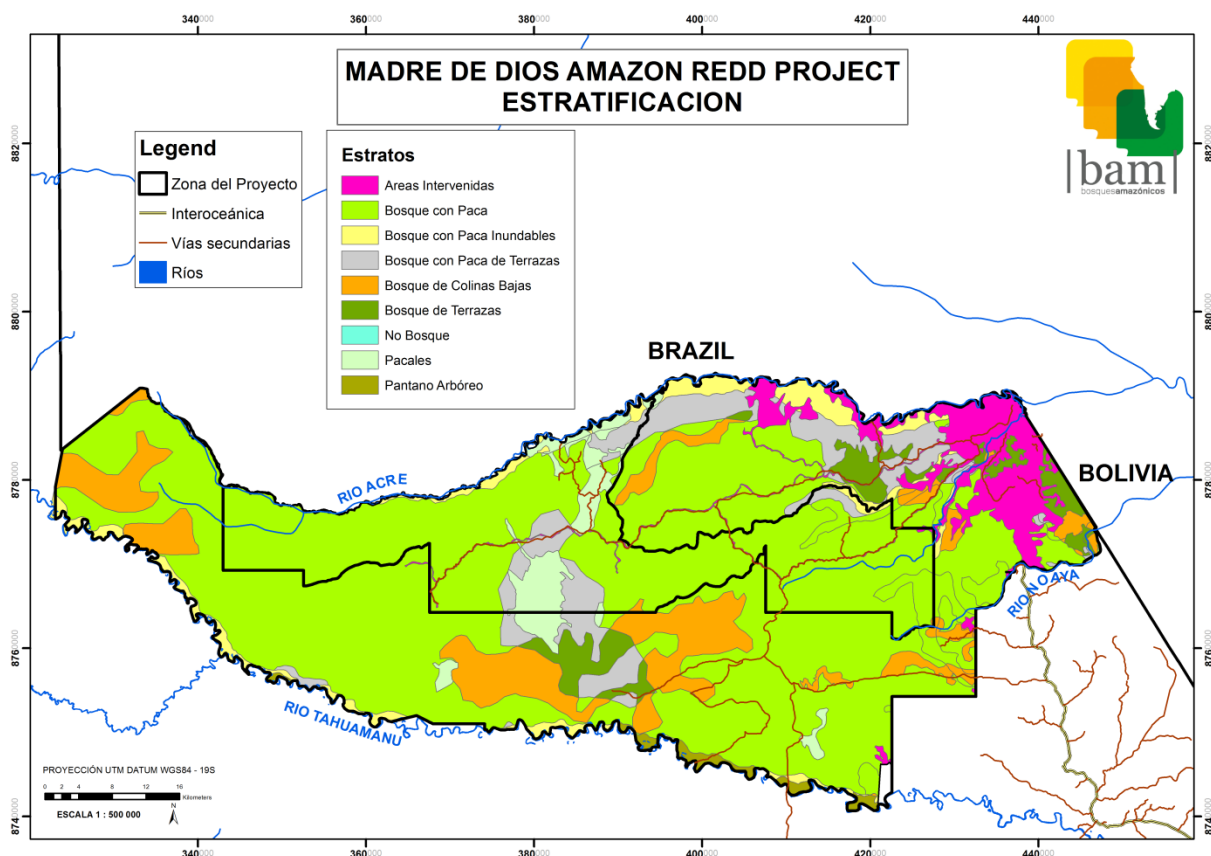


Fig. 67: Stratification for the Madre de Dios Amazon REDD Project

Step 4.2.: Estimation of carbon stocks and carbon stock changes per stratum**4.2.1. Forest carbon stocks**

The carbon stocks in each of the defined strata were taken from the carbon inventories carried out in the Belgium Native Community – Madre de Dios⁵³ and information on tree biomass of Maderacre and Maderyja concessions area⁵⁴. Carbon stocks of these forest types or strata correspond to the strata identified within the Madre de Dios Amazon REDD project area. In addition to this, there are strata located in the same region of Madre de Dios⁵⁵.

Carbon inventories of the Belgium Native Community have been carried out in November 2010. In each of these strata plots of 20 m x 50 m were defined, where the aerial biomass within each plot was assessed and then converted to T/ha of dry biomass. The following carbon pools were included: tree component (palms and forest trees), litter, undergrowth and dead-wood.

The strata for which data from the Belgium Native Community area was taken were: flooded forest with “paca”, low hill forest and terrace forest. In addition to this, the strata for which data from the Maderacre and Maderyja aerial biomass was taken were: low hill forest with “paca”, terrace forest with “paca” and “pacaes”. The carbon stocks for the swamp with tree stratum was taken from the Carbon Inventory carried out in the Bahuaja Sonene National Park⁵⁶ and the carbon stocks for the intervened areas stratum from the carbon stock of a secondary forest of 3 years.

⁵³ Carbon Inventory carried out by FONAM

⁵⁴ Calculations were made based on the forestry inventory data of both concessions. WWF was directly responsible for the development of said exploratory inventory, hiring the necessary technical staff and having a permanent supervisor to ensure the reliability of the work.

⁵⁵ Forestry Inventories of Maderacre and Maderyja concessions

⁵⁶ PDD Reducing deforestation and degradation in the Tambopata National Reserve and Bahuaja-Sonene National Park, in the scope of the Madre de Dios region (August, 2010).

The biomass calculation was carried out applying formula 1 (Chavé et al., 2005) for tree species and formula 2 for palms (Winrock, 2005). Litter carbon stocks were estimated through in-field samplings taken from subplots of 1 m² and then put into a stove to determine the moisture content that allows the estimation of dry biomass in each of these subplots, weight that was then converted to hectares. Dead wood biomass was estimated applying formula 3. The requirements of the correspondent modules of the approved VCS VM0007 REDD Methodology Modules were followed (VMD0001 CP-AB; VMD0003 CP-L).

Formula 1:

$$B = \rho * \exp (-1.499 + 2.148 * \ln (DBH) + 0.207 * (\ln (DBH))^2 - 0.0281 * (\ln (DBH))^3) - \text{Dry Kg}$$

Where,

P = Density by species (gr/cm³)

DBH = Diameter at breast height (cm)

Formula 2:

$$B = 6.666 + 12.826 * H^{0.5} * \ln H$$

Where,

H = Palm Height (m)

Formula 3:

$$D^2 * \pi^2 / (8 * L) \text{ m}^3/\text{ha}$$

Where,

D = Tree diameter (cm)

L = Length of the transect – 50 meters

Once the biomass for trees, palms and “pacaes” was determined, the carbon stocks were calculated by multiplying the data by 0.49⁵⁷ (IPCC, 2006) and then converted to tonnes (from kg to tonnes) by dividing it by 1000. Then, it was multiplied by 44/12 to convert carbon into carbon dioxide (CO₂). For the determination of belowground carbon, an expansion factor of 0.24 was assumed⁵⁸ (IPCC, 2006).

⁵⁷ Draft 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4. Agriculture, Forestry and Other Land use (Table 4.3)

⁵⁸ Draft 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4. Agriculture, Forestry and Other Land use (Table 4.4).

The results of carbon stocks by each stratum and carbon pool are shown in the following chart. Likewise, carbon stocks for post-deforestation classes are also presented: grassland, livestock, clean cultivation and infrastructure. These carbon stocks for post-deforestation classes were taken from other studies in the Peruvian Amazon⁵⁹. For the case of deforestation for clean cultivation, the carbon stock determined for maize crop was used, which is the dominant crop in the area. For the deforestation for agricultural and livestock activity, and taking into account that this post-deforestation class was defined as a mixed area of pastures and agriculture, an average stock of clean cultivation and grassland was used.

Chart 32: Carbon stocks in post-deforestation strata and land-use

				Tree		Roots	Understory	Litter	Major necromass	Ctot _d
				C stock t CO ₂ e ha ⁻¹	C stock t CO ₂ e ha ⁻¹	C stock t CO ₂ e ha ⁻¹	C stock t CO ₂ e ha ⁻¹	C stock t CO ₂ e ha ⁻¹	C stock t CO ₂ e ha ⁻¹	
ID _{cl}	Name		Reference							
001	BPCB	Forest with "paca"	Maderacre	407.46	97.79		4.04	8.06	4.21	521.56
002	BPT	Terrace forest with "paca"	Maderacre	402.03	96.49		4.89	8.30	1.80	513.51
003	BTI	Flooded forest with "paca"	Belgium	406.20	94.81		2.95	2.73	2.73	565.51
004	BCB	Low hills forest	Belgium	404.27	93.54		2.46	1.70	1.70	515.80
005	BT	Terrace forest	Belgium	530.28	123.94		3.63	5.04	5.04	679.30
006	P	"Pacales"	Maderacre	487.48	117.00					604.48
007	PA	Swamp with tres	Bahuaja-Sonene	294.66	70.72					426.18
008	AI	Intervened áreas	ALEGRE (B.S 3 años) Pucallpa	77.62	1.03	6.71		21.63		106.99
009	DP	Deforestation x Pastures	ALEGRE	18.66						18.66
010	DA	Deforestation x Agric. Livestock	Average DP y DA	25.15						25.15
011	DI	Deforestation x Infrastructure		0.00						-
012	DC	Deforestation x clean crop	ALEGRE (Crops)	31.63						31.63

In the chart below, the baseline annual carbon stocks is shown, according to the projected deforestation.

⁵⁹ Alegre et al, 2002, referred by Anthony Robert Yquise Pérez, Vicente Pocomucha, Ytavclerh Vargas C. in "Carbon stocked in different land-use systems of the José Crespo y Castillo district, Huánuco-Peru.

Chart 33: Baseline carbon stocks in the forests of the Madre de Dios Amazon REDD project area

Proyecto Year		Carbon stock changes in initial (pre-deforestation) forest classes																Total C stock change in initial forests	
		ID _{cl} = 001		ID _{cl} = 002		ID _{cl} = 003		ID _{cl} = 004		ID _{cl} = 005		ID _{cl} = 006		ID _{cl} = 007		ID _{cl} = 008		acumulado	annual
		Año	Bosque con Paca	Bosque con Paca de Terrazas	Bosque con Paca Inundables	Bosque de Colinas Bajas		Bosque de Terrazas	Pacales	Pantano arbóreo	Áreas Interveni-das								
			ABSLPA _{id,t}			ΔCBSLPA _{id,t}	ABSLPA _{id,t}				ΔCBSLPA _{id,t}	ABSLPA _{id,t}	ΔCBSLPA _{id,t}	ABSLPA _{id,t}	ΔCBSLPA _{id,t}	ABSLPA _{id,t}	ΔCBSLPA _{id,t}		
		ha	t CO ₂ -e	ha	t CO ₂ -e	ha	t CO ₂ -e	ha	t CO ₂ -e	ha	t CO ₂ -e	ha	t CO ₂ -e	ha	t CO ₂ -e	ha	t CO ₂ -e	t CO ₂ -e	t CO ₂ -e
0	2006	7,057	3,680,510	0	0	470	266,044	0	0	0	0	0	0	0	188	20,134	3,966,688		
1	2007	10,162	5,299,934	94	48,316	470	266,044	0	0	0	0	94	56,875	0	0	188	20,134	5,691,303	1,724,615
2	2008	11,761	6,134,183	94	48,316	470	266,044	188	97,063	0	0	376	227,500	0	0	282	30,201	6,803,307	1,112,004
3	2009	14,396	7,508,240	94	48,316	470	266,044	188	97,063	0	0	376	227,500	0	0	282	30,201	8,177,364	1,374,057
4	2010	15,337	7,998,974	94	48,316	470	266,044	188	97,063	0	0	565	341,250	0	0	282	30,201	8,781,849	604,485
5	2011	17,407	9,078,590	659	338,210	470	266,044	188	97,063	0	0	1,223	739,376	0	0	282	30,201	10,549,485	1,767,636
6	2012	19,759	10,305,427	1,317	676,421	565	319,253	188	97,063	0	0	1,317	796,251	0	0	376	40,268	12,234,683	1,685,198
7	2013	21,735	11,335,970	1,317	676,421	565	319,253	188	97,063	0	0	1,411	853,126	0	0	376	40,268	13,322,101	1,087,418
8	2014	24,181	12,611,880	1,694	869,684	565	319,253	188	97,063	0	0	1,600	966,876	0	0	376	40,268	14,905,024	1,582,923
9	2015	26,251	13,691,496	2,258	1,159,579	659	372,462	188	97,063	0	0	1,788	1,080,626	0	0	376	40,268	16,441,494	1,536,470
10	2016	28,039	14,623,891	2,729	1,401,157	659	372,462	282	145,595	0	0	2,070	1,251,252	0	0	376	40,268	17,834,626	1,393,132
11	2017	29,168	15,212,773	3,105	1,594,421	659	372,462	282	145,595	0	0	2,258	1,365,002	0	0	376	40,268	18,730,520	895,895
12	2018	32,085	16,734,050	3,481	1,787,684	659	372,462	282	145,595	0	0	3,011	1,820,002	0	0	470	50,335	20,910,128	2,179,608
13	2019	33,590	17,519,226	4,140	2,125,894	659	372,462	282	145,595	0	0	3,670	2,218,128	0	0	470	50,335	22,431,640	1,521,511
14	2020	35,660	18,598,842	4,234	2,174,210	659	372,462	282	145,595	0	0	3,764	2,275,003	0	0	470	50,335	23,616,447	1,184,807
15	2021	37,260	19,433,091	4,516	2,319,157	659	372,462	282	145,595	0	0	4,234	2,559,378	0	0	470	50,335	24,880,018	1,263,572
16	2022	41,494	21,641,396	4,987	2,560,736	659	372,462	282	145,595	0	0	4,799	2,900,629	0	0	470	50,335	27,671,153	2,791,135
17	2023	43,375	22,622,866	5,175	2,657,368	753	425,671	282	145,595	0	0	4,987	3,014,379	0	0	470	50,335	28,916,213	1,245,060
18	2024	46,857	24,438,584	5,175	2,657,368	753	425,671	282	145,595	0	0	5,363	3,241,879	0	0	470	50,335	30,959,431	2,043,218
19	2025	48,362	25,223,759	5,739	2,947,262	753	425,671	282	145,595	0	0	5,645	3,412,504	0	0	470	50,335	32,205,127	1,245,695
20	2026	50,244	26,205,228	5,739	2,947,262	753	425,671	282	145,595	0	0	5,645	3,412,504	0	0	565	60,402	33,196,663	991,536
21	2027	52,220	27,235,771	5,928	3,043,894	753	425,671	282	145,595	0	0	5,739	3,469,379	0	0	565	60,402	34,380,712	1,184,049
22	2028	53,443	27,873,726	6,116	3,140,525	753	425,671	282	145,595	0	0	5,739	3,469,379	0	0	565	60,402	35,115,299	734,587
23	2029	56,266	29,345,930	6,398	3,285,473	753	425,671	282	145,595	0	0	5,739	3,469,379	0	0	565	60,402	36,732,450	1,617,151
24	2030	57,677	30,082,032	6,398	3,285,473	847	478,880	282	145,595	0	0	5,739	3,469,379	0	0	565	60,402	37,521,761	789,311
25	2031	59,277	30,916,281	6,492	3,333,789	847	478,880	282	145,595	0	0	5,834	3,526,254	0	0	565	60,402	38,461,200	939,440
26	2032	60,029	31,308,868	6,492	3,333,789	941	532,088	282	145,595	0	0	5,834	3,526,254	0	0	565	60,402	38,906,997	445,797
27	2033	62,005	32,339,411	6,492	3,333,789	941	532,088	282	145,595	0	0	6,022	3,640,005	0	0	565	60,402	40,051,290	1,144,293
28	2034	63,134	32,928,293	6,492	3,333,789	941	532,088	282	145,595	0	0	6,116	3,696,880	0	0	565	60,402	40,697,046	645,757
29	2035	64,922	33,860,688	6,586	3,382,104	941	532,088	282	145,595	0	0	6,210	3,753,755	0	0	565	60,402	41,734,633	1,037,587
30	2036	65,487	34,155,129	6,680	3,430,420	1,035	585,297	282	145,595	0	0	6,210	3,753,755	0	0	565	60,402	42,130,598	395,965
31	2037	65,957	34,400,496	6,680	3,430,420	1,035	585,297	282	145,595	0	0	6,586	3,981,255	0	0	565	60,402	42,603,466	472,868
32	2038	66,616	34,744,011	6,680	3,430,420	1,129	638,506	282	145,595	0	0	6,586	3,981,255	0	0	565	60,402	43,000,189	396,723
33	2039	66,992	34,940,304	6,774	3,478,736	1,129	638,506	282	145,595	0	0	6,680	4,038,130	0	0	565	60,402	43,301,674	301,485
34	2040	68,309	35,627,333	6,774	3,478,736	1,223	691,715	282	145,595	0	0	6,869	4,151,880	0	0	659	70,469	44,165,728	864,054
35	2041	68,968	35,970,847	6,963	3,575,367	1,223	691,715	282	145,595	0	0	6,963	4,208,755	0	0	659	70,469	44,662,749	497,021
36	2042	69,721	36,363,435	7,151	3,671,999	1,411	798,133	282	145,595	0	0	7,057	4,265,630	0	0	659	70,469	45,315,261	652,512
37	2043	70,191	36,608,802	7,151	3,671,999	1,411	798,133	282	145,595	0	0	7,057	4,265,630	0	0	659	70,469	45,560,628	245,367
38	2044	70,756	36,903,243	7,151	3,671,999	1,411	798,133	282	145,595	0	0	7,057	4,265,630	0	0	659	70,469	45,855,069	294,441
39	2045	72,073	37,590,271	7,245	3,720,315	1,411	798,133	282	145,595	0	0	7,151	4,322,505	0	0	659	70,469	46,647,288	792,219
40	2046	72,355	37,737,492	7,245	3,720,315	1,411	798,133	282	145,595	0	0	7,527	4,550,006	0	0	659	70,469	47,022,009	374,721
																		43,055,321.12	

4.2.2. Estimation of post-deforestation carbon stocks

In order to determine post-deforestation areas, an analysis of the following document was carried out: "Monitoring of land-use between Puerto Maldonado e Iñapari, correspondent to the segment 3 of the Interoceanic road for the years 1990, 2000 and 2005"⁶⁰, conducted in October 2007.

This study includes an analysis of the types of post-deforestation land-use in the area of the segment 3 of the Interoceanic road. The study area corresponded to a total area of 2,660,654 hectares of said segment of the Interoceanic road, and covered the provinces of Tahuamanu and Tambopata. The method used for monitoring was based on the analysis of satellite images that provide information on land-use. The images used were Landsat, with a pixel size of 30 m x 30 m (years 1990, 2000 and 2005) and CBERS images for the year 2005⁶¹.

In the following chart, the results of this monitoring are presented, where the land-use change for the years 1990, 2000 and 2005 was determined. It should be highlighted that the agricultural activity is developed mainly in areas close to the road and riverbanks and that the agriculture and livestock activity was defined as those areas where it was not possible to distinguish the agricultural activity from livestock and engage both activities in different proportions.

Chart 34: Areas of post-deforestation classes and percentage in relation to deforestation

Classes	Area (ha) 1990	%	Area (ha) 2000	%	Area (ha) 2005	%	Rate of change 1990-2000	Rate of change 2000-2005
Forest	2,516,202		2,470,645		2,452,192		- 1.81	- 0.75
Agriculture activity	949	1.67	3,587	3.51	4,074	3.37	277.98	13.58
Livestock activity	15,493	27.29	50,814	49.73	64,897	53.74	227.98	27.71
Agric./Livestock activity	39,477	69.53	45,965	44.98	48,886	40.48	16.43	6.35
Roads	760	1.34	1,502	1.47	2,462	2.04	97.63	63.91
Landing fields	16		16		16		-	-
Urban areas	100	0.18	313	0.31	448	0.37	213.00	43.13
Forestry activity	-		153	0.15	19	0.02		- 87.58
Mask	87,657		87,657		87,657		-	-
Total area of study	2,660,654		2,660,652		2,660,651			
TOTAL NON-FOREST (without mask and landing field)	56,779	100	102,181	100	120,767	100		

Source: Adapted from the Monitoring of land-use within the segment 3 of the Interoceanic road / CDC-SZF-INRENA

⁶⁰ CDC, UNALM, Frankfurt Zoological Society, INRENA, 2007

⁶¹ For further information see: <http://www.ibcperu.org/doc/isis/11992.pdf>

The trend of post-deforestation land-use change, assessed in the study, corresponds to the area where the Madre de Dios Amazon REDD Project is located. From the above chart, it can be inferred that post-deforestation anthropic activities have been increasing annually. In the first period, the areas have increased by 263.80 ha/year for agricultural activities; 3,532 ha/year for livestock activities and 648.80 ha/year for the agricultural and livestock activities. In the second period, said areas have increased by 97.40 ha/year for agricultural activities; 2,816.60 ha/year for livestock activities and 584 ha/year for agricultural and livestock activities.

It can be corroborated that the results of the analysis and interpretation of the images of 2005 performed in this study, are closely associated with the production data of the main products of Tahuamanu province registered for the same year, according to the Agricultural Information Management, as shown in the following chart:

Chart 35: Production of the main crops within the Tahuamanu district, 2005

Province	District	Crops (T)					Grasses (T)		
		Rice	Maize	Papaya	Banana	Yucca	Braqueari	Torourco grass	Yaragua grass
Tahuamanu	Iñapari	241	320	79	214	211	58,200	1,140	1,080
	Iberia	1,567	2,275	248	640	682	52,800	900	1,630
	Tahuamanu	640	392	67	260	360	9,890	480	1,080
	TOTAL	5,829		2,367			127,200		
	TOTAL (%)	4.31		1.75			93.95		

Source: Adapted from the Monitoring of land-use within the segment 3 of the Interoceanic road / CDC-SZF-INRENA. Ministry of Agriculture – Agricultural Information Management.

Taking into account the areas of post-deforestation activities in relation to the total deforested area within the area of the study, it appears that the livestock activity is the only one that has increased 22 percentage points in the first period (10 years) and 4 points in the second period (5 years). The agricultural activity has had an increase of 3 percentage points for the first period and a decrease of 0.14 in the second period. Finally, the agricultural and livestock activity has increased 24 points in the first period and decreased 4 points in the second period.

Data from 1990 shows that the post-deforestation activity that prevailed was the agriculture and livestock one, followed by livestock and then agriculture. In 2000, the three activities have increased and agriculture as well as livestock activities have increased more than three times. For 2005, the areas for agriculture and livestock have also increased, but the increment was not as significant as in the first period.

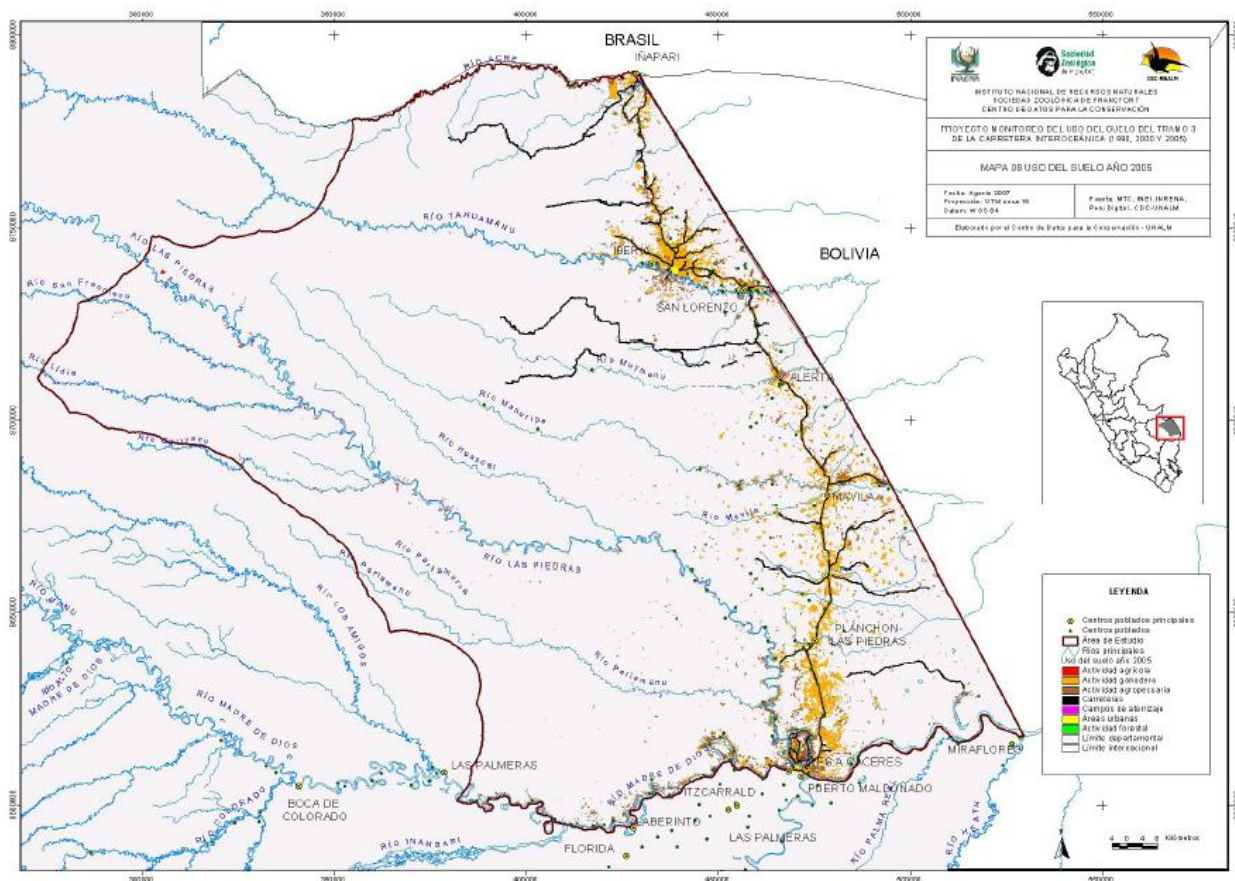


Fig. 68: Map of land-use, 2005. Monitoring study.

Conclusions:

In accordance to the calculations carried out, the percentage used for land-use change from forest to post-deforestation classes, is the percentage determined in the study for 2005. Although it can positively said that there is an increasing trend in livestock areas, there is no certainty in the number of this trend, so it was decided accordingly to use the percentages of the last year included in the study (year 2005).

Land-use changes from forest to other land-use systems:

Clean cultivation	4%
Grasslands	54%
Agriculture and livestock	40%
Infrastructure (*)	2%

(*) Increase in urban areas, roads

According to said percentages, the final areas converted from forest to other type of system from the total deforested area by year can be determined. In order to establish the final stock, the information on carbon stock per hectare of each one of these systems was considered, according to studies conducted in the Peruvian rainforest. These stocks were previously presented in chart 32 of this template.

In chart 36 below, the post-deforestation areas established in the Madre de Dios Amazon REDD project area are presented and in chart 37 annual post-deforestation stocks are shown.

Chart 36: Post-deforestation areas established within the project area

Area of post-deforestation classes established on deforested areas within the project area						
ID >		009	010	011	012	
Name >		Deforestacion x Pastos	Deforestacion x Agropecuaria	Deforestacion x Infraestructura	Deforestacion x Cultivo en Limpio	
% historic >		40%	54%	2%	4%	annual
Project year t	Año	ABSLPA _{fcl,t} ha	ABSLPA _{fcl,t} ha	ABSLPA _{fcl,t} ha	ABSLPA _{fcl,t} ha	ABSLPA _t ha
0	2006	3,086.15	4,166.31	154.31	308.62	7,715.38
1	2007	4,403.41	5,944.61	220.17	440.34	11,008.53
2	2008	5,269.04	7,113.20	263.45	526.90	13,172.60
3	2009	6,322.85	8,535.84	316.14	632.28	15,807.12
4	2010	6,774.48	9,145.55	338.72	677.45	16,936.20
5	2011	8,091.74	10,923.85	404.59	809.17	20,229.35
6	2012	9,409.00	12,702.15	470.45	940.90	23,522.50
7	2013	10,236.99	13,819.94	511.85	1,023.70	25,592.48
8	2014	11,441.34	15,445.81	572.07	1,144.13	28,603.36
9	2015	12,608.06	17,020.88	630.40	1,260.81	31,520.15
10	2016	13,661.87	18,443.52	683.09	1,366.19	34,154.67
11	2017	14,339.32	19,358.08	716.97	1,433.93	35,848.29
12	2018	15,995.30	21,593.66	799.77	1,599.53	39,988.25
13	2019	17,124.38	23,117.91	856.22	1,712.44	42,810.95
14	2020	18,027.64	24,337.32	901.38	1,802.76	45,069.11
15	2021	18,968.54	25,607.53	948.43	1,896.85	47,421.36
16	2022	21,076.16	28,452.82	1,053.81	2,107.62	52,690.40
17	2023	22,017.06	29,723.03	1,100.85	2,201.71	55,042.65
18	2024	23,560.14	31,806.18	1,178.01	2,356.01	58,900.34
19	2025	24,501.04	33,076.40	1,225.05	2,450.10	61,252.59
20	2026	25,291.39	34,143.38	1,264.57	2,529.14	63,228.48
21	2027	26,194.66	35,362.79	1,309.73	2,619.47	65,486.64
22	2028	26,759.20	36,124.91	1,337.96	2,675.92	66,897.99
23	2029	28,001.18	37,801.60	1,400.06	2,800.12	70,002.96
24	2030	28,603.36	38,614.54	1,430.17	2,860.34	71,508.40
25	2031	29,318.44	39,579.90	1,465.92	2,931.84	73,296.11
26	2032	29,657.17	40,037.18	1,482.86	2,965.72	74,142.92
27	2033	30,522.80	41,205.77	1,526.14	3,052.28	76,306.99
28	2034	31,012.06	41,866.29	1,550.60	3,101.21	77,530.16
29	2035	31,802.42	42,933.27	1,590.12	3,180.24	79,506.05
30	2036	32,103.51	43,339.74	1,605.18	3,210.35	80,258.77
31	2037	32,442.23	43,797.01	1,622.11	3,244.22	81,105.58
32	2038	32,743.32	44,203.48	1,637.17	3,274.33	81,858.30
33	2039	32,969.14	44,508.33	1,648.46	3,296.91	82,422.84
34	2040	33,646.58	45,422.89	1,682.33	3,364.66	84,116.46
35	2041	34,022.94	45,930.97	1,701.15	3,402.29	85,057.36
36	2042	34,512.21	46,591.49	1,725.61	3,451.22	86,280.53
37	2043	34,700.39	46,845.53	1,735.02	3,470.04	86,750.98
38	2044	34,926.21	47,150.38	1,746.31	3,492.62	87,315.52
39	2045	35,528.38	47,963.32	1,776.42	3,552.84	88,820.96
40	2046	35,791.84	48,318.98	1,789.59	3,579.18	89,479.59
						81,764.21

Chart 37: Annual post-deforestation carbon stocks within the project area

Project Year	Carbon stock changes in final (post-deforestation) non forest classes								Total C stock change in final post-deforestation classes	
	ID _{fd} =	009	ID _{fd} =	010	ID _{fd} =	011	ID _{fd} =	012	cumulative	annual
	Name	Deforestacion x Pastos		Deforestacio n x Agropecuaria		Deforestacion x Infraestructura		Deforestacion x Cultivo en Limpio		
	ABSLPA _{fd,t} ha	CBSLPA _{fd,t} t CO ₂ -e	ABSLPA _{fd,t} ha	CBSLPA _{fd,t} t CO ₂ -e	ABSLPA _{fd,t} ha	ΔCBSLPA _{fd,t} t CO ₂ -e	ABSLPA _{fd,t} ha	ΔCBSLPA _{fd,t} t CO ₂ -e		
0 2006	3,086.2	57,587.6	4,166	104,761.7	154.3	0.0	308.6	9,761.5	172,110.8	
1 2007	4,403.41	82,167.7	5,945	149,477.1	220.2	0.0	440.3	13,928.0	245,572.8	73,461.94
2 2008	5,269.0	98,320.3	7,113.2	178,861.5	263.5	0.0	526.9	16,666.0	293,847.8	48,275.0
3 2009	6,322.8	117,984.3	8,535.8	214,633.8	316.1	0.0	632.3	19,999.2	352,617.3	58,769.6
4 2010	6,774.5	126,411.8	9,145.5	229,964.8	338.7	0.0	677.4	21,427.7	377,804.3	25,187.0
5 2011	8,091.7	150,991.9	10,923.8	274,680.2	404.6	0.0	809.2	25,594.2	451,266.2	73,461.9
6 2012	9,409.0	175,571.9	12,702.2	319,395.6	470.5	0.0	940.9	29,760.7	524,728.2	73,461.9
7 2013	10,237.0	191,022.3	13,819.9	347,502.4	511.8	0.0	1,023.7	32,379.6	570,904.2	46,176.1
8 2014	11,441.3	213,495.5	15,445.8	388,385.0	572.1	0.0	1,144.1	36,189.0	638,069.5	67,165.2
9 2015	12,608.1	235,266.4	17,020.9	427,990.1	630.4	0.0	1,260.8	39,879.3	703,135.7	65,066.3
10 2016	13,661.9	254,930.5	18,443.5	463,762.4	683.1	0.0	1,366.2	43,212.5	761,905.3	58,769.6
11 2017	14,339.3	267,571.6	19,358.1	486,758.8	717.0	0.0	1,433.9	45,355.3	799,685.7	37,780.4
12 2018	15,995.3	298,472.3	21,593.7	542,972.5	799.8	0.0	1,599.5	50,593.1	892,037.9	92,352.2
13 2019	17,124.4	319,540.9	23,117.9	581,299.9	856.2	0.0	1,712.4	54,164.4	955,005.3	62,967.4
14 2020	18,027.6	336,395.8	24,337.3	611,961.9	901.4	0.0	1,802.8	57,021.4	1,005,379.2	50,373.9
15 2021	18,968.5	353,953.0	25,607.5	643,901.5	948.4	0.0	1,896.9	59,997.5	1,057,852.0	52,472.8
16 2022	21,076.2	393,281.1	28,452.8	715,446.1	1,053.8	0.0	2,107.6	66,663.9	1,175,391.1	117,539.1
17 2023	22,017.1	410,838.3	29,723.0	747,385.6	1,100.9	0.0	2,201.7	69,640.0	1,227,863.9	52,472.8
18 2024	23,560.1	439,632.1	31,806.2	799,766.5	1,178.0	0.0	2,356.0	74,520.7	1,313,919.3	86,055.4
19 2025	24,501.0	457,189.3	33,076.4	831,706.0	1,225.1	0.0	2,450.1	77,496.8	1,366,392.2	52,472.8
20 2026	25,291.4	471,937.4	34,143.4	858,535.3	1,264.6	0.0	2,529.1	79,996.7	1,410,469.3	44,077.2
21 2027	26,194.7	488,792.3	35,362.8	889,197.2	1,309.7	0.0	2,619.5	82,853.7	1,460,843.2	50,373.9
22 2028	26,759.2	499,326.6	36,124.9	908,361.0	1,338.0	0.0	2,675.9	84,639.3	1,492,326.9	31,483.7
23 2029	28,001.2	522,502.1	37,801.6	950,521.2	1,400.1	0.0	2,800.1	88,567.7	1,561,591.0	69,264.1
24 2030	28,603.4	533,738.7	38,614.5	970,962.5	1,430.2	0.0	2,860.3	90,472.4	1,595,173.6	33,582.6
25 2031	29,318.4	547,082.2	39,579.9	995,236.6	1,465.9	0.0	2,931.8	92,734.2	1,635,053.0	39,879.3
26 2032	29,657.2	553,402.8	40,037.2	1,006,734.8	1,482.9	0.0	2,965.7	93,805.6	1,653,943.2	18,890.2
27 2033	30,522.8	569,555.4	41,205.8	1,036,119.2	1,526.1	0.0	3,052.3	96,543.6	1,702,218.2	48,275.0
28 2034	31,012.1	578,685.1	41,866.3	1,052,727.8	1,550.6	0.0	3,101.2	98,091.2	1,729,504.0	27,285.9
29 2035	31,802.4	593,433.2	42,933.3	1,079,557.0	1,590.1	0.0	3,180.2	100,591.1	1,773,581.2	44,077.2
30 2036	32,103.5	599,051.5	43,339.7	1,089,777.7	1,605.2	0.0	3,210.4	101,543.4	1,790,372.5	16,791.3
31 2037	32,442.2	605,372.0	43,797.0	1,101,275.9	1,622.1	0.0	3,244.2	102,614.8	1,809,262.7	18,890.2
32 2038	32,743.3	610,990.4	44,203.5	1,111,496.6	1,637.2	0.0	3,274.3	103,567.1	1,826,054.0	16,791.3
33 2039	32,969.1	615,204.1	44,508.3	1,119,162.0	1,648.5	0.0	3,296.9	104,281.4	1,838,647.5	12,593.5
34 2040	33,646.6	627,845.3	45,422.9	1,142,158.5	1,682.3	0.0	3,364.7	106,424.1	1,876,427.9	37,780.4
35 2041	34,022.9	634,868.1	45,931.0	1,154,934.4	1,701.1	0.0	3,402.3	107,614.6	1,897,417.1	20,989.1
36 2042	34,512.2	643,997.9	46,591.5	1,171,542.9	1,725.6	0.0	3,451.2	109,162.1	1,924,702.9	27,285.9
37 2043	34,700.4	647,509.3	46,845.5	1,177,930.8	1,735.0	0.0	3,470.0	109,757.3	1,935,197.5	10,494.6
38 2044	34,926.2	651,723.0	47,150.4	1,185,596.3	1,746.3	0.0	3,492.6	110,471.6	1,947,791.0	12,593.5
39 2045	35,528.4	662,959.6	47,963.3	1,206,037.6	1,776.4	0.0	3,552.8	112,376.3	1,981,373.6	33,582.6
40 2046	35,791.8	667,875.7	48,319.0	1,214,980.7	1,789.6	0.0	3,579.2	113,209.6	1,996,066.0	14,692.4
									1,823,955.11	

Step 4.3.: Total estimation of the baseline carbon stocks

The aim of this step was to complete the baseline assessment by calculating baseline carbon stock changes. In this sense, carbon stocks for each stratum defined in the stratification process were estimated.

Based on the land-use changes from initial forest classes (or strata) to the final classes (non-forest), and taking into account the respective changes in carbon stocks, the total gross change in carbon stocks was estimated (without discounting carbon from wood products) for the reference period of the Madre de Dios Amazon REDD Project (till 2046). The results of these calculations showed an accumulated volume of 41'231,366.01 tons of CO₂.

In order to estimate the net carbon stocks in the baseline, carbon from wood products that are elaborated from the wood obtained from the project area has been deducted. Following the guidance of Module (CP-W), the accumulated net volume is 41'142,173.56 tons of CO₂.

Chart 38: Estimation of baseline gross changes in carbon stocks for the Madre de Dios Amazon REDD Project

Project year t	Año	Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change		Cwp tCO2 por clase de producto (sawnwood)	tCO2 Netas
		cumulative $\Delta C_{BSLPA-i_t}$	annual $\Delta C_{BSLPA-i}$	cumulative $\Delta C_{BSLPA-f_t}$	annual $\Delta C_{BSLPA-f}$	annual ΔC_{BSLPA_t}	cumulative ΔC_{BSLPA}		
		t CO ₂ -e	t CO ₂ -e	t CO ₂ -e	t CO ₂ -e	tCO ₂ -e	tCO ₂ -e		
0	2006	3,966,687.8	-	172,110.8	-	-	3,794,576.9	1,369.70	1,369.70
1	2007	5,691,302.9	1,724,615.1	245,572.8	73,461.9	1,651,153.1	5,445,730.1	3,421.06	1,647,732.07
2	2008	6,803,307.3	1,112,004.5	293,847.8	48,275.0	1,063,729.5	6,509,459.6	2,131.47	1,061,598.01
3	2009	8,177,364.2	1,374,056.9	352,617.3	58,769.6	1,315,287.4	7,824,746.9	2,166.91	1,313,120.45
4	2010	8,781,849.0	604,484.8	377,804.3	25,187.0	579,297.8	8,404,044.7	3,464.25	575,833.55
5	2011	10,549,485.3	1,767,636.3	451,266.2	73,461.9	1,694,174.4	10,098,219.1	2,166.91	1,692,007.45
6	2012	12,234,683.2	1,685,197.9	524,728.2	73,461.9	1,611,735.9	11,709,955.0	2,166.91	1,609,569.02
7	2013	13,322,100.9	1,087,417.8	570,904.2	46,176.1	1,041,241.7	12,751,196.7	2,166.91	1,039,074.77
8	2014	14,905,024.2	1,582,923.2	638,069.5	67,165.2	1,515,758.0	14,266,954.7	2,166.91	1,513,591.13
9	2015	16,441,494.0	1,536,469.8	703,135.7	65,066.3	1,471,403.5	15,738,358.2	2,166.91	1,469,236.58
10	2016	17,834,625.5	1,393,131.6	761,905.3	58,769.6	1,334,362.0	17,072,720.2	2,166.91	1,332,195.10
11	2017	18,730,520.3	895,894.8	799,685.7	37,780.4	858,114.4	17,930,834.6	2,166.91	855,947.44
12	2018	20,910,128.3	2,179,608.0	892,037.9	92,352.2	2,087,255.8	20,018,090.4	2,166.91	2,085,088.91
13	2019	22,431,639.6	1,521,511.3	955,005.3	62,967.4	1,458,543.9	21,476,634.3	2,166.91	1,456,377.02
14	2020	23,616,446.6	1,184,807.0	1,005,379.2	50,373.9	1,134,433.1	22,611,067.4	2,166.91	1,132,266.18
15	2021	24,880,018.1	1,263,571.5	1,057,852.0	52,472.8	1,211,098.7	23,822,166.1	2,166.91	1,208,931.80
16	2022	27,671,153.2	2,791,135.1	1,175,391.1	117,539.1	2,673,596.0	26,495,762.1	2,166.91	2,671,429.05
17	2023	28,916,213.0	1,245,059.8	1,227,863.9	52,472.8	1,192,586.9	27,688,349.0	2,166.91	1,190,420.03
18	2024	30,959,431.3	2,043,218.4	1,313,919.3	86,055.4	1,957,162.9	29,645,512.0	2,166.91	1,954,996.03
19	2025	32,205,126.6	1,245,695.3	1,366,392.2	52,472.8	1,193,222.4	30,838,734.4	2,166.91	1,191,055.52
20	2026	33,196,662.8	991,536.2	1,410,469.3	44,077.2	947,459.1	31,786,193.5	2,166.91	945,292.15
21	2027	34,380,712.1	1,184,049.3	1,460,843.2	50,373.9	1,133,675.4	32,919,868.9	2,166.91	1,131,508.50
22	2028	35,115,298.7	734,586.5	1,492,326.9	31,483.7	703,102.9	33,622,971.7	2,166.91	700,935.95
23	2029	36,732,449.8	1,617,151.2	1,561,591.0	69,264.1	1,547,887.0	35,170,858.8	2,166.91	1,545,720.14
24	2030	37,521,760.6	789,310.8	1,595,173.6	33,582.6	755,728.2	35,926,586.9	2,166.91	753,561.24
25	2031	38,461,200.3	939,439.7	1,635,053.0	39,879.3	899,560.3	36,826,147.3	2,166.91	897,393.44
26	2032	38,906,996.8	445,796.5	1,653,943.2	18,890.2	426,906.3	37,253,053.6	2,166.91	424,739.40
27	2033	40,051,289.6	1,144,292.8	1,702,218.2	48,275.0	1,096,017.8	38,349,071.4	2,166.91	1,093,850.93
28	2034	40,697,046.2	645,756.6	1,729,504.0	27,285.9	618,470.7	38,967,542.2	2,166.91	616,303.83
29	2035	41,734,632.8	1,037,586.6	1,773,581.2	44,077.2	993,509.4	39,961,051.6	2,166.91	991,342.54
30	2036	42,130,598.2	395,965.4	1,790,372.5	16,791.3	379,174.1	40,340,225.7	2,166.91	377,007.17
31	2037	42,603,465.8	472,867.6	1,809,262.7	18,890.2	453,977.4	40,794,203.1	2,166.91	451,810.47
32	2038	43,000,188.9	396,723.1	1,826,054.0	16,791.3	379,931.8	41,174,134.9	2,166.91	377,764.85
33	2039	43,301,673.6	301,484.7	1,838,647.5	12,593.5	288,891.2	41,463,026.1	2,166.91	286,724.31
34	2040	44,165,728.0	864,054.4	1,876,427.9	37,780.4	826,274.0	42,289,300.1	2,166.91	824,107.10
35	2041	44,662,748.9	497,020.9	1,897,417.1	20,989.1	476,031.7	42,765,331.8	2,166.91	473,864.82
36	2042	45,315,260.9	652,512.0	1,924,702.9	27,285.9	625,226.1	43,390,557.9	2,166.91	623,059.21
37	2043	45,560,628.2	245,367.3	1,935,197.5	10,494.6	234,872.7	43,625,430.7	2,166.91	232,705.83
38	2044	45,855,068.9	294,440.8	1,947,791.0	12,593.5	281,847.3	43,907,278.0	2,166.91	279,680.38
39	2045	46,647,288.2	792,219.3	1,981,373.6	33,582.6	758,636.7	44,665,914.7	2,166.91	756,469.79
40	2046	47,022,008.9	374,720.7	1,996,066.0	14,692.4	360,028.3	45,025,943.0	2,166.91	357,861.37
							41,231,366.01		41,142,173.56

Step 4.4.: Estimation of the sum of baseline greenhouse gas emissions

The greenhouse gas emissions as a result of deforestation activities within the Madre de Dios Amazon REDD project area in the baseline is determined, according to the VMD0007 BL-UP Module of the approved VCS VM0007 REDD Methodology Modules, by the sum of CO₂ emissions due to fossil fuel combustion per stratum per year, emissions of non-CO₂ greenhouse gases due to biomass burning per stratum per year and direct N₂O emissions due to nitrogen application within the scope of the project.

$$GHG_{BSL,E} = \sum_{t=1}^{t'} \sum_{i=1}^M (E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct-N,i,t})$$

- **CO₂ emissions due to fossil fuel combustion**

The calculation of CO₂ emissions due to fossil fuel combustion, according to the VMD0014 E-FFC Module of the approved VCS VMD0007 REDD Methodology Modules, is optional. However, it is proposed to quantify CO₂ emissions due to fossil fuel combustion if there are lower in a project scenario than in the baseline. There is no information regarding the number of machines, equipment, vehicles, etc. that are annually incorporated for agriculture and livestock activities during the baseline (post-deforestation) within the project area, therefore it was decided not to quantify this variable.

- **Non-CO₂ emissions due to biomass burning**

According to the VMD0013 E-BB Module of the approved VCS VMD0007 REDD Methodology Modules, the estimation of burned biomass is given by: the conversion of forest land to non-forest land due to fire, periodic burnings of agriculture of pastures after deforestation and forest land burning.

Agricultural residues burning in clean agriculture post-deforestation land-use has been considered. In relation to forest biomass burning, it has been estimated that 50% of the deforested area is burned in the field. According to the abovementioned Module of the methodology, the following formula should be used for the calculations:

$$E_{BiomassBurn,i,t} = \sum_{g=1}^G \left((A_{burn,i,t} * B_{i,t} * COMF_i * G_{g,i}) * 10^{-3} \right) * GWP_g$$

Where,

- A Burned area in stratum i at time t (ha)
- B Average aerial biomass before the burning T/ha
- CF Combustion factor (IPCC, Table 2.6)
- G Emission factor Kg/T (IPCC, Table 2.5)
- GWP Global warming power (CH₄ = 21 and N₂O = 310)

- **Estimation of CH₄ and N₂O emissions due to agricultural residues burning in clean agriculture post-deforestation areas**

Clean agriculture carries out activities such as agricultural residues burning which generates methane and nitrous oxide emissions (CH₄ and N₂O). Calculations have been made to estimate these emissions based on the corn crop as the post-deforestation clean crop that would mainly occur in the Madre de Dios Amazon REDD project area. The combustion factor and emission factor data were taken from the correspondent module of the approved VCS VM0007 REDD Methodology Modules (VMD0013 E-BB) and the dry fraction of the Greenhouse Gas Inventory, Agriculture and Other Land Use Sector of Peru, 2005. Also, 17.25 T of dry biomass/ha has been considered for this crop.

The chart below shows the calculations carried out to estimate the methane and nitrous oxide emissions derived from clean crop areas due to agricultural residues burning.

Chart 39: Estimation of CO₂ emissions generated by other GHGs

Biomass before burning (T/ha)	Residue ratio	Combustion Factor Table 2.6. IPCC (*)	Emission Factor Kg/T burned dry biomass Table 2.5. IPCC (*)	Total GHG t/ha/year	GWP	Total tCO ₂ e
17.2527	0.75	0.8	2.7	0.02794937 tCH ₄	21	0.58693685
			0.07	0.00072461 tN ₂ O	310	0.22463015

(*) According to the VMD0013 E-BB Module / 17.25 T/ha dry biomass for maize crop

Taking into account the total of the deforested areas that are annually converted to clean crop and the total tCH₄/ha/year or tN₂O/ha/year that would be emitted due to agricultural residues burning, the number of tonnes of each one of these gases is achieved. Then, said number is transformed to tCO₂e by multiplying by their respective warming power (CH₄ = 21 and N₂O = 310), which can be observed in the following chart:

Chart 40: Estimation of annual CO2 emissions generated by other GHGs (CH4 and N2O)

Area of post-deforestation classes established on deforested areas within the project area							Otros GEI anualizado		
ID >		009	010	011	012		Incorporación de fertilizante nitrogenado (Agropecuaria y pastos)	Quema de Biomasa (Residuos agrícolas- Cultivo en limpio)	
Name >		Deforestacion x Pastos	Deforestacion x Agropecuaria	Deforestacion x Infraestructura	Deforestacion x Cultivo en Limpio				
% historic >		40%	54%	2%	4%	annual			
Project year t	Año	ABSLPA _{fd,t}	ABSLPA _{fd,t}	ABSLPA _{fd,t}	ABSLPA _{fd,t}	ABSLPA _t	N2O (T/ha/año)	CH4 (T/ha/año)	N2O (T/ha/año)
		ha	ha	ha	ha	ha	0.00125	2.79E-02	7.25E-04
0	2006	3,086.2	4,166.3	154.3	308.6	7,715.4	9.07	8.63	0.22
1	2007	4,403.4	5,944.6	220.2	440.3	11,008.5	12.9	12.3	0.3
2	2008	5,269.0	7,113.2	263.5	526.9	13,172.6	15.5	14.73	0.38
3	2009	6,322.8	8,535.8	316.1	632.3	15,807.1	18.6	17.67	0.46
4	2010	6,774.5	9,145.5	338.7	677.4	16,936.2	19.9	18.93	0.49
5	2011	8,091.7	10,923.8	404.6	809.2	20,229.4	23.8	22.62	0.59
6	2012	9,409.0	12,702.2	470.5	940.9	23,522.5	27.6	26.30	0.68
7	2013	10,237.0	13,819.9	511.8	1,023.7	25,592.5	30.1	28.61	0.74
8	2014	11,441.3	15,445.8	572.1	1,144.1	28,603.4	33.6	31.98	0.83
9	2015	12,608.1	17,020.9	630.4	1,260.8	31,520.2	37.0	35.24	0.91
10	2016	13,661.9	18,443.5	683.1	1,366.2	34,154.7	40.1	38.18	0.99
11	2017	14,339.3	19,358.1	717.0	1,433.9	35,848.3	42.1	40.08	1.04
12	2018	15,995.3	21,593.7	799.8	1,599.5	39,988.3	47.0	44.71	1.16
13	2019	17,124.4	23,117.9	856.2	1,712.4	42,811.0	50.3	47.86	1.24
14	2020	18,027.6	24,337.3	901.4	1,802.8	45,069.1	53.0	50.39	1.31
15	2021	18,968.5	25,607.5	948.4	1,896.9	47,421.4	55.7	53.02	1.37
16	2022	21,076.2	28,452.8	1,053.8	2,107.6	52,690.4	61.9	58.91	1.53
17	2023	22,017.1	29,723.0	1,100.9	2,201.7	55,042.7	64.7	61.54	1.60
18	2024	23,560.1	31,806.2	1,178.0	2,356.0	58,900.3	69.2	65.85	1.71
19	2025	24,501.0	33,076.4	1,225.1	2,450.1	61,252.6	72.0	68.48	1.78
20	2026	25,291.4	34,143.4	1,264.6	2,529.1	63,228.5	74.3	70.69	1.83
21	2027	26,194.7	35,362.8	1,309.7	2,619.5	65,486.6	76.9	73.21	1.90
22	2028	26,759.2	36,124.9	1,338.0	2,675.9	66,898.0	78.6	74.79	1.94
23	2029	28,001.2	37,801.6	1,400.1	2,800.1	70,003.0	82.3	78.26	2.03
24	2030	28,603.4	38,614.5	1,430.2	2,860.3	71,508.4	84.0	79.94	2.07
25	2031	29,318.4	39,579.9	1,465.9	2,931.8	73,296.1	86.1	81.94	2.12
26	2032	29,657.2	40,037.2	1,482.9	2,965.7	74,142.9	87.1	82.89	2.15
27	2033	30,522.8	41,205.8	1,526.1	3,052.3	76,307.0	89.7	85.31	2.21
28	2034	31,012.1	41,866.3	1,550.6	3,101.2	77,530.2	91.1	86.68	2.25
29	2035	31,802.4	42,933.3	1,590.1	3,180.2	79,506.1	93.4	88.89	2.30
30	2036	32,103.5	43,339.7	1,605.2	3,210.4	80,258.8	94.3	89.73	2.33
31	2037	32,442.2	43,797.0	1,622.1	3,244.2	81,105.6	95.3	90.67	2.35
32	2038	32,743.3	44,203.5	1,637.2	3,274.3	81,858.3	96.2	91.52	2.37
33	2039	32,969.1	44,508.3	1,648.5	3,296.9	82,422.8	96.8	92.15	2.39
34	2040	33,646.6	45,422.9	1,682.3	3,364.7	84,116.5	98.8	94.04	2.44
35	2041	34,022.9	45,931.0	1,701.1	3,402.3	85,057.4	99.9	95.09	2.47
36	2042	34,512.2	46,591.5	1,725.6	3,451.2	86,280.5	101.4	96.46	2.50
37	2043	34,700.4	46,845.5	1,735.0	3,470.0	86,751.0	101.9	96.99	2.51
38	2044	34,926.2	47,150.4	1,746.3	3,492.6	87,315.5	102.6	97.62	2.53
39	2045	35,528.4	47,963.3	1,776.4	3,552.8	88,821.0	104.4	99.30	2.57
40	2046	35,791.8	48,319.0	1,789.6	3,579.2	89,479.6	105.1	100.04	2.59
Emisiones Totales otros GEI al año 2046							105.1	100.04	2.59
Emisiones totales CO2 equiv al año 2046							32,592.9	2,100.7548	803.9926

- **Estimation of CH₄ and N₂O emissions due to in field forest biomass burning**

Considering that some part of aerial biomass of the deforested areas are burned in the field, calculations to estimated its CH₄ and N₂O emissions have been made according to the VMD0013 E-BB Module of the approved VCS VM0007 REDD Methodology Modules. It has been considered that 50% of deforested forest areas are burned. In order to use the correspondent formula, the combustion factor of wet tropical forest (0.5) for all the forest types identified within the Madre de Dios Amazon REDD project area and the combustion factor of secondary forests (0.55) for intervened areas were applied (factors taken from table 2.6. in Annex 1 of the VMD0013 E-BB Module of the REDD Methodology Modules). The emission factor used for methane gas was 6.8 and for nitrous oxide 0.2, factors corresponding to primary forests according to table 2.5 in Annex 2 of the VMD0013 E-BB Module of the REDD Methodology Modules. These calculations are presented in chart 42.

- **Direct N₂O emissions from perennial crops⁶²**

Direct N₂O emissions occur due to the incorporation of nitrogen fertilizers in pasture areas. The pasture post-deforestation activity, which in the zone consists mainly in planting Braquearias, considers the incorporation of nitrogen fertilizers to improve their productivity. The incorporation of nitrogen fertilizers in areas of clean crops was not considered, since agricultural residues burning is a way of preparing the land for the next harvest.

Chart 41: Estimation of direct N₂O emissions

Synthetic fertilizer N applied to the soil (ha/year)	N fraction of direct emissions	Nitrous oxide emissions tN ₂ O/ha/year
100	0.0125	0.00125

⁶² http://www.inia.gob.pe/webinia/tecnologia/CRIANZAS/PASTOS/2001/11_Manejo_Brachiaria/Manejo_Brachiaria.htm

Chart 42: Calculation of other GHGs emissions (CH4 and N2O) due to forest biomass burning

Proy ect year t	Biomasa a seca T/ha	Áreas quemadas anuales en el área del proyecto									Suma total biomasa quemada en bosque primario por año (T/año)	Suma total biomasa quemada en bosque secundario por año (T/año)	Emisión CH4										Emisión N2O											
		Estrato	BPC	BPT	BT	BCB	BT	P	PA	AI			Área quemada (ha)*Stock estrato (T biomasa seca/ha)*FC*FE(Kg/T materia seca)*PGC/1000										Área quemada (ha)*Stock estrato (T biomasa seca/ha)*FC*FE(Kg/T materia seca)*PGC/1000											
													Factor de Combustión FC Tabla 2.6 IPCC (*)	Factor de emisión FE Kg / T Materia seca quemada Tabla 2.5 IPCC (**)	PGC	TOTAL T CO2/año (en bosque primario)	TOTAL T CO2/año (en bosque secundario)	TOTAL T CO2/año	Factor de Combustión FC Tabla 2.6 IPCC (*)	Factor de emisión FE Kg / T Materia seca quemada Tabla 2.5 IPCC (**)	PGC	TOTAL T CO2/año (en bosque primario)	TOTAL T CO2/año (en bosque secundario)	TOTAL T CO2/año	Factor de Combustión FC Tabla 2.6 IPCC (*)	Factor de emisión FE Kg / T Materia seca quemada Tabla 2.5 IPCC (**)	PGC	TOTAL T CO2/año (en bosque primario)	TOTAL T CO2/año (en bosque secundario)	TOTAL T CO2/año				
		ha	ha	ha	ha	ha	ha	ha	ha	ha			0.5	6.8	21	0.5	6.8	21	0.5	6.8	21	0.5	6.8	21	0.5	6.8	21	0.5	6.8	21	0.5	6.8	21	
		Biomasa total quemada (t)																																
0	2006	3528.4	0	235.225	0	0	0	0	94.09	3,857.69	832215.9936	0	54282.2005	0	0	0	5549.389796	886498.1941	5549.389796	63295.97106	435.85	63,731.82	27,481.44	189.23	27,670.68									
1	2007	5080.9	47.045	235.225	0	0	47.045	0	94.09	5,504.27	1198931.031	10919.47617	54282.2005	0	0	12764.4694	5549.389796	1276357.177	5549.389796	91,131.90	435.85	91,567.75	39,567.07	189.23	39,756.31									
2	2008	5880.6	47.045	235.225	94.09	0	188.18	0	141.135	6,586.30	1387026.636	10919.47617	54282.2005	21478.24238	0	51057.8774	0	8324.084694	1524764.452	8324.084694	108,868.18	653.77	109,521.96	47,267.70	283.85	47,551.55								
3	2009	7197.9	47.045	235.225	94.09	0	188.18	0	141.135	7,903.56	1697720.627	10919.47617	54282.2005	21478.24238	0	51057.8774	0	8324.084694	1835458.423	8324.084694	131,051.73	653.77	131,705.51	56,899.21	283.85	57,183.06								
4	2010	7668.3	47.045	235.225	94.09	0	282.27	0	141.135	8,468.10	1808682.759	10919.47617	54282.2005	21478.24238	0	76586.8161	0	8324.084694	1971948.495	8324.084694	140,797.19	653.77	141,450.97	61,130.43	283.85	61,414.29								
5	2011	8703.3	329.315	235.225	94.09	0	611.59	0	141.135	10,114.68	2052799.451	76436.3332	54282.2005	21478.24238	0	16598.102	0	8324.084694	2370934.328	8324.084694	169,284.71	653.77	169,938.48	73,498.96	283.85	73,782.82								
6	2012	9879.5	658.63	282.27	94.09	0	658.63	0	188.18	11,761.25	2390204.782	152872.6664	65138.6406	21478.24238	0	178072.571	0	11098.77959	2748396.902	11098.77959	196,235.54	871.70	197,107.24	85,200.30	378.47	85,578.77								
7	2013	10867	658.63	282.27	94.09	0	705.68	0	188.18	12,796.24	2563225.26	152872.6664	65138.6406	21478.24238	0	191467.094	0	11098.77959	2994181.85	11098.77959	213,784.58	871.70	214,656.28	92,819.64	378.47	93,198.11								
8	2014	12091	846.81	282.27	94.09	0	799.77	0	188.18	14,301.68	2851726.805	166550.5711	65138.6406	21478.24238	0	216895.979	0	11098.77959	3351890.238	11098.77959	239,324.96	871.70	240,196.66	103,908.60	378.47	104,287.07								
9	2015	13126	1129.08	329.315	94.09	0	893.86	0	188.18	15,760.08	3095843.496	262067.4281	75995.0807	21478.24238	0	242524.918	0	11098.77959	3697909.165	11098.77959	264,030.71	871.70	264,902.41	114,635.18	378.47	115,013.65								
10	2016	14019	1364.305	329.315	141.14	0	1035	0	188.18	17,077.34	3306671.548	316664.809	75995.0807	32217.36358	0	280818.326	0	11098.77959	4012367.127	11098.77959	286,483.01	871.70	287,354.71	124,383.38	378.47	124,761.85								
11	2017	14584	1552.485	329.315	141.14	0	1129.1	0	188.18	17,924.15	349826.107	360342.7137	75995.0807	32217.36358	0	306347.264	0	11098.77959	4214782.529	11098.77959	300,931.62	871.70	301,803.32	130,656.58	378.47	131,035.05								
12	2018	16042	1740.665	329.315	141.14	0	1505.4	0	235.225	19,994.13	3783808.718	404020.6183	75995.0807	32217.36358	0	408463.019	0	13873.47449	4704504.799	13873.47449	335,901.64	1,089.62	336,991.27	145,839.65	473.09	146,312.73								
13	2019	16795	2069.98	329.315	141.14	0	1834.8	0	235.225	21,405.48	3961348.129	480456.9516	75995.0807	32217.36358	0	497814.305	0	13873.47449	5047831.83	13873.47449	360,415.19	1,089.62	361,504.82	156,482.79	473.09	156,955.87								
14	2020	17830	2117.025	329.315	141.14	0	1881.8	0	235.225	22,534.56	4205464.821	491376.4277	75995.0807	32217.36358	0	510578.774	0	13873.47449	5315632.467	13873.47449	379,536.16	1,089.62	380,625.78	164,784.61	473.09	165,257.69								
15	2021	18630	2258.16	329.315	141.14	0	2117	0	235.225	23,710.68	4394100.446	524134.8562	75995.0807	32217.36358	0	574001.121	0	13873.47449	5600848.867	13873.47449	399,900.61	1,089.62	400,990.23	173,626.31	473.09	174,099.40								
16	2022	20747	2493.385	329.315	141.14	0	2369.3	0	235.225	26,345.20	489430.042	578732.1371	75995.0807	32217.36358	0	650887.937	0	13873.47449	6231362.661	13873.47449	444,919.29	1,089.62	446,008.92	193,172.24	473.09	193,645.33								
17	2023	21688	2587.475	376.36	141.14	0	2493.4	0	235.225	27,521.33	5115354.307	600571.1894	86851.5208	32217.36358	0	676516.876	0	13873.47449	6511511.257	13873.47449	464,921.90	1,089.62	466,011.53	201,856.85	473.09	202,329.93								
18	2024	23428	2587.475	376.36	141.14	0	2681.6	0	235.225	29,450.17	5525914.197	600571.1894	86851.5208	32217.36358	0	727574.753	0	13873.47449	6973129.024	13873.47449	497,881.41	1,089.62	498,971.04	216,167.00	473.09	216,640.09								
19	2025	24181	2869.745	376.36	141.14	0	2822.7	0	235.225	30,626.30	5703453.609	666088.0465	86851.5208	32217.36358	0	765868.161	0	13873.47449	7254478.701	13873.47449	517,969.78	1,089.62	519,059.40	224,888.84	473.09	225,361.93								
20	2026	25122	2869.745	376.36	141.14	0	2822.7	0	282.27	31,614.24	5925377.874	666088.0465	86851.5208	32217.36358	0	765868.161	0	16648.16939	7476402.966	16648.16939	533,815.17	1,307.55	535,122.72	231,768.49	567.70	232,336.19								
21	2027	26110	2963.835	376.36	141.14	0	2869.7	0	282.27	32,743.32	615898.353	687926.9988	86851.5208	32217.36358	0	778632.63	0	16648.16939	7744026.866	16648.16939	552,923.52	1,307.55	554,231.07	240,064.83	567.70	240,632.54								
22	2028	26722	3057.925	376.36	141.14	0	2869.7	0	282.27	33,449.00	6302649.125	709765.9512	86851.5208	32217.36358	0	778632.63	0	16648.16939	7910116.591	16648.16939	564,782.32	1,307.55	566,089.87	245,213.61	567.70	245,781.32								
23	2029	28133	3199.06	376.36	141.14	0	2869.7	0	282.27	35,001.48	663535.522	742524.3797	86851.5208	32217.36358	0	778632.63	0	16648.16939	8275761.417	16648.16939	590,889.37	1,307.55	592,196.91	256,548.60	567.70	257,116.31								
24	2030	28839	3199.06	423.405	141.14	0	2869.7	0	282.27	35,754.20	6801978.721	742524.3797	97707.9609	32217.36358	0	778632.63	0	16648.16939	8453061.055	16648.16939	603,548.56	1,307.55	604,856.11	262,044.89	567.70	262,612.60								
25	2031	29638	3246.105	423.405	141.14	0	2916.8	0	282.27	36,648.06	6990614.346	753443.8558	97707.9609	32217.36358	0	791297.1	0	16648.16939	8665380.626	16648.16939	618,708.18	1,307.55	620,015.72	268,626.80	567.70	269,194.50								
26	2032	30015	3246.105	470.45	141.14	0	2916.8	0	282.27	37,071.46	7079884.052	753443.8558	108564.401	32217.36358	0	791297.1	0	16648.16939	8765006.772	16648.16939	625,821.48	1,307.55	627,129.03	271,715.21	567.70	272,282.91								
27	2033	31003	3246.105	470.45	141.14	0	3010.9	0	282.27	38,153.50	7312404.53	753443.8558	108564.401	32217.36358	0	816826.098	0	16648.16939	9023556.189	16648.16939	644,281.91	1,307.55	645,589.46	279,730.24	567.70									

Step 4.5.: Calculation of CO2 equivalent net emissions

STEP 4.5: Calculation of net emissions

$$\Delta C_{BSL,unplanned} = \Delta C_{BSL,PA,unplanned} + GHG_{BSL,E}$$

$$\Delta C_{BSL,PA,unplanned} = \Delta C_{TOT,PA}$$

$$\Delta C_{BSL,LK,unplanned} = \Delta C_{TOT,LB}$$

The estimated sum of other GHGs generated due to post-deforestation activities, which includes agricultural residues burning, forest aerial biomass burning and incorporation of nitrogen fertilizers, has been added to the net CO2 emissions calculation (presented in the item 4.3. above: 41'142,173.56 tCO2), as shown in the following chart. Therefore, the total avoided emissions up to 2046 are 42'172,873.48 tCO2e.

Chart 43: Total CO2e within the Madre de Dios Amazon REDD project area

Total CO2e up to year 2046	Due to biomass burning				Nitrogen fertilizer incorporation in perennial agriculture activity and pastures	TOTAL CO2e
	Agricultural residues in areas of clean crops		From deforested forest			
	CH4	N2O	CH4	N2O		
	2,100.75	803.99	693,920.31	301,281.93	32,592.94	1,030,699.92
TOTAL NET CO2e UP TO YEAR 2046						42'172,873.48

Chart 44: Summary chart of accumulated annual emissions within the Madre de Dios Amazon REDD project area

Año	Cambio del Stock de carbono en clases iniciales de bosque (T CO2)	Cambio del Stock de carbono en clases finales post-deforestación (T CO2)	Cambio total del Stock de Carbono en Línea base (TCO2)	Stock de carbono en productos aprovechados Cwp TCO2 (sawnwood)	TCO2 Netas	Fertilizante nitrogenado (Agropecuaria y pastos)	Quema de Biomasa (Residuos agrícolas- Cultivo en limpio)		Quema de Biomasa en bosque		Total de Emisión Neta acumulada (TCO2)
						N2O (T CO2 e)	CH4 (T CO2 e)	N2O (T CO2 e)	CH4 (T CO2 e)	N2O (TCO2e)	
2007	1,724,615.07	73,461.94	1,651,153.13	3,421.06	1,647,732.07	4,009.86	258.45	98.91	27,835.93	12,085.63	1,692,020.85
2008	2,836,619.54	121,736.94	2,714,882.61	5,552.53	2,709,330.08	4,798.12	309.26	118.36	45,790.14	19,880.87	2,780,226.82
2009	4,210,676.46	180,506.49	4,030,169.97	7,719.44	4,022,450.53	5,757.74	371.11	142.03	67,973.68	29,512.38	4,126,207.48
2010	4,815,161.22	205,693.44	4,609,467.77	11,183.69	4,598,284.08	6,169.01	397.62	152.18	77,719.15	33,743.61	4,716,465.64
2011	6,582,797.52	279,155.39	6,303,642.14	13,350.60	6,290,291.54	7,368.54	474.93	181.76	106,206.66	46,112.14	6,450,635.58
2012	8,267,995.40	352,617.33	7,915,378.07	15,517.51	7,899,860.56	8,568.07	552.25	211.35	133,375.42	57,908.09	8,100,475.74
2013	9,355,413.16	398,793.41	8,956,619.75	17,684.42	8,938,935.33	9,322.06	600.85	229.95	150,924.46	65,527.43	9,165,540.08
2014	10,938,336.40	465,958.61	10,472,377.78	19,851.33	10,452,526.45	10,418.77	671.53	257.01	176,464.84	76,616.39	10,716,955.00
2015	12,474,806.18	531,024.91	11,943,781.27	22,018.24	11,921,763.03	11,481.21	740.01	283.22	201,170.59	87,342.97	12,222,781.04
2016	13,867,937.74	589,794.46	13,278,143.28	24,185.15	13,253,958.13	12,440.84	801.87	306.89	223,622.89	97,091.17	13,588,221.78
2017	14,763,832.53	627,574.89	14,136,257.64	26,352.06	14,109,905.58	13,057.74	841.63	322.10	238,071.49	103,364.37	14,465,562.92
2018	16,943,440.51	719,927.05	16,223,513.46	28,518.97	16,194,994.49	14,565.72	938.82	359.30	273,259.45	118,642.06	16,602,759.84
2019	18,464,951.82	782,894.43	17,682,057.39	30,685.88	17,651,371.51	15,593.89	1,005.09	384.67	297,773.00	129,285.19	18,095,413.35
2020	19,649,758.82	833,268.33	18,816,490.48	32,852.79	18,783,637.69	16,416.42	1,058.11	404.96	316,893.96	137,587.01	19,255,998.16
2021	20,913,330.34	885,741.15	20,027,589.20	35,019.70	19,992,569.50	17,273.23	1,113.33	426.09	337,258.41	146,428.72	20,495,069.28
2022	23,704,465.41	1,003,280.26	22,701,185.15	37,186.61	22,663,998.54	19,192.48	1,237.04	473.43	382,277.10	165,974.65	23,233,153.24
2023	24,949,525.17	1,055,753.08	23,893,772.09	39,353.52	23,854,418.57	20,049.29	1,292.26	494.57	402,279.71	174,659.26	24,453,193.65
2024	26,992,743.53	1,141,808.50	25,850,935.03	41,520.43	25,809,414.60	21,454.45	1,382.83	529.23	435,239.21	188,969.41	26,456,989.73
2025	28,238,438.78	1,194,281.31	27,044,157.47	43,687.34	27,000,470.13	22,311.26	1,438.06	550.37	455,327.58	197,691.25	27,677,788.63
2026	29,229,975.01	1,238,358.48	27,991,616.53	45,854.25	27,945,762.28	23,030.97	1,484.45	568.12	471,390.90	204,665.52	28,646,902.23
2027	30,414,024.32	1,288,732.38	29,125,291.94	48,021.16	29,077,270.78	23,853.51	1,537.46	588.41	490,499.25	212,961.86	29,806,711.26
2028	31,148,610.87	1,320,216.07	29,828,394.79	50,188.07	29,778,206.72	24,367.59	1,570.60	601.09	502,358.05	218,110.64	30,525,214.70
2029	32,765,762.04	1,389,480.19	31,376,281.84	52,354.98	31,323,926.86	25,498.58	1,643.49	628.99	528,465.09	229,445.63	32,109,608.65
2030	33,555,072.79	1,423,062.79	32,132,010.00	54,521.89	32,077,488.11	26,046.93	1,678.84	642.52	541,124.29	234,941.92	32,881,922.60
2031	34,494,512.48	1,462,942.13	33,031,570.35	56,688.80	32,974,881.55	26,698.11	1,720.81	658.58	556,283.90	241,523.82	33,801,766.77
2032	34,940,309.01	1,481,832.35	33,458,476.66	58,855.71	33,399,620.95	27,006.56	1,740.69	666.19	563,397.21	244,612.23	34,237,043.83
2033	36,084,601.84	1,530,107.34	34,554,494.50	61,022.62	34,493,471.88	27,794.82	1,791.50	685.63	581,857.64	252,627.27	35,358,228.74
2034	36,730,358.45	1,557,393.20	35,172,965.24	63,189.53	35,109,775.71	28,240.36	1,820.21	696.62	592,276.26	257,150.76	35,989,959.92
2035	37,767,945.06	1,601,470.37	36,166,474.69	65,356.44	36,101,118.25	28,960.08	1,866.60	714.38	609,020.41	264,420.63	37,006,100.35
2036	38,163,910.44	1,618,261.67	36,545,648.77	67,523.35	36,478,125.42	29,234.26	1,884.27	721.14	615,328.83	267,159.58	37,392,453.50
2037	38,636,778.03	1,637,151.89	36,999,626.15	69,690.26	36,929,935.89	29,542.71	1,904.15	728.75	622,935.71	270,462.28	37,855,509.50
2038	39,033,501.10	1,653,943.19	37,379,557.91	71,857.17	37,307,700.74	29,816.89	1,921.83	735.51	629,256.75	273,206.71	38,242,638.43
2039	39,334,985.79	1,666,536.66	37,668,449.13	74,024.08	37,594,425.05	30,022.52	1,935.08	740.59	634,116.86	275,316.85	38,536,556.94
2040	40,199,040.23	1,704,317.09	38,494,723.14	76,190.99	38,418,532.15	30,639.42	1,974.84	755.80	648,024.48	281,355.17	39,381,281.86
2041	40,696,061.08	1,725,306.22	38,970,754.87	78,357.90	38,892,396.97	30,982.14	1,996.93	764.26	656,041.05	284,835.75	39,867,017.10
2042	41,348,573.07	1,752,592.08	39,595,980.99	80,524.81	39,515,456.18	31,427.68	2,025.65	775.25	666,400.19	289,333.42	40,505,418.36
2043	41,593,940.38	1,763,086.65	39,830,853.73	82,691.72	39,748,162.01	31,599.04	2,036.69	779.48	670,361.54	291,053.33	40,743,992.09
2044	41,888,381.14	1,775,680.12	40,112,701.02	84,858.63	40,027,842.39	31,804.68	2,049.95	784.55	675,115.16	293,117.22	41,030,713.95
2045	42,680,600.45	1,809,262.73	40,871,337.73	87,025.54	40,784,312.19	32,353.03	2,085.29	798.07	687,897.96	298,667.18	41,806,113.73
2046	43,055,321.12	1,823,955.11	41,231,366.01	89,192.45	41,142,173.56	32,592.94	2,100.75	803.99	693,920.31	301,281.93	42,172,873.48

b. APPLICATION OF THE CP-W MODULE OF THE REDD METHODOLOGY MODULES⁶³

As it was previously mentioned, the concessions carry out sustainable forest management and their main product is sawn wood. Therefore, the VMD0005 CP-W Module of the approved VCS VM0007 REDD Methodology Modules was applied and is described following.

PART 1: ESTIMATION OF CARBON STOCKS IN THE WOOD PRODUCTS CARBON POOL

Step 1: Estimation of the extracted volume

This step consists of the identification of wood product classes. As it was abovementioned, for the case of Maderacre and Maderyja timber concessions, their product is sawn wood. The factors used in the estimation are those determined within the VMD0005 CP-W Module of the methodology for this type of product.

Step 2: Calculation of the biomass carbon of the volume extracted by wood product type from within the project area

For the estimation of the volume extracted from within the project area, the information of annual harvesting for Maderacre and Maderyja timber concessions, according to the 2006, 2007, 2008 and 2010 Annual Operative Plans (AOPs) were taken into account. During 2009 there was no wood extraction, thus said year was not included in this analysis. For the subsequent years, the average wood extraction for the concessions worked years was considered.

According to the abovementioned Module of the methodology, the formula to be used for the calculation is the following:

⁶³ According to the document: "Estimación de las reservas de carbono en los productos de madera a largo plazo", Bosques Amazónicos Technical Area, application of the CP-W Module of the approved VCS REDD Methodology Modules, March 2011, which will be available to the auditors.

$$C_{XB,ty,i} = \frac{1}{A_i} * \sum_{j=1}^S (V_{ex,ty,j,i} * D_j * CF_j * \frac{44}{12})$$

Where,

C_{XB} : Biomass carbon stock by class of wood product and stratum (tCO2/ha)

V_{ex} : Volume of wood extracted per stratum by species and class of wood product (m3 roundwood)

D : Wood density (T/m3)

CF : Carbon fraction of wood by tree species (0.49)

The following chart includes the annual C_{XB} within the Madre de Dios Amazon REDD project area for years 2006, 2007, 2008 and 2010.

Chart 45: Annual biomass carbon stocks by class of wood product and stratum within the Madre de Dios Amazon REDD project

DATA PARCELA DE CORTA ANUAL				Cálculo Carbono de volumen extraído por producto de madera en el área del proyecto $C_{XB}=1/A(V * D * F * 44/12)$						Cálculo de proporción de biomasa de carbono secuestrado después de 100 años $C_{WP}=C_{XB} * (1-WW) * (1-SLF) * (1-OF)$			
Año	Concesión	Número de árboles	Especies aprovechadas	Total m3 rollizo	Promedio Densidad (T/m3)	Biomasa (T)	Carbono (T)	CO2 (T)	C_{XB} (T CO2)	0.76	0.80	0.16	C_{WP}
2004	Maderyja	103	Caoba	1,130.57	0.47	531.37	260.37	954.69	954.69				985.57
2004	Maderacre	770	Quinilla, Tahuari, Estoraque, shiwahuaco, Cedro	6,198.51	0.82	5,107.57	2,502.71	9,176.61	9,176.61				
2005	Maderacre	1,486	Estoraque, Caoba, Cedro, Ishhpingo	11,365.55	0.59	6,705.68	3,285.78	12,047.86	12,047.86				1,629.41
2005	Maderyja	1,221	Estoraque, Shiwahuaco, Caoba, Cedro, Ishhpingo	4,051.05	0.65	2,616.98	1,282.32	4,701.83	4,701.83				
2006	Maderacre	2,005	Azucarhuayo, estoraque, Shihuahuaco, Ishpingo	11,436.87	0.68	7,719.89	3,782.75	13,870.07	13,870.07				1,369.70
2006	Maderyja	52	Caoba	248.53	0.47	116.81	57.24	209.87	209.87				
2007	Maderyja	852	Estoraque, Shiwahuaco, Caoba, Ishhpingo, Azucar huayo, Itauba, Ana Caspi, Quinilla, Pumaquiro, Palo bastón, cedro.	7,972.71	0.69	5,522.92	2,706.23	9,922.84	22,045.21				3,421.06
2007	Maderacre	1,226	Estoraque, Shihuahuaco, Caoba, Ishhpingo, Azucar huayo, Itauba, Ana Caspi, Quinilla, Pumaquiro, Palo bastón, cedro.	10,543.12	0.69	7,303.51	3,578.72	13,121.97	13,121.97				
2007	Maderyja	1,559	Estoraque, Palo Bastón, Shihuahuaco, Ishpingo, Cedro, Tahuari	8,976.25	0.75	6,747.15	3,306.10	12,122.37					
2008	Maderacre	297	Capirona, Palo Bastón, Quinilla	1,659.79	0.82	1,361.03	666.90	2,445.32	20,869.92				2,131.47
2008	Maderacre	1,597	Ana Caspi, Palo Bastón, Ishpingo, Capirona, shihuahuaco, Quinilla, Ana Caspi, Estoraque, azucar huayo, Copaiba	14,264.91	0.72	10,254.88	5,024.89	18,424.61					
2008	Maderyja		Caoba	1,232.49	0.47	579.27	283.84	1,040.76	1,040.76				
2010	Maderyja	1,102	Shihuahuaco, Estoraque, Caoba, Azucar huayo	18,140.00	0.69	12,425.90	6,088.69	22,325.20	22,325.20				3,464.25
2010	Maderacre	1,208	Shihuahuaco, Estoraque, Azucar huayo, Copaiba, Ishpingo, Palo Bastón	10,717.06	0.69	7,394.77	3,623.44	13,285.94	13,285.94				

Step 3: Calculation of proportion of biomass carbon extracted that remains sequestered in wood products

In order to calculate the proportion of biomass carbon extracted that remains sequestered in wood products after 100 years, and as it was mentioned in step 1 above, only sawn wood was considered since it is the product of the concessions. In this sense, the CP-W indicates the following formula to be used for this calculation:

$$C_{WP,i} = \sum_{ty=s,w,oir,p,o} C_{XB,ty,i} * (1 - WW_{ty}) * (1 - SLF_{ty}) * (1 - OF_{ty})$$

Where,

Cwp : Carbon stock in long-term carbon products

Ww : Wood waste (0.24, according to the CP-W Module)

SLF : Fraction of wood products that will be emitted to the atmosphere within 5 years of timber harvest (0.2, according to the CP-W Module)

OF : Fraction of wood products that will be emitted to the atmosphere between 5 and 100 years of timber harvest (0.84, according to the CP-W Module)

Chart 46: Proportion of biomass carbon extracted that remains sequestered in wood products after 100 years

Year	Calculation of the proportion of biomass carbon sequestered after 100 years $C_{WP}=C_{XB}*(1-WW)*(1-SLF)*(1-OF)$				
	C_{XB} (tCO ₂)	0.76	0.80	0.16	C_{WP} (tCO ₂)
2004	10,131.30				985.57
2005	16,749.70				1,629.41
2006	14,079.94				1,369.70
2007	35,167.18				3,421.06
2008	21,910.68				2,131.47
2010	35,611.14				3,464.25

The average Cwp for the rest of the years is 2,166.91.

2.5 Additionality

The Madre de Dios Amazon REDD Project additionality is demonstrated by the fact that it seeks the reduction of those emissions that would occur without its implementation, which means that the project would conserve the forest and avoid the net emissions that would occur in the baseline scenario.

In this sense and as it was mentioned before, the Madre de Dios Amazon REDD Project proposes the implementation of the following actions:

- Monitoring and surveillance throughout the conservation area through Community System.
- Installation of control posts.
- Delimitation of 100% of the concessions boundaries, through “hitos”.
- Development of skills and abilities of the members of the associations linked to the environmentally friendly productive projects.
- Developing and seeking funding for sustainable projects.
- Tracking and monitoring of risks and deforestation agents, as well as leakage risks.
- Monitoring of land-use and land-use changes within the project zone (satellite monitoring).
- Training activities on agroforestry systems and other sustainable projects to project stakeholders.
- Implementation of dissemination mechanisms for environmental education for youth and children of the project area.

With the income generated by the sale of carbon credits, that is additional to the sale of wood, all the activities that are necessary to preserve the area under sustainable forest management according to the FSC Standards can be funded. In addition to this, the project could be prepared to strengthen the control and care of the environment, especially given the increased pressure on forests that will be accelerated with the paving of the Interoceanic road.

Furthermore, it is important to highlight that, currently, most of timber enterprises, including Maderacre and Maderyja, only have the resources to carry out sustainable forest management activities in the areas to be harvested each year, but not in the entire concession area. Under this situation, the risk for the rest of the area to be affected by deforestation agents is imminent. If the concessions do not achieve a greater presence within their areas, they could be invaded by shifting farmers or other agents, losing as a result large areas of forests.

Likewise, it should be mentioned that timber harvesting within the concessions, when carried out applying sustainable management criteria, generates positive impacts on biodiversity conservation and the development of local populations. The operations of companies such as Maderacre and Maderyja timber concessions generate permanent employment and local income for the region and the country, as well as contribute to forest recovering and conservation. In this sense, the FSC Certification that both concessions have achieved in 2007 represents an additional guarantee that their activities are carried out in compliance with their management plans and respecting local populations and the environment.

In summary, the income generated by the sale of carbon credits is the only option to continue and constantly improve the sustainable management of the concessions forests.

- **APPLICATION OF THE “TOOL FOR THE DEMONSTRATION AND ASSESSMENT OF ADDITIONALITY IN AFOLU PROJECT ACTIVITIES”⁶⁴**

First, it is important to mention that within the Project Area, none of the proposed Project activities violates any law⁶⁵.

STEP 1: IDENTIFICATION OF ALTERNATIVE LAND USE SCENARIOS TO THE PROPOSED VCS AFOLU PROJECT ACTIVITY

Sub.step 1a: Identify credible alternative land use scenarios to the proposed project activity

- * **Alternative scenario 1:**

In the case the REDD project is not implemented, the management and production of the timber concessionaires will initially remain the same, with sustainable environmental management under FSC. The profitability would be good during the early years and when it becomes threatened by illegal logging events and deforestation by immigrant settlers, they will ask local governments for help in the implementation of surveillance systems.

⁶⁴ Approved VCS Tool VT0001, Version 1.0, “Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities”, Sectoral Scope 14, 14 May 2010.

⁶⁵ Annex 1 of the Madre de Dios Amazon REDD Project VCS PD Template contains an analysis of the Peruvian legislation related to the REDD Project.

This proposal will be received by the authorities, which will organize, together with Maderacre and Maderyja concessions, to protect the concessioned forest areas. They will go through a critical period due to an increase in the population of the area given by the paving of the Interoceanic road. Forest areas are finally protected and the concessions continue to develop their sustainable forestry activities, increasing progressively their profitability.

There are no significant land-use changes and the areas remain forest areas.

* **Alternative scenario 2:**

In the case the REDD project is not implemented, the management and production of the timber concessionaires will initially remain the same, with sustainable environmental management under FSC. The profitability would be good during the early years, however and given the improvement of the Interoceanic road and thus the immigration of people to the area, there would be more deforestation agents and the concessions areas would be deforested by illegal loggers and settlers in order to develop agricultural and livestock activities.

As a result of the Interoceanic road, the opportunity cost is different, the distribution of products to the markets is easier and as forest areas are more accessible they would be easily deforested by illegal loggers. Moreover, considering that the concessions would not be able to implement an effective surveillance and monitoring system within the project area and project zone, their areas would be easily deforested by immigrant people to carry out subsistence crop cultivation or livestock grazing activities.

In this scenario, land-use changes are mostly for pastures and livestock, as it has been developed in previous years within this area.

* **Alternative scenario 3:**

In the case the REDD project is not implemented, the management and production of the timber concessionaires will initially remain the same, with sustainable environmental management under FSC. The profitability would be good during the early years and when it became to be threatened by illegal logging events and deforestation by immigrant settlers they will ask local governments for help in the implementation of surveillance systems.

Although this proposal will be received by the authorities, their action is slow and thus deforestation and illegal logging events continue to happen within the concessions areas, which make their profitability to decrease. In addition to this, they would not be able to continue with a sustainable environmental management system that demand greater investment and follow rigorous environmental standards. They will join the Belgium Native Community for the preservation of their forest areas; however this initiative only protects the northern part of the concessions while the southern part begins to lose larger areas of the concessioned forests.

In this scenario, land-use changes are mostly for pastures and livestock in the southern part of the concessions, keeping their forests in the northern part. The Madre de Dios government is not able to control nor deforestation nor illegal logging.

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

The three proposed alternative scenarios described above could occur under current historical and legal circumstances.

Timber concessions have been implemented since 2004 and under the three proposed alternative scenarios Maderacre and Maderyja timber concessions will continue their mandate to manage their areas under forest harvesting, however the profitability of each scenario is different.

The paving of the Interoceanic road has been carried out with the government consent and the three proposed alternative scenarios consider the consequences and risks involved in this fact. The land-use changes is a reality that is occurring in the country and the conversion from forest to non-forest areas has been occurring as a result of poor governance and deficient management of natural resources by the government. Although this does not happen by the lack of laws, they do not develop actions that contribute to the implementation of these laws (incentives, trainings, alternative projects, etc.). This weakness in governance is a reality at a national level that central as well as regional governments are seeking to combat.

The three alternative scenarios proposed in substep 1a are credible scenarios.

Sub.step 1c: Selection of the baseline scenario

The first proposed alternative scenario is an ideal scenario, but unlikely, even in the case the administration and management of regional governments and authorities responsible for safeguarding forest areas have a history of success in this regard. On the contrary, within the Peruvian rainforest, deforestation is increasing and deforested areas and illegal logging activities occurs rapidly in concession areas, without giving the concessionaires the opportunity to protect their forests, which are their source of investment and labor.

The second alternative scenario is a more likely scenario, which has been occurring throughout the Peruvian rainforest where the implementation of roads generates the immigration of people, some of them with Andean customs of harvesting and burning forests for agricultural and livestock activities on a small scale. Little or nothing can be made by the concessionaires that employ their resources in meeting the requirements of environmental standards and only have economic resources to safeguard those areas of annual harvesting, since they cannot protect all the concessions areas.

The third alternative scenario is also unlikely since the actions of local governments before the advancement of shifting agriculture has always been minimal. The government has no resources to implement activities or actions that train people in the proper management of forest resources or alternative land-uses to compensate for their basic needs in harmony with the sustainable use of natural resources. The Belgium Native Community could join for the safeguard of the northern areas of the concessions, but surely and with the advance of deforestation and being so few people (70 community members) they will be looking for safeguarding their forest areas and refugee, as shown in the baseline chapter, that are essential for the daily subsistence of the community.

According to the abovementioned, the alternative scenario 2 is selected as the baseline scenario, because it is the most likely, it is related to the regional history in terms of land-use change and continues with the legislation of granting and management of Maderacre and Maderyja timber concessions.

STEP 2: INVESTMENT ANALYSIS – DISCOUNTED CASH FLOW METHOD

Currently, the sustainable forest management of the 100,000 hectares of primary forests that Maderacre and Maderyja concessions managed as timber concessions since 2002⁶⁶ is carried out. Said forest management consists of the harvesting under a system of management plans, where the main premise is that only what the forest is able to regenerate is extracted from it. Thus, this situation allows the preservation of the forest through selective and sustainable logging over time.

Despite their concession contracts empower them to make use of timber and non-timber products as well as environmental services, Maderacre and Maderyja concessions currently make only use of timber products.

Maderacre and Maderyja concessions, as enterprises, carry out forest management operations, extraction and milling. As for the timber concession, this Business Unit (which is the one that is analyzed) has the income from the sale of its standing trees (to third parties or to themselves, as raw material for its production) and as costs and investments the activities required to be able to use these trees under the FSC Certification.

The cash flow of the concessions in the “WITHOUT Madre de Dios Amazon REDD Project” Scenario, calculated for the 2006-2046 period, includes the income from the sale of standing wood, based on the exploratory inventory data⁶⁷ and according to local selling prices, with an increase in species and volumes over the time, facilitated by the completion of the Inter-oceanic road in 2011.

With respect to the expenses, the following activities are considered:

Activities of the Timber Concessions
General Management Plan
Exploratory Inventory
Diagnosis Sampling
Wildlife Study
Identification of High Conservation Value Forest

⁶⁶ Timber Concession Contracts for 40 years renewable.

⁶⁷ Inventory carried out with 95% of confidence over the total area of the concessions, data that was also used for the carbon calculations.

Activities of the Timber Concessions
Development of the Silviculture Plan
Development of the Forestry Management General Plan
Silviculture
Permanent Monitoring Plots
Plot Trees
Nursery
Enrichment
Certification
Certification
Forestry Pre-Harvesting
Commercial Census
Payment for the Use Rights
Trainings
Forestry Harvesting
Dragging Roads
Monitoring of Harvesting Activities
Chain of Custody
Custody of the Concessions
Delimitation of the Concessions Boundaries
Periodic and Annual Patrolling Within Vulnerable Sectors
Social Responsibility
Administrative Costs

The result shows a cash flow with a positive Net Present Value (NPV) (in Spanish Valor Actual Neto VAN)⁶⁸ for both concessions, which is translated into a certain Economic NPV per hectare⁶⁹ for both concessions.

⁶⁸ The Cash Flow for the "Without Madre de Dios Amazon REDD Project" Scenario will be available to the auditors but not included within this template for being considered commercially sensitive information. The discount rate used is 16.86%, based on the following report: "Galarza, Elsa y Karlos La Serna (2005). "Las concesiones forestales en el Perú: ¿cómo hacerlas sostenibles?", en Barrantes, Roxana (ed.). La política forestal en la Amazonía andina. Lima: CIES. Pp. 445-600."

⁶⁹ The NPV per hectare has been calculated by dividing the total projected NPV by the total number of hectares of both concessions (49,376 hectares for Maderacre and 49,556 hectares for Maderya).

However, within the results it can be appreciated that the first years of operation have negative financial results, as a result of the costs on the entire concession area (regarding an exploitation model under the highest international standards) greater than the income from the wood of the portion of area corresponding to the Annual Harvesting Plot of each year. Despite this, Maderacre and Maderyja concessions were able to certificate their operations in 2007, thanks to the funding from international cooperation and other sources, as a capital contribution. However, these sources are not sustainable over the time and could threaten the viability of holding the FSC Certification, which allows a good control of the concessions and the application of a reduced impact logging of their forests.

Even with the funding obtained, which makes feasible the early years of operation, the Financial NPV per hectare (US\$ 14.04 per hectare) is lower than the one offered by the extensive livestock activity under the Inter-oceanic scenario (US\$ 50/ha), or agriculture (US\$ 42.50/ha)⁷⁰; activities identified in the previous step as the most common land-use activities within the region and which involve complete logging and burning of the forest in order to implement them.

Even more, considering the completion of the inter-oceanic road, which will result on the one hand in benefits on the concession's timber businesses, but on the other hand will generate increased pressure on local forests and, therefore, will require a greater control and resource allocation by both concessions in order to maintain their current status. In practice, there will be a negative incentive to produce less expensive wood (meaning without FSC Certification) if the Business Unit of the concessions with FSC Certification is not profitable by itself. Additionally, there will be a higher risk of deforestation, because the burning of forests for livestock and agriculture will be the more profitable and attractive economic activities within the zone.

In the scenario under the implementation of the Madre de Dios Amazon REDD Project, the situation changes. The REDD Project demands the implementation of the activities mentioned above and, additionally, the following:

⁷⁰ Reference: Estrategias de conservación a lo largo de la Carretera Interoceánica en Madre de Dios, Peru. Un Análisis Económico Espacial. Conservación Estratégica. Serie Técnica 10, Marzo 2010".

Madre de Dios Amazon REDD Project Activities
Socialization and dissemination of the project goals
Identification and selection of proposals for the environmentally friendly productive projects
Development of the skills and capacities of the members of the associations linked to the selected projects
Design of the project profiles of the selected projects
Look for financing and/or co-financing for the approved profiles (funding)
Support on the implementation of the approved projects
Community monitoring REDD Project
Monitoring of deforestation mitigation measures / leakage risks
Monitoring of land cover changes and leakage
Community impacts mitigation
Review and update of the custody plan
Installation of the control post PCA 5 Maderacre
Delimitation of 100% of the concessions boundaries
Installation of hitos in the concessions vertexes
Improve the signaling within the concessions
Periodic and annual patrolling within vulnerable sectors
Annual monitoring of possible invasions during satellite images
In-field verification of sectors identified as potential points of invasion (due to deforestation)
Development and implementation of mechanisms for the dissemination of environmental education among children, adolescents and communities involved in the project
Monitoring of changes in carbon stocks
Biodiversity monitoring
Biodiversity impacts mitigation
Project developers cost

These activities can only be managed with the income obtained from the sale of carbon credits as a result of the implementation of the Madre de Dios Amazon REDD Project within the concessions.

Under this scenario, a higher Financial NPV per hectare is expected⁷¹, which means higher profitability than the livestock and agriculture activities within the zone, projected at 66% to 96% higher, respectively.

With this revenue, which is additional to the wood, all the necessary activities to preserve the area under a sustainable forest management according to the FSC Standards can be funded, as well as to be prepared to strengthen the control and care of the environment regarding the increased pressure on the forests that should be accelerated with the completion of the inter-oceanic road.

Sensitivity Analysis

In the case of the scenario without the financial benefits from the sale of VCUs, the selling prices of the concessions timber would have to increase by over 50% in order to equal the profitability of livestock activity. In a scenario where the selling prices do not grow at a rate higher than 5% annually, it is almost impossible for that to happen.

In the case of the scenario with the implementation of the REDD project activities, if the selling prices of the VCUs are sensitized⁷², it can be appreciated that even with a reduction of 10% of the price throughout the 2006-2046 period, the NPV per hectare is still greater than the second economic alternative for land use (livestock and agriculture). Following, a chart including the changes in the profitability indicator is presented:

VCUs selling prices

Change	VAN / HA <u>with</u> REDD
+10%	US\$ 95.33
+5%	US\$ 89.28
Current	US\$ 83.23
-5%	US\$ 77.18
-10%	US\$ 71.13

⁷¹ The Cash Flow for the "With Madre de Dios Amazon REDD Project" Scenario will be available to the auditors but not included within this template for being considered commercially sensitive information.

⁷² It is important to mention that the selling prices that were considered for the analysis are under the average included in the following report: "Building Bridges: State of the Voluntary Carbon Markets 2010. A Report by Ecosystem Marketplace & Bloomberg New Energy Finance". This in order to apply a conservative principle to the analysis.

Even regarding the scenario with the VCU's sales revenues, if the costs associated to the implementation of the REDD project activities are sensitized, it can be appreciated that the impact of this variable on the profitability is minimal.

Activities associated to the implementation of the REDD Project

Change	VAN / HA <u>with</u> REDD
+10%	US\$ 82.09
+5%	US\$ 82.66
Current	US\$ 83.23
-5%	US\$ 83.80
-10%	US\$ 84.37

STEP 3: COMMON PRACTICE ANALYSIS

The existence of forest concessions within Peru is a common practice. In fact, in the country there are 1,182 concessions for a total of 7.5 million hectares. Only in Madre de Dios, 1.3 million hectares have been concessioned among 198 companies.

However, it is not a common practice for forest concessions to carry out forest management under international standards, certified by the FSC and the CCBA. Within the country, there are only six forestry concessions that have achieved FSC Certification and only Maderacre and Maderyja concessions have achieved both FSC and CCB Certification. Therefore, Maderacre and Maderyja are the only concessions that are implementing the important number of additional activities that are required in order to obtain those certifications from the social and biodiversity point of view.

Furthermore, the Agency for Supervising of Forest Resources and Wildlife (in Spanish Organismo de Supervisión de los Recursos Forestales y de Fauna Silvestre – OSINFOR⁷³) conducted 303 audits to forest concessions throughout the country, during 2010, and as a result it began “66 Administrative Procedures to an equal number of forest concessions for non-compliance with their obligations to the State”. This demonstrates that to conduct a good forest management in the forest concessions of the country, which allow the conservation of the forests and the sustainable development from its orderly use, is not a common practice.

⁷³ <http://www.osinfor.gob.pe>

SUMMARY OF THE ADDITIONALITY TEST:

In summary;

- the Madre de Dios Amazon REDD project is not the only credible alternative land use consistent with enforced mandatory applicable laws,
- one of those alternative land uses, that of Slash and Burn Cattle Ranching and Agriculture is by far the most likely baseline land use,
- the Madre de Dios Amazon REDD project passes the Investment Analysis Test as it is not a financially viable land use without the AFOLU VCS project revenues,
- and the project activities are NOT common practice.

therefore it is additional under the rules of VT0001 Tool for the Demonstration of Additionality in VCS AFOLU Project Activities.

2.6 Methodology Deviations

There are no methodology deviations in the application of the approved VCS REDD Methodology Modules.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

a. Total estimation of the baseline carbon stocks

The aim of this step was to complete the baseline assessment by calculating baseline carbon stock changes. In this sense, carbon stocks for each stratum defined in the stratification process were estimated.

Based on the land-use changes from initial forest classes (or strata) to the final classes (non-forest), and taking into account the respective changes in carbon stocks, the total gross change in carbon stocks was estimated (without discounting carbon from wood products) for the reference period of the Madre de Dios Amazon REDD Project (till 2046). The results of these calculations showed an accumulated volume of 41'231,366.01 tons of CO₂.

In order to estimate the net carbon stocks in the baseline, carbon from wood products that are elaborated from the wood obtained from the project area has been deducted. Following the guidance of Module (CP-W), the accumulated net volume is 41'142,173.56 tons of CO₂.

Chart 47: Estimation of baseline gross changes in carbon stocks for the Madre de Dios Amazon REDD Project

Project year t	Año	Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change		Cwp tCO2 por clase de producto (sawnwood)	tCO2 Netas
		cumulative $\Delta CBSLPA-i_t$	annual $\Delta CBSLPA-i$	cumulative $\Delta CBSLPA-f_t$	annual $\Delta CBSLPA-f$	annual $\Delta CBSLPA_t$	cumulative $\Delta CBSLPA$		
		t CO ₂ -e	t CO ₂ -e	t CO ₂ -e	t CO ₂ -e	tCO ₂ -e	tCO ₂ -e		
0	2006	3,966,687.8	-	172,110.8	-	-	3,794,576.9	1,369.70	- 1,369.70
1	2007	5,691,302.9	1,724,615.1	245,572.8	73,461.9	1,651,153.1	5,445,730.1	3,421.06	1,647,732.07
2	2008	6,803,307.3	1,112,004.5	293,847.8	48,275.0	1,063,729.5	6,509,459.6	2,131.47	1,061,598.01
3	2009	8,177,364.2	1,374,056.9	352,617.3	58,769.6	1,315,287.4	7,824,746.9	2,166.91	1,313,120.45
4	2010	8,781,849.0	604,484.8	377,804.3	25,187.0	579,297.8	8,404,044.7	3,464.25	575,833.55
5	2011	10,549,485.3	1,767,636.3	451,266.2	73,461.9	1,694,174.4	10,098,219.1	2,166.91	1,692,007.45
6	2012	12,234,683.2	1,685,197.9	524,728.2	73,461.9	1,611,735.9	11,709,955.0	2,166.91	1,609,569.02
7	2013	13,322,100.9	1,087,417.8	570,904.2	46,176.1	1,041,241.7	12,751,196.7	2,166.91	1,039,074.77
8	2014	14,905,024.2	1,582,923.2	638,069.5	67,165.2	1,515,758.0	14,266,954.7	2,166.91	1,513,591.13
9	2015	16,441,494.0	1,536,469.8	703,135.7	65,066.3	1,471,403.5	15,738,358.2	2,166.91	1,469,236.58
10	2016	17,834,625.5	1,393,131.6	761,905.3	58,769.6	1,334,362.0	17,072,720.2	2,166.91	1,332,195.10
11	2017	18,730,520.3	895,894.8	799,685.7	37,780.4	858,114.4	17,930,834.6	2,166.91	855,947.44
12	2018	20,910,128.3	2,179,608.0	892,037.9	92,352.2	2,087,255.8	20,018,090.4	2,166.91	2,085,088.91
13	2019	22,431,639.6	1,521,511.3	955,005.3	62,967.4	1,458,543.9	21,476,634.3	2,166.91	1,456,377.02
14	2020	23,616,446.6	1,184,807.0	1,005,379.2	50,373.9	1,134,433.1	22,611,067.4	2,166.91	1,132,266.18
15	2021	24,880,018.1	1,263,571.5	1,057,852.0	52,472.8	1,211,098.7	23,822,166.1	2,166.91	1,208,931.80
16	2022	27,671,153.2	2,791,135.1	1,175,391.1	117,539.1	2,673,596.0	26,495,762.1	2,166.91	2,671,429.05
17	2023	28,916,213.0	1,245,059.8	1,227,863.9	52,472.8	1,192,586.9	27,688,349.0	2,166.91	1,190,420.03
18	2024	30,959,431.3	2,043,218.4	1,313,919.3	86,055.4	1,957,162.9	29,645,512.0	2,166.91	1,954,996.03
19	2025	32,205,126.6	1,245,695.3	1,366,392.2	52,472.8	1,193,222.4	30,838,734.4	2,166.91	1,191,055.52
20	2026	33,196,662.8	991,536.2	1,410,469.3	44,077.2	947,459.1	31,786,193.5	2,166.91	945,292.15
21	2027	34,380,712.1	1,184,049.3	1,460,843.2	50,373.9	1,133,675.4	32,919,868.9	2,166.91	1,131,508.50
22	2028	35,115,298.7	734,586.5	1,492,326.9	31,483.7	703,102.9	33,622,971.7	2,166.91	700,935.95
23	2029	36,732,449.8	1,617,151.2	1,561,591.0	69,264.1	1,547,887.0	35,170,858.8	2,166.91	1,545,720.14
24	2030	37,521,760.6	789,310.8	1,595,173.6	33,582.6	755,728.2	35,926,586.9	2,166.91	753,561.24
25	2031	38,461,200.3	939,439.7	1,635,053.0	39,879.3	899,560.3	36,826,147.3	2,166.91	897,393.44
26	2032	38,906,996.8	445,796.5	1,653,943.2	18,890.2	426,906.3	37,253,053.6	2,166.91	424,739.40
27	2033	40,051,289.6	1,144,292.8	1,702,218.2	48,275.0	1,096,017.8	38,349,071.4	2,166.91	1,093,850.93
28	2034	40,697,046.2	645,756.6	1,729,504.0	27,285.9	618,470.7	38,967,542.2	2,166.91	616,303.83
29	2035	41,734,632.8	1,037,586.6	1,773,581.2	44,077.2	993,509.4	39,961,051.6	2,166.91	991,342.54
30	2036	42,130,598.2	395,965.4	1,790,372.5	16,791.3	379,174.1	40,340,225.7	2,166.91	377,007.17
31	2037	42,603,465.8	472,867.6	1,809,262.7	18,890.2	453,977.4	40,794,203.1	2,166.91	451,810.47
32	2038	43,000,188.9	396,723.1	1,826,054.0	16,791.3	379,931.8	41,174,134.9	2,166.91	377,764.85
33	2039	43,301,673.6	301,484.7	1,838,647.5	12,593.5	288,891.2	41,463,026.1	2,166.91	286,724.31
34	2040	44,165,728.0	864,054.4	1,876,427.9	37,780.4	826,274.0	42,289,300.1	2,166.91	824,107.10
35	2041	44,662,748.9	497,020.9	1,897,417.1	20,989.1	476,031.7	42,765,331.8	2,166.91	473,864.82
36	2042	45,315,260.9	652,512.0	1,924,702.9	27,285.9	625,226.1	43,390,557.9	2,166.91	623,059.21
37	2043	45,560,628.2	245,367.3	1,935,197.5	10,494.6	234,872.7	43,625,430.7	2,166.91	232,705.83
38	2044	45,855,068.9	294,440.8	1,947,791.0	12,593.5	281,847.3	43,907,278.0	2,166.91	279,680.38
39	2045	46,647,288.2	792,219.3	1,981,373.6	33,582.6	758,636.7	44,665,914.7	2,166.91	756,469.79
40	2046	47,022,008.9	374,720.7	1,996,066.0	14,692.4	360,028.3	45,025,943.0	2,166.91	357,861.37
							41,231,366.01		41,142,173.56

b. Estimation of the sum of baseline greenhouse gas emissions

The greenhouse gas emissions as a result of deforestation activities within the Madre de Dios Amazon REDD project area in the baseline is determined, according to the VMD0007 BL-UP Module of the approved VCS VM0007 REDD Methodology Modules, by the sum of CO₂ emissions due to fossil fuel combustion per stratum per year, emissions of non-CO₂ greenhouse gases due to biomass burning per stratum per year and direct N₂O emissions due to nitrogen application within the scope of the project.

$$GHG_{BSL,E} = \sum_{t=1}^{t'} \sum_{i=1}^M (E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct-N,i,t})$$

- **CO₂ emissions due to fossil fuel combustion**

The calculation of CO₂ emissions due to fossil fuel combustion, according to the VMD0014 E-FFC Module of the approved VCS VMD0007 REDD Methodology Modules, is optional. However, it is proposed to quantify CO₂ emissions due to fossil fuel combustion if there are lower in a project scenario than in the baseline. There is no information regarding the number of machines, equipment, vehicles, etc. that are annually incorporated for agriculture and livestock activities during the baseline (post-deforestation) within the project area, therefore it was decided not to quantify this variable.

- **Non-CO₂ emissions due to biomass burning**

According to the VMD0013 E-BB Module of the approved VCS VMD0007 REDD Methodology Modules, the estimation of burned biomass is given by: the conversion of forest land to non-forest land due to fire, periodic burnings of agriculture of pastures after deforestation and forest land burning.

Agricultural residues burning in clean agriculture post-deforestation land-use has been considered. In relation to forest biomass burning, it has been estimated that 50% of the deforested area is burned in the field. According to the abovementioned Module of the methodology, the following formula should be used for the calculations:

$$E_{BiomassBurn,i,t} = \sum_{g=1}^G \left((A_{burn,i,t} * B_{i,t} * COMF_i * G_{g,i}) * 10^{-3} \right) * GWP_g$$

Where,

- A Burned area in stratum i at time t (ha)
- B Average aerial biomass before the burning T/ha
- CF Combustion factor (IPCC, Table 2.6)
- G Emission factor Kg/T (IPCC, Table 2.5)
- GWP Global warming power (CH₄ = 21 and N₂O = 310)

- **Estimation of CH₄ and N₂O emissions due to agricultural residues burning in clean agriculture post-deforestation areas**

Clean agriculture carries out activities such as agricultural residues burning which generates methane and nitrous oxide emissions (CH₄ and N₂O). Calculations have been made to estimate these emissions based on the corn crop as the post-deforestation clean crop that would mainly occur in the Madre de Dios Amazon REDD project area. The combustion factor and emission factor data were taken from the correspondent module of the approved VCS VM0007 REDD Methodology Modules (VMD0013 E-BB) and the dry fraction of the Greenhouse Gas Inventory, Agriculture and Other Land Use Sector of Peru, 2005. Also, 17.25 T of dry biomass/ha has been considered for this crop.

The chart below shows the calculations carried out to estimate the methane and nitrous oxide emissions derived from clean crop areas due to agricultural residues burning.

Chart 48: Estimation of CO₂ emissions generated by other GHGs

Biomass before burning (T/ha)	Residue ratio	Combustion Factor Table 2.6. IPCC (*)	Emission Factor Kg/T burned dry biomass Table 2.5. IPCC (*)	Total GHG t/ha/year	GWP	Total tCO ₂ e
17.2527	0.75	0.8	2.7	0.02794937 tCH ₄	21	0.58693685
			0.07	0.00072461 tN ₂ O	310	0.22463015

(*) According to the VMD0013 E-BB Module / 17.25 T/ha dry biomass for maize crop

Taking into account the total of the deforested areas that are annually converted to clean crop and the total tCH₄/ha/year or tN₂O/ha/year that would be emitted due to agricultural residues burning, the number of tonnes of each one of these gases is achieved. Then, said number is transformed to tCO₂e by multiplying by their respective warming power (CH₄ = 21 and N₂O = 310), which can be observed in the following chart:

Chart 49: Estimation of annual CO2 emissions generated by other GHGs (CH4 and N2O)

Area of post-deforestation classes established on deforested areas within the project area							Otros GEI anualizado		
ID >		009	010	011	012		Incorporación de fertilizante nitrogenado (Agropecuaria y pastos)	Quema de Biomasa (Residuos agrícolas- Cultivo en limpio)	
Name >		Deforestacion x Pastos	Deforestacion x Agropecuaria	Deforestacion x Infraestructura	Deforestacion x Cultivo en Limpio				
% historic >		40%	54%	2%	4%	annual			
Project year t	Año	ABSLPA _{fd,t}	ABSLPA _{fd,t}	ABSLPA _{fd,t}	ABSLPA _{fd,t}	ABSLPA _t	N2O (T/ha/año)	CH4 (T/ha/año)	N2O (T/ha/año)
		ha	ha	ha	ha	ha	0.00125	2.79E-02	7.25E-04
0	2006	3,086.2	4,166.3	154.3	308.6	7,715.4	9.07	8.63	0.22
1	2007	4,403.4	5,944.6	220.2	440.3	11,008.5	12.9	12.3	0.3
2	2008	5,269.0	7,113.2	263.5	526.9	13,172.6	15.5	14.73	0.38
3	2009	6,322.8	8,535.8	316.1	632.3	15,807.1	18.6	17.67	0.46
4	2010	6,774.5	9,145.5	338.7	677.4	16,936.2	19.9	18.93	0.49
5	2011	8,091.7	10,923.8	404.6	809.2	20,229.4	23.8	22.62	0.59
6	2012	9,409.0	12,702.2	470.5	940.9	23,522.5	27.6	26.30	0.68
7	2013	10,237.0	13,819.9	511.8	1,023.7	25,592.5	30.1	28.61	0.74
8	2014	11,441.3	15,445.8	572.1	1,144.1	28,603.4	33.6	31.98	0.83
9	2015	12,608.1	17,020.9	630.4	1,260.8	31,520.2	37.0	35.24	0.91
10	2016	13,661.9	18,443.5	683.1	1,366.2	34,154.7	40.1	38.18	0.99
11	2017	14,339.3	19,358.1	717.0	1,433.9	35,848.3	42.1	40.08	1.04
12	2018	15,995.3	21,593.7	799.8	1,599.5	39,988.3	47.0	44.71	1.16
13	2019	17,124.4	23,117.9	856.2	1,712.4	42,811.0	50.3	47.86	1.24
14	2020	18,027.6	24,337.3	901.4	1,802.8	45,069.1	53.0	50.39	1.31
15	2021	18,968.5	25,607.5	948.4	1,896.9	47,421.4	55.7	53.02	1.37
16	2022	21,076.2	28,452.8	1,053.8	2,107.6	52,690.4	61.9	58.91	1.53
17	2023	22,017.1	29,723.0	1,100.9	2,201.7	55,042.7	64.7	61.54	1.60
18	2024	23,560.1	31,806.2	1,178.0	2,356.0	58,900.3	69.2	65.85	1.71
19	2025	24,501.0	33,076.4	1,225.1	2,450.1	61,252.6	72.0	68.48	1.78
20	2026	25,291.4	34,143.4	1,264.6	2,529.1	63,228.5	74.3	70.69	1.83
21	2027	26,194.7	35,362.8	1,309.7	2,619.5	65,486.6	76.9	73.21	1.90
22	2028	26,759.2	36,124.9	1,338.0	2,675.9	66,898.0	78.6	74.79	1.94
23	2029	28,001.2	37,801.6	1,400.1	2,800.1	70,003.0	82.3	78.26	2.03
24	2030	28,603.4	38,614.5	1,430.2	2,860.3	71,508.4	84.0	79.94	2.07
25	2031	29,318.4	39,579.9	1,465.9	2,931.8	73,296.1	86.1	81.94	2.12
26	2032	29,657.2	40,037.2	1,482.9	2,965.7	74,142.9	87.1	82.89	2.15
27	2033	30,522.8	41,205.8	1,526.1	3,052.3	76,307.0	89.7	85.31	2.21
28	2034	31,012.1	41,866.3	1,550.6	3,101.2	77,530.2	91.1	86.68	2.25
29	2035	31,802.4	42,933.3	1,590.1	3,180.2	79,506.1	93.4	88.89	2.30
30	2036	32,103.5	43,339.7	1,605.2	3,210.4	80,258.8	94.3	89.73	2.33
31	2037	32,442.2	43,797.0	1,622.1	3,244.2	81,105.6	95.3	90.67	2.35
32	2038	32,743.3	44,203.5	1,637.2	3,274.3	81,858.3	96.2	91.52	2.37
33	2039	32,969.1	44,508.3	1,648.5	3,296.9	82,422.8	96.8	92.15	2.39
34	2040	33,646.6	45,422.9	1,682.3	3,364.7	84,116.5	98.8	94.04	2.44
35	2041	34,022.9	45,931.0	1,701.1	3,402.3	85,057.4	99.9	95.09	2.47
36	2042	34,512.2	46,591.5	1,725.6	3,451.2	86,280.5	101.4	96.46	2.50
37	2043	34,700.4	46,845.5	1,735.0	3,470.0	86,751.0	101.9	96.99	2.51
38	2044	34,926.2	47,150.4	1,746.3	3,492.6	87,315.5	102.6	97.62	2.53
39	2045	35,528.4	47,963.3	1,776.4	3,552.8	88,821.0	104.4	99.30	2.57
40	2046	35,791.8	48,319.0	1,789.6	3,579.2	89,479.6	105.1	100.04	2.59
Emisiones Totales otros GEI al año 2046							105.1	100.04	2.59
Emisiones totales CO2 equiv al año 2046							32,592.9	2,100.7548	803.9926

- **Estimation of CH₄ and N₂O emissions due to in field forest biomass burning**

Considering that some part of aerial biomass of the deforested areas are burned in the field, calculations to estimated its CH₄ and N₂O emissions have been made according to the VMD0013 E-BB Module of the approved VCS VM0007 REDD Methodology Modules. It has been considered that 50% of deforested forest areas are burned. In order to use the correspondent formula, the combustion factor of wet tropical forest (0.5) for all the forest types identified within the Madre de Dios Amazon REDD project area and the combustion factor of secondary forests (0.55) for intervened areas were applied (factors taken from table 2.6. in Annex 1 of the VMD0013 E-BB Module of the REDD Methodology Modules). The emission factor used for methane gas was 6.8 and for nitrous oxide 0.2, factors corresponding to primary forests according to table 2.5 in Annex 2 of the VMD0013 E-BB Module of the REDD Methodology Modules. These calculations are presented in chart 42.

- **Direct N₂O emissions from perennial crops⁷⁴**

Direct N₂O emissions occur due to the incorporation of nitrogen fertilizers in pasture areas. The pasture post-deforestation activity, which in the zone consists mainly in planting Braquearias, considers the incorporation of nitrogen fertilizers to improve their productivity. The incorporation of nitrogen fertilizers in areas of clean crops was not considered, since agricultural residues burning is a way of preparing the land for the next harvest.

Chart 50: Estimation of direct N₂O emissions

Synthetic fertilizer N applied to the soil (ha/year)	N fraction of direct emissions	Nitrous oxide emissions tN ₂ O/ha/year
100	0.0125	0.00125

⁷⁴ http://www.inia.gob.pe/webinia/tecnologia/CRIANZAS/PASTOS/2001/11_Manejo_Brachiaria/Manejo_Brachiaria.htm

Chart 51: Calculation of other GHGs emissions (CH4 and N2O) due to forest biomass burning

Proy ect year t	Biomasa seca T/año	Áreas quemadas anuales en el área del proyecto									Suma total biomasa quemada en bosque primario por año (T/año)	Suma total biomasa quemada en bosque secundario por año (T/año)	Emisión CH ₄										Emisión N ₂ O									
		Estrato	BPC	BPT	BT	BCB	BT	P	PA	AI			Área quemada (ha)*Stock estrato (T biomasa seca/ha)*FC*FE(Kg/T materia seca)*PGC/1000										Área quemada (ha)*Stock estrato (T biomasa seca/ha)*FC*FE(Kg/T materia seca)*PGC/1000									
		ha	ha	ha	ha	ha	ha	ha	ha	ha			Factor de Combustión FC Tabla 2.6 IPCC (*)	Factor de emisión FE Kg / T Materia seca quemada Tabla 2.5 IPCC (**)	PGC	TOTAL T CO ₂ /año (en bosque primario)	TOTAL T CO ₂ /año (en bosque secundario)	TOTAL T CO ₂ /año	Factor de Combustión FC Tabla 2.6 IPCC (*)	Factor de emisión FE Kg / T Materia seca quemada Tabla 2.5 IPCC (**)	PGC	TOTAL T CO ₂ /año (en bosque primario)	TOTAL T CO ₂ /año (en bosque secundario)	TOTAL T CO ₂ /año								
		ha	ha	ha	ha	ha	ha	ha	ha	ha			0.5	6.8	21	0.5	6.8	21	0.5	6.8	21	0.5	6.8	21								
		Año	ha	ha	ha	ha	ha	ha	ha	ha			ha	Biomasa total quemada (t)										Biomasa total quemada (t)								
0	2006	3528.4	0	235.225	0	0	0	0	94.09	3,857.69	832215.9936	0	54282.2005	0	0	0	5549.389796	886498.1941	5549.389796	63295.97106	435.85	63,731.82	27,481.44	189.23	27,670.68							
1	2007	5080.9	47.045	235.225	0	0	47.045	0	94.09	5,504.27	1198931.031	10919.47617	54282.2005	0	0	12764.4694	5549.389796	1276357.177	5549.389796	91,131.90	435.85	91,567.75	39,567.07	189.23	39,756.31							
2	2008	5880.6	47.045	235.225	94.09	0	188.18	0	141.135	6,586.30	1387026.636	10919.47617	54282.2005	21478.24238	0	51057.8774	0	8324.084694	1524764.452	8324.084694	108,868.18	653.77	109,521.96	47,267.70	283.85	47,551.55						
3	2009	7197.9	47.045	235.225	94.09	0	188.18	0	141.135	7,903.56	1697720.627	10919.47617	54282.2005	21478.24238	0	51057.8774	0	8324.084694	1835458.423	8324.084694	131,051.73	653.77	131,705.51	56,899.21	283.85	57,189.06						
4	2010	7668.3	47.045	235.225	94.09	0	282.27	0	141.135	8,468.10	1808682.759	10919.47617	54282.2005	21478.24238	0	76586.8161	0	8324.084694	1971948.495	8324.084694	140,797.19	653.77	141,450.97	61,130.43	283.85	61,414.29						
5	2011	8703.3	329.315	235.225	94.09	0	611.59	0	141.135	10,114.68	2052799.451	78436.3332	54282.2005	21478.24238	0	16598.102	0	8324.084694	2370934.328	8324.084694	169,284.71	653.77	169,938.48	73,498.96	283.85	73,782.82						
6	2012	9879.5	658.63	282.27	94.09	0	658.63	0	188.18	11,761.25	2390204.782	152872.6664	65138.6406	21478.24238	0	178702.571	0	11098.77959	2748396.902	11098.77959	196,235.54	871.70	197,107.24	85,200.30	378.47	85,578.77						
7	2013	10867	658.63	282.27	94.09	0	705.68	0	188.18	12,796.24	2563225.26	152872.6664	65138.6406	21478.24238	0	191467.04	0	11098.77959	2994181.85	11098.77959	213,784.58	871.70	214,656.28	92,819.64	378.47	93,198.11						
8	2014	12091	846.81	282.27	94.09	0	799.77	0	188.18	14,301.68	2851726.805	166550.5711	65138.6406	21478.24238	0	21695.979	0	11098.77959	3351890.238	11098.77959	239,324.96	871.70	240,196.66	103,908.60	378.47	104,287.07						
9	2015	13126	1129.08	329.315	94.09	0	893.86	0	188.18	15,760.08	3095843.496	262067.4281	75995.0807	21478.24238	0	24254.918	0	11098.77959	3697909.165	11098.77959	264,030.71	871.70	264,902.41	114,635.18	378.47	115,013.65						
10	2016	14019	1364.305	329.315	141.14	0	1035	0	188.18	17,077.34	3306671.548	316664.809	75995.0807	32217.36358	0	280818.326	0	11098.77959	4012367.127	11098.77959	286,483.01	871.70	287,354.71	124,383.38	378.47	124,761.85						
11	2017	14584	1552.485	329.315	141.14	0	1129.1	0	188.18	17,924.15	349826.107	360342.7137	75995.0807	32217.36358	0	306347.264	0	11098.77959	4214782.529	11098.77959	300,931.62	871.70	301,803.32	130,656.58	378.47	131,035.05						
12	2018	16042	1740.665	329.315	141.14	0	1505.4	0	235.225	19,994.13	3783808.718	404020.6183	75995.0807	32217.36358	0	408463.019	0	13873.47449	4704504.799	13873.47449	335,901.64	1,089.62	336,991.27	145,839.65	473.09	146,312.73						
13	2019	16795	2069.98	329.315	141.14	0	1824.8	0	235.225	21,405.48	3961348.129	480456.9516	75995.0807	32217.36358	0	497814.305	0	13873.47449	5047831.83	13873.47449	360,415.19	1,089.62	361,504.82	156,482.79	473.09	156,955.87						
14	2020	17830	2117.025	329.315	141.14	0	1881.8	0	235.225	22,534.56	4205464.821	491376.4277	75995.0807	32217.36358	0	510578.774	0	13873.47449	5315632.467	13873.47449	379,536.16	1,089.62	380,625.78	164,784.61	473.09	165,257.69						
15	2021	18630	2258.16	329.315	141.14	0	2117	0	235.225	23,710.68	4394100.446	524134.8562	75995.0807	32217.36358	0	574001.121	0	13873.47449	5600848.867	13873.47449	399,900.61	1,089.62	400,990.23	173,626.31	473.09	174,099.40						
16	2022	20747	2493.385	329.315	141.14	0	2399.3	0	235.225	26,345.20	489430.042	578732.2371	75995.0807	32217.36358	0	650887.937	0	13873.47449	6231362.661	13873.47449	444,919.29	1,089.62	446,008.92	193,172.24	473.09	193,645.33						
17	2023	21688	2587.475	376.36	141.14	0	2493.4	0	235.225	27,521.33	5115354.307	600571.1894	86851.5208	32217.36358	0	676516.876	0	13873.47449	6511511.257	13873.47449	464,921.90	1,089.62	466,011.53	201,856.85	473.09	202,329.93						
18	2024	23428	2587.475	376.36	141.14	0	2681.6	0	235.225	29,450.17	5525914.197	600571.1894	86851.5208	32217.36358	0	72754.753	0	13873.47449	6973129.024	13873.47449	497,881.41	1,089.62	498,971.04	216,167.00	473.09	216,640.09						
19	2025	24181	2869.745	376.36	141.14	0	2822.7	0	235.225	30,626.30	5703453.609	666088.0465	86851.5208	32217.36358	0	76588.161	0	13873.47449	7254478.701	13873.47449	517,969.78	1,089.62	519,059.40	224,888.84	473.09	225,361.93						
20	2026	25122	2869.745	376.36	141.14	0	2822.7	0	282.27	31,614.24	5925377.874	666088.0465	86851.5208	32217.36358	0	76588.161	0	16648.16939	7476402.966	16648.16939	533,815.17	1,307.55	535,122.72	231,768.49	567.70	232,336.19						
21	2027	26110	2963.835	376.36	141.14	0	2869.7	0	282.27	32,743.32	615898.353	687926.9988	86851.5208	32217.36358	0	778632.63	0	16648.16939	7744026.866	16648.16939	552,923.52	1,307.55	554,231.07	240,064.83	567.70	240,632.54						
22	2028	26722	3057.925	376.36	141.14	0	2869.7	0	282.27	33,449.00	6302649.125	709765.9512	86851.5208	32217.36358	0	778632.63	0	16648.16939	7910116.591	16648.16939	564,782.32	1,307.55	566,089.87	245,213.61	567.70	245,781.32						
23	2029	28133	3199.06	376.36	141.14	0	2869.7	0	282.27	35,001.48	663535.522	742524.3797	86851.5208	32217.36358	0	778632.63	0	16648.16939	8275761.417	16648.16939	590,889.37	1,307.55	592,196.91	256,548.60	567.70	257,116.31						
24	2030	28839	3199.06	423.405	141.14	0	2869.7	0	282.27	35,754.20	6801978.721	742524.3797	97707.9609	32217.36358	0	778632.63	0	16648.16939	8453061.055	16648.16939	603,548.56	1,307.55	604,856.11	262,044.89	567.70	262,612.60						
25	2031	29638	3246.105	423.405	141.14	0	2916.8	0	282.27	36,648.06	6990614.346	753443.8558	97707.9609	32217.36358	0	791397.1	0	16648.16939	8665380.626	16648.16939	618,708.18	1,307.55	620,015.72	268,626.80	567.70	269,194.50						
26	2032	30015	3246.105	470.45	141.14	0	2916.8	0	282.27	37,071.46	7079884.052	753443.8558	108564.401	32217.36358	0	791397.1	0	16648.16939	8765006.772	16648.16939	625,821.48	1,307.55	627,129.03	271,715.21	567.70	272,282.91						
27	2033	31003	3246.105	470.45	141.14	0	3010.9	0	282.27	38,153.50	7312404.53	753443.8558	108564.401	32217.36358	0	816926.098	0	16648.16939	9023556.189	16648.16939	644,281.91	1,307.55	645,589.46	279,730.24	567.70	280,297.94						
28	2034	31567	3246.105	470.45	141.14	0	3057.9	0	282.27	38,765.08	7445559.089	753443.8558	108564.401	32217.36358	0	829690.508	0	16648.16939	9169475.217	16648.16939	654,700.53	1,307.55	656,008.08	284,253.73	567.70	284,821.43						
29	2035	32461	3299.15	470.45	141.14	0	3105	0	282.27	39,753.03	7656387.141	764363.332	108564.401	32217.36358	0	842454.977	0	16648.16939	9409887.215	16648.16939	671,444.69	1,307.55	672,7									

c. Calculation of CO2 equivalent net emissions

STEP 4.5: Calculation of net emissions

$$\Delta C_{BSL,unplanned} = \Delta C_{BSL,PA,unplanned} + GHG_{BSL,E}$$

$$\Delta C_{BSL,PA,unplanned} = \Delta C_{TOT,PA}$$

$$\Delta C_{BSL,LK,unplanned} = \Delta C_{TOT,LB}$$

The estimated sum of other GHGs generated due to post-deforestation activities, which includes agricultural residues burning, forest aerial biomass burning and incorporation of nitrogen fertilizers, has been added to the net CO2 emissions calculation (presented in the item 4.3. above: 41'142,173.56 tCO2), as shown in the following chart. Therefore, the total avoided emissions up to 2046 are 42'172,873.48 tCO2e.

Chart 52: Total CO2e within the Madre de Dios Amazon REDD project area

Total CO2e up to year 2046	Due to biomass burning				Nitrogen fertilizer incorporation in perennial agriculture activity and pastures	TOTAL CO2e
	Agricultural residues in areas of clean crops		From deforested forest			
	CH4	N2O	CH4	N2O		
	2,100.75	803.99	693,920.31	301,281.93	32,592.94	1,030,699.92
TOTAL NET CO2e UP TO YEAR 2046						42'172,873.48

Chart 53: Summary chart of accumulated annual emissions within the Madre de Dios Amazon REDD project area

Año	Cambio del Stock de carbono en clases iniciales de bosque (T CO2)	Cambio del Stock de carbono en clases finales post-deforestación (T CO2)	Cambio total del Stock de Carbono en Línea base (TCO2)	Stock de carbono en productos aprovechados Cwp TCO2 (sawnwood)	TCO2 Netas	Fertilizante nitrogenado (Agropecuaria y pastos)	Quema de Biomasa (Residuos agrícolas- Cultivo en limpio)		Quema de Biomasa en bosque		Total de Emisión Neta acumulada (TCO2)
						N2O (T CO2 e)	CH4 (T CO2 e)	N2O (T CO2 e)	CH4 (T CO2 e)	N2O (TCO2e)	
2007	1,724,615.07	73,461.94	1,651,153.13	3,421.06	1,647,732.07	4,009.86	258.45	98.91	27,835.93	12,085.63	1,692,020.85
2008	2,836,619.54	121,736.94	2,714,882.61	5,552.53	2,709,330.08	4,798.12	309.26	118.36	45,790.14	19,880.87	2,780,226.82
2009	4,210,676.46	180,506.49	4,030,169.97	7,719.44	4,022,450.53	5,757.74	371.11	142.03	67,973.68	29,512.38	4,126,207.48
2010	4,815,161.22	205,693.44	4,609,467.77	11,183.69	4,598,284.08	6,169.01	397.62	152.18	77,719.15	33,743.61	4,716,465.64
2011	6,582,797.52	279,155.39	6,303,642.14	13,350.60	6,290,291.54	7,368.54	474.93	181.76	106,206.66	46,112.14	6,450,635.58
2012	8,267,995.40	352,617.33	7,915,378.07	15,517.51	7,899,860.56	8,568.07	552.25	211.35	133,375.42	57,908.09	8,100,475.74
2013	9,355,413.16	398,793.41	8,956,619.75	17,684.42	8,938,935.33	9,322.06	600.85	229.95	150,924.46	65,527.43	9,165,540.08
2014	10,938,336.40	465,958.61	10,472,377.78	19,851.33	10,452,526.45	10,418.77	671.53	257.01	176,464.84	76,616.39	10,716,955.00
2015	12,474,806.18	531,024.91	11,943,781.27	22,018.24	11,921,763.03	11,481.21	740.01	283.22	201,170.59	87,342.97	12,222,781.04
2016	13,867,937.74	589,794.46	13,278,143.28	24,185.15	13,253,958.13	12,440.84	801.87	306.89	223,622.89	97,091.17	13,588,221.78
2017	14,763,832.53	627,574.89	14,136,257.64	26,352.06	14,109,905.58	13,057.74	841.63	322.10	238,071.49	103,364.37	14,465,562.92
2018	16,943,440.51	719,927.05	16,223,513.46	28,518.97	16,194,994.49	14,565.72	938.82	359.30	273,259.45	118,642.06	16,602,759.84
2019	18,464,951.82	782,894.43	17,682,057.39	30,685.88	17,651,371.51	15,593.89	1,005.09	384.67	297,773.00	129,285.19	18,095,413.35
2020	19,649,758.82	833,268.33	18,816,490.48	32,852.79	18,783,637.69	16,416.42	1,058.11	404.96	316,893.96	137,587.01	19,255,998.16
2021	20,913,330.34	885,741.15	20,027,589.20	35,019.70	19,992,569.50	17,273.23	1,113.33	426.09	337,258.41	146,428.72	20,495,069.28
2022	23,704,465.41	1,003,280.26	22,701,185.15	37,186.61	22,663,998.54	19,192.48	1,237.04	473.43	382,277.10	165,974.65	23,233,153.24
2023	24,949,525.17	1,055,753.08	23,893,772.09	39,353.52	23,854,418.57	20,049.29	1,292.26	494.57	402,279.71	174,659.26	24,453,193.65
2024	26,992,743.53	1,141,808.50	25,850,935.03	41,520.43	25,809,414.60	21,454.45	1,382.83	529.23	435,239.21	188,969.41	26,456,989.73
2025	28,238,438.78	1,194,281.31	27,044,157.47	43,687.34	27,000,470.13	22,311.26	1,438.06	550.37	455,327.58	197,691.25	27,677,788.63
2026	29,229,975.01	1,238,358.48	27,991,616.53	45,854.25	27,945,762.28	23,030.97	1,484.45	568.12	471,390.90	204,665.52	28,646,902.23
2027	30,414,024.32	1,288,732.38	29,125,291.94	48,021.16	29,077,270.78	23,853.51	1,537.46	588.41	490,499.25	212,961.86	29,806,711.26
2028	31,148,610.87	1,320,216.07	29,828,394.79	50,188.07	29,778,206.72	24,367.59	1,570.60	601.09	502,358.05	218,110.64	30,525,214.70
2029	32,765,762.04	1,389,480.19	31,376,281.84	52,354.98	31,323,926.86	25,498.58	1,643.49	628.99	528,465.09	229,445.63	32,109,608.65
2030	33,555,072.79	1,423,062.79	32,132,010.00	54,521.89	32,077,488.11	26,046.93	1,678.84	642.52	541,124.29	234,941.92	32,881,922.60
2031	34,494,512.48	1,462,942.13	33,031,570.35	56,688.80	32,974,881.55	26,698.11	1,720.81	658.58	556,283.90	241,523.82	33,801,766.77
2032	34,940,309.01	1,481,832.35	33,458,476.66	58,855.71	33,399,620.95	27,006.56	1,740.69	666.19	563,397.21	244,612.23	34,237,043.83
2033	36,084,601.84	1,530,107.34	34,554,494.50	61,022.62	34,493,471.88	27,794.82	1,791.50	685.63	581,857.64	252,627.27	35,358,228.74
2034	36,730,358.45	1,557,393.20	35,172,965.24	63,189.53	35,109,775.71	28,240.36	1,820.21	696.62	592,276.26	257,150.76	35,989,959.92
2035	37,767,945.06	1,601,470.37	36,166,474.69	65,356.44	36,101,118.25	28,960.08	1,866.60	714.38	609,020.41	264,420.63	37,006,100.35
2036	38,163,910.44	1,618,261.67	36,545,648.77	67,523.35	36,478,125.42	29,234.26	1,884.27	721.14	615,328.83	267,159.58	37,392,453.50
2037	38,636,778.03	1,637,151.89	36,999,626.15	69,690.26	36,929,935.89	29,542.71	1,904.15	728.75	622,935.71	270,462.28	37,855,509.50
2038	39,033,501.10	1,653,943.19	37,379,557.91	71,857.17	37,307,700.74	29,816.89	1,921.83	735.51	629,256.75	273,206.71	38,242,638.43
2039	39,334,985.79	1,666,536.66	37,668,449.13	74,024.08	37,594,425.05	30,022.52	1,935.08	740.59	634,116.86	275,316.85	38,536,556.94
2040	40,199,040.23	1,704,317.09	38,494,723.14	76,190.99	38,418,532.15	30,639.42	1,974.84	755.80	648,024.48	281,355.17	39,381,281.86
2041	40,696,061.08	1,725,306.22	38,970,754.87	78,357.90	38,892,396.97	30,982.14	1,996.93	764.26	656,041.05	284,835.75	39,867,017.10
2042	41,348,573.07	1,752,592.08	39,595,980.99	80,524.81	39,515,456.18	31,427.68	2,025.65	775.25	666,400.19	289,333.42	40,505,418.36
2043	41,593,940.38	1,763,086.65	39,830,853.73	82,691.72	39,748,162.01	31,599.04	2,036.69	779.48	670,361.54	291,053.33	40,743,992.09
2044	41,888,381.14	1,775,680.12	40,112,701.02	84,858.63	40,027,842.39	31,804.68	2,049.95	784.55	675,115.16	293,117.22	41,030,713.95
2045	42,680,601.45	1,809,262.73	40,871,337.73	87,025.54	40,784,312.19	32,353.03	2,085.29	798.07	687,897.96	298,667.18	41,806,113.73
2046	43,055,321.12	1,823,955.11	41,231,366.01	89,192.45	41,142,173.56	32,592.94	2,100.75	803.99	693,920.31	301,281.93	42,172,873.48

3.2 Project Emissions

According to the VMD0015 M-MON Module of the approved VCS VM0007 REDD Methodology Modules, carbon stock changes in the project scenario are determined by the following formula:

$$\Delta C_P = \sum_{t=1}^{t^*} \sum_{i=1}^M (\Delta C_{P,DefP,Ai,t} + \Delta C_{P,Deg,i,t} + GHG_{P-E,i,t} - \Delta C_{P,Enh,i,t})$$

Where,

$\Delta C_{P,DefP,Ai,t}$ = Carbon stock change as a result of deforestation in the project area in the with project scenario.

$\Delta C_{P,Deg,i,t}$ = Carbon stock change as a result of degradation

$GHG_{P-E,i,t}$ = GHG emissions as a result of deforestation and degradation activities within the project area.

$\Delta C_{P,Enh,i,t}$ = Carbon stock change as a result of forest growth and sequestration during the project life in areas projected to be deforested in the baseline. This variable can be conservatively considered as zero, as indicated for areas with baselines determined as BL-UP.

For a with project scenario, there would be no changes in carbon stock in the project scenario as a result of deforestation or degradation, since surveillance and monitoring activities will be carried out within the Madre de Dios Amazon REDD project area to avoid the activities of deforestation agents. Therefore, it can be considered that there would be no deforestation within the project area, neither non-CO2 emissions due to deforestation activities.

In relation to forest growth and sequestration in the with project scenario, it was also conservatively considered as zero (0) (ex-ante).

3.3 Leakage

APPLICATION OF THE LK-ASU MODULE OF THE REDD METHODOLOGY MODULES⁷⁵

PART 1: ESTIMATION OF CARBON STOCK CHANGES AND GREENHOUSE GAS EMISSIONS IN THE LEAKAGE BELT

According to the VMD0007 BL-UP Module of the REDD Methodology Modules, the carbon stock changes and greenhouse gas emissions in the Leakage Belt must be determined applying the following formula:

$$\Delta C_{TOT} = C_{BSL} - C_{post} - C_{wp}$$

This formula is the same used for the project area. Therefore, the steps for stratification and determination of carbon stocks per stratum before and after deforestation are used also for the Leakage Belt.

$$C_{BSL} = \sum_{t=1}^{t^*} \sum_{i=1}^M ((C_{BSL,i}) * A_{unplanned,i,t})$$

$$C_{post} = \sum_{t=1}^t \sum_{i=1}^M (C_{post,i} * A_{unplanned,i,t})$$

$$C_{wp} = \sum_{t=1}^t \sum_{i=1}^M (C_{WP,i} * A_{unplanned,i,t})$$

The Madre de Dios Amazon REDD Project Leakage Belt is formed by the Belgium Native Community (53,378 ha), timber concessions (158,340 ha), Alto Purús Reserved Zone and Purús National Park in a minimum proportion (3,509.12 ha, both National Protected Areas). This is shown in the following figure:

⁷⁵ According to the document: "Estimación de las emisiones debido al desplazamiento de la deforestación no planeada para el Proyecto Madre de Dios Amazon REDD", Bosques Amazónicos Technical Area, application of the LK-ASU Module of the approved VCS REDD Methodology Modules, March 2011, which will be available to the auditors.

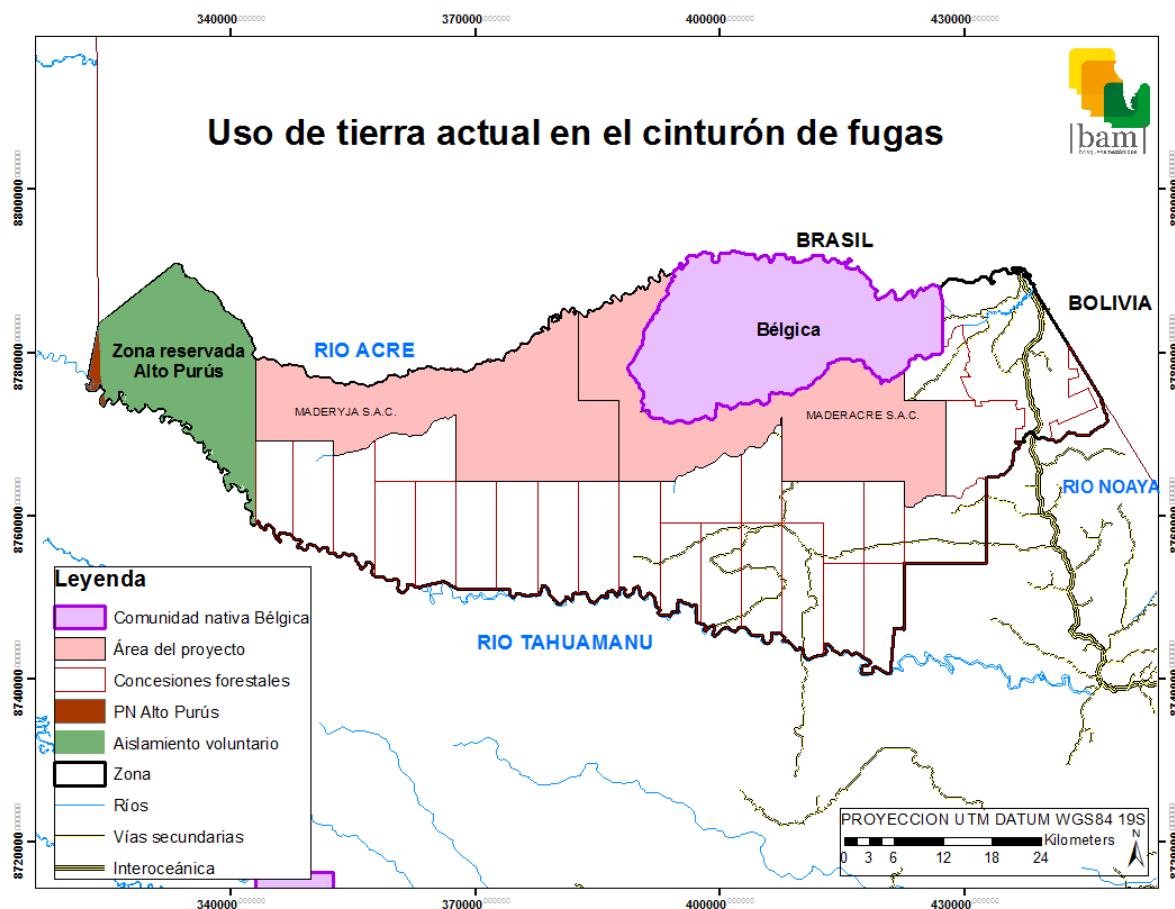


Fig. 69: Current land-use within the Leakage Belt of the Madre de Dios Amazon REDD Project

According to the applied deforestation model (SIMAMAZONIA Model), each identified stratum will have a particular area deforested annually. The total deforested area within the Leakage Belt, according to the model for 2046, is 193,051.06 hectares.

Chart 54: Deforested areas per stratum within the Madre de Dios Amazon REDD Project Leakage Belt

Area deforested in each forest classes <i>icl</i> within the leakage area										Total area deforested in the leakage area
<i>ID_{icl}</i> > Name>		001	002	003	004	005	006	007	008	
Project year t		BPCB <i>ABSLPA_{icl,t}</i> ha	BPT <i>ABSLPA_{icl,t}</i> ha	BTI <i>ABSLPA_{icl,t}</i> ha	BCB <i>ABSLPA_{icl,t}</i> ha	BT <i>ABSLPA_{icl,t}</i> ha	P <i>ABSLPA_{icl,t}</i> ha	PA <i>ABSLPA_{icl,t}</i> ha	AI <i>ABSLPA_{icl,t}</i> ha	
0	2006	6,961.6	1,411.2	282.3	752.7	2,728.4	-	-	7,150.3	19,286.4
1	2007	9,595.6	2,163.9	188.2	1,034.9	3,198.8	0.0	-	8,373.3	24,554.8
2	2008	12,135.7	2,540.2	188.2	1,881.6	3,857.4	0.0	-	9,126.0	29,729.2
3	2009	14,111.3	2,634.3	0.0	2,352.1	4,139.6	0.0	-	9,784.6	33,021.9
4	2010	17,027.8	2,916.6	376.3	3,292.9	4,516.0	188.2	-	10,066.8	25,211.9
5	2011	20,414.6	3,292.8	470.4	4,327.8	4,798.2	188.1	94.1	11,007.6	44,593.6
6	2012	26,435.7	4,986.3	1,034.9	5,644.9	5,645.0	94.0	94.1	12,324.8	56,259.6
7	2013	29,069.8	5,550.8	1,223.0	6,585.8	6,021.3	0.1	94.1	13,359.7	61,904.6
8	2014	32,832.9	6,491.6	1,599.4	7,714.8	6,397.6	0.1	94.1	14,018.3	69,148.7
9	2015	34,808.5	6,773.8	1,693.4	8,843.8	6,585.8	0.1	94.1	14,770.9	73,570.4
10	2016	37,913.1	7,338.2	1,693.4	10,160.9	6,962.1	188.3	94.1	16,088.1	80,438.3
11	2017	40,171.0	7,996.8	1,693.4	11,007.6	6,962.1	188.3	94.1	16,370.3	84,483.7
12	2018	42,616.9	9,219.8	1,787.5	11,948.5	7,056.2	188.4	376.3	16,370.3	89,564.0
13	2019	45,251.1	9,313.9	2,163.8	13,359.7	7,056.2	376.6	376.3	16,840.8	94,738.4
14	2020	47,320.8	10,348.8	2,257.9	13,453.8	7,526.6	470.7	470.4	17,028.9	98,877.9
15	2021	50,143.1	10,725.1	2,540.2	13,642.0	7,997.0	564.8	470.4	17,123.0	103,205.6
16	2022	51,554.0	10,913.2	2,916.5	13,736.0	8,279.3	753.0	470.4	17,311.2	105,933.7
17	2023	53,717.8	11,007.3	3,104.7	14,206.5	8,279.3	659.0	470.4	17,311.2	108,756.0
18	2024	55,787.3	11,383.6	3,104.7	14,300.5	8,279.3	564.9	470.4	17,593.4	111,484.1
19	2025	58,327.4	11,007.2	3,292.8	15,617.7	8,561.5	376.8	470.4	17,875.7	115,529.5
20	2026	61,337.9	11,007.2	3,386.9	16,840.8	8,561.5	188.6	470.4	17,875.7	119,669.0
21	2027	64,912.9	11,665.8	3,481.0	17,781.6	8,843.8	188.6	470.4	18,063.8	125,407.9
22	2028	68,676.1	12,136.2	3,857.3	18,534.3	8,843.8	188.6	470.4	18,252.0	130,958.7
23	2029	71,404.3	12,230.2	4,045.5	19,381.0	8,843.8	188.6	658.6	18,346.1	135,098.1
24	2030	73,003.6	12,794.7	4,139.6	20,039.6	8,843.8	94.5	658.6	18,346.1	137,920.4
25	2031	77,143.1	12,794.7	4,139.6	20,227.7	8,843.8	0.5	846.7	18,346.1	142,342.2
26	2032	80,718.2	12,888.8	4,233.6	20,980.4	8,843.8	187.7	846.7	18,534.2	147,233.5
27	2033	85,139.9	12,888.8	4,327.7	22,203.5	8,937.8	187.7	940.8	18,534.2	153,160.5
28	2034	87,868.2	13,077.0	4,610.0	23,708.8	8,937.8	187.7	940.8	18,534.2	157,864.6
29	2035	91,443.2	13,359.2	4,798.1	24,461.5	8,937.8	375.8	1,034.9	18,628.3	163,039.0
30	2036	94,547.9	13,453.3	4,892.2	24,743.7	8,937.8	375.8	1,034.9	18,628.3	166,614.0
31	2037	97,934.8	13,547.4	4,986.3	25,496.4	9,126.0	564.0	1,034.9	18,628.3	171,318.1
32	2038	100,192.8	13,735.5	5,174.5	26,060.9	9,126.0	564.0	1,034.9	18,628.3	174,516.8
33	2039	103,767.9	13,829.6	5,362.6	26,907.6	9,220.1	658.1	1,223.1	18,628.3	179,597.3
34	2040	108,283.7	13,923.7	5,268.5	27,566.2	9,220.1	658.0	1,223.1	18,534.2	184,677.6
35	2041	111,952.9	14,205.9	5,268.5	29,165.6	9,784.6	752.1	1,223.1	18,534.2	190,887.0
36	2042	115,810.2	14,300.0	5,550.8	31,141.3	10,160.9	846.2	1,223.1	18,534.2	197,566.7
37	2043	118,444.5	14,488.2	5,644.8	31,799.9	10,160.9	846.2	1,223.1	18,534.2	201,141.8
38	2044	121,831.4	14,488.2	5,833.0	32,458.5	10,160.9	1,222.5	1,223.1	18,534.2	205,751.9
39	2045	125,688.7	14,488.2	6,115.3	33,117.1	10,160.9	1,128.4	1,223.1	18,628.3	210,549.9
40	2046	126,817.7	14,488.2	6,209.3	33,681.6	10,160.9	1,128.4	1,223.1	18,628.3	212,337.5
										193,051.1

Step 1: Estimation of baseline total carbon stocks in the leakage belt

The aim of this step is to complete the assessment of the leakage belt in the baseline through the estimation of carbon stock changes. Each of the identified strata is deforested annually, resulting in a decrease in carbon stocks. The carbon stocks used for each stratum are the same as those used in the project area. In the following chart, the initial carbon stock per stratum in the leakage belt is presented.

Chart 55: Carbon stock per stratum in the Leakage Belt

I	Año	Carbon stock changes in initial (pre-deforestation) forest classes																Total C stock change in initial forests	
		ID _{id} =	001	ID _{id} =	002	ID _{id} =	003	ID _{id} =	004	ID _{id} =	005	ID _{id} =	006	ID _{id} =	007	ID _{id} =	008	acumulado	annual
		Name	Bosque con Paca	Bosque con Paca de Terrazas	Bosque con Paca Inundables	Bosque de Colinas Bajas	Bosque de Terrazas	Pacales	Pantano arbóreo	Áreas Intervénidas									
		ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ABSLPA _{id,t} ha	ΔCBSLPA _{id,t} t CO ₂ -e	ΔCBSLPA _{id,t} t CO ₂ -e	ΔCBSLPA _{id,t} t CO ₂ -e
0	2006	6,962	3,630,863	1,411	724,680	282	159,635	752.66	388,223	2,728	1,853,412	0	0	0	0	7,150	765,031	7,521,843	
1	2007	9,596	5,004,685	2,164	1,111,172	188	106,430	1,034.91	533,807	3,199	2,172,966	0	4	0	0	8,373	895,891	9,824,956	2,303,112
2	2008	12,136	6,329,499	2,540	1,304,420	188	106,430	1,881.64	970,550	3,857	2,620,341	0	18	0	0	9,126	976,420	12,307,679	2,482,723
3	2009	14,111	7,359,853	2,634	1,352,732	0	21	2,352.05	1,213,190	4,140	2,812,073	0	18	0	0	9,785	1,046,884	13,784,771	1,477,092
4	2010	17,028	8,880,973	2,917	1,497,668	376	212,798	3,292.88	1,698,469	4,516	3,067,716	188	113,768	0	0	10,067	1,077,082	16,548,474	2,763,703
5	2011	20,415	10,647,394	3,293	1,690,893	470	266,002	4,327.79	2,232,276	4,798	3,259,448	188	113,683	94	40,096	11,008	1,177,745	19,427,538	2,879,064
6	2012	26,436	13,787,754	4,986	2,560,482	1,035	585,226	5,644.94	2,911,666	5,645	3,834,645	94	56,808	94	40,096	12,325	1,318,671	25,095,349	5,667,811
7	2013	29,070	15,161,622	5,551	2,850,354	1,223	691,636	6,585.77	3,396,945	6,021	4,090,288	0	67	94	40,096	13,360	1,429,399	27,660,408	2,565,059
8	2014	32,833	17,124,306	6,492	3,333,459	1,599	904,454	7,714.76	3,979,280	6,398	4,345,931	0	76	94	40,096	14,018	1,499,863	31,227,466	3,567,058
9	2015	34,809	18,154,684	6,774	3,478,372	1,693	957,655	8,843.75	4,561,615	6,586	4,473,753	0	85	94	40,096	14,771	1,580,392	33,246,652	2,019,186
10	2016	37,913	19,773,908	7,338	3,768,225	1,693	957,655	10,160.90	5,241,002	6,962	4,729,396	188	113,839	94	40,096	16,088	1,721,319	36,345,440	3,098,789
11	2017	40,171	20,951,532	7,997	4,106,394	1,693	957,655	11,007.64	5,677,753	6,962	4,729,396	188	113,848	94	40,096	16,370	1,751,518	38,328,192	1,982,752
12	2018	42,617	22,227,223	9,220	4,734,435	1,788	1,010,859	11,948.47	6,163,032	7,056	4,793,307	188	113,884	376	160,385	16,370	1,751,517	40,954,641	2,626,449
13	2019	45,251	23,601,111	9,314	4,782,720	2,164	1,223,678	13,359.71	6,890,950	7,056	4,793,307	377	227,656	376	160,385	16,841	1,801,848	43,481,655	2,527,014
14	2020	47,321	24,680,558	10,349	5,314,148	2,258	1,276,883	13,453.79	6,999,478	7,527	5,112,860	471	284,531	470	200,481	17,029	1,821,981	45,630,920	2,149,265
15	2021	50,143	26,152,581	10,725	5,507,385	2,540	1,436,497	13,641.96	7,036,534	7,997	5,432,414	565	341,424	470	200,481	17,123	1,832,047	47,939,362	2,308,442
16	2022	51,554	26,888,452	10,913	5,603,990	2,917	1,649,315	13,736.04	7,085,062	8,279	5,624,146	753	455,192	470	200,481	17,311	1,852,179	49,358,818	1,419,455
17	2023	53,718	28,016,976	11,007	5,652,294	3,105	1,755,721	14,206.45	7,327,701	8,279	5,624,146	659	398,331	470	200,481	17,311	1,852,179	50,827,829	1,469,012
18	2024	55,787	29,096,365	11,384	5,845,542	3,105	1,755,721	14,300.54	7,376,229	8,279	5,624,146	565	341,478	470	200,481	17,593	1,882,378	52,122,340	1,294,511
19	2025	58,327	30,421,183	11,007	5,652,272	3,293	1,862,130	15,617.69	8,055,620	8,562	5,815,879	377	227,750	470	200,481	17,876	1,912,577	54,147,890	2,025,550
20	2026	61,338	31,991,334	11,007	5,652,272	3,387	1,915,335	16,840.77	8,686,483	8,562	5,815,879	189	114,009	470	200,481	17,876	1,912,576	56,288,366	2,140,476
21	2027	64,913	33,855,898	11,666	5,990,448	3,481	1,968,539	17,781.59	9,171,762	8,844	6,007,611	189	114,013	470	200,481	18,064	1,932,708	59,241,460	2,953,094
22	2028	68,676	35,818,633	12,136	6,232,000	3,857	2,181,358	18,534.25	9,559,985	8,844	6,007,611	189	114,013	470	200,481	18,252	1,952,841	62,066,921	2,825,461
23	2029	71,404	37,241,536	12,230	6,280,301	4,045	2,287,767	19,381.00	9,996,736	8,844	6,007,611	189	114,013	659	280,673	18,346	1,962,907	64,171,544	2,104,623
24	2030	73,004	38,075,662	12,795	6,570,173	4,140	2,340,968	20,039.58	10,336,431	8,844	6,007,611	95	57,143	659	280,673	18,346	1,962,907	65,631,567	1,460,023
25	2031	77,143	40,234,660	12,795	6,570,169	4,140	2,340,968	20,227.74	10,433,487	8,844	6,007,611	0	276	847	360,865	18,346	1,962,907	67,910,943	2,279,376
26	2032	80,718	42,099,274	12,889	6,618,481	4,234	2,394,168	20,980.40	10,821,710	8,844	6,007,611	188	113,465	847	360,865	18,534	1,983,039	70,398,614	2,487,671
27	2033	85,140	44,405,465	12,889	6,618,481	4,328	2,447,373	22,203.48	11,452,573	8,938	6,071,522	188	113,456	941	400,961	18,534	1,983,039	73,492,870	3,094,256
28	2034	87,868	45,828,438	13,077	6,715,105	4,610	2,606,987	23,708.80	12,229,019	8,938	6,071,522	188	113,451	941	400,961	18,534	1,983,039	75,948,523	2,455,653
29	2035	91,443	47,693,010	13,359	6,860,037	4,798	2,713,396	24,461.46	12,617,243	8,938	6,071,522	376	227,188	1,035	441,057	18,628	1,993,106	78,616,559	2,668,036
30	2036	94,548	49,312,284	13,453	6,908,345	4,892	2,766,597	24,743.71	12,762,826	8,938	6,071,522	376	227,188	1,035	441,057	18,628	1,993,106	80,482,925	1,866,367
31	2037	97,935	51,078,771	13,547	6,956,657	4,986	2,819,801	25,496.37	13,151,049	9,126	6,199,343	564	340,912	1,035	441,057	18,628	1,993,106	82,980,697	2,497,772
32	2038	100,193	52,256,415	13,736	7,053,281	5,174	2,926,206	26,060.86	13,442,217	9,126	6,199,343	564	340,912	1,035	441,057	18,628	1,993,106	84,652,537	1,671,840
33	2039	103,768	54,121,045	13,830	7,101,589	5,363	3,032,616	26,907.61	13,878,968	9,220	6,263,254	658	397,778	1,223	521,250	18,628	1,993,106	87,309,605	2,657,068
34	2040	108,284	56,476,332	13,924	7,149,901	5,269	2,979,407	27,566.19	14,218,663	9,220	6,263,254	658	397,769	1,223	521,250	18,534	1,983,039	89,989,615	2,680,010
35	2041	111,953	58,390,020	14,206	7,294,830	5,269	2,979,407	29,165.59	15,043,638	9,785	6,646,718	752	454,635	1,223	521,250	18,534	1,983,039	93,313,536	3,323,921
36	2042	115,810	60,401,844	14,300	7,343,134	5,551	3,139,013	31,141.33	16,062,723	10,161	6,902,362	846	511,501	1,223	521,250	18,534	1,983,039	96,864,865	3,551,329
37	2043	118,445	61,775,774	14,488	7,439,758	5,645	3,192,217	31,799.90	16,402,419	10,161	6,902,362	846	511,501	1,223	521,250	18,534	1,983,039	98,728,319	1,863,454
38	2044	121,831	63,542,257	14,488	7,439,758	5,833	3,298,627	32,458.48	16,742,114	10,161	6,902,362	1,223	738,984	1,223	521,250	18,534	1,983,039	101,168,389	2,440,070
39	2045	125,689	65,554,057	14,488	7,439,754	6,115	3,458,241	33,117.06	17,081,809	10,161	6,902,362	1,128	682,108	1,223	521,250	18,628	1,993,105	103,632,686	2,464,297
40	2046	128,818	66,142,881	14,488	7,439,754	6,209	3,511,445	33,681.56	17,372,977	10,161	6,902,362	1,128	682,091	1,223	521,250	18,628	1,993,105	104,565,864	933,178
																		97,044,021	

Step 2: Estimation of post-deforestation baseline carbon stocks

Based on land-use changes from initial classes “strata” (forest) to post-deforestation classes (non-forest), taking into account the respective carbon stock changes, the total gross carbon stock changes were estimated. In the following chart, the post-deforestation stock in the Madre de Dios Amazon REDD Project leakage belt is presented.

Chart 56: Carbon stock in post-deforestation classes

Project year t		Carbon stock changes in final (post-deforestation) non forest classes								Total C stock change in final post-deforestation classes	
		ID _{fcl} =	009	ID _{fcl} =	010	ID _{fcl} =	011	ID _{fcl} =	012	cumulative	annual
		Name	Deforestación x Pastos	Deforestación x Agropecuaria	Deforestación x Infraestructura	Deforestación x Cultivo en Limpio					
		ABSLPA _{fcl,t} ha	CBSLPA _{fcl,t} t CO ₂ -e	ABSLPA _{fcl,t} ha	CBSLPA _{fcl,t} t CO ₂ -e	ABSLPA _{fcl,t} ha	ΔCBSLPA _{fcl,t} t CO ₂ -e	ABSLPA _{fcl,t} ha	ΔCBSLPA _{fcl,t} t CO ₂ -e		
0	2006	7,714.6	143,953.7	10,414.7	261,876.6	385.7	0.0	771.5	24,401.2	430,231.5	
1	2007	9,821.9	183,277.0	13,259.6	333,412.3	491.1	0.0	982.2	31,066.7	547,756.0	117,524.5
2	2008	11,891.7	221,898.8	16,053.8	403,672.1	594.6	0.0	1,189.2	37,613.4	663,184.3	115,428.3
3	2009	13,208.8	246,475.4	17,831.8	448,381.2	660.4	0.0	1,320.9	41,779.3	736,635.9	73,451.6
4	2010	10,084.7	188,181.4	13,614.4	342,334.3	504.2	0.0	1,008.5	31,898.1	562,413.8	-174,222.1
5	2011	17,837.4	332,846.5	24,080.5	605,505.0	891.9	0.0	1,783.7	56,419.8	994,771.2	432,357.4
6	2012	22,503.8	419,921.4	30,380.2	763,909.2	1,125.2	0.0	2,250.4	71,179.6	1,255,010.2	260,239.0
7	2013	24,761.8	462,055.8	33,428.5	840,559.0	1,238.1	0.0	2,476.2	78,321.7	1,380,936.4	125,926.2
8	2014	27,659.5	516,126.2	37,340.3	938,922.3	1,383.0	0.0	2,765.9	87,487.0	1,542,535.4	161,599.0
9	2015	29,428.2	549,129.6	39,728.0	998,961.2	1,471.4	0.0	2,942.8	93,081.3	1,641,172.2	98,636.7
10	2016	32,175.3	600,391.4	43,436.7	1,092,215.2	1,608.8	0.0	3,217.5	101,770.5	1,794,377.1	153,205.0
11	2017	33,793.5	630,586.6	45,621.2	1,147,145.6	1,689.7	0.0	3,379.3	106,888.8	1,884,621.0	90,243.9
12	2018	35,825.6	668,505.7	48,364.6	1,216,126.8	1,791.3	0.0	3,582.6	113,316.4	1,997,948.8	113,327.8
13	2019	37,895.4	707,127.6	51,158.7	1,286,386.7	1,894.8	0.0	3,789.5	119,863.0	2,113,377.3	115,428.5
14	2020	39,551.2	738,024.6	53,394.1	1,342,593.7	1,977.6	0.0	3,955.1	125,100.3	2,205,718.6	92,341.3
15	2021	41,282.2	770,326.5	55,731.0	1,401,356.4	2,064.1	0.0	4,128.2	130,575.7	2,302,258.6	96,539.9
16	2022	42,373.5	790,688.8	57,204.2	1,438,399.0	2,118.7	0.0	4,237.3	134,027.3	2,363,115.0	60,856.5
17	2023	43,502.4	811,754.6	58,728.2	1,476,721.3	2,175.1	0.0	4,350.2	137,598.1	2,426,074.0	62,959.0
18	2024	44,593.7	832,117.6	60,201.4	1,513,765.0	2,229.7	0.0	4,459.4	141,049.7	2,486,932.3	60,858.3
19	2025	46,211.8	862,312.5	62,386.0	1,568,694.8	2,310.6	0.0	4,621.2	146,168.0	2,577,175.3	90,243.0
20	2026	47,867.6	893,209.6	64,621.3	1,624,901.9	2,393.4	0.0	4,786.8	151,405.3	2,669,516.8	92,341.5
21	2027	50,163.2	936,044.6	67,720.3	1,702,826.1	2,508.2	0.0	5,016.3	158,666.1	2,797,536.8	128,020.0
22	2028	52,383.5	977,475.5	70,717.7	1,778,196.1	2,619.2	0.0	5,238.3	165,688.9	2,921,360.5	123,823.7
23	2029	54,039.2	1,008,371.9	72,953.0	1,834,402.0	2,702.0	0.0	5,403.9	170,926.1	3,013,699.9	92,339.5
24	2030	55,168.2	1,029,438.0	74,477.0	1,872,724.8	2,758.4	0.0	5,516.8	174,496.9	3,076,659.8	62,959.8
25	2031	56,936.9	1,062,442.0	76,864.8	1,932,764.8	2,846.8	0.0	5,693.7	180,091.3	3,175,298.1	98,638.4
26	2032	58,893.4	1,098,950.8	79,506.1	1,999,180.5	2,944.7	0.0	5,889.3	186,279.8	3,284,411.1	109,113.0
27	2033	61,264.2	1,143,190.2	82,706.7	2,079,659.6	3,063.2	0.0	6,126.4	193,778.7	3,416,628.5	132,217.3
28	2034	63,145.8	1,178,301.1	85,246.9	2,143,532.4	3,157.3	0.0	6,314.6	199,730.2	3,521,563.7	104,935.3
29	2035	65,215.6	1,216,922.7	88,041.0	2,213,791.8	3,260.8	0.0	6,521.6	206,276.9	3,636,991.4	115,427.7
30	2036	66,645.6	1,243,607.1	89,971.6	2,262,335.3	3,332.3	0.0	6,664.6	210,800.1	3,716,742.6	79,751.1
31	2037	68,527.2	1,278,718.3	92,511.8	2,326,208.5	3,426.4	0.0	6,852.7	216,751.7	3,821,678.5	104,935.9
32	2038	69,806.7	1,302,593.8	94,239.1	2,369,642.1	3,490.3	0.0	6,980.7	220,798.7	3,893,034.6	71,356.1
33	2039	71,838.9	1,340,514.0	96,982.5	2,438,625.6	3,591.9	0.0	7,183.9	227,226.5	4,006,366.0	113,331.4
34	2040	73,871.0	1,378,433.6	99,725.9	2,507,607.8	3,693.6	0.0	7,387.1	233,654.1	4,119,695.4	113,329.4
35	2041	76,354.8	1,424,780.4	103,079.0	2,591,920.6	3,817.7	0.0	7,635.5	241,510.2	4,258,211.2	138,515.7
36	2042	79,026.7	1,474,638.2	106,686.0	2,682,620.5	3,951.3	0.0	7,902.7	249,961.4	4,407,220.2	149,009.0
37	2043	80,456.7	1,501,322.7	108,616.6	2,731,164.3	4,022.8	0.0	8,045.7	254,484.7	4,486,971.8	79,751.6
38	2044	82,300.7	1,535,731.8	111,106.0	2,793,760.4	4,115.0	0.0	8,230.1	260,317.2	4,589,809.4	102,837.7
39	2045	84,220.0	1,571,544.8	113,697.0	2,858,910.3	4,211.0	0.0	8,422.0	266,387.8	4,696,842.9	107,033.5
40	2046	84,935.0	1,584,886.8	114,662.2	2,883,181.8	4,246.7	0.0	8,493.5	268,649.4	4,736,718.0	39,875.1
											4,306,486.5

For the case of wood products carbon within the leakage belt (Cwp), the sawn wood product has been considered. Taking into account the average annual extraction within the project area (95,030.9 ha), the extracted volume within the leakage belt was estimated, for the 158,340 hectares of existing timber concessions. Subtracting the annual Cwp, the net carbon stock can be estimated for the project duration 2007-2046: 92,594,775.0 tCO₂.

Chart 57: Net carbon stock within the Madre de Dios Amazon REDD Project leakage belt

Project year t	Año	Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change		Cwp tCO ₂ por clase de producto (sawnwood)	tCO ₂ Netas
		cumulative	annual	cumulative	annual	annual	cumulative		
		$\Delta C_{BSLPA-i_t}$ t CO ₂ -e	$\Delta C_{BSLPA-i}$ t CO ₂ -e	$\Delta C_{BSLPA-f_t}$ t CO ₂ -e	$\Delta C_{BSLPA-f}$ t CO ₂ -e	ΔC_{BSLPA_t} tCO ₂ -e	ΔC_{BSLPA} tCO ₂ -e		
0	2006	7,521,843.3	-	430,231.5	-	-	7,091,611.8	2,192.3	
1	2007	9,824,955.7	2,303,112.4	547,756.0	117,524.5	2,185,587.9	9,277,199.7	5,475.7	2,180,112.3
2	2008	12,307,678.9	2,482,723.2	663,184.3	115,428.3	2,367,294.8	11,644,494.5	3,411.6	2,363,883.3
3	2009	13,784,770.9	1,477,092.1	736,635.9	73,451.6	1,403,640.5	13,048,135.0	3,468.3	1,400,172.2
4	2010	16,548,474.2	2,763,703.3	562,413.8	174,222.1	2,937,925.4	15,986,060.4	5,544.8	2,932,380.6
5	2011	19,427,538.3	2,879,064.1	994,771.2	432,357.4	2,446,706.6	18,432,767.0	3,468.3	2,443,238.3
6	2012	25,095,349.0	5,667,810.7	1,255,010.2	260,239.0	5,407,571.7	23,840,338.7	3,468.3	5,404,103.4
7	2013	27,660,407.7	2,565,058.7	1,380,936.4	125,926.2	2,439,132.5	26,279,471.2	3,468.3	2,435,664.2
8	2014	31,227,465.8	3,567,058.1	1,542,535.4	161,599.0	3,405,459.1	29,684,930.4	3,468.3	3,401,990.8
9	2015	33,246,651.7	2,019,185.9	1,641,172.2	98,636.7	1,920,549.2	31,605,479.6	3,468.3	1,917,080.9
10	2016	36,345,440.3	3,098,788.5	1,794,377.1	153,205.0	2,945,583.6	34,551,063.1	3,468.3	2,942,115.3
11	2017	38,328,192.3	1,982,752.0	1,884,621.0	90,243.9	1,892,508.1	36,443,571.2	3,468.3	1,889,039.8
12	2018	40,954,641.3	2,626,449.1	1,997,948.8	113,327.8	2,513,121.3	38,956,692.5	3,468.3	2,509,653.0
13	2019	43,481,655.1	2,527,013.8	2,113,377.3	115,428.5	2,411,585.3	41,368,277.8	3,468.3	2,408,116.9
14	2020	45,630,920.0	2,149,264.9	2,205,718.6	92,341.3	2,056,923.6	43,425,201.4	3,468.3	2,053,455.3
15	2021	47,939,362.3	2,308,442.3	2,302,258.6	96,539.9	2,211,902.3	45,637,103.7	3,468.3	2,208,434.0
16	2022	49,358,817.6	1,419,455.3	2,363,115.0	60,856.5	1,358,598.9	46,995,702.6	3,468.3	1,355,130.6
17	2023	50,827,829.2	1,469,011.5	2,426,074.0	62,959.0	1,406,052.6	48,401,755.2	3,468.3	1,402,584.3
18	2024	52,122,340.1	1,294,510.9	2,486,932.3	60,858.3	1,233,652.6	49,635,407.8	3,468.3	1,230,184.3
19	2025	54,147,890.4	2,025,550.3	2,577,175.3	90,243.0	1,935,307.3	51,570,715.1	3,468.3	1,931,839.0
20	2026	56,288,366.4	2,140,476.0	2,669,516.8	92,341.5	2,048,134.6	53,618,849.7	3,468.3	2,044,666.3
21	2027	59,241,460.1	2,953,093.7	2,797,536.8	128,020.0	2,825,073.7	56,443,923.3	3,468.3	2,821,605.4
22	2028	62,066,921.3	2,825,461.2	2,921,360.5	123,823.7	2,701,637.5	59,145,560.8	3,468.3	2,698,169.2
23	2029	64,171,544.2	2,104,622.9	3,013,699.9	92,339.5	2,012,283.4	61,157,844.3	3,468.3	2,008,815.1
24	2030	65,631,567.0	1,460,022.8	3,076,659.8	62,959.8	1,397,063.0	62,554,907.3	3,468.3	1,393,594.7
25	2031	67,910,942.8	2,279,375.7	3,175,298.1	98,638.4	2,180,737.4	64,735,644.7	3,468.3	2,177,269.1
26	2032	70,398,613.7	2,487,671.0	3,284,411.1	109,113.0	2,378,557.9	67,114,202.6	3,468.3	2,375,089.6
27	2033	73,492,870.1	3,094,256.4	3,416,628.5	132,217.3	2,962,039.0	70,076,241.6	3,468.3	2,958,570.7
28	2034	75,948,522.7	2,455,652.5	3,521,563.7	104,935.3	2,350,717.3	72,426,958.9	3,468.3	2,347,249.0
29	2035	78,616,558.7	2,668,036.0	3,636,991.4	115,427.7	2,552,608.4	74,979,567.3	3,468.3	2,549,140.1
30	2036	80,482,925.3	1,866,366.6	3,716,742.6	79,751.1	1,786,615.5	76,766,182.7	3,468.3	1,783,147.2
31	2037	82,980,696.9	2,497,771.6	3,821,678.5	104,935.9	2,392,835.7	79,159,018.4	3,468.3	2,389,367.4
32	2038	84,652,537.2	1,671,840.3	3,893,034.6	71,356.1	1,600,484.2	80,759,502.6	3,468.3	1,597,015.9
33	2039	87,309,605.0	2,657,067.7	4,006,366.0	113,331.4	2,543,736.3	83,303,239.0	3,468.3	2,540,268.0
34	2040	89,989,615.1	2,680,010.1	4,119,695.4	113,329.4	2,566,680.7	85,869,919.7	3,468.3	2,563,212.4
35	2041	93,313,536.5	3,323,921.4	4,258,211.2	138,515.7	3,185,405.6	89,055,325.3	3,468.3	3,181,937.3
36	2042	96,864,865.0	3,551,328.5	4,407,220.2	149,009.0	3,402,319.5	92,457,644.9	3,468.3	3,398,851.2
37	2043	98,728,318.9	1,863,453.9	4,486,971.8	79,751.6	1,783,702.3	94,241,347.1	3,468.3	1,780,234.0
38	2044	101,168,389.0	2,440,070.1	4,589,809.4	102,837.7	2,337,232.4	96,578,579.6	3,468.3	2,333,764.1
39	2045	103,632,686.0	2,464,297.0	4,696,842.9	107,033.5	2,357,263.4	98,935,843.0	3,468.3	2,353,795.1
40	2046	104,565,864.0	933,178.1	4,736,718.0	39,875.1	893,303.0	99,829,146.0	3,468.3	889,834.7
							92,737,534.2		92,594,775.0

With respect to greenhouse gas emissions due to post-deforestation activities in the leakage belt, burning of agricultural residues and nitrogen incorporation to agricultural and livestock areas and pastures were considered. GHG emissions due to forest biomass burning after felling have also been considered. The same considerations as in the development of the BL-UP Module of the methodology for the project area were employed. In the following charts, the calculations of GHG emissions within the Madre de Dios Amazon REDD Project leakage belt are presented.

Chart 58: Other GHG emissions due to residues burning and nitrogen incorporation

Area of post-deforestation classes established on deforested areas within the leakage area							Otros GEI anualizado		
ID >		009	010	011	012	annual	Incorporación de fertilizante nitrogenado (A. perenne y pastos)	Quema de Biomasa (Residuos agrícolas- Cultivo en limpio)	
Name >		Deforestacion x Pastos	Deforestacion x Agropecuaria	Deforestacion x Infraestructura	Deforestacion x Cultivo en Limpio		N20 (T/ha/año)	CH4 (T/ha/año)	N20 (T/ha/año)
% historic >		40%	54%	2%	4%				
Proje ct year t	Año	ABSLPA _{fcl,t} ha	ABSLPA _{fcl,t} ha	ABSLPA _{fcl,t} ha	ABSLPA _{fcl,t} ha	ABSLPA _t ha	0.00125	2.79E-02	7.25E-04
0	2006	7,714.6	10,414.7	385.7	771.5	19,286.4			
1	2007	9,821.9	13,259.6	491.1	982.2	24,554.8	28.85	27.45	0.71
2	2008	11,891.7	16,053.8	594.6	1,189.2	29,729.2	34.93	33.24	0.86
3	2009	13,208.8	17,831.8	660.4	1,320.9	33,021.9	38.80	36.92	0.96
4	2010	10,084.7	13,614.4	504.2	1,008.5	25,211.9	29.62	28.19	0.73
5	2011	17,837.4	24,080.5	891.9	1,783.7	44,593.6	52.40	49.85	1.29
6	2012	22,503.8	30,380.2	1,125.2	2,250.4	56,259.6	66.10	62.90	1.63
7	2013	24,761.8	33,428.5	1,238.1	2,476.2	61,904.6	72.74	69.21	1.79
8	2014	27,659.5	37,340.3	1,383.0	2,765.9	69,148.7	81.25	77.31	2.00
9	2015	29,428.2	39,728.0	1,471.4	2,942.8	73,570.4	86.45	82.25	2.13
10	2016	32,175.3	43,436.7	1,608.8	3,217.5	80,438.3	94.51	89.93	2.33
11	2017	33,793.5	45,621.2	1,689.7	3,379.3	84,483.7	99.27	94.45	2.45
12	2018	35,825.6	48,364.6	1,791.3	3,582.6	89,564.0	105.24	100.13	2.60
13	2019	37,895.4	51,158.7	1,894.8	3,789.5	94,738.4	111.32	105.92	2.75
14	2020	39,551.2	53,394.1	1,977.6	3,955.1	98,877.9	116.18	110.54	2.87
15	2021	41,282.2	55,731.0	2,064.1	4,128.2	103,205.6	121.27	115.38	2.99
16	2022	42,373.5	57,204.2	2,118.7	4,237.3	105,933.7	124.47	118.43	3.07
17	2023	43,502.4	58,728.2	2,175.1	4,350.2	108,756.0	127.79	121.59	3.15
18	2024	44,593.7	60,201.4	2,229.7	4,459.4	111,484.1	130.99	124.64	3.23
19	2025	46,211.8	62,386.0	2,310.6	4,621.2	115,529.5	135.75	129.16	3.35
20	2026	47,867.6	64,621.3	2,393.4	4,786.8	119,669.0	140.61	133.79	3.47
21	2027	50,163.2	67,720.3	2,508.2	5,016.3	125,407.9	147.35	140.20	3.63
22	2028	52,383.5	70,717.7	2,619.2	5,238.3	130,958.7	153.88	146.41	3.80
23	2029	54,039.2	72,953.0	2,702.0	5,403.9	135,098.1	158.74	151.04	3.92
24	2030	55,168.2	74,477.0	2,758.4	5,516.8	137,920.4	162.06	154.19	4.00
25	2031	56,936.9	76,864.8	2,846.8	5,693.7	142,342.2	167.25	159.13	4.13
26	2032	58,893.4	79,506.1	2,944.7	5,889.3	147,233.5	173.00	164.60	4.27
27	2033	61,264.2	82,706.7	3,063.2	6,126.4	153,160.5	179.96	171.23	4.44
28	2034	63,145.8	85,246.9	3,157.3	6,314.6	157,864.6	185.49	176.49	4.58
29	2035	65,215.6	88,041.0	3,260.8	6,521.6	163,039.0	191.57	182.27	4.73
30	2036	66,645.6	89,971.6	3,332.3	6,664.6	166,614.0	195.77	186.27	4.83
31	2037	68,527.2	92,511.8	3,426.4	6,852.7	171,318.1	201.30	191.53	4.97
32	2038	69,806.7	94,239.1	3,490.3	6,980.7	174,516.8	205.06	195.11	5.06
33	2039	71,838.9	96,982.5	3,591.9	7,183.9	179,597.3	211.03	200.79	5.21
34	2040	73,871.0	99,725.9	3,693.6	7,387.1	184,677.6	217.00	206.46	5.35
35	2041	76,354.8	103,079.0	3,817.7	7,635.5	190,887.0	224.29	213.41	5.53
36	2042	79,026.7	106,686.0	3,951.3	7,902.7	197,566.7	232.14	220.87	5.73
37	2043	80,456.7	108,616.6	4,022.8	8,045.7	201,141.8	236.34	224.87	5.83
38	2044	82,300.7	111,106.0	4,115.0	8,230.1	205,751.9	241.76	230.03	5.96
39	2045	84,220.0	113,697.0	4,211.0	8,422.0	210,549.9	247.40	235.39	6.10
40	2046	84,935.0	114,662.2	4,246.7	8,493.5	212,337.5	249.50	237.39	6.15
Emisiones totales al año 2046							249.50	237.39	6.15
Emisiones totales de CO2 equiv al año 2046							77,343.92	4,985.15	1,907.90

Chart 59: Other GHG emissions due to forest burning within the Madre de Dios Amazon REDD Project leakage belt

Proy ect year t	Tipo bosque	Biomasa seca T/ha	Emisión CH4										Emisión N2O																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
			Área quemada (ha)*Stock estrato (T biomasa seca/ha)*FC*FE(Kg/ T materia seca)*PGC/1000										Área quemada (ha)*Stock estrato (T biomasa seca/ha)*FC*FE(Kg/ T materia seca)*PGC/1000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
			Factor de Combusti ón FC Tabla 2.6 IPCC (*)	Factor de emisión FE Kg / T Materia seca Tabla 2.5 IPCC (**)	PGC	TOTAL T CO2 /año (en bosque primario)	TOTAL T CO2/año (en bosque secundario)	TOTAL T CO2/AÑO	Factor de Combusti ón FC Tabla 2.6 IPCC (*)	Factor de emisión FE Kg / T Materia seca Tabla 2.5 IPCC (**)	PGC	TOTAL T CO2 /AÑO (en bosque primario)	TOTAL T CO2/año (en bosque secundario)	TOTAL T CO2/AÑO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Año	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha	ha

As a result, the net emission due to deforestation within the Madre de Dios Amazon REDD Project leakage belt up to 2046 is 94'916,008.97 tCO₂e, accounting for emitted GHGs.

Chart 60: Total net CO₂ emissions (tCO₂) within the Madre de Dios Amazon REDD Project leakage belt

Total CO2e up to year 2046	Due to biomass burning				Nitrogen fertilizer incorporation in perennial agriculture activity and pastures	TOTAL CO2e
	Agricultural residues in areas of clean crops		From deforested forest			
	CH4	N2O	CH4	N2O		
	4,985.15	1,907.90	1,559,781.09	677,215.88	77,343.92	2,321,233.94
TOTAL NET CO2e UP TO YEAR 2046						94,916,008.97

Chart 61: Summary chart of accumulated annual emissions within the Madre de Dios Amazon REDD Project leakage belt

Año	Cambio del Stock de carbono en clases iniciales de bosque (T CO2)	Cambio del Stock de carbono en clases finales post-deforestación (T CO2)	Cambio total del Stock de Carbono en Línea base (TCO2)	Stock de carbono en productos aprovechados Cwp TCO2 (sawnwood)	TCO2 Netas	Fertilizante nitrogenado (Agropecuaria y pastos)	Quema de Biomasa (Residuos agrícolas- Cultivo en limpio)		Quema de Biomasa en bosque		Total de Emisión Neta (TCO2)
						N2O (T CO2 e)	CH4 (T CO2 e)	N2O (T CO2 e)	CH4 (T CO2 e)	N2O (TCO2e)	
2007	2,303,112.38	117,524.46	2,185,587.92	5,475.67	2,180,112.25	8,944.08	576.48	220.63	37,859.09	16,437.42	2,244,149.96
2008	4,785,835.57	232,952.81	4,552,882.76	8,887.24	4,543,995.52	10,828.86	697.97	267.12	78,128.40	33,921.30	4,667,839.17
2009	6,262,927.66	306,404.39	5,956,523.27	12,355.54	5,944,167.72	12,028.22	775.27	296.71	102,402.20	44,460.34	6,104,130.47
2010	9,026,630.92	132,182.30	8,894,448.62	17,900.34	8,876,548.29	9,183.42	591.91	226.53	146,609.96	63,654.18	9,096,814.30
2011	11,905,694.98	564,539.71	11,341,155.26	21,368.64	11,319,786.62	16,243.21	1,046.94	400.68	193,234.40	83,897.29	11,614,609.15
2012	17,573,505.68	824,778.72	16,748,726.96	24,836.94	16,723,890.02	20,492.55	1,320.83	505.50	284,642.63	123,584.34	17,154,435.87
2013	20,138,564.40	950,704.92	19,187,859.47	28,305.24	19,159,554.23	22,548.74	1,453.36	556.23	326,273.53	141,659.38	19,652,045.47
2014	23,705,622.53	1,112,303.92	22,593,318.61	31,773.54	22,561,545.07	25,187.43	1,623.44	621.32	383,650.08	166,570.76	23,139,198.09
2015	25,724,808.45	1,210,940.64	24,513,867.81	35,241.85	24,478,625.96	26,798.03	1,727.25	661.05	416,376.36	180,779.65	25,104,968.30
2016	28,823,596.99	1,364,145.63	27,459,451.36	38,710.15	27,420,741.22	29,299.65	1,888.49	722.75	466,870.53	202,702.89	28,122,225.53
2017	30,806,348.98	1,454,389.50	29,351,959.48	42,178.45	29,309,781.03	30,773.20	1,983.46	759.10	498,893.93	216,606.61	30,058,797.35
2018	33,432,798.06	1,567,717.29	31,865,080.77	45,646.75	31,819,434.02	32,623.68	2,102.74	804.75	540,736.09	234,773.37	32,630,474.65
2019	35,959,811.83	1,683,145.80	34,276,666.02	49,115.05	34,227,550.97	34,508.47	2,224.22	851.24	581,209.78	252,345.98	35,098,690.67
2020	38,109,076.74	1,775,487.10	36,333,589.64	52,583.35	36,281,006.28	36,016.27	2,321.40	888.44	615,737.00	267,336.79	37,203,306.20
2021	40,417,519.02	1,872,027.04	38,545,491.98	56,051.66	38,489,440.32	37,592.63	2,423.01	927.32	652,693.37	283,382.28	39,466,458.94
2022	41,836,974.36	1,932,883.50	39,904,090.86	59,519.96	39,844,570.91	38,586.33	2,487.05	951.84	675,309.35	293,201.54	40,855,107.02
2023	43,305,985.91	1,995,842.49	41,310,143.42	62,988.26	41,247,155.16	39,614.37	2,553.32	977.19	698,780.86	303,392.25	42,292,473.16
2024	44,600,496.78	2,056,700.75	42,543,796.03	66,456.56	42,477,339.47	40,608.09	2,617.37	1,001.71	719,834.90	312,533.36	43,553,934.89
2025	46,626,047.10	2,146,943.79	44,479,103.31	69,924.86	44,409,178.44	42,081.64	2,712.34	1,038.06	752,271.11	326,616.31	45,533,897.90
2026	48,766,523.15	2,239,285.26	46,527,237.89	73,393.16	46,453,844.73	43,589.44	2,809.53	1,075.25	786,540.23	341,495.06	47,629,354.23
2027	51,719,616.83	2,367,305.27	49,352,311.56	76,861.47	49,275,450.10	45,679.83	2,944.26	1,126.82	834,028.77	362,113.33	50,521,343.11
2028	54,545,078.02	2,491,128.94	52,053,949.08	80,329.77	51,973,619.31	47,701.69	3,074.58	1,176.69	879,283.97	381,761.95	53,286,618.19
2029	56,649,700.93	2,583,468.43	54,066,232.50	83,798.07	53,982,434.44	49,209.47	3,171.76	1,213.88	912,805.73	396,316.21	55,345,151.49
2030	58,109,723.77	2,646,428.24	55,463,295.53	87,266.37	55,376,029.16	50,237.51	3,238.02	1,239.24	936,180.57	406,464.95	56,773,389.46
2031	60,389,099.50	2,745,066.60	57,644,032.89	90,734.67	57,553,298.22	51,848.14	3,341.83	1,278.97	972,760.46	422,346.98	59,004,874.61
2032	62,876,770.46	2,854,179.62	60,022,590.84	94,202.97	59,928,387.86	53,629.80	3,456.67	1,322.92	1,012,801.75	439,731.85	61,439,330.86
2033	65,971,026.85	2,986,396.97	62,984,629.88	97,671.28	62,886,958.61	55,788.72	3,595.82	1,376.18	1,062,344.22	461,241.89	64,471,305.43
2034	68,426,679.39	3,091,332.23	65,335,347.16	101,139.58	65,234,207.58	57,502.17	3,706.26	1,418.45	1,101,469.27	478,228.96	66,876,532.68
2035	71,094,715.44	3,206,759.92	67,887,955.51	104,607.88	67,783,347.63	59,386.94	3,827.74	1,464.94	1,144,185.88	496,775.38	69,488,988.51
2036	72,961,082.00	3,286,511.04	69,674,570.97	108,076.18	69,566,494.79	60,689.16	3,911.68	1,497.06	1,174,183.05	509,799.36	71,316,575.10
2037	75,458,853.62	3,391,446.96	72,067,406.66	111,544.48	71,955,862.17	62,402.62	4,022.12	1,539.33	1,214,246.83	527,194.00	73,765,267.07
2038	77,130,693.95	3,462,803.08	73,667,890.87	115,012.78	73,552,878.09	63,567.76	4,097.21	1,568.07	1,240,968.95	538,796.04	75,401,876.13
2039	79,787,761.69	3,576,134.49	76,211,627.20	118,481.09	76,093,146.12	65,418.30	4,216.49	1,613.72	1,283,332.60	557,189.22	78,004,916.45
2040	82,467,771.83	3,689,463.93	78,778,307.90	121,949.39	78,656,358.51	67,268.81	4,335.76	1,659.37	1,326,511.05	575,936.17	80,632,069.68
2041	85,791,693.21	3,827,979.66	81,963,713.55	125,417.69	81,838,295.86	69,530.58	4,481.54	1,715.16	1,379,792.43	599,069.54	83,892,885.11
2042	89,343,021.73	3,976,988.64	85,366,033.10	128,885.99	85,237,147.10	71,963.69	4,638.37	1,775.18	1,436,457.07	623,671.84	87,375,653.24
2043	91,206,475.62	4,056,740.24	87,149,735.38	132,354.29	87,017,381.09	73,265.92	4,722.30	1,807.30	1,466,339.83	636,646.14	89,200,162.58
2044	93,646,545.72	4,159,577.91	89,486,967.81	135,822.59	89,351,145.21	74,945.11	4,830.53	1,848.72	1,505,421.34	653,614.31	91,591,805.23
2045	96,110,842.67	4,266,611.43	91,844,231.24	139,290.90	91,704,940.34	76,692.82	4,943.18	1,891.83	1,544,899.70	670,754.77	94,004,122.66
2046	97,044,020.73	4,306,486.50	92,737,534.23	142,759.20	92,594,775.03	77,343.92	4,985.15	1,907.90	1,559,781.09	677,215.88	94,916,008.97

PART 2: ESTIMATION OF THE PROPORTIONS OF AREA DEFORESTED BY IMMIGRANT AND LOCAL DEFORESTATION AGENTS IN THE BASELINE

There is only one community located within 2 km of the leakage belt and project area boundaries, the Belgium Native Community. Said Community has a total area of 53,378 hectares and is located in the Iñapari district, Tahuamanu province, Madre de Dios region. It belongs to the ethnolinguistic Yine group, of the Arawac linguistic family. The population of this community is Yine and according to the latest census, from June 2006, there are 70 community members of whom 37 are men and 33 women, distributed in 16 nuclear families.

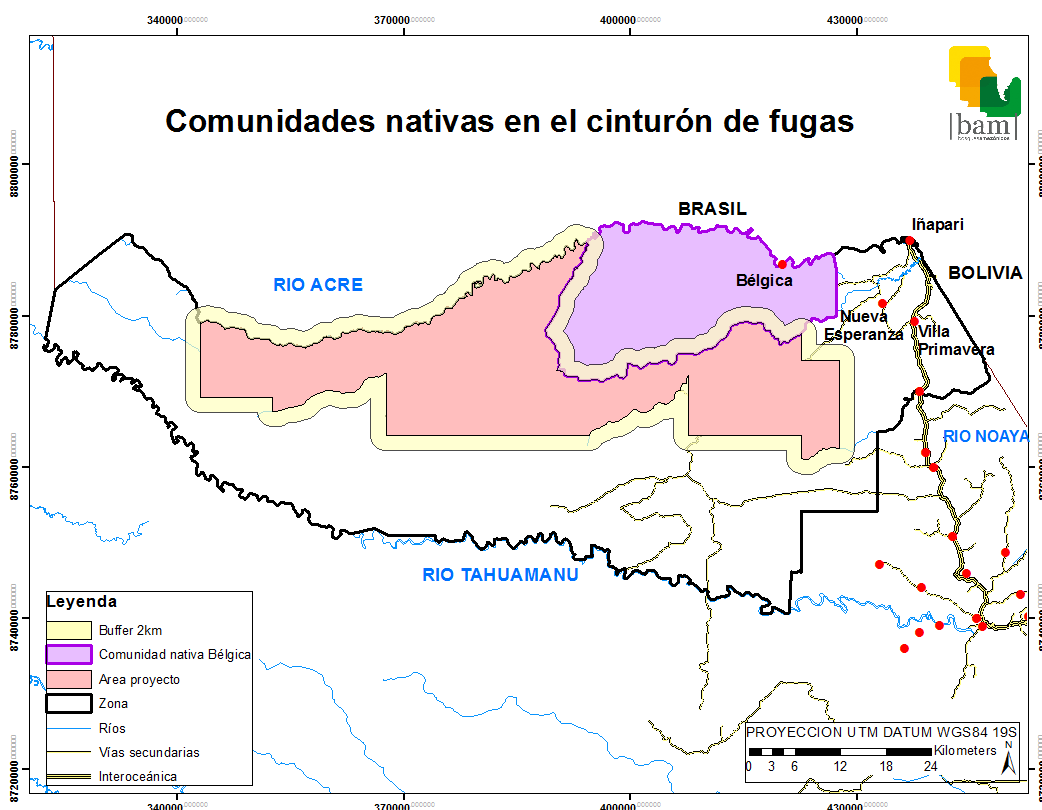


Fig. 70: The Belgium Native Community within the Madre de Dios Amazon REDD Project leakage belt

According to the Life Plan of the Belgium Native Community⁷⁶, a map including the future use of its resources has been determined. In this map, the community shows the areas identified for its activities, as part of its Land Management. Following, said areas identified for the development of its activities are presented:

⁷⁶ Taken from the Life Plan of the Belgium Native Community working paper. CESVI – July 2006. Indigenous Forestry Project: "Strengthening Sustainable Forest Management within the Indigenous People Territory in the Peruvian Amazon".

- Urban Growth Area: in Belgium stream, 1 km inward.
- Agriculture and Livestock Area: established at 1 km on both sides of the Iñapari's road, which enters the community's territory. It will be an agricultural area and pastures for cattle grazing.
- Refuge Area for future use of controlled hunting and exploitation of non-timber resources: this area will be limited to forestry operations, Shiringa stands will be reserved and non-timber products for handicrafts manufacture will be collected.
- Forest Area: from Alto Bélgica in straight line to the San Pablo stream (to the headwaters of the streams); thence in straight line to Yaveryja River.
- Fishing Area: in the streams and Branco and Acre Rivers, which determines areas for timber harvesting, agriculture and livestock and areas for animal refuge.

It should be mentioned that the Belgium Native Community has included, as part of its plans, to perform the adaptation of its Forest Management General Plan with the map of future use and to conduct an Exploratory Inventory, which summarizes the interest of the Community to make a sustainable use of the forest.

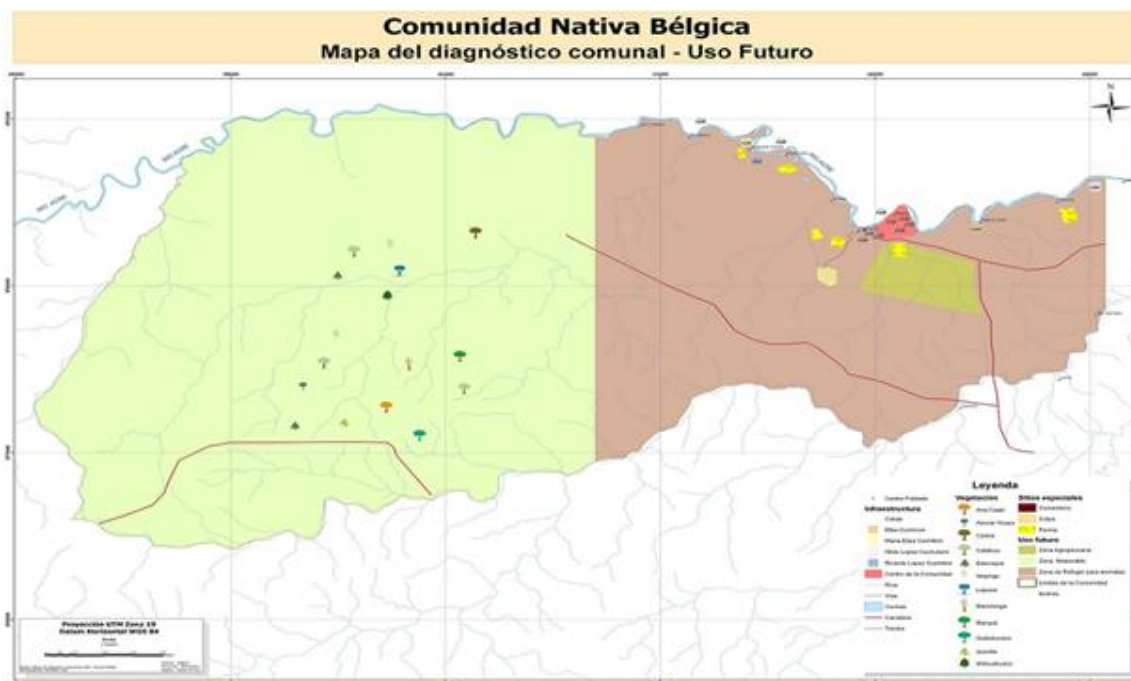


Fig. 71: Map of Community Diagnosis – Future Use

- **Migration in Iñapari**

An analysis of population growth of the Iñapari district was performed, district to which correspond the Madre de Dios Amazon REDD project area. According to the historical data of population growth, developed by the INEI⁷⁷, the urban population in the city of Iñapari has increased, from 1972 up to 2007, from 80 to 996 people, with an average annual rate of 7.4%, as shown in the chart below.

Chart 62: Urban growth in Iñapari

Census Year	Urban Population	Growth Average Rate	
		Intercensal Period (%)	Annual Mean 1972-2007(%)
1,972	80		7.47
1,981	230	12.45	
1,993	343	3.39	
2,007	996	7.91	

Preparation: IUPP

Source: INEI. Population Census.

The Urban Development Plan of the city of Iñapari includes a projection of urban growth for said city, taking into account the impact of the Interoceanic road on the population growth due to immigration purposes, in the short and medium-terms, according to the following assumptions:

- * In the short term (3 years), due to the influence of the construction of the Interoceanic road, it is estimated that the population growth rate will be similar to the last intercensal period, increased by 5 points, reaching an annual mean of 12.91%, slightly higher than the registered for the period 80-93.
- * In the medium term (8 years), due to the fact that the Interoceanic road will be in full operation, as well as the improvements in urban services and development expectations, a significant increase of the growth rate is expected since 2010, estimating an approximate increase of 50%; in this sense, for the second period a rate of 19.37% is proposed.

⁷⁷ Based on the Urban Development Plan of the City of Iñapari. Section II Urban Development Proposal. June 2008.

- * In the long term (14 years), it is assumed that since 2015 the growing trend will be stabilizing gradually, reaching an annual mean of 7.47%, equivalent to the historical average recorded.

Under the abovementioned assumptions, the projection of urban population for 2021 in the city of Iñapari is presented in the following chart, showing a total of 5,354 people.

Chart 63: Projection of urban population in Iñapari

Year	Population	
	Recorded	Projected
1972	80	
1981	230	
1993	343	
2007	996	996
2010		1434
2015		3475
2021		5354

Preparation: IUPP

Source: INEI

In relation to the total immigration within the Iñapari district, as shown in the previous chart, in the recent years 37% of the total population lived somewhere else 5 years ago.

Chart 64: Immigration of total population within the Iñapari district

Categories	Cases	%
Had not been born	143	11.10
Lived in this District 5 years ago	672	52.17
Lived in this District less than 5 years ago	473	36.72
Total	1,288	100.00

Source: INEI. National Census 2007.

Likewise, the following chart includes information about the activities developed by the immigrant and resident population according to 2007 Census. This chart shows that of 670 economically active persons working within the Iñapari district, 293 are engaged in crop-livestock activities, which require land-use change from forest to non-forest.

Chart 65: Activities developed by the residents of Iñapari district (Economically Active Population)

Activity	Population in Iñapari District			% of the Total		
	Lived in this district 5 years ago	Lived in this district less than 5 years ago	Total	Residents (%)	Immigrants (%)	Total (%)
Agric./livest., hunting and silviculture	175	118	293	48.75	37.94	43.73
Fishing	1	0	1	0.28	-	0.15
Manufacture industry	25	20	45	6.96	6.43	6.72
Electricity, gas and water supply	0	1	1	-	0.32	0.15
Construction	19	21	40	5.29	6.75	5.97
Sale, mant., rep. vehicles	4	4	8	1.11	1.29	1.19
Wholesale trade	2	3	5	0.56	0.96	0.75
Retail	37	27	64	10.31	8.68	9.55
Hotels and restaurants	22	22	44	6.13	7.07	6.57
Transp., storage and communic.	15	18	33	4.18	5.79	4.93
Financial intermediation	2	1	3	0.56	0.32	0.45
Real estate, businesses, rentals	2	8	10	0.56	2.57	1.49
Publ. adm., defense, social sec.	23	27	50	6.41	8.68	7.46
Education	11	13	24	3.06	4.18	3.58
Social services and health care	4	11	15	1.11	3.54	2.24
Other activ., com. serv., soc., pers.	8	7	15	2.23	2.25	2.24
Homes and domestic service	9	10	19	2.51	3.22	2.84
TOTAL	359	311	670	100	100	100

- Migration in Tahuamanu Province

As a reference and to get to know how the population is increasing and developing activities within the Tahuamanu Province, the data on population and immigration within the province in the last five years is presented. Information about the activities developed by immigrant and resident people within the Tahuamanu Province is also presented.

Chart 66: Immigration of total population within the Tahuamanu Province

Categories	Cases	%
Had not been born	1,037	9.65
Lived in this District 5 years ago	6,303	58.68
Lived in this District less than 5 years ago	3,402	31.67
Total	10,742	100.00

Chart 67: Activities developed by the residents of Tahuamanu Province (Economically Active Population)

Activity	Population in Tahuamanu Province			% of the Total		
	Lived in this district 5 years ago	Lived in this district less than 5 years ago	Total	Residents (%)	Immigrants (%)	Total (%)
Agric./livest., hunting and silviculture	1257	345	1602	41.59	13.70	28.91
Fishing	11	2	13	0.36	0.08	0.23
Mining and quarrying	129	212	341	4.27	8.42	6.15
Manufacture industry	123	143	266	4.07	5.68	4.80
Electricity, gas and water supply	6	5	11	0.20	0.20	0.20
Construction	539	1056	1595	17.84	41.92	28.79
Sale, mant., rep. vehicles	20	25	45	0.66	0.99	0.81
Wholesale trade	13	20	33	0.43	0.79	0.60
Retail	190	115	305	6.29	4.57	5.50
Hotels and restaurants	147	132	279	4.86	5.24	5.04
Transp., storage and communic.	131	128	259	4.33	5.08	4.67
Financial intermediation	3	7	10	0.10	0.28	0.18
Real estate, businesses, rentals	21	52	73	0.69	2.06	1.32
Publ. adm., defense, social sec.	112	101	213	3.71	4.01	3.84
Education	119	72	191	3.94	2.86	3.45
Social services and health care	62	29	91	2.05	1.15	1.64
Other activ., com. serv., soc., pers.	52	35	87	1.72	1.39	1.57
Homes and domestic service	27	20	47	0.89	0.79	0.85
Not specified econ. activity	60	20	80	1.99	0.79	1.44
TOTAL	3022	2519	5541	100	100	100

- **Estimation of the proportions of area deforested by immigrant and local deforestation agents**

Within the report: "Assessment of the Impacts of the Interoceanic Road Integrated to the Madre de Dios Region"⁷⁸, it is stated that the main deforestation agents in this area are settlers engaged mainly with the collection of dry fruits, timber extraction and hunting. In addition to this, it states that: "...today, the number of farms has increased, there is more deforestation on both sides of the road and the town is mainly devoted to monocultures and cattle grazing".

⁷⁸ Based on the report: "Assessment of the Impacts of the Interoceanic Road Integrated to the Madre de Dios Region", 2009. Lourdes Fernández Felipe-Morales.

The Belgium Native Community recorded a population of 70 community members in 2006 and its total territory consists of 53,348 hectares. Said Community is not considered a deforestation agent. According to the SIMAMAZONIA modeling, their forests are also threatened.

According to the studies and censuses carried out at a national level in Peru (2007), it can be inferred that deforestation within the Madre de Dios Amazon REDD project area and leakage belt will be given mainly by the population of the districts surrounding the project. The Iñapari district has been increasing since 1972, date on which there were only 80 urban residents. In 2007, the urban population recorded was 996 (twelve times higher) and its projection for 2021 is 5354 (5 times higher).

In relation to the information on the activities developed by the population, according to the 2007 Census information, the main activity within the Tahuamanu province as in the Iñapari district is agriculture, livestock and silvopasture. This activity is carried out by converting land-use from forest to non-forest.

Of the total Economically Active Population of the Iñapari district (670), 44% (293) is engaged in agriculture-livestock activities. In the last 5 years, 354 residents have been recorded, of whom 49% (174) have developed agriculture-livestock activities. For the same period, there are 311 people that have immigrated to the district, 38% (118) of those are also engaged in this activity.

Taking into account that the population increase is directly proportional to deforestation, it has been established that the deforestation rate caused by immigrants and residents will be equal to the percentages determined in the last census of people that are engaged in this activities.

As it can be seen in the following chart, of the total economically active population recorded within the Iñapari district (670), 270 are engaged in the agriculture-livestock activity, people to whom deforestation is attributed. Of said population, 175 correspond to residents and 118 to immigrants and therefore deforestation will be occurring 60% by residents and 40% by immigrants.

Chart 68: Activities developed by the Tahuamanu province residents (Economically Active Population)

	Residents (60%)	Immigrants (40%)
People causing deforestation (agriculture-livestock activity)	175	118
	293	
Total population of the Iñapari district	670	

PART 3: ESTIMATION OF UNPLANNED DEFORESTATION DISPLACED FROM THE PROJECT AREA TO THE LEAKAGE BELT

According to the VMD0010 LK-ASU Module of the REDD Methodology Modules, the estimated value of carbon stock changes and GHG emitted within the project area must be multiplied by a factor less than 1, which represents the deforestation rate that would be displaced to the leakage belt. For the case of the Madre de Dios Amazon REDD Project and according to the SIMAMAZONIA Model, 81,764.21 hectares will be deforested up to 2046 within the project area.

It is estimated that 60% of deforestation within the project area is caused by residents, with whom the Madre de Dios Amazon REDD Project plans to work, carry out surveillance and monitoring activities and training activities for the implementation of sustainable projects. The remaining 40% would be the deforestation caused by immigrant agents. It is established that 15% of the deforestation of the area could be displaced to the leakage belt area.

The total emissions estimated for the Madre de Dios Amazon REDD Project are of 42'172,873.48 tCO₂e, which multiplied by 0.15 (specific factor determined as the displacement to the leakage belt area) is equal to 6'325,931.02 tCO₂e of emissions due to deforestation displacement from the project area to the leakage belt. This should be verified during monitoring.

PART 4: ESTIMATION OF UNPLANNED DEFORESTATION DISPLACED FROM THE PROJECT AREA TO OUTSIDE THE LEAKAGE BELT

- a) The deforestation displacement from the project area to the leakage belt and in any case as an alternative, the displacement to outside of the leakage belt is estimated. This requires the definition of the total available national forest area (TOTFOR). The total national forest area should be reduced to just the area of forest within 5km of a road or river that is suitable for conversion to agriculture or raising livestock. The area of protected forests (PROTFOR) and the area of managed forests (MANFOR) may be excluded from the total forest area.

$$AVFOR = TOTFOR - PROTFOR - MANFOR$$

The national forest area has been considered taking into account that no information of the total area within 5km of a road or river is available. The TOTFOR of the Peruvian rainforest is 70'180,130.4 hectares (PROCLIM, 2000). The PROTFOR⁷⁹, considering the protected areas within the forest area, consists of 16'452,255.72 hectares. At a national level, the total area of managed forests is 9'000,000⁸⁰ hectares (7'500,000 hectares of timber concessions and 1'500,000 hectares of non-timber concessions: chestnut, shiringa, reforestation, wildlife, etc.).

$$AVFOR = 70'180,130.4 - (16'452,255.72 \text{ ha} + 9'000,000)$$

$$AVFOR = 44'727,874.7$$

- b) The area of forest in the Leakage Belt as a proportion of the total available national forest area is given by the following equation:

$$PROP_{LB} = LBFOR / AVFOR$$

LBFOR = total Leakage Belt area minus those areas of protected forests and/or areas of managed forests, which in the case of the Madre de Dios Amazon REDD Project consists of 3,509.12 hectares from the Alto Purús Reserved Zone and Purús National Park and 158,340 hectares from areas of managed forests (timber concessions).

$$PROP_{LB} = \frac{250,253.34 - (3,509.12 + 158,340)}{44'727,874.7}$$

$$PROP_{LB} = 92,166.5124 / 44'727,874$$

$$PROP_{LB} = 0.00206061$$

⁷⁹ National Protected Areas located within the Peruvian rainforest have been considered.

⁸⁰ Information provided by the Forestry Department of the Ministry of Agriculture.

- c) According to the VMD0010 LK-ASU Module of the REDD Methodology Modules, the stratification of the AVFOR per carbon stock must be carried out. In this sense, there are national-level studies of carbon stocks in different strata or forest types. However, said studies have not been homogenized to date. At a country level, work is being done. Thus, in order to perform this step, the average stock established for Peru in the Second Communication on Climate Change was taken into account, which is 380 tCO₂/ha, default value determined by the IPCC for Tropical Forests.

$$PROP_{CS} = C_{OLB} / C_{LB}$$

$$PROP_{CS} = 380 / 491.66 \text{ tCO}_2/\text{ha}$$

$$PROP_{CS} = 0.77288227$$

- d) Then, the $LK_{PROP} = PRO_{IMM} * (1 - PROP_{LB}) * PROP_{CS}$

$$LK_{PROP} = 0.40 * (1 - 0.00206061) * 0.77288227$$

$$LK_{PROP} = 0.30851587$$

$$\Delta C_{LK-ASU,OLB} = (\Delta C_{BSL,LK,unplanned} - \Delta C_{P,LB}) * LK_{PROP}$$

- e) Within the Leakage Belt, the difference of emissions between the net CO₂ changes in the baseline and the net CO₂ changes in the project would be given by the emissions due to the displacement of deforestation from the project area to the leakage belt. Said displacement could move to outside the leakage belt.

$$\Delta C_{LK-ASU,OLB} = (6'325,931.02) * 0.30851587$$

$$\Delta C_{LK-ASU,OLB} = 1'951,650.11 \text{ tCO}_2$$

PART 5: EMISSIONS FROM LEAKAGE PREVENTION ACTIVITIES

The following leakage prevention activities are considered in the framework of the Madre de Dios Amazon REDD Project:

- Training in Agroforestry and Silvopasture to residents of the Iñapari district and Belgium Native Community members. These training activities will not generate GHGs emissions, since they will be carried out with the same residents and a previously trained staff from the area. Thus, no transport of skilled people is needed.

- Training in sustainable alternative activities such as Ecotourism, Shiringa Management, Fish Farms, etc., that encourage the rational use of non-timber resources within the Madre de Dios Amazon REDD project zone.

PART 6: ESTIMATION OF TOTAL LEAKAGE DUE TO THE DISPLACEMENT OF UNPLANNED DEFORESTATION

$$\Delta C_{LK-AS,unplanned} = \Delta C_{LK-A\ SU-LB} + \Delta C_{LK-ASU-OLB} + GHG_{LK,E}$$

$$\Delta C_{LK-AS} = 6'325,931.02 + 1'951,650.11$$

$$\Delta C_{LK-AS} = 8'277,581.13\ tCO_2$$

3.4 Summary of GHG Emission Reductions and Removals

Chart 69: Net GHG emission reductions or removals of the Madre de Dios Amazon REDD Project

Years	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2007	1,692,020.85	0	332,105.42	1,359,915.43
2008	1,088,205.97	0	213,590.22	874,615.75
2009	1,345,980.66	0	264,185.56	1,081,795.10
2010	590,258.16	0	115,854.33	474,403.83
2011	1,734,169.93	0	340,378.33	1,393,791.60
2012	1,649,840.16	0	323,826.31	1,326,013.86
2013	1,065,064.34	0	209,048.04	856,016.30
2014	1,551,414.92	0	304,507.66	1,246,907.26
2015	1,505,826.05	0	295,559.59	1,210,266.45
2016	1,365,440.74	0	268,005.13	1,097,435.61
2017	877,341.13	0	172,202.22	705,138.91
2018	2,137,196.92	0	419,483.41	1,717,713.51
2019	1,492,653.51	0	292,974.12	1,199,679.39
2020	1,160,584.81	0	227,796.55	932,788.26
2021	1,239,071.13	0	243,201.64	995,869.49

Years	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
2022	2,738,083.96	0	537,423.95	2,200,660.01
2023	1,220,040.41	0	239,466.34	980,574.08
2024	2,003,796.08	0	393,299.85	1,610,496.23
2025	1,220,798.90	0	239,615.21	981,183.69
2026	969,113.60	0	190,215.08	778,898.52
2027	1,159,809.03	0	227,644.28	932,164.75
2028	718,503.44	0	141,025.97	577,477.46
2029	1,584,393.95	0	310,980.69	1,273,413.26
2030	772,313.95	0	151,587.76	620,726.19
2031	919,844.17	0	180,544.60	739,299.57
2032	435,277.06	0	85,435.04	349,842.02
2033	1,121,184.90	0	220,063.24	901,121.67
2034	631,731.19	0	123,994.54	507,736.65
2035	1,016,140.43	0	199,445.38	816,695.04
2036	386,353.15	0	75,832.38	310,520.77
2037	463,056.00	0	90,887.42	372,168.58
2038	387,128.93	0	75,984.65	311,144.28
2039	293,918.51	0	57,689.56	236,228.96
2040	844,724.92	0	165,800.39	678,924.52
2041	485,735.24	0	95,338.84	390,396.40
2042	638,401.27	0	125,303.73	513,097.54
2043	238,573.73	0	46,826.63	191,747.10
2044	286,721.86	0	56,277.01	230,444.84
2045	775,399.79	0	152,193.44	623,206.35
2046	366,759.74	0	71,986.64	294,773.10
Total	42,172,873.48	0	8,277,581.13	33,895,292.34

Taking into account the requirements of the LK-ASU Module of the REDD Methodology Modules, the column of Estimated Leakage Emissions of the previous chart consists of the sum of leakage emissions within and outside the leakage belt, being this sum the Estimated Total Leakage Emissions of the project.

In this sense, the following chart includes three different columns for leakage emissions, the first one corresponds to the leakage emissions within the leakage belt, the second presents the leakage emissions outside the leakage belt and the third is the sum of these two columns and corresponds to the Estimated Total Leakage Emissions of the Madre de Dios Amazon REDD Project.

Chart 70: Estimated leakage emissions of the Madre de Dios Amazon REDD Project

Years	Estimated leakage emissions within the leakage belt (x 0.15) (tCO ₂ e)	Estimated leakage emissions outside the leakage belt (x 0.31183941) (tCO ₂ e)	Estimated total leakage emissions (tCO ₂ e)
2007	253,803.13	78,302.29	332,105.42
2008	163,230.90	50,359.32	213,590.22
2009	201,897.10	62,288.46	264,185.56
2010	88,538.72	27,315.60	115,854.33
2011	260,125.49	80,252.84	340,378.33
2012	247,476.02	76,350.28	323,826.31
2013	159,759.65	49,288.39	209,048.04
2014	232,712.24	71,795.42	304,507.66
2015	225,873.91	69,685.68	295,559.59
2016	204,816.11	63,189.02	268,005.13
2017	131,601.17	40,601.05	172,202.22
2018	320,579.54	98,903.88	419,483.41
2019	223,898.03	69,076.09	292,974.12
2020	174,087.72	53,708.82	227,796.55
2021	185,860.67	57,340.97	243,201.64
2022	410,712.59	126,711.35	537,423.95
2023	183,006.06	56,460.27	239,466.34

Years	Estimated leakage emissions within the leakage belt (x 0.15) (tCO ₂ e)	Estimated leakage emissions outside the leakage belt (x 0.31183941) (tCO ₂ e)	Estimated total leakage emissions (tCO ₂ e)
2024	300,569.41	92,730.43	393,299.85
2025	183,119.83	56,495.38	239,615.21
2026	145,367.04	44,848.04	190,215.08
2027	173,971.35	53,672.92	227,644.28
2028	107,775.52	33,250.46	141,025.97
2029	237,659.09	73,321.60	310,980.69
2030	115,847.09	35,740.67	151,587.76
2031	137,976.63	42,567.98	180,544.60
2032	65,291.56	20,143.48	85,435.04
2033	168,177.74	51,885.50	220,063.24
2034	94,759.68	29,234.86	123,994.54
2035	152,421.06	47,024.32	199,445.38
2036	57,952.97	17,879.41	75,832.38
2037	69,458.40	21,429.02	90,887.42
2038	58,069.34	17,915.31	75,984.65
2039	44,087.78	13,601.78	57,689.56
2040	126,708.74	39,091.66	165,800.39
2041	72,860.29	22,478.55	95,338.84
2042	95,760.19	29,543.54	125,303.73
2043	35,786.06	11,040.57	46,826.63
2044	43,008.28	13,268.74	56,277.01
2045	116,309.97	35,883.47	152,193.44
2046	55,013.96	16,972.68	71,986.64
Total	6,325,931.02	1,951,650.11	8,277,581.13

4 MONITORING

4.1 Data and Parameters Available at Validation

Data Unit / Parameter:	Forest cover map – Strata within the project zone
Data unit:	Ha
Description:	Map showing the forest cover within the project zone at the crediting period starting date. It shows the location of Forest and Non-Forest areas. Those storage areas, water courses and deforested areas with different land-use types have been determined as Non-Forest areas.
Source of data:	Forest Map of the Ecological Economic Zoning - IIAP.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	The Ecological Economic Zoning is the official data of the Madre de Dios region, which was developed by the IIPA in 2009 and the regional government uses it as its official source.
Any comment:	

Data Unit / Parameter:	Forest cover map – Strata within the project area
Data unit:	Ha
Description:	Map showing the forest cover within the project area at the crediting period starting date. Those storage areas, water courses and areas used for infrastructure construction such as camping sites and paths have been determined as Non-Forest areas. To date, there were no deforested areas.
Source of data:	Forest Map of the Ecological Economic Zoning - IIAP.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	The Ecological Economic Zoning is the official data of the Madre de Dios region, which was developed by the IIPA in 2009 and the regional government uses it as its official source.
Any comment:	

Data Unit / Parameter:	Forest cover map – Strata within the leakage belt
Data unit:	Ha
Description:	Map showing the forest cover within the project leakage belt at the crediting period starting date. It shows the location of Forest and Non-Forest areas. Storage areas, water courses and deforested areas with different land-use types have been determined as Non-Forest areas.
Source of data:	Forest Map of the Ecological Economic Zoning – IIAP.
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	The Ecological Economic Zoning is the official data of the Madre de Dios region, which was developed by the IIPA in 2009 and the regional government uses it as its official source.
Any comment:	

Data Unit / Parameter:	Deforested areas within the project zone, according to SIMAMAZONIA.
Data unit:	Ha
Description:	Total deforested area during the reference period, according to SIMAMAZONIA.
Source of data:	SIMAMAZONIA deforestation model.
Value applied:	275379.84 ha
Justification of choice of data or description of measurement methods and procedures applied:	The prediction model for deforestation developed by SIMAMAZONIA was employed ⁸¹ . This model simulates deforestation within the Amazon basin including the main paved roads. The study establishes 47 sub-regions throughout the Amazon basin, four of which are located in Peru, one within the Madre de Dios region, covering an area of 84,861 km ² .
Any comment:	

⁸¹ <http://www.csr.ufmg.br/simamazonia/>

Data Unit / Parameter:	Carbon stocks in the carbon pools used for the baseline scenario: ABOVEGROUND
Data unit:	T CO ₂ e ha ⁻¹
Description:	Carbon stock in the different forest strata. Determined from the data collected in carbon inventories carried out within the leakage belt (Belgium Native Community) and tree biomass inventories carried out within the project area.
Source of data:	Dasometric parameters from trees and palms taken from the inventory plots.
Value applied:	Low hill forest with "paca": 407.46 Terrace forest with "paca": 402.03 Flooded forest with "paca": 406.2 Low hill forest: 404.27 Terrace forest: 530.28 Pacal: 487.48
Justification of choice of data or description of measurement methods and procedures applied:	Inventories have been carried out within the project area and its leakage belt. The DBH and height data recorded during the in-field work has been used. Plots have been determined within the different strata and the aboveground biomass was estimated based on the Chavé formula for trees and the Winrock formula for palms.
Any comment:	Values are calculated through allometric equations.

Data Unit / Parameter:	Carbon stocks in the carbon pools used for the baseline scenario: BELOWGROUND
Data unit:	T CO ₂ e ha ⁻¹
Description:	Carbon stock as roots. Determined from the data collected in carbon inventories carried out within the leakage belt (Belgium Native Community) and tree biomass inventories carried out within the project area.
Source of data:	Dasometric parameters from trees and palms taken from the inventory plots.
Value applied:	Low hill forest with "paca": 97.79 Terrace forest with "paca": 96.49 Flooded forest with "paca": 94.81 Low hill forest: 93.54 Terrace forest: 123.94 Pacal: 117

Justification of choice of data or description of measurement methods and procedures applied:	Once the aboveground biomass was determined based on the Chavé formula for trees and the Winrock formula for palms, a factor of 0.24 was used to determine the belowground biomass, according to the CP-AB Module of the VCS approved REDD Methodology Modules.
Any comment:	

Data Unit / Parameter:	Carbon stocks in the carbon pools used for the baseline scenario: UNDERSTORY
Data unit:	T CO ₂ e ha ⁻¹
Description:	Carbon stock at the understory level, under the form of trees of DBH < 10cm, shrubs and herbaceous.
Source of data:	Understory inventories carried out with the use of mini-plots of 1x1m within the leakage belt.
Value applied:	Low hill forest with "paca": 4.04 Terrace forest with "paca": 4.89 Flooded forest with "paca": 2.95 Low hill forest: 2.46 Terrace forest: 3.63 Pacal: 0.00
Justification of choice of data or description of measurement methods and procedures applied:	The woody stems of less than 10cm in diameter were collected and a herbaceous sampling, conducting the report of fresh weight and their respective wet sample (weighed and labeled). Then, in the laboratory, they were subjected to drying, quantifying the biomass on a dry basis for both herbaceous and woody biomass.
Any comment:	

Data Unit / Parameter:	Carbon stocks in the carbon pools used for the baseline scenario: LITTER
Data unit:	T CO ₂ e ha ⁻¹
Description:	Carbon stock under the form of litter.
Source of data:	Litter inventories carried out with the use of mini-plots of 1x1m within the leakage belt.
Value applied:	Low hill forest with "paca": 8.06 Terrace forest with "paca": 8.3 Flooded forest with "paca": 2.73 Low hill forest: 1.7

	Terrace forest: 5.04 Pacal: -----
Justification of choice of data or description of measurement methods and procedures applied:	All litter and dead twigs included in the mini-plots were weighed fresh and the weight of wet samples was also determined, which were then labeled (approx. 100 g.). Then, in the laboratory, samples were dried separately, quantifying the biomass on a dry basis for the minor necromass.
Any comment:	

Data Unit / Parameter:	Carbon stocks in the carbon pools used for the baseline scenario: MAJOR NECROMASS
Data unit:	T CO ₂ e ha ⁻¹
Description:	Carbon stock under the form of major necromass.
Source of data:	Necromass inventories carried out with the use of linear transects within the leakage belt.
Value applied:	Low hill forest with "paca": 4.21 Terrace forest with "paca": 1.8 Flooded forest with "paca": 2.73 Low hill forest: 1.7 Terrace forest: 5.04 Pacal: -----
Justification of choice of data or description of measurement methods and procedures applied:	It was evaluated through the use of linear transects in order to measure the dead wood in the soil. The diameter of each piece of dead wood that crosses the line was measured. The weight of the wet samples was determined (approx. 100 g.). Then, in the laboratory, the samples were dried separately, quantifying the mass on a dry basis for the major necromass.
Any comment:	

Data Unit / Parameter:	Carbon stocks in wood products
Data unit:	T CO2 e
Description:	It estimates the carbon stock in the harvested wood products within the project area.

Source of data:	The carbon stock used was determined according to the C-AP Module of the VCS approved REDD Methodology Modules. The wood volumes are taken from the roundwood harvesting reports.
Value applied:	Year 2007: 3421.06 Year 2008: 2131.47 Year 2009: 0.00 Year 2010: 3464.25
Justification of choice of data or description of measurement methods and procedures applied:	Calculation of biomass and carbon from harvested wood volumes for each harvest year within the project area.
Any comment:	

Data Unit / Parameter:	Land use change (% determined for the baseline)
Data unit:	%
Description:	Estimates the proportion of areas within the project zone that have been affected by the land use change to different types of non-forest cover.
Source of data:	Land use monitoring between Puerto Maldonado and Iñapari, correspondent to the segment 3: Interoceanic road for the years 1990, 2000 and 2005. October 2007. CDC, UNALM, Frankfurt Zoological Society, INRENA, 2007.
Value applied:	40% deforestation due to pastures 54% agriculture and livestock 4% clean cultivation 2% infrastructure
Justification of choice of data or description of measurement methods and procedures applied:	The study area includes the project area. In this sense, the trend of the assessed land use change corresponds to the project area. The percentages used are for the year 2005, according to the study.
Any comment:	

Data Unit / Parameter:	Emissions due to biomass burning (agriculture and forest)
Data unit:	T CO2 e

Description:	In the case of biomass burning, the emissions of CH4 and N2O were estimated. Factors included in charts 2.6 and 2.5 of the E-BB Module of the VCS approved REDD Methodology Modules for tropical forests were used. In the case of agricultural biomass burning, the combustion factor included in chart 2.6. of the E-BB Module was used. The percentage of deforested areas that have been burned is 50%, estimated according to expert consultation ⁸² and the Peruvian GHG inventory.
Source of data:	The source of the combustion factors used were taken from the previously mentioned charts of the E-BB Module of the VCS approved REDD Methodology Modules and according to expert consultations and the Peruvian GHG inventory.
Value applied:	Combustion factor of the Chart 2.6 IPCC: 0.8 (maize crop was used as reference). Emission factor of the Chart 2.5. IPCC: 2.7 for CH4 and 0.07 for N2O.
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

⁸² Ing. Erasmo Otárola, Ing. Carlos Ortiz.

Data Unit / Parameter:	Emissions due to nitrogen incorporation
Data unit:	T CO2 e
Description:	In the case of nitrogen incorporation, the emission of N2O was estimated.
Source of data:	The source of data used for nitrogen incorporation was the records of INIA ⁸³ .
Value applied:	100 kg/ha/año Nitrogen fraction of the emissions: 0,0125
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

4.2 Data and Parameters Monitored

Data Unit / Parameter:	Forest cover map – Strata within the project area
Data unit:	Ha
Description:	Map showing the forest cover within the project area at the crediting period starting date. It shows the location of Forest and Non-Forest areas. It should show if there are deforested areas within the project area.
Source of data:	Satellite images in combination with GPS data collected in the field.
Description of measurement methods and procedures to be applied:	It will be determined whether there are variations in the forest strata identified within the project area through the analysis of satellite images. In the case that there are deforested areas, this will be verified in the field and the deforested area will be determined using the GPS.
Frequency of monitoring/recording:	Every 5 years
Value applied:	The same as in the cover map at the beginning of the project. No deforestation is estimated within the project area.
Monitoring equipment:	GIS Software, available satellite images, GPS
QA/QC procedures to be applied:	Permanent interrelation between the in-field team and the GIS area for the planning of the

⁸³ http://www.inia.gob.pe/webinia/tecnologia/CRIANZAS/PASTOS/2001/11_Manejo_Brachiaria/Manejo_Brachiaria.htm

	verification work. Field contrast with GPS of all the points identified as potentially deforested areas.
Calculation method:	Calculation of areas with GIS Software from GPS data.
Any comment:	The same stratification suggested at the beginning of the project will continue to be used.

Data Unit / Parameter:	Forest cover map – Strata within the leakage belt
Data unit:	Ha
Description:	Map showing the forest cover and its different strata within the project leakage belt at the beginning of each monitoring period. It should show if there are deforested areas. The “non-forest” areas correspond to deforested areas with a different land cover depending on the type of land use.
Source of data:	Satellite images in combination with GPS data collected in the field.
Description of measurement methods and procedures to be applied:	Through the analysis of satellite images it will be determined whether there are variations in the forest strata identified within the project leakage belt. In the case that there are potentially deforested areas, this will be verified in the field with GPS. This verification could only be carried out in those sites where the access is allowed by the landowners.
Frequency of monitoring/recording:	Every 5 years
Value applied:	
Monitoring equipment:	GIS Software, available satellite images and GPS
QA/QC procedures to be applied:	Permanent interrelation between the in-field team and the GIS area for the planning of the verification works. Field contrast with GPS of all the points identified such as potentially deforested areas.
Calculation method:	Calculation of areas with GIS Software from the satellite images interpretation.
Any comment:	The same stratification suggested at the beginning of the project will continue to be used.

Data Unit / Parameter:	Results of the Participatory Rural Appraisal (PRA)
Data unit:	
Description:	Participatory rural appraisal for the identification of the potential of degradation within the project area.
Source of data:	PRA
Description of measurement methods and procedures to be applied:	The PRA will be conducted through interviews and/or surveys applied to local actors, aiming at identifying the existence of degradation potential within the project area due to: • Firewood extraction • Coal production • Illegal logging If the result indicates that the degradation potential is low, then it is assumed that $\Delta_{Cp,Deg,i,t} = 0$.

Description of measurement methods and procedures to be applied (cont.):	If $\geq 10\%$ of the surveys indicate that there is a risk of degradation, then the verification procedures must be implemented to estimate the degradation. An additional outcome of the PRA will be the “penetration distance” that should be used for the calculation of the area of potential degradation (buffer area).
Frequency of monitoring/recording:	Every 2 years
Value applied:	The degradation is considered as “0” at the beginning of the project
Monitoring equipment:	Surveys such as interview and/or questionnaire type.
QA/QC procedures to be applied:	The procedures will be conducted by the Social Area of the project, which should be trained in the processes of data collection, data analysis and interpretation. The formats for the development of interviews and/or surveys will be validated.
Calculation method:	
Any comment:	To date, it is assumed that the emissions due to degradation are = 0, because the protection systems are still efficient taking into account the current pressure level on the project area.

Data Unit / Parameter:	Degradation results
Data unit:	
Description:	Checks if degradation processes have occurred within the project area.
Source of data:	In-field measurements
Description of measurement methods and procedures to be applied:	If the PRA indicates that there is potential for degradation, then the procedures for verifying its occurrence must be run. In this sense, sample transects that cross the buffer area are distributed in order to identify whether there are new stumps. These transects should cover an area not lesser than 1% of the entire buffer area.
Frequency of monitoring/recording:	Every time the results of the PRA indicate that there is potential for degradation within the project area.
Value applied:	0
Monitoring equipment:	Garmin Map 60 CSx GPS Receptor or a superior one, compass and metric tapes.
QA/QC procedures to be applied:	Training staff on the necessary procedures for the estimation of degradation.
Calculation method:	
Any comment:	To date, it is assumed that the emissions due to degradation are = 0, because the protection systems are still efficient taking into account the current pressure level on the project area.

Data Unit / Parameter:	Burned area
Data unit:	Ha
Description:	Burned area within the project area
Source of data:	Fire Alerts and FIRMS reports in combination with GPS data collected in the field. If the burning occurrence is verified in the field, the burned area will be measured with GPS.
Description of measurement methods and procedures to be applied:	If a burning is recorded, the type of affected forest will be identified as well as the burned area so as to determine the GHG emissions (CH ₄ and N ₂ O).
Frequency of monitoring/recording:	Every 5 years or every time this type of event

	occurs.
Value applied:	
Monitoring equipment:	Fire Alerts ⁸⁴ and FIRMS ⁸⁵ reports. Satellite images, Garmin Map 60 CSx GPS or a superior one.
QA/QC procedures to be applied:	In addition to the patrolling actions throughout the area for the determination of burning events, the GIS Area of the project will report potential burning points using Fire Alerts and FIRMS reports to survey the field.
Calculation method:	The coordinates of the vertexes of the affected area are collected and the area is defined through the GIS.
Any comment:	
Data Unit / Parameter:	Deforested area within the project area
Data unit:	Ha
Description:	Deforested area within the project area at the beginning of each monitoring period.
Source of data:	Satellite images in combination with GPS data collected from the field.
Description of measurement methods and procedures to be applied:	Satellite images interpretation.
Frequency of monitoring/recording:	Every 5 years
Value applied:	According to the deforestation modeling in the baseline case. For the scenario with the implementation of the REDD project it has been considered "0".
Monitoring equipment:	GIS Software, satellite images, Garmin Map 60 CSx GPS or a superior one.
QA/QC procedures to be applied:	In-field corroboration by the technical team using GPS.
Calculation method:	The coordinates of the vertexes of the affected area are collected and the area is defined through the GIS.
Any comment:	

⁸⁴ <https://firealerts.conservation.org/fas/setLocale.do?siteLanguageID=3>
⁸⁵ <http://firefly.geog.umd.edu/download/request?source=>

Data Unit / Parameter:	Deforested area within the leakage belt
Data unit:	Ha
Description:	Deforested area within the leakage belt of the project at the beginning of each monitoring period.
Source of data:	Satellite images in combination with GPS data collected from the field.
Description of measurement methods and procedures to be applied:	Satellite images interpretation.
Frequency of monitoring/recording:	Every 5 years
Value applied:	According to the deforestation model.
Monitoring equipment:	GIS Software, satellite images, Garmin Map 60 CSx GPS or a superior one.
QA/QC procedures to be applied:	In-field corroboration by the technical team using GPS. This verification could only be carried out in those sites where the access is allowed by the landowners.
Calculation method:	Coordinates of the vertexes of the affected area are obtained and the area is defined with the GIS.
Any comment:	

Data Unit / Parameter:	Potentially degraded area within the project area
Data unit:	Ha
Description:	Area potentially affected by degradation processes within the project area.
Source of data:	GIS delimitation with in-field verification.
Description of measurement methods and procedures to be applied:	The potentially degraded area will be defined by a Buffer Area with a length equal to the "penetration distance" (distance that the degradation agents can enter from the nearest access points) and a width equal to its length. An area is established in each access point.
Frequency of monitoring/recording:	It must be conducted every time the PRA identifies a degradation potential.
Value applied:	The degradation within the project area has been considered = 0.
Monitoring equipment:	GIS Software.
QA/QC procedures to be applied:	Staff trained on in-field measurement.
Calculation method:	
Any comment:	

Data Unit / Parameter:	Degraded area within the project area
Data unit:	Hectares
Description:	Area affected by degradation processes within the project area at the beginning of each monitoring period and verified by sample plots.
Source of data:	In-field measurements.
Description of measurement methods and procedures to be applied:	Assessment of the buffer area defined from the result of the PRA with the use of sample plots systematically distributed in order to cover at least 3% of said area.
Frequency of monitoring/recording:	Every time a degradation event occurs or at least every 5 years. It will depend on whether there is degradation within the project area.
Value applied:	The degradation within the project area has been determined as 0 (ex-ante).

Monitoring equipment:	GIS Software, Garmin Map 60 CSx GPS or a superior one, compasses and metric tapes.
QA/QC procedures to be applied:	Training staff on the necessary procedures to estimate degradation.
Calculation method:	
Any comment:	No degraded areas nor plots have been ex-ante determined within the project area.

Data Unit / Parameter:	Carbon stock lost due to degradation
Data unit:	T CO2 e
Description:	Carbon biomass lost by logging activities due to degradation processes within the project area.
Source of data:	In field measurements.
Description of measurement methods and procedures to be applied:	With the stumps identified during the assessment of the sample plots of the buffer area, this procedures should be followed: Measure the diameter of the stumps, which will be assumed as their DBH. If they were very large (e.g. due to buttresses), then the species of the stump is identified and standing trees of the same species are located. Afterwards, their DBH and stump diameter are measured and a ratio between DBH/stump

	diameter is calculated. With this ratio, the DBH from the stump diameter of the cleared individuals found is estimated. - With the DBH data, the carbon stock of the cleared individuals is calculated through an allometric equation to be defined. - It will be assumed that all the carbon stock will be emitted to the atmosphere.
Frequency of monitoring/recording:	Every time a degradation event occurs or at least every 5 years. It will depend on whether there is degradation within the project area.
Value applied:	The degradation within the project area has been determined as 0 (ex-ante).
Monitoring equipment:	Metric tapes, diametric tapes, compass, Map 60 CSx GPS receptor or a superior one.
QA/QC procedures to be applied:	Training staff on the necessary procedures to estimate degradation.
Calculation method:	
Any comment:	To date, it is assumed that the emissions due to degradation are = 0, because the protection systems are still efficient taking into account the current pressure level on the project area.

Data Unit / Parameter:	Emissions due to biomass burning
Data unit:	T CO ₂ e
Description:	Quantification of GHG emissions due to biomass burning (CH ₄ and N ₂ O).
Source of data:	Calculation of burned areas.
Description of measurement methods and procedures to be applied:	From the calculation of burned areas, the amount of GHG emissions is estimated.
Frequency of monitoring/recording:	Every time an event occurs or at least every 5 years. It will depend on whether there are burnings within the project area.
Value applied:	The ex-ante determination of emissions due to biomass burning within the project area has been determined as 0.
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	For CH ₄ : Burned area (ha) x Stratum stock (T dry biomass / ha) x FC x FE (kg / T dry mass) x PCG/1000

	For N ₂ O: Burned area (ha) x Stratum stock (T dry biomass / ha) x FC x FE (kg / T dry mass) x PCG/1000
Any comment:	

Data Unit / Parameter:	Emissions due to nitrogen incorporation (if deforestation and use of fertilizers in the new land uses occurs)
Data unit:	T CO ₂ e
Description:	Quantification of N ₂ O emissions ⁸⁶ .
Source of data:	Fertilizer employed.
Description of measurement methods and procedures to be applied:	Control of the amount of fertilizer employed.
Frequency of monitoring/recording:	Every time an event occurs or at least every 5 years. It will depend on whether there is employment of fertilizers within the project area.
Value applied:	The ex-ante determination of emissions due to nitrogen incorporation within the project area has been determined as 0.
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	For the calculation the factor 0.0125 is used.
Any comment:	

Data Unit / Parameter:	Carbon stock in wood products
Data unit:	T CO ₂ e
Description:	Estimates the carbon stock in harvested wood products within the project area.
Source of data:	The wood volumes are taken from the roundwood harvesting reports according to the extraction balances from the forestry authority.
Description of measurement methods and procedures to be applied:	Biomass calculation from the volumes of timber harvested within the project area in each harvest year.
Frequency of monitoring/recording:	Every 5 years
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	

⁸⁶ http://www.inia.gob.pe/webinia/tecnologia/CRIANZAS/PASTOS/2001/11_Manejo_Brachiaria/Manejo_Brachiaria.htm

Calculation method:	
Any comment:	

4.3 Description of the Monitoring Plan

The Madre de Dios Amazon REDD Project involves two adjacent timber concessions, included within the “Permanent Production Forest” of the Madre de Dios region. It has a total official area of 98,927.38⁸⁷ hectares covered by natural tropical forests with the presence of “Paca” (native bamboo). This type of forest is characterized by a great diversity of flora and fauna of Amazonian species. The physiographic type corresponds mainly to “Low Hills”.

Although the management of the area for the production of forest products, mainly wood under an FSC scheme, is in charge of the two forest concessions, both constitute a single unit for the implementation of the Madre de Dios Amazon REDD Project. In this sense, the implementation of the activities related to the monitoring component of the project is performed by a single technical team.

The main goal of this Monitoring Plan is the collection of the data that allow the validation of the deforestation modeling and the degradation within the project area and its leakage belt throughout time, regularly updating the emissions estimations as well as the generation of sufficient and timely information to make the necessary adjustments to the model included in the VCS Madre de Dios Amazon REDD Project PD Template.

The Monitoring Plan is focused in the following two main components:

1. Monitoring of the Madre de Dios Amazon REDD Project objectives.
 - a) OUTCOME 1: Contribute to the sustainable development of rural producers living in the buffer zone of the project.
 - b) OUTCOME 2: Reduce the vulnerability of the project area from external factors of deforestation and degradation.

This component will be conducted through the assessment of compliance with the activities proposed for each objective.

⁸⁷ * Total number of hectares stratified by the IIAP for the Ecological Economic Zoning, which was based on the Forest Map of the National Geographic Institute (IGN) and which has available shapes. This data was employed in the development of all the maps required by the applied methodology. The area according to CIEF – Peru Digital (98,932 has), which was employed for the concession contracts and therefore in the FSC Certificates, the FMP and the PDD submitted to the CCBA does not have available shapes. If the images are compared, it can be appreciated that in the upper part there is no perfect overlap between the two profiles.

2. Monitoring of the parameters described in the item 4.2. of this Monitoring Plan (Data and Parameters Monitored):

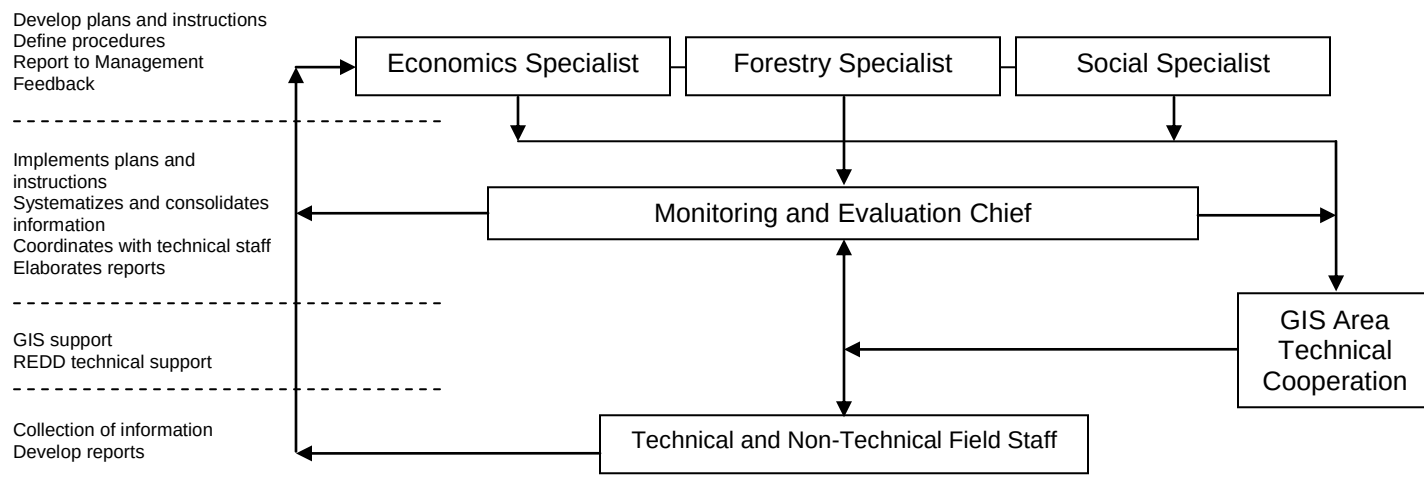
- a) Forest cover map – Strata within the project area
- b) Forest cover map – Strata within the project leakage belt
- c) Results of the PRA
- d) Degradation results
- e) Burned area
- f) Deforested area within the project area
- g) Deforested area within the project leakage belt
- h) Potentially degraded area within the project area
- i) Degraded area within the project area
- j) Carbon stock loss due to degradation
- k) Emissions due to biomass burning (if deforestation within the project area occurs – land use change to agriculture and burning of the forest)
- l) Emissions due to nitrogen incorporation (if deforestation and fertilizer are employed in the new land uses).
- m) Carbon stock in wood products

ORGANIZATIONAL STRUCTURE

The Madre de Dios Amazon REDD Project counts with a skilled and experienced technical team for its implementation and its monitoring component. In addition to this, it also counts with the technical advice of Greenoxx NGO, AIDER NGO and Bosques Amazónicos SAC (BAM), all of them experienced institutions in the development of conservation and sustainable use of resources projects and projects involving the use of environmental services such as REDD Projects.

The development of the Monitoring Plan is in charge of a multidisciplinary team, led by an Economist, a Forestry Specialist and a Social Specialist, allowing the integral address of the different components of the plan. Its implementation is responsibility of the Monitoring and Evaluation Chief, who must articulate it with the technical and non-technical field staff, the same that carry out the in-field measurements and the corroboration of the laboratory information. There is also a GIS Area for mapping support. Additionally, AIDER and BAM NGOs provide their support for the development of the modeling and specialized items that are required for the monitoring of the project.

Following, the information flow of the monitoring system is detailed:



INFORMATION MANAGEMENT: DATA COLLECTION, PROCESSING AND REPORT

Forms have been defined for the collection of the field data that is currently within the concessions processes and forms will be defined for those variables to be monitored. The collected data will be systematically digitalized in Excel type spreadsheets, also designed according to the information requirements. The calculations will be made in said spreadsheets using the correspondent formulas and afterwards the necessary reports are delivered as the basis for the elaboration of the consolidated Monitoring Report.

All the field monitoring processes should be documented, all the established sample units or plots should be georeferenced and systematized within the GIS.

The physical and digital files which store the data generated during the monitoring process will be accessible in the two modalities described before (physical files and digital files), being kept in the project offices in the locality of Iñapari and in Maderacre's central office in Lima, Perú throughout the Madre de Dios Amazon REDD Project duration and for at least two years after the end of the project crediting period.

The information management comprises the following steps or processes:

Step 1: Selection and Analysis of the Source of Land Use Change

1.1. For the monitoring period of 5 years the following actions will be carried out:

- The collected and analyzed data should cover the entire project area and leakage belt. Available data for the year when verification occurs.
- For the calculation of each category of land use change:
 - The area of each category within the project area will be calculated and where required within the leakage belt.
 - The forest cover maps of reference for the project area and leakage belt will be updated.
 - The remaining forest area within the project zone will be updated.

1.2. For the monitoring period of 10 years. Baseline review:

- Use of high resolution images (30 m x 30 m or less, if available) at the end of the period where the baseline will be reviewed.
- The collected and analyzed data should cover:
 - The entire reference region: available data for the year of baseline renewal or not less than a year earlier.
 - For the processing of the data change for the Great Land Use Capacity (in spanish Capacidad de Uso Mayor de las Tierras), will be georeferenced and geometrical corrections will be made as well as clouds and shadows detections.
- The area of each category within the reference region, project area and where required within the leakage belt will be calculated.
- The forest cover maps of reference for the reference area, project area and leakage belt will be updated.
- The total deforested areas during the first 10 years will be estimated in order to adjust the baseline and the deforestation rate if necessary.

Note: The indications of the correspondent Module of the REDD Methodology Modules will be taken into account with respect to clouds for the determination of maps. A classification accuracy of 90% or more will be sought.

Step 2: Interpretation and Analysis

2.1. Monitoring of Deforestation

a) Deforested area within the Project Area (PA) per stratum.

b) Deforested area within the Leakage Belt (LB) per stratum.

In both cases it must be specified to what type of Land Use (LU) the deforested areas have been changed. For the baseline re-calculation it should be established or indicated if the percentages of land use change are still the same as in the initial baseline.

c) Carbon stock in carbon pools:

- Carbon stock in each stratum defined in the baseline is maintained. It will be reassessed for the baseline review (in 10 years).
- Carbon stock of each land use is maintained. It will be reassessed for the baseline review (in 10 years).

d) Volume of timber harvested in each concession, per stratum and per year.

e) Deforested area within the Reference Region (for the baseline review).

2.2. Monitoring of Degradation

The Madre de Dios Amazon REDD Project counts with a Custody System in the process of implementation (control posts, defined boundaries, regular patrolling, etc.). In this sense, it is expected that there will be no degradation by wood extraction due to illegal logging or firewood or coal production. If this occurs within the concessions, this degradation will be discounted.

A Participatory Rural Appraisal (PRA) will be conducted in order to determine whether degradation occurs. In this sense, these steps will be followed:

1. Degradation due to illegal logging:

- a) The PRA will be conducted every 2 years. If the results indicate that the project area has no pressure from this type of degradation, then it will be assumed that:
- $$\Delta C_{p,Deg,i,t} = 0.$$

- b) If the results of the PRA indicate that there is potential for degradation, then it must:
- Obtain a “penetration distance” in the PRA (distance that the degradation agents can enter from the nearest access points).
 - Identify the most important access points to the vulnerable area.
 - From said points, draw the distances and create a Buffer Area with a width equal to length.
 - Transects will be established to evaluate the buffer zone. The assessed area should not be lesser than 1% of the buffer area.
 - If stumps are not found (harvested trees), then it is assumed that $\Delta C_{p,Deg,i,t} = 0$ and the assessment is repeated every 2 years.
 - If stumps are found, then a systematic assessment is carried out. For this, plots are distributed systematically, being the area to assess $\geq 3\%$ of the buffer area.
 - Take into account the diameter of the stumps, which will be assumed as their DBH. If they were very large (e.g. due to buttresses), then the species of the stump is identified and standing trees of the same species are located. Afterwards, their DBH and stump diameter are measured and a ratio between DBH/stump diameter is calculated. With this ratio, the DBH from the stump diameter of the cleared individuals that were found is estimated.
 - With the DBH data, the carbon stock of the harvested trees is calculated, using the allometric equation that was employed for the estimation of the tree carbon stocks in the baseline (Chavé Equation).
 - It will be assumed that all stock will be lost to the atmosphere.
 - This assessment must be repeated every 5 years.

2. Degradation due to fire:

- a) Burned areas must be measured in the field using GPS.
- b) In order to calculate the emissions from this, the E-BB Module of the approved VCS REDD Methodology Modules shall be followed.

2.3. Monitoring of areas of increased carbon stocks

The increase in carbon stocks is assumed to be zero, thus it does not require monitoring.

2.4. Monitoring of project emissions

The non-CO2 GHG emissions will be calculated:

- a) N2O and CH4 from the burning of agricultural and forest biomass. It is carried out in those areas of land where use change occurred. For the ex-ante calculations of the biomass burned within the forest, it was estimated (through expert consultation) that 50% of the deforested forest was burned. In the case that deforestation within the project area occurs, a new percentage will be established (based on real measurements that will be made or literature support). It will be indicated what was done for the baseline recalculation (every 10 years).
- b) N2O emissions due to the use of fertilizer within deforested areas. In the case that deforestation and N2O use occur during the project lifetime, the amount of nitrogen fertilizer used per deforested hectare shall be determined.

SATELLITE IMAGES ANALYSIS AND INTERPRETATION:

The deforestation and the source of land use change analysis should be conducted through the use of satellite images and in-field verifications. The procedures that will be considered are the following:

1. Selection of satellite images:

Landsat type satellite images are used.

The Path-Row needed to cover the entire project zone area is identified.

The monitoring reports must detail the relationship between the acquired images and the use of an "Images Acquisition Form" that includes the following information: Path, Row, Date, Year, Source and Code.

Images with a cloud cover surpassing 10% of the entire area of the image must not be used, this to ensure the proper analysis of it.

2. Processing of satellite images processing:

For the processing of the selected satellite images Software ENVI 4.7.1® and ArcGis 9.3.1® type will be used.

The processing of satellite images should include the following steps:

a) Geometric Correction

This process is applied to transform images by eliminating geometrical distortions from the sensor, which means that they must be orthorectified. In this sense, 20 points of control were taken into account with a mean square error of 2 pixels or less.

b) Band composition

It is applied to obtain a better quality in the classification of images by obtaining a single file per image.

c) Supervised classification

The areas for the training on supervised classification should be determined. In this sense, there will be a selection of samples of those pixels that were assigned by both in-field data (sampling and field survey) and the user (knowledge of the study zone).

The result is the definition of sampling zones (ROI's), which can be:

- Forest
- Deforestation
- Rivers
- Cochas
- Clouds
- Shadows
- Beaches (Sandbank)

An initial classification of the ROIs must be done, with a classifier “Maximum Likelihood” type, because the results generated have a good estimate.

Afterwards, a post-classification should be carried out in order to solve problems or inconsistencies in the isolated pixels.

Finally, a visual classification should be made, on a scale of 1:20,000, in order to finish cleaning up all the mistakes that could be generated throughout the process. The criteria for manual interpretation shall be based on the knowledge of certain areas, their relationship to the land occupation and/or other human activities that take place within the study area, photo interpretation analysis and criteria for discriminating changes from a similar spectral behavior but with a different thematic meaning.

Those areas defined as “Non-Forest” must be assessed in the field by sampling in order to define which type of land use the deforested areas have changed to.

INTERNAL AUDITING

The main purpose of the management system of the project's information quality is to minimize the risks of error, obtaining reliable data on which to base the monitoring results. It includes the following steps:

1. Training

It includes the training of general staff in the different roles to play within the framework of the Madre de Dios Amazon REDD Project, however, aiming at always having quality information, the training on those critical points of the information management will be prioritized, which are field collection and its processing (Evaluation and Monitoring Chief, field staff and GIS Specialist). All staff must go through an induction process before executing any activity related to the monitoring.

2. In-field verification

It basically consists of monitoring in the field that the field staff is following the procedures set out in the methodological guidelines given in the previous process of induction. This work is in charge of the Evaluation and Monitoring Chief.

An error in following the procedures should be corrected in the field during the execution of samplings or assessments.

3. Review of the collected data pre and post digitalization

The collected data should be reviewed before (field forms) and after (electronic spreadsheet) its digitalization, so that a second eye can detect inconsistent information. This work is in charge of the Evaluation and Monitoring Chief.

If any information inconsistency is identified at the level of field forms, this information must be verified in the field. If the inconsistency is found in the digitalized information, it must be corroborated in the field forms and whether the inconsistency persists, it must be corroborated in the field.

4. Review of the monitoring reports prior to publication

The monitoring reports must be reviewed prior to publication, in order to confirm the calculations, analysis and the conclusions are accurate and measured. This work is in charge of the Project Chief or Coordinator.

If non-conformities exist during the internal or external auditing processes, the data should be reviewed and the non-conformities addressed.

5 ENVIRONMENTAL IMPACT

It is important to highlight that the maintenance of the environmental conditions is of the greatest importance for both timber concessions. In this sense, the achievement of the FSC Certification for both concessions is a concrete demonstration of that.

Furthermore, useful measures to protect valuable forest species and also species and areas of importance for the development of native fauna are taken into account in all the operations carried out by both concessions.

As a result of the Evaluation of Fauna carried out within the concession area, complemented with the study of high conservation value forests, the evaluation made through the satellite imagery Landsat and with the highly detailed knowledge of the area by Maderacre and Maderyja personnel, important places to the preservation of the flora and fauna were defined as conservation areas. Into them all kind of exploitation activities are strictly forbidden.

The High Conservation Value Forests study, carried out as a requirement for the achievement of the FSC Certification by Fernando Canchanya, specialist on this type of evaluations, have identified the fish zones (rivers, streams and cochas) within the concession, as well as the aguajales as places of high conservation value. Additionally, it is recommended that all forestry activities near to fauna collpas shall be restricted.

Following, a summary of the process of identification of High Conservation Value Forests within Maderacre and Maderyja timber concessions is presented:

With the objective of identifying conservation attributes within and in the surroundings of the Maderacre and Maderyja timber concessions, studies for the identification of High Conservation Value Forests (HCVF) were carried out. Said studies, complemented with the Rapid Evaluation of Native Fauna, have enabled the definition of conservation areas within both concessions.

For the identification of sites with conservation attributes, the evaluation was focused on the biodiversity and community components. In this way, knowledge on the location of important sites for wildlife and the satisfaction of the basic needs of the indigenous communities and villages which could use the natural resources within the concession to satisfy their basic needs is improved. Also, to have an idea on the degree of usage of native flora and fauna by human beings.

In order to identify High Conservation Value Forests (HCVF) within the Maderacre and Maderyja concessions, the following definitions were considered:

- **HCVF 1.** Forestry areas containing globally, regionally or nationally significant concentrations of biodiversity values (i.e. endemism, endangered species, refuges).
 - HCVF 1.1. Area of influence and/or buffer zone within protected areas.
 - HCVF 1.2. Presence of threatened species or critically endangered species.
 - HCVF 1.3. Concentration of endemic species.
 - HCVF 1.4. Critical temporary concentrations.
- **HCVF 2.** Significant intact forestry areas at a landscape level.
- **HCVF 3.** Forestry areas that are or contain threatened or endangered ecosystems.
- **HCVF 4.** Forestry areas that provide essential services in critical situations (i.e. water basin protection, control of erosion).

- HCVF 4.1. Unique sources of safe water.
- HCVF 4.2. Forests that are critical for water collection.
- HCVF 4.3. Forests that are critical for control erosion.
- **HCVF 5.** Forestry areas that are fundamental to the satisfaction of the basic needs of local communities (i.e. subsistence, health care).
- **HCVF 6.** Forests that are critical for the cultural identity of the communities (i.e. areas of cultural, economic or religious significance).

The data collection and its processing were done in the following phases:

- **Desk Review:** written and digital information on the zone were collected, such as map of forest types, phisiography, satellite images, National Charts, General Forestry Management Plans, Annual Operative Plans, Social Diagnosis of communities adjacent to the concessions, Fauna Studies, categorization of Native Fauna species and information on protected natural areas. In this phase, information on the HCVF 1, HCVF 2 and HCVF 3 items was gathered.
- **Field Visit:** by means of workshops, interviews and surveys with people that live in indigenous communities and villages adjoining the concessions.

Target group: indigenous communities or local communities living within the forests to be certified or in their vicinity, and that are using any of the services provided by the forest.

Within the indigenous community that was visited and in every village, local leaders were first contacted and the objectives, scopes and expected results of the study were explained to them. Afterwards they reunited the rest of the members of the community and presented the working team. Likewise, working hours were established in coordination with community leaders, so that the presence of evaluators did not interfere with the daily community routine.

In the consultation processes, a variety of sub-groups were incorporated within the local organizational scheme (leaders, women, youths, elders, etc.). None of the groups was regarded as homogeneous.

Following, a description of the information taken into account for the elaboration of the questionnaire guide to be used for the aforementioned tools (workshop, survey and thorough interview) is presented:

- * **Workshop:** consisted of a group of people, men and women in equal number (if possible), who represented the feeling of the community. The group was also integrated by people of different ages, in order to have the largest possible quantity of criteria. In summary, men and women representing the will of the community participated in the workshop.

During the workshop, the community and village members elaborated maps of the territory and the use of the resources from the forest by the local people. Then, said maps were digitalized and complemented with cartographic information, maps of types of forest, physiography, satellite images and national charts to obtain the High Conservation Value Forests of both concessions and adjoining areas.

- * **Survey:** is one of the most well-known and used tools, with the purpose of collecting general information from the population about certain subject. It must be easy to handle, that is to say, to contain accordingly structured questions which can be answered by means of Yes or No or Affirmative or Negative. In a survey, open questions can be also used, so as to allow the interviewee to incorporate value judgments in his answers.

- * **Thorough interview:** in the same way as the previously described tools, it aims to collect quality information that facilitates the understanding and interpretation of a social fact. It was applied to key people within the community or village, meaning people with leadership, representative or great experience (elders) characteristics, whose answers are relevant for the interpretation of the currently social reality of the community. In each community or village, their leaders were interviewed.

In this phase, information on HCVF 4, HCVF 5 and HCVF 6 was gathered.

Following, a summary of the information collected from communities and villages visited during the field visit is presented:

- **HCVF 4. Essential Services Provision:**

- Source of freshwater for human consumption: the areas which provide the water used for human consumption by local populations were identified in the field. Additionally, and using maps of the area, the origin sources of said water were marked.
- Forests that are critical for water collecting: local people were consulted about critical areas for the maintenance of reservoirs, irrigations, hydropower, etc.

- Forests that are critical for control of erosion: land areas with forest / non forest with land instability problems were identified in the field (i.e. sensitive to erosion, landslides, dams, etc.). Also, and using satellite images and national charts, the physiography of the terrains of the concessions was verified.
- Forests that are critical for agriculture and fisheries: critical forests for agriculture and fisheries were located in the field.
- **HCVF 5. Satisfaction of the basic needs of local communities:** the areas from which local populations obtain their food, fuel, clothing (fibers, palms), medicines, apparels (pottery, weapons, etc.) and construction materials were identified in the field.

A distinction between those resources that are fundamental (without which the quality of life is seriously deteriorated) from those that may be useful but eventually was made in consultation with the residents involved.

Besides, the resources used locally or within the local economy were differentiated from those whose destiny is the external market.

- **HCVF 6. Areas of cultural, ecological, economic or religious importance for local communities:** in the field visit, a consultation on areas of importance such as sacred sites, cemeteries, prohibited places, initiation areas, shamanism areas, etc. was made.

Areas with presence (presumably or real) of voluntarily isolated or non contacted indigenous were also identified in the field.

- **Processing of information:** after gathering all the in-field and desk review information, it was processed. By means of the workshops, the location of the sites that provide the resources for the satisfaction of the essential needs to the Belgium Community and local populations were determined in consultation with their correspondent members. The surveys and interviews also helped to identify the resources and services provided by the forests to local populations for the satisfaction of their needs.

Analyzing both outcomes, the High Conservation Value Forests, according to their importance to the community, within Maderacre and Maderyja timber concessions were identified.

According to this, within the Madre de Dios Amazon REDD project area, five protection or conservation areas were defined, which have been managed by the concessions. Said areas constitute refuges for wildlife and recovering areas for wildlife.

- **Conservation areas within the Madre de Dios Amazon REDD project area**

As it was mentioned, within the Madre de Dios Amazon REDD project area five protection or conservation areas were defined with the following characteristics:

1. One zone for the conservation of high terrace forests, of *bajío* ecosystems (lowlands), “cochas” and native fauna refuges. This zone is located in the north-west border of the concession, over the Acre River bank.

In this case a conservation corridor is established with Maderyja concession, which amplifies the effect of the conservation area. This conservation area is denominated MRA AC1.

2. The other zone for the conservation of the only one “aguajal” ecosystem of the concession, which is refuge of endemic fauna and flora species. This zone is localized in the north-eastern border of the Maderacre concession. This conservation area is denominated MRA AC2.

3. One zone for the conservation of high terrace forests, of *bajío* ecosystems, cochas and native fauna refuges.

This zone is located in the northern border of the concession, over the Acre River bank. In this case a conservation corridor is established with Maderacre concession, which amplifies the effect of the conservation area. This conservation area is denominated MRY AC3.

4. Other zone for the conservation of Psitácidos collpas and low hills highly dissected forests. This zone is localized in the middle of the concession area in a zone with a high concentration of collpas (more than 3 have been detected). This conservation area is denominated MRY AC2.

5. The third one is a buffer zone in the boundary with the Reserve for Indigenous in Isolation conditions, localized in the west border of the concession, with the objective to reduce the impact over these human groups. This conservation area is denominated MRY AC1.

In addition to this, the fiscal zone of 50m over both banks of any open river or stream within the concession area will be protected either.

Following, a chart with specific information of said conservation areas within the Madre de Dios Amazon REDD project area is enclosed:

Chart 71: Conservation areas within the Madre de Dios Amazon REDD project area

Conservation Area	Area (has)	Perimeter (m)	Vertex	East (x)	Vertexes North (y)	References
MRA AC1	1792,09	38377,03	V-1	394127	8789789	Over Acre River Over Yaveryja River
			V-2	392919	8786483	
			V-3	388681	8786483	
			V-4	388681	8785170	
			V-5	386186	8785170	
			V-6	386186	8784132	
			V-7	384518	8784132	
			V-8	384518	8783555	
			V-9	382557	8783555	
			V-10	382557	8784837	Over Acre River
MRA AC2	227,41	9420,78	V-11	420464	8776507	Over Yaveryja River
			V-12	420464	8775924	Over Yaveryja River
			V-13	418410	8775924	
			V-14	418410	8778074	

Conservation Area	Area (has)	Perimeter (m)	Vertex	East (x)	Vertexes North (y)	References
MRY AC1	695,29	13374,39	V-1	382557	8784837	Over Acre River
			V-2	382557	8782804	Over Acre River
			V-3	379013	8782810	
MRY AC2	803,54	11356,78	V-4	379229	8774249	
			V-5	379229	8771570	
			V-6	376230	8771570	
			V-7	376230	8774249	
MRY AC3	501,27	21098,72	V-8	343500	8779252	Over Acre River
			V-9	343500	8769249	Over Acre River
			V-10	343000	8769249	
			V-11	343000	8779329	

In addition to the conservation areas defined within the concessions, it is important to highlight that both of them have developed a sustainable forestry system based on:

- ✓ A minimum diameter required for a tree to be selected for harvesting.
- ✓ Harvesting intensity depending on: diametric structure, abundance of each specie, market requirements, ecological characteristics and rotation. Taking all these items into account the whole forested area is divided into annual harvesting plots. In these, types of vegetation and forest stratum; distribution of the trees within the forest to be harvested; contour lines; rivers and streams; protected forests and protected areas; roads and paths; localization of special sites if there is any; plot boundaries are clearly defined.
- ✓ The main criteria to determine the trees to be harvested is the replacement. It means that only what the forest will produce for the next cycle is allowed to be cut and in consequence the productive capacity of the woods is maintained and the stability of the ecosystem is forwarded.

The defined productive forest area to be exploited annually includes those trees that will be harvested this year, but also those which are of the previous diametric class and thus kept for the next year harvest and those which are identified as seeding trees⁸⁸ (individuals with good shape, healthy, a straight tree trunk and a well developed canopy).

- ✓ The harvesting method is the directed felling, which implies selective harvesting with low impact technologies, and with a well-planned construction of roads based on the distribution of the remaining trees after harvesting.
- ✓ With said harvesting method the tree falling direction is determined in order to protect the status of the remaining trees, giving priority to the protection of the most valuable timber species as mahogany, cedar, shihuahaco, estoraque and azúcar huayo and ecological species (i.e. for fauna species) as those from Sapotaceae, Moraceae, Lecythidaceae, Bombacaceae and Leguminosae families. This harvesting method also allows the protection of any fauna specie during the felling of trees.
- ✓ With the aim to maximize the exploitable volume of the felling trees a very low cut is made.

⁸⁸ Seedling trees: at the beginning of the forest operations a proportion of 1/10 trees of each timber species was defined to be kept as a seeding tree. Said number will be opportunely adjusted taking into account all the lessons learned about species dynamics and reproduction, in order to assure the adequate development of all Maderacre & Maderya timber species in the long term.

Besides the sustainable forestry system mentioned before, both concessions have designed also other general measures to protect the environment:

- Definition of strict conservation areas: with the objective to protect habitats and vulnerable species (i.e. wetlands).
- Protection of the river banks: all the water courses within the concession area, from the largest to the smallest one, are localized during the forest census and marked in a map. A buffer area along both sides of the river is defined as a protected area and clearly signalized in the map used as a guide for all the exploitation activities.
- Protection of flora species that play an important role in the development of native fauna i.e. collpas, hollow trees.
- Protection of all its non-productive forests: i.e. pacaes, secondary forests, which are defined as non-productive are also clearly identified during the forest census and marked in the guiding map.

As it was mentioned above, no one of both timber concessions has the capacity to harvest, process and add value to the total volume that the forest produces annually. That is the reason why a capitalization and re-inversion process is being carried out by the companies and a centre where all the forest wood production should be processed will be constructed as soon as possible.

In order to protect all the concession forests and other natural resources, a protection plan was designed. However, the company has not got enough economic resources to carry out the totality of the protection plan. It is expected that the revenue from the sale of carbon credits will allow the project to contract specialized forest guards who will be in charge of patrolling and controlling the project area.

The timber extraction in the forestry concession, when carried out applying sustainable management criteria, will generate positive impacts in the conservation of biodiversity and the development of local populations. The operations of project developers, generate permanent local work posts and income for the region and the country, besides contributing to the recovery and conservation of the forests. The FSC Certification they have achieved in 2007, represents an additional guarantee that their actions are carried out respecting their management plans and also respecting the local populations and the environment.

This is why, the consolidation of a sustainable forestry management in these areas is so important for the development of the region and for this purpose concession holders need to increase their economical and human resources with respect to their actual situation, mainly with the objective of guaranteeing the conservation of the whole area of forests of the concessions they have been granted the administration.

Hereunder and based on the “Environmental Impacts Evaluation” carried out as a requirement for the achievement of the FSC Certification by the WWF Consultant⁸⁹, there is a list of the operations carried out by both timber concessions that have the greater impact on the environment:

1. Construction of camping sites.
2. Construction of roads.
3. Felling and cutting up of trees.
4. Extraction of trees.
5. Terrestrial transportation of the wood.
6. Forestry operations.
7. Maintenance of protection and conservation areas.

Following an analysis considering the positive and the negative impacts that these operations produce on the environment is presented.

- **Positive environmental impacts of Maderacre and Maderyja operations**

- a) Related with the additional sequestration of CO₂ from the atmosphere**

First of all, it is important to mention that most of the operations aforementioned require a total removal of the covering vegetation from the area. As a result of it, secondary woods and herbaceous vegetation of rapid initial growth will cover these clearing areas, thus representing an additional sequestration of CO₂ from the atmosphere.

In the specific operation of roads construction, where the area that will be removed from its covering vegetation is higher, the growth of the surrounding woods will be stimulated because of the entrance of more light inside them. Therefore, an additional sequestration of CO₂ from the atmosphere is also achieved.

⁸⁹ Said study, carried out by Roberto Kometter, WWF Consultant, will be available to the auditors.

It is important to also consider as a positive impact the selected method of felling trees used by both concessions and stated in their Forestry Manuals. Said method consists on the selective felling of trees which result in a diminishing of the tree density which allows a higher entrance of light inside the forest. In consequence, the growth and regeneration of the wood is forwarded, representing an additional sequestration of CO₂ from the atmosphere.

b) Related with the presence of workers in the forests

Another positive impact is related with the permanent presence of workers that said operations imply. In this sense, the risk of illegal logging within the concession area is reduced, as well as the risk of migratory agriculture.

Said risks are also minimized considering the availability of roads to allow permanent patrolling inside the forests in order to prevent and control any illegal logging and agricultural activities within the concession area.

c) Related with the maintenance of protection and conservation areas

The maintenance of protection and conservation areas as fiscal strips, gorge heads and representative areas of the different types of forests, produce positive impacts on the soil. The maintenance of the covering vegetation protects the soil from erosion. River beds are also protected in order to avoid the disturbance of water courses.

The maintenance of the forest without disturbances decreases the surface drainage and in consequence reduces the erosion and improves above surface water quality. Furthermore, the forests enhance water infiltration, increasing the quantity and quality of below surface water.

It should be added that said maintenance of protection and conservation areas looks forward to the preservation of the genetic resources of the area. Moreover, they function as a barrier for fires, plagues and the invasion of exotics species and weeds.

Fauna natural habitats are also preserved because of the existence of said protection areas, thus their reproduction and development is assured. In addition, they represent a refuge for the species that have to migrate as a result of the operations carried out within the productive area.

- **Negative environmental impacts of Maderacre and Maderyja operations**

- a) Related with the removal of the covering vegetation**

As it was mentioned before, most of the operations carried out require a total removal of the covering vegetation from the correspondent area. Some negative impacts related to this specific operation have been detected and are listed below:

- ✓ The soil is directly exposed to the rainfall causing its erosion. The soil removed due to the erosion will be transported to the water courses producing accumulation of sediments on the river banks.
- ✓ There is an increasing of the surface drainage because of a lower retention of water by the roots that had been removed from the area. In addition, as a result of the anthropogenic activities carried out in the camping sites, high quantities of waste are produced and might be transported by said surface drainage increasing the risk of above and below surface water pollution.
- ✓ An important loss in genetic resources because of the disappearance of individuals is produced as well as a negative impact in sensitive fauna species due to the fact that their natural habitats are modified and some of them are forced to migrate to other sites.
- ✓ There is an increasing of the soil and environment temperature which affects directly the microclimate, the vegetation and the sensitive fauna of the area. The risk of fires because of these is also higher.
- ✓ Weed species should cover the clearing areas.

- b) Related with the anthropogenic activities and the use of heavy machinery and equipments**

Impacts related with the anthropogenic activities carried out by the workers that are living temporarily inside the forests and also with the use of equipments and machinery for constructing roads and other forestry operations:

- ✓ Some smoke emissions are produced and the air should be polluted.

- ✓ The use of oils and other toxic substances for the equipments increases the risk of accidental spillovers and in consequence of soil pollution.
- ✓ There is a higher risk of illegal hunting by the operators leaving in the camping site.
- ✓ Because of the presence of human beings and the noise that the machinery produces, a disturbance of the natural habitats of some fauna species occur and some of them are forced to migrate to other sites.
- ✓ The use of heavy machinery for some operations produces the compression of the inner layers of the soil.
- ✓ Because of their size, said heavy machinery may injure the standing trees by friction and the presence of fungus and any other diseases would be forwarded.

c) Related to the felling of trees

The impacts related to the felling of trees operation are listed below:

- ✓ Tree falling produces a removal of the surface soil of the area where the tree has fallen down, which may be transported by means of rainfall and surface drainage.
- ✓ Because of their important weight and height, the felled trees of both timber concessions produce the compression of the inner layers of the soil when they fall down. In addition to this, the remaining trees may be injured forwarding the presence of fungus and any other diseases.

• Mitigation measures for the detected negative impacts

The measures to minimize the negative impacts listed before, that Maderacre and Maderyja operations caused on the environment, are the following:

- ✓ Reduce the camping site size to 0.25 ha at the most, but always taking into account that all the needs for the people who will live there are present.
- ✓ Allow the construction of only 2 camping sites for each AHP (annually harvesting plot).
- ✓ Construct the camping sites in areas with zero degree of slope or very close to zero.
- ✓ Construct the roads with low degree of slope.

- ✓ Stimulate the development of secondary vegetation in the adjacent areas in order to cover the soil and reduce the erosion.

As a result of these measures, the negative impacts will affect only a very small proportion of the soil and the erosive potential of rainfall water will be highly reduced.

- ✓ Selective harvesting method.
- ✓ Cutting up of trees considering techniques and quality criteria in order to reduce the waste because of errors in the cutting points.

As a result of these measures, the protection of the remaining trees after any harvesting operation is assured and in consequence the wood productivity of the forests is guaranteed.

- ✓ Definition and protection of natural areas of high conservation value and high conservation value forests.

As a result of these measures, the protection of high conservation value habitats and flora and fauna species and in consequence the maintenance of the biodiversity conditions of the project area is also assured.

In the following chart, a detailed analysis including all the impacts mentioned before and their respective mitigation measures is presented.

Chart 72: Environmental impacts and mitigation measures

Operation	Impact produced	Mitigation measures
Construction and management of camping sites	Erosion	Selection of areas with low slope degree, determination of a maximum camping site size allowed; leveling; construction of canals for taking out the water; re-planting with native species in areas free of constructions if it is necessary. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Soil pollution	Camping sites design considering the establishment of specific areas dedicated to: throwing out the waste, storage of food, garage, bathrooms, etc. In the food and materials storage and garage area, a wood platform on the soil will be set in order to prevent spillovers. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Air pollution	Maintenance of machinery and other equipment engines in good conditions. The landfill and the waste deposit will be covered with soil after each evacuation. Maintenance of toilets. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Increase in pathologies	Adequate clothes should be provided to the personnel. Promotion of self-hygiene. Maintenance of the camping site always clean. Keep the medical kit well provided. Maintenance of the toilet sites. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
Construction of roads	Removal of the covering vegetation from the surface	Well-planned and efficient construction of roads in order to minimize the area to be affected. Technical definitions should be taken into account for said construction. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Erosion	Construction of roads regarding the defined degree of slope allowed. Maintenance of ditches. The roads will be closed when it rains. Adequate design of bridges and sewers are taken into account. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.

Operation	Impact produced	Mitigation measures
Construction of roads	Disturbance of water courses	Planning of paths and roads construction in order to disturb as less water courses as possible. Adequate design of bridges and sewers must be taken into account. Permanent cleaning of riverbeds. No removing material will be placed along the roads. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Soil compression	Paths and roads will be closed when it rains; natural regeneration will be stimulated. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Disturbance of natural habitats of endangered species	During the monitoring study, said areas will be identified and accordingly signaled thus to prevent them from the disturbance of constructing roads operations. Maintenance of the contact points of the forest canopy to allow the free movement of the fauna species. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Injury of standing trees and natural regeneration	The selected harvesting method of directed felling must be applied in the construction of roads operations. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Increase in migratory agriculture	Adequate signing of the roads. Permanent control of the transit through them and patrolling within the area.
Felling and cutting up of trees	Erosion	Directed felling is used as the selected harvesting method to avoid the trees falling down on hillocks and in consequence the removal of the soil. Also the felling of non selected to be harvested trees is avoided. Leave on site as much felled tress biomass as possible in order to protect the soil. No harvesting operations will be carried out in areas with high slope degree. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Soil pollution	Chain saws must be always in good conditions for their use and any possible oil leakage will be avoided. Oil spillovers must be prevented when chain saws are recharged. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.

Operation	Impact produced	Mitigation measures
Felling and cutting up of trees	Disturbance of water courses	In the case of big brooks, no trees are allowed to be felled from their edge up to 50 m. In the case of small brooks, with the selected harvesting method the risk of trees falling down into the water courses is minimized. The riverbeds must be maintained clean. No removing material will be placed along the paths and roads. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Water courses pollution	No oil recharging will take place next to water courses and no chain saw will be cleaned with said water. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Loss of vegetation	Directed felling to avoid the felling of non-expected to be harvested trees. Selective cut up of lianas must be carried out. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Loss of genetic resources	A minimum diameter is required for a tree to be selected for harvesting and the harvesting intensity, stated in the forestry operations manuals of both concessions, will be adjusted to the data produced in each monitoring study in order to preserve the viability of each specie. A minimum of 10% of seedling trees will be identified and marked during said study. Those trees will represent proportionally all the exploitable diametric classes. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Disturbance of natural habitats of endangered species	During the monitoring study mentioned before, the protection and conservation areas will be identified as well and marked to keep them free of any human intervention. Also, measures will be determined in order to protect and preserve trees with fruits that represent food to other native fauna species. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Decrease in fauna populations because of illegal hunting	Hunting and fishing is forbidden, either for self-consumption purposes or commercial ones. Control actions will be carried on as well as sanctions will be applied. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.

Operation	Impact produced	Mitigation measures
Wood extraction	Erosion	Well-planned and efficient construction of roads and paths as a way out for wood production having as a priority to affect the smallest possible area. Transportation of wood pieces with one of their ends suspended thus to avoid the removal of the soil. The size and the minimum accepted slopes of the places where the wood will be temporarily stored are defined. If necessary, some canals can be constructed due to the drainage of rainfall water. Wood extraction and transportation must be avoided in rainy days. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Soil compression	Wood extraction and wood storage operations must be carried out regarding the sites accordingly defined to said operations, therefore the compression of any other areas is avoided. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Total loss of covering vegetation	The size of the sites where the wood will be stored will be determined taking into account the impacts that this operation could cause on the environment. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Partial loss of covering vegetation	Well-planned and efficient construction of roads and paths as a way out for wood production so as the smallest possible area is affected. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Increase in diseases, plagues (fungus) because of adjacent vegetation injuries	Efficient use (by means of training the personnel) of heavy machinery and equipments in order to minimize the injury of the remnant trees and adjacent vegetation. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
Terrestrial transportation	Erosion	Efficient use of heavy machinery used for wood extraction so as the removal of the soil is reduced. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Soil compression	Wood extraction operations must be carried out by means of the defined roads and paths, therefore the compression of other areas is avoided. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.

Operation	Impact produced	Mitigation measures
Terrestrial transportation	Fauna displacement	Well-planned transportation network.
	Decrease in fauna populations due to illegal hunting	The transportation of people from outside the concessions area by the Maderacre and Maderyja trucks is not allowed. All hunting activities are forbidden within the concession area. In this sense, truck drivers and their assistants are not allowed to hunt as well as to transport any animal specie. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Increase in migratory agriculture	The transportation of people from outside the concessions area by the Maderacre and Maderyja trucks is not allowed.
Forestry operations	Partial loss of vegetation	Selective cut up of lianas should be carried out. Training courses for all the personnel with respect to the forestry management plan.
	Weed and herbaceous species invasion	Selective cut up of lianas should be carried out. Training courses for all the personnel with respect to the forestry management plan.
Maintenance of conservation areas	Illegal logging	Adequate signs, the maintenance of all the concession borders, a permanent patrolling and a systematic monitoring will help to avoid illegal logging activities. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.
	Migratory agriculture	Adequate signs, the maintenance of all the concession borders, a permanent patrolling and a systematic monitoring will help to avoid illegal logging activities.
All the operations	Water and soil pollution	Establishment of precise regulations for the handling of any oil and other toxic substances, as well as for the repairing of any machinery that is out of order. Training courses for all the personnel with respect to the forestry management plan, the rulebook of forestry operations and industrial security.
	Emission of gases (smoke)	Maintain in good conditions all the engines and carburization systems to reduce toxic gases emissions and the minimize oil consumption. Training courses for all the personnel with respect to the forestry management plan, the rulebook of forestry operations and industrial security.
	Sound pollution	Maintain into the allowed limits the sounds produced because of the operations carried out, considering the use of silencers if necessary. Training courses for all the personnel with respect to the forestry management plan, the rulebook of forestry operations and industrial security.

Operation	Impact produced	Mitigation measures
All the operations	Accidents	Establishment of precise regulations for all the operations carried out in the concession area. Provide the personnel with all the required tools for carrying out said operations. Give adequate training courses to the responsible personnel. Permanent control and monitoring of the development of the operations. A sanction plan must be established and well-known by all the involved personnel. Operation areas must be well signalized. Training courses for all the personnel with respect to the forestry management plan, the rulebook of forestry operations and industrial security.
	Illegal logging	Permanent control, promotion of the functioning of the Forestry Management Committee and the fluent communication with all the forestry authorities.
	Rejection by the neighbor populations	Establishment of precise regulations regarding the relationship of both concessions staff with all their neighbors. Alcohol drinks are not allowed among the staff within the concession area and its surroundings. Promotion of the active participation and involvement of the surrounding population by means of the Forestry Management Committee. Keep said population permanently informed of all the activities that are being carried out within the concession area. Training courses on the performing of the Relationship Plan.

6 STAKEHOLDER COMMENTS

The collection of comments from Stakeholders was carried out during the month of March by the technical team of the concessions. This was led by the Social Responsibility and Relationship with the Community Area, in charge of the Soc. Claudia Canchaya Toledo and conducted in coordination with the General Manager (Ec. José Luis Canchaya), the Forest Manager (Eng. Nelson Kroll Kohel) and the Administrator (Héctor Pérez Pereyra)⁹⁰.

Methodology employed

The methodology applied to the collection of Stakeholder comments was based on the application of the following methods:

⁹⁰ According to the document "Stakeholder Comments Report", developed by the Soc. Claudia Canchaya Toledo, April 2011, which will be available to the auditors.

i. Survey:

A survey was applied to a sample of 97 residents of the Iñapari district (12% of the adult population). The age of the respondents ranges between 18 and 73 years, 84.3% of them are between 18 and 45 years.

ii. Semi-structured interviews:

A total of 6 interviews were conducted to the main Stakeholders, who are detailed in the following chart:

Interviews conducted

Name	Position	Institution/organization
Mercedes Perales Yabar	President // Lieutenant Mayor	Management Committee of the Acre River // Provincial Municipality of Tahuamanu
Celso CuriPaucarmayta	Mayor	Provincial Municipality of Tahuamanu
VinivioRigo Nico	Manager	AgroIndustrial Victori SAC
Ilson López	President	Belgium Native Community
William Arauz	Forest Concessions Manager	Technical Administration of Forestry and Wildlife of Tahuamanu (in Spanish Administración Técnica Forestal y de Fauna Silvestre -ATFFS)
Juan Carlos Flores	Representative	Bosques Amazónicos (BAM)
Alonso Córdova	Representative	World Wildlife Fund (WWF)

iii. Workshop:

An informative workshop on the Madre de Dios Amazon REDD Project was developed, through this workshop the project was disseminated and socialized while receiving comments from local authorities and representatives of the district organizations. In this sense, all the local institutions and organizations of the district were invited, including representatives of the Boards of the Belgium Native Community and rural communities. It was attended by a total of 10 institutions/organizations by means of their representatives, as shown in the following chart:

Workshop participants

Name	Position	Institution/organization
Jorge Barra Gonzáles	President	Chamber of Commerce, Industry and Tourism of Iñapari
Celso Curi Paucarmayta	Mayor	Provincial Municipality of Tahuamanu
José G. Gabriel Gastelo	Governor	Provincial Government of Tahuamanu
Gilber Cuevas Arenas	Director	IEBR Secondary School of Iñapari
Óscar Huamán Espinillo	Vicepresidente// Fiscal	Development Committee // Merchants Association "Contigo Perú"
L. Mercedes Perales Yabar	President // Lieutenant Mayor // President	Management Committee of the Acre River Forest // Provincial Municipality of Tahuamanu // Iñapari Mothers Club
Belkis Mendoza L.	Representative	Association of Residents of La Colonia Neighbor
Sandro Cardozo M.	Manager	SERVFORES SAC

Summary of the received comments:

The process of collecting comments, as it was previously mentioned, was carried out at the local level (between the district's population, institutions and organizations of the Iñapari district), regional and national (public and private institutions).

Below, a summary of the comments received by the different Stakeholders is presented:

1. Primary Stakeholders:

Comments received from local population:

By applying interviews, information regarding the following subjects was collected:

Direct benefits

In general, the perception about the timber concessions and the Madre de Dios Amazon REDD Project among the local population is positive. This is because more than half the population is being benefited directly by the company. Thus, 53.6% of respondents and their families state that are receiving or have received some benefit from the timber concessions of the Madre de Dios Amazon REDD Project.

The main perceived benefit among the beneficiaries is the employment, covering 84.4% of the cases. The latter has an impact on improving the livelihood conditions of many families in the area, who have been able to purchase a plot of land, build a home and start or improve the family business, as a result of the salary.

Another benefit that is observed, which corresponds to 15.2% of the cases, is the purchase of goods or hiring of services. This is a consequence of the implementation of an entrepreneurial policy of the concessions consisting in prioritize the hiring of local suppliers.

Likewise, 13% of respondents recognize as a benefit the donation of goods or support that the concessions perform in favour of the local population, especially through the various institutions and social organizations within the district.

Concessions' strengths

Regarding this issue, it should be highlighted that a large group of people identifies more than one of the strengths that characterize the concessions of the Madre de Dios Amazon REDD Project. Consistently with the direct benefits, the employment opportunities provided to local populations is widely recognized by the 88.4% of respondents. Also, most people recognize as strengths the hiring of services from local suppliers (67.4%) and the support given to local institutions and local organizations (67.4%).

Other strengths that are identified by the majority are related to the safety and training opportunities that the concessions provides to its employees. Thus, 68.4% recognizes that the concession's employees have safety equipments and 50.5% that the concessions train their staff.

They also emphasize the strengths in relation to environmental management. In this sense, 47.7% said that the concessions carry out an adequate forest management and 43.2% that reforestation is conducted within the concessions.

Concessions' weaknesses

Regarding the weaknesses, most respondents focused on the labour aspect. The main weakness refers to the smaller number of permanent staff with respect to temporary staff on the payroll and thus with social benefits (22.7%). This is due to the seasonality of the main activity of the concessions: timber exploitation, which is concentrated in certain months of the year. The recruitment is done by means of temporary contracts, according to the law, but for the period that each activity requires. It is worth mentioning that, in addition to the social benefits, the concessions have an agreement with the Health Centre. This agreement is ratified each year, so that the workers can receive health attendance freely.

On the other hand, one of the weaknesses perceived by the population refers to the technological issue. In this sense, 14.4% of respondents mentioned that the Processing Plants could be implemented with more modern equipment. It should be mentioned that currently there is proper equipment for primary processing, which requires a basic technology. On the other hand, in the case of Maderyja concession that performs second processing with modern technology, it does so in Callao due to the competitive advantages of performing this industrial process near the dispatching Port.

Expectations / Recommendations

Among the main recommendations that emerged from the respondents, those related to the labour subject should be highlighted. In this sense, 51.5% of respondents refer to the improvement of the working conditions of the workers, in accordance with those reported in the previous section, such as the temporality of the positions. In addition to this, to a much lesser extent, they indicate that staff should be trained and provided with safety equipment.

Finally, it should be mentioned that a small group of respondents (5.2%) indicated that the concessions should improve their informational and communicational aspects with the population. They consider that they should expand the dissemination of the activities that the concessions carry out because, for example, not all the people know about the proper management and the standards that they comply in relation to this.

Comments received during the workshop with the representatives of local institutions and organizations:

The workshop with the authorities and social representatives was focused in two issues: the strengths and the expectations and recommendations to the concessions.

Concessions's strengths

The main strength that is recognized to the timber concessions of the Madre de Dios Amazon REDD Project by the authorities and social leaders of Iñapari are the proper forest management and their achievements in terms of FSC Certification. The concessions are recognized as pioneering forest companies to obtain this certification and from these the experience has been replicated to other concessions of the district and even in the Belgium Native Community.

Likewise, as among local population, they identify the hiring of local workers and local suppliers, thus benefiting local families and boosting the economy within the district significantly. Additionally, they recognize the economic investment that shareholders carry out within the district, providing also local employment opportunities.

Expectations / Recommendations

The expectations of the attendants to the workshop were focused on the contributions that the concessions can continue to generate for the community.

First, taking into account the main strength identified on the concessions experience, management capacity and accumulated knowledge on issues of sustainable management of their resources and currently in the field of environmental services through the Madre de Dios Amazon REDD Project, a greater contribution is expected with respect to dissemination, information and training on environmental subjects. It is worth mentioning that the population considers that the concessions are able to generate a significant contribution to the community through the transfer of information and knowledge on different topics that they dominate.

It is recommended, for instance, that the concessions integrate the technical team of the REDD Roundtable that the Municipality is planning to promote at the provincial level. It is considered that this participation would be essential for the development of a technical proposal to have presence and integrate into the regional REDD Roundtable and also have influence at the level of the national REDD Roundtable.

Additionally, through the REDD Roundtable, it is seek to promote and disseminate information, to inform and educate local people in conservation and the REDD+ issues, expecting to have the support of the forest concessions in the work of dissemination and training.

In addition to this, the realization of a schedule to develop environmental education activities is expected. Firstly, to carry out presentations in environmental issues, targeted to the student population of the Secondary Educational Institution, as had been previously coordinated by the Management Committee of the Acre River Forest, to which the concessions belong. Also, to continue with the guided tours to the facilities of the Processing Plant, where the forestry Nursery is located, targeted to students at the initial, primary and secondary levels of the district.

On the other hand, there are expectations in relation to the generation of potential synergies between the concessions and the Municipality. The relationship with the Municipality has historically been good. A mayor's representative is a member of the Relationship with the Community Advisory Committee of Maderacre concession, making him directly involved in the social responsibility policy of the concessions. Regarding the new management, which started in January 2011, coordination has been taking place and there is the intention on both sides to design a macro agreement allowing the development of joint programs. Coordinated efforts with other public and private institutions are also expected. Among the public institutions with whom good relationships are maintained and the creation of alliances has been sought, the following should be mentioned: Educational Institutions and the Health Care Centre of Iñapari, and among the private institutions local forest companies, especially Agro Industrial Victoria SAC and NGOs with a presence within the region.

Comments received through semi-structured interviews:Provincial Municipality of Tahuamanu

The Municipality recognizes as strengths the generation of local employment and the investment of the shareholders profits in family businesses within the same locality.

Among the weaknesses, the constraints of the national legislation relating to the distribution of the forest fee to the municipality are indicated, being low the provision that they receives from the State.

An inter-institutional agreement that allows the management of articulated programs for the benefit of the population is expected to be concluded. In this sense, the support of private companies from Iñapari is expected for the development and implementation of the “Children’s Forest” (in Spanish Bosque de los Niños – BONI), which would replicate the experience of the BONI’s project from the School of Villa Primavera Community to other educational institutions of the area.

Agro Industrial Company Victoria SAC

The Manager of the company, Vinicio Rigo Nico, considers that the main strengths of Maderacre and Maderyja concessions are the generation of local employment and boosting the local economy through the procurement of services from local suppliers. In this regard, for instance, Maderacre hires the timber harvesting services of a local company (SERFORES).

Likewise, he recognizes the ability of management by the technical staff of the concessions, who have been able to overcome various obstacles and meet important achievements for the forestry sector such as their early FSC Certification in the region and the country.

Lastly, he expects that his company as well as Maderacre and Maderyja concessions to keep working coordinately as they have done so far.

Belgium Native Community

The President of the Belgium Native Community, Ilson López, believes that the main strength of the Maderacre and Maderyja timber concessions is the proper management that they carry out within the concession, as well as the compliance with the legislation and their Annual Operative Plans. Additionally, he considers that they have made considerable progress in their REDD Project. Taking into account these two elements, he expresses his wish that the concessions support them in the REDD Project that the community has been developing, through an informative presentation within the community so that all members have the opportunity to attend it.

Another strength identified is the employment opportunity that the concessions provide to the members of the community, especially in forest operations, fulfilling their promise. In this way, the community members have access to training and generate significant revenue to improve the quality of life for their families.

Lastly, he expects that the good relationships between the concessions and the Belgium Native Community are maintained as it has always been.

Management Committee of the Acre River Forest

As a strength, they identified the important role that Maderacre and Maderyja concessions have played within the zone, being a management model for other forest companies that have been adapting to the FSC certification process for the proper management of the forest resources and chain of custody.

For this reason, this is expected to continue with the support of the concessions in the planning and implementation of the activities of the Committee. Thus, the development of presentations to high school students covering various topics such as the FSC Certification, sustainable management of the resources and administration and management of forest concessions is expected. It is also expected that the concessions continue with the educational visits to the Processing Plant and Forestry Nursery, targeted to children and youths of the district. Finally, they expect the involvement of the concessions in the dissemination of the activities of the Committee and environmental education.

2. Secondary Stakeholders:

Comments received through semi-structured interviews:

Technical Administration of Forest and Wildlife of Tahuamanu (ATFFS)

The main strength that differentiates Maderacre and Maderyja concessions from the rest of the forest concessions of the province, is the strict enforcement of the concessions contracts, the Forestry Law and the times set by the State for the submission of the plans and documents, which have been approved without major problems. In addition to this, the concessions carry out a proper management of the concessions and the chain of custody, hence having their FSC Certification in force.

Likewise, they recognize the effort that the concessions make to comply with the regulations and expect that the good relationship between the concessions and the ATFFS is maintained.

Bosques Amazónicos (BAM)

The main strength they indicate is the credibility that the concessions have reached at the regional and national level, in relation to FSC Certification of forest management and the chain of custody of their processing plant. And currently being the first companies, together with Greenoxx NGO, that achieved the validation of their Madre de Dios Amazon REDD Project. The latter represents an alternative to generate additional income, while allows to complement the sustainable management of the forest as they have been performing.

However, this project represents a challenge in terms of compliance with the proposed goals. To this end, appropriate strategies should be generated in order to meeting the timing defined in the project planning, because a constraint in this type of projects seems to be the ability to have the necessary resources to implement the planned activities.

World Wildlife Fund

WWF recognizes the diverse strengths of the concessions of the Madre de Dios Amazon REDD Project.

First of all, the important forest resources that the concessions have within their areas. Secondly, the proper forest management that they perform within the concessions as well as the chain of custody, under FSC Certification. Third, the entrepreneurial spirit and vision of the executive staff of the concessions, unlike to the existing in other concessions of the Madre de Dios region. Fourth, which goes hand in hand with this, is the human resource, because they have high-level professionals who have been able to run the business efficiently despite some difficulties that have occurred.

The expectations that WWF has is that, on one hand, the concessions actively participate in the regional and national REDD Roundtable to make an impact on the regulation of the methodology for biomass measurement of the REDD mechanism and the regulation of the distribution of environmental services income. On the other hand, that the concessions achieve the involvement of deforestation agents of their buffer zone to the Madre de Dios Amazon REDD Project to ensure the established environmental conservation.

Report on how due account was taken of any comments received:

The Stakeholder comments have been used as a tool to incorporate various aspects to be taken into account in the planning of the Social Responsibility and Relationship with the Community Area of the concessions. In this way, the following is being considered:

- Coordinate with the Health Care Centre of Iñapari the renewal of the agreement for mutual support for the care of the concessions staff in case of accidents.
- Strengthen communication strategies through a comprehensive communication plan, which considers the dissemination of the activities of the concessions in terms of forest management, enrichment and reforestation within the concessions. Likewise, with regard to security measures implemented for the company staff and the training that are provided to their employees on various topics.
- Coordinate with the Municipality, the Management Committee of the Acre River Forest; forest companies and other local and regional institutions, for the design and implementation of joint educational programs, as well as other types of social projects. In this sense, the following topics are being coordinated:

- Development of educational presentations on the sustainable management of resources, FSC forest certification, among others. It is being coordinated with the Management Committee of the Acre River Forest and the IEBR Secondary School of Iñapari.
- Conduct guided tours to the Processing Plant. It is being coordinated with the Management Committee of the Acre River.
- Analyze the feasibility of a tree planting project within the Iñapari district. In this sense, some conversations are being carried out with the Provincial Municipality of Tahuamanu.
- Continue to participate in the forums for discussion on the regulation of the REDD+ mechanism within the country, through the active participation in the working meetings of the REDD Roundtable at the provincial (when established), regional and national level.
- Disseminate information and knowledge about the REDD+ mechanism and the voluntary carbon market. During the workshop conducted, general information about this issue was disseminated. Additionally, a descriptive guide on REDD and a summary of the Madre de Dios Amazon REDD Project were distributed. Finally, the planning of an informative workshop on REDD with the Belgium Native Community, who have been developing a similar project for quite a long time, has begun.

In relation to the project Stakeholders, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project mentions that the PDD shows a stakeholder map, based on material prepared for FSC certification and Smartwood verification process. A group stakeholder interview was held in Spanish at the Iñapari city hall. Interview subjects included the Sub-Major (and President of the Chamber of Tourism and Commerce in Iñapari), the President of La Colonia neighborhood (and also shareholder of Maderacre) and the President of the Mother's Club, being the last two women. The first two were aware of the REDD project, its aims and its potential benefits and were very supportive of it. At the concession site, interviews were held with 5 male workers in one to one basis. Some of them were aware of the existence of a "carbon" project in the concessions. 9 phone interviews were held (24th July 2009) and they showed that although many stakeholders do not have details about the REDD project (some have only heard about it), they are familiar with the forest concessions and have positive opinion and/or a good working relationship with them and in all cases are supportive of carbon sequestration projects.

A key finding is that the regional government is very supportive of REDD initiatives as it promotes the regional REDD working table. AIDER and SFBAM, the entities responsible for the carbon modeling of this project are members of this group. The President of the Native Community Belgica, which neighbors Maderacre's concession, expressed that this community has started the planning process of a carbon sequestration project as well.

It adds that during the site visit (24th-27th June 2009), the auditors met with technical and management staff of both Maderacre and Maderyja. They made presentations and explained different areas of the project and their competencies, interviews were held with them along the visit. In addition, Maderacre concession has created a Consultative Committee on the Relationship with the Community activities, which provides the necessary transparency to the whole timber concessions activities and in consequence to this specific project activity. The main purpose of this Committee is to give the correspondent advice to the staff in the design and implementation of its social policies. Members of this Committee were consulted about this PDD.

In addition, the original PDD was published online for public comments on the CCB website and this was announced globally through email and also to the two main foresters' egropus in Peru (Forestales Molineros and Forestales del Centro). During the formal comment period for the PDD, only one formal comment was received from WWF-Peru clarifying dates of contracts signed and name of networks.

In addition to this, in the SCS Final Validation Report was stated that the project, in order to demonstrate transparency, communication channels have been established with the community through stakeholder groups, meetings and employees. During the site visit, several notices regarding stakeholder meetings were visible in the town hall. Additionally, all materials (including the CCBA PDD) are available to the public in the native Spanish language at the headquarters of Maderacre and Maderyja. Also, all project documents are available in electronic format and have been distributed to interested parties via email. Lastly, Maderacre and Maderyja employees are important members of the community and are valuable communicators of project information.

Said report also mentions that there are two feedback mechanisms for management actions and monitoring programs. The first feedback is in the form of annual work plans which contain information about project activities, project outcomes, measures of success and lessons learned. The implementation and feedback on management actions and monitoring programs are updated and documented in the annual work plan on a yearly basis. The second feedback mechanism in community feedback provided through community meetings, part of the community plan. This mechanism is related to the annual work plan because community feedback is incorporated into the annual work plan. Together, both of these feedback mechanisms are reliable and improve the project outcomes.

Finally, the Validation Report adds that discussions with project proponents indicates that the REDD project will represent valuable capacity-building opportunities for various stakeholders. The project activities will be mainly designed with the community. Some current project activities are listed in the social community plans for Maderacre and Maderyja. In addition, the PDD indicates that a specific training plan addressed to local families will be designed to strengthen local capacity.

In fact, the following actions were taken during the 2010 period⁹¹:

- * In relation to the opportunities to access to information and communication for building a culture of sustainable management and forest conservation, there is a program developed in this respect which is in the process of validation. However, the concessions have been participating in consultation bodies, such as the Forest Management Committee of the Acre River, assuming in it the position of Vice President, through its designated representative, Eng. Nelson Kroll Kohel. Additionally, a representative has been designated to serve on the Management Committee of the Yaverija River Subbasin, which is in the process of formation and the Madre de Dios Amazon REDD Project is participating in this process.
- * There is also a Relationship with the Community Advisory Committee. In these and through the participation in various events, the concessions report their activities and the scope of the Madre de Dios Amazon REDD Project. In particular, the scope of the Madre de Dios Amazon REDD Project was already reported to the population through the RRCC Advisory Committee. Also, training for staff and local suppliers is conducted.

⁹¹ According to the "2010 Monitoring Report of the Madre de Dios Amazon REDD Project", already submitted to the CCBA.

- * In relation to the participation for coordination and consultation with the State, to establish efficient mechanisms of supervision and control, the Madre de Dios Amazon REDD Project participates in one body, the Forest Management Committee, where the Technical and Forestry Administration of Tahuamanu – GOREMAD participates. The Project have participated also in 5 other meetings in this respect.
- * With respect to the permanent review and training for workers, contractors and general population about the relationship with the community protocols, 100% of the employees have been trained in the following subjects: Chain of Custody Procedures, Forestry Census, Reduced Impact Logging, FSC Certification, Industrial Safety and First Aid. Additionally, members of the RRCC Advisory Committee were trained and local suppliers were also convened, attending only one (SERFORES) who was trained.
- * With respect to the fact that the corresponding governmental sectors will be institutionally strengthen, through a dynamic interaction and the demonstration that a responsible model is feasible, serious and respectful of the highest standards in relation to forest management, state institutions are being strengthened through the participation in consultation bodies, as well as the participaton as speakers at various events where the scope of the management that has been carried out is disseminated.

In this sense, during the first half of the 2010, the conessions had participated in seven events where the Madre de Dios Amazon REDD Project was exposed and explained to national and foreign (Brazil) officials: Meeting of the Management Committee of Acre River, Business Roundtable with the participation of GFTN USA-Peru organized by WWF-CERF Project, Mahogany Group Meeting, Dialog Event “Environmental Services and REDD in Madre de Dios: Current Status, Meeting of the Working Group for the Management of the Yaverja River Sub Basin, Meeting of the Working Group of the Forum MAP Region and Symposium Forest Management in the Brazilian Amazon and Seminar Celebrating 30 years of Forest Research in Tapajós National Forest by Embrapa, Eastern Amazon.

- * Related to the coordination and supporting actions with adjoining concessions to protect concessioned forests in general, there have been coordination actions with a total of 7 concessions. There is one contract for the use and exploitation of the access path to the concessions and in relation to the opening of said path, there has been coordination actions between the following concessions: MADERACRE SAC, MADERYJA SAC, Agro Industrial VICTORIA SAC, CATAHUA SAC, PUMAQUIRO SAC, TRANSFORESTAL, through three meetings. There is also a service contract for the use and exploitation of the road, which specifies measures for the protection and care of the forest. Two additional meetings were also made, in the framework of the Forest Management Committee, related to the establishment of control posts on the access to the concessions, which at the same time serve as control mechanisms for the protection of the Reserve of Indigenous People in Voluntary Isolation and the Alto Purús National Park, where the following institutions participated: MADERACRE SAC, MADERYJA SAC, Agro Industrial VICTORIA SAC, PUMAQUIRO SAC, AMATEC SAC, RAZOR-BILLED CURASSOW SAC and other civil society actors.

- * Taking into account the development of modern and transparent management tools which help in providing information and the relationship with public institutions, the following documents are available: Protocol to Queries and Requests of Citizens, Protocol for the Public Information on Non-routine Operations of the Company, Action Protocol for Constructive Conflict Transformation and the Annual Public Summary of Activities.

ANNEX 1: PERUVIAN LEGISLATION RELATED TO THE REDD PROJECT

Chart 73: Peruvian legislation related to the REDD Project

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Political constitution of the Country	October 31st, 1993	The Constitution has a chapter that establishes the State Policy with respect to the environment and natural resources. In this way, it is established in Act 66 that natural resources are a patrimony of the Nation, and through organic law the conditions for their use and grant to individuals is established. Respect to the National Policy for the Environment, Act 67 of the Constitution recognizes the promotional role in the use of natural resources, reinforcing the State commitment to develop the possible mechanisms for the conservation and sustainable use of its biological diversity.
Law N° 28611 General Law for the Environment	October 15th, 2005	In Act VI of this Law it is established that the main objectives of the environmental management are to prevent, monitor and avoid environmental degradation, and when it is not possible, to eliminate the causes of said degradation by mitigating, recovering, restoring or by eventual compensation measures that should be adopted. At the same time, article XI mentions that the design and application of public environmental policies are regulated through the environmental governance principle, that conducts to the harmonization of policies, institutions, norms, procedures, tools and information in order to make possible the effective and integrated participation of public and private actors in decision making, handling of conflicts and construction of agreements, on the basis of clearly defined responsibilities, juridical security and transparency. On the other hand, Act 150 of the Law stipulates which actions are susceptible to be rewarded through incentives, those measures or processes that are implemented and executed through the initiative of the holder of the activity and with the objective of reducing and/or preventing environmental pollution and degradation of natural resources.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Law N° 28611 General Law for the Environment		Act 94 of this Law establishes that the protection of water resources, the protection of biodiversity, the mitigation of greenhouse gases and scenic beauty, among others, are environmental services. Since those services generate benefits that are being used without retribution or compensation, the State has the need to establish mechanisms to give value, retribution and maintain the generation of those environmental services, trying to achieve the conservation of ecosystems, biological diversity and the rest of the natural resources. This act finally mentions that the Environmental National Authority (Ministry of the Environment) promotes the creation of financing, payment and monitoring mechanisms for environmental services.
Supreme Decree No. 12-2009-MINAM National Environmental Policy	May 24th, 2009	The elaboration of the National Environmental Policy is a mandate that comes mainly from the Political Constitution of Peru and the General Law for the Environment, constituting a series of public guidance, objectives, strategies and instruments that have the purpose of defining and orienting the actions of the entities of the National, Regional and Local Government, of the private sector and of the civil society, in environmental matters. The National Environmental Policy is divided in 5 objectives, 4 political central ideas and objectives and guidance specific for each policy. One of the objectives of the National Environmental Policy that is relevant for the Project is the one that consists of achieving the conservation and sustainable management of the natural patrimony of the country, with efficiency, fairness and social well being, making a priority the integral management of natural resources. Environmental services are identified within the National Environmental Policy in various issues, establishing the need to promote its economic value through economic and financial instruments, highlighting the importance of implementing conservation systems for forests and protection of said systems from degradation and deforestation.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
National Strategy for Climate Change ⁹²	In restructuration process	Principle 13 of the Strategy establishes the following: "Decrease deforestation looking to control transient agriculture and non-planned human settlements in forests areas that are not appropriate and that origin a land use change". At the same time, the strategies related to the formulation of the Project are the following: (9) "Management of forest ecosystems in order to mitigate their vulnerability to climate change and to improve the capacity of carbon capture" and (11) "Management of fragile ecosystems, especially mountain ecosystems for the mitigation of their vulnerability to climate change".
Legislative Decree No. 1013 Law for the creation of Ministry of Environment	May 15th, 2008	Through this norm the Ministry of Environment is created, its sectorial competency is established and its organic structure and roles are regulated. The Ministry of Environment is the organism in the Executive Power which regulates the environmental sector, develops, directs, supervises and executes the Environmental National Policy. At the same time, it promotes conservation and sustainable use of natural resources, biological diversity and Natural Protected Areas. The environmental sector comprehends the National System of Environmental Management as a functional system, that integrates the National System for the Evaluation of Environmental Impact, the National System for Environmental Information and the National System of State Protected Areas, as well as the management of the natural resources within its competence, biodiversity, climate change, soil management and the rest of the related ambits established by Law.

⁹² The National Strategy for Climate Change is currently under a restructuration process, carried out by the General Direction for Climate Change, Desertification and Water of MINAM.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Supreme Decree No. 006-2009-MINAM: needs denomination and adequate the functioning of the National Commission on Climate Change according to the Legislative Decree No. 1013	March 29th, 2009	The National Commission on Climate Change has the general role of following up the diverse public and private sectors involved in the matter, through the implementation of the Framework for the Convention on Climate Change, which should orientate and inform with respect to the strategies, plans and development projects at national, sectoral and regional level.
Law 26821 Organic Law for the Sustainable Management of the Natural Resources	June 27th, 1997	It regulates the general framework for the sustainable management of natural resources provided these form part of the patrimony of the country. This law establishes that natural resources maintained in their source, being renewable or non-renewable, are patrimony of the Nation. Profits and products from natural resources, obtained in the form established in the present Law, belong to the owners of the rights granted on them. The rights over natural resources are granted to individuals through concessions, permits, and authorizations according to the conditions that are established in the specific norm for each resource. Specific norms include all the mechanisms of economic retribution to the State for the grant, the maintenance of the validity rights, the conditions for the inscription in the corresponding registry, as well as the possibility of cession between private individuals. This means that the control, that is to say the ownership of the profits and products obtained according to this Organic Law, correspond to the owners of the rights granted over the areas where the natural resources that generate them are located. The regulation for the concession to private individuals of the rights over the use of natural resources, renewable and non-renewable, is different according to the nature of said resources.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Law 26839 on Conservation and Sustainable Management of Biological Diversity	July 17th, 1997	It regulates the general framework for the conservation of biological diversity and the sustainable use of its components. It contemplates dispositions relative to planning, inventory and monitoring, mechanisms for conservation, rural and native communities and scientific and technological investigation. The Law establishes that the principles and definitions of the Agreement on Biological Diversity are valid in the application of the Law, it contains an Item on Natural Protected Areas that is in agreement with Law 26834.
Law 28852 Law for the Promotion of Private Investment in Reforestation and Agroforestry	July 28th, 2006	The norm has the objective to declare of national interest the promotion of private investment in reforestation activities with forestry plantations, agroforestry and environmental services. The State promotes the use of negotiable values from the national financing system or any other type of instrument of fixed and/or variable income, allow the financing of forestry plantation, agroforestry and environmental services projects in the country. At the same time, it promotes the constitution and development of Forestry Investment Private Funds oriented to said financing. Act 6 of this Law establishes that the State promotes the negotiation of environmental services, specifically carbon sequestration, with the participation of the private sector in the framework of the agreements on the matter subscribed by the country.
Law 25268 Law that declares of public need and national interest the protection, preservation or reforestation of natural pastures and existent trees in the national territory.	June 22nd, 1990	Said Law declares that it is a public need and a national interest to protect, preserve and reforest natural pastures and existent trees within the territory of the Republic, forbidding irrational and indiscriminate exploitation, as well as burning of pastures

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Ministerial Resolution 104-2009-MINAM Approves procedure for the evaluation and authorization of Greenhouse Gases Emissions Projects (GHG) and carbon capture	May 24th, 2009	With the approval of this procedure, the Ministry of the Environment seeks to promote conservation of the environment, guaranteeing the sustainable use of the natural resources in the framework of the projects developed within the Clean Development Mechanism of the Kyoto Protocol, forestry projects, Reduced Emissions from Degradation and Deforestation (REDD) and programmatic CDM. The General Direction on Climate Change, Desertification and Water Resources of the Ministry of the Environment is competent to give conformance on the projects.
Regional Ordinance No. 007-2009-GRMDD/CR	February 17th, 2009 (date of emission. It has not been published in the official newspaper yet	Approves Dictum No. 003-2009-GOREMAD/CAMAYA that creates the Technical Commission on Climate Change of the Madre de Dios Region, which has the purpose of proposing short, medium and long term measures to sensitize the population and establish plans and programs to avoid the conditions that affect the Amazonian Region, in the framework of the competency of the Regional Governments over the sustainable management of natural resources and improvement of the environmental quality and over the protection and preservation of the reserves and Regional Protected Natural Areas.
Regional Ordinance 032-2009-GRMDD/CR	It was publicly announced on December 4th, 2009. It has not been published in the official newspaper yet	Approves Ecological and Economical Zoning of Madre de Dios at macro level, at a 1:250,000 scale, as a basic instrument for territorial planning, for the implementation of development policies, program, public and private investment projects that contribute to the sustainable development of the region. It identifies the Ecological and Economical Units that help to define the most appropriate use for each space. This implies the identification of areas apt for agriculture, livestock, forestry, fishery, mining - energy, protection, biodiversity conservation, ecotourism, urban - industry, among others.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Regional Ordinance 032-2009- GRMDD/CR		The Ecological and Economical Zoning of Madre de Dios establishes 20 productive areas and within them 14 areas of agriculture and livestock production and 4 areas of forestry production and other associations. In all of them, agriculture, agroforestry, tourism, conservation, reforestation and investigation are established as recommended uses. These areas are graphically represented in map 21 – Simplified Ecological and Economical Zoning.
Legislative Decree No 1079 Establishes measures that guarantee the patrimony of natural protected areas	June 29th, 2008	The Law establishes that the competent authority to administer the native forestry, flora and fauna patrimony within the Protected Natural Areas and their environmental services is the Ministry of the Environment through the National Service for Natural Protected Areas – SERNANP. At the same time, it details the principles that sustain the administrative procedures related to issues referred to renewable natural resources located in the Natural Protected Areas. Said principles are: (1) the principle of prevention, (2) the principle of eminence, (3) the principle of administrative protection, and (4) the principle of environmental governance. The principle of eminent ownership is relevant since it establishes that the rights for the sustainable use of renewable natural resources are granted to private individuals through the modalities that are established in the specific law for each of them. In any case, the State retains the dominium over them, as well as over its profits, in the case when these have not been obtained together with the deeds which granted them. This disposition is in agreement with the regulation of the Organic Law for the Sustainable Management of the Natural Resources.
Law 26834 Law of Natural Protected Areas	July 5th, 1997	The purpose of this Law is the management of Protected Natural Areas and their conservation in conformance with Act 68 of the Political Constitution of Peru. Respect to the management of natural resources in Natural Protected Areas, it establishes in Act 27 that said management would only be authorized if it is compatible with the category, the assigned zoning and Master Plan of the area.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Law 26834 of Natural Protected Areas		The management of resources should not affect the compliance with the final purpose for which the area was established. In this same line, Act 28 of the Law establishes that the requests to manage natural resources within Protected Natural Areas of SINANPE and the Regional Conservation Areas, will be negotiated before the competent authority following the guidance of Act 27. The authorization granted requires the previous favorable opinion of the SERNANP.
Supreme Decree No. 038-2001-AG Regulation for the Natural Protected Areas	June 27th, 2001	This norm allows the management of natural resources in Natural Protected Areas and Buffer Areas, when their conservation and that of its environmental services is guaranteed. Respect to the renewable natural resources management within a Protected Natural Area of direct use, the Regulation established that said management is done according to the assigned zoning, based in an adequate monitoring and under the conditions allowed by the Native Forestry and Fauna Law and its Regulation, the Master Plan of the ANP, the Master Plan of the area and the respective management plan. On the other hand, the regulation includes Act 107 to determine that it is possible to carry out the management of non-wood forestry products for consumption or commercialization, giving priority to the local population, in Protected Natural Areas of direct use within the areas that allow it and according to the corresponding specific management plans.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Law 27308 Law on Forestry and Native Fauna	July 8th, 2000	The purpose of this Law is to norm, regulate and supervise the sustainable use and the conservation of the forestry and native fauna resources of the country, making its management compatible with the progressive valorization of the environmental services of the forest, according to the established in Acts 66 and 67 of the Public Constitution of Peru, in the General Law for the Environment, in Law N° 26821, in the Organic Law for the Sustainable Management of the Natural Resources and in the International Agreements in force for the Peruvian State. It establishes the modalities to manage forestry resources in concessions (wood and non-wood end use), permits (for forests in private properties, secondary forests and forestry plantations) and authorizations (for dry forests and nurseries). It establishes that all management of forestry products and native fauna is subject to the payment of rights in favor of the State. It recognizes the participation of the private sector in the development and the commercialization of environmental services, including Reducing Emissions from Avoided Deforestation.
Law 27795 Law for the demarcation and territorial organization	February 24th, 2003 and modified on February 15th, 2006	The purpose of this Law is to establish the basic definitions, technical criteria and procedures for the treatment of territorial demarcation that is exclusive competence of the Executive Power in accordance with numeral 7) of Act 102 of the Political Constitution of Peru, as well as achieving the definition of boundaries and the rational organization of the territory of the Republic. In this Law populations of more than 150 people are established as Population centers, less than 150 people are considered as scattered population.
Supreme Decree 14-2001-AG Regulation of the Forestry and Native Fauna Law	April 10th, 2001	It is relevant to indicate that it regulates the modalities to manage forestry resources. Among them are the conservation concessions, concessions for the management of other resources from the forest (among them chestnut) and concessions for reforestation and forestry plantations.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Law N° 27783 Law for the Basis of Decentralization	July 17th, 2002	It regulates the structure and organization of the State in a democratic, decentralized and non-concentrated way, corresponding to the National Government, Regional Governments and Local Governments. At the same time, it defines the norms that regulate the administrative, economic, productive, financial tributary and fiscal decentralization. Also, the law determines the competency of the three levels of the Government and determines the goods and resources of the regional and local Governments; and regulates the relationships of the Government in its different levels. Act 36 mentions the shared competencies, being one of them promotion, management and regulation of the economic and productive activities in their scope and level, corresponding to the different sectors, including the environment.
Law 27867 Organic Law of the Regional Governments	November 19th, 2002	Law that in Acts 9° and 10° establishes constitutional competencies which are exclusive and shared with the Regional Governments in environmental matter in order to promote and regulate activities or services within the environmental sector. It also establishes exclusive competencies to promote the sustainable use of forestry and biodiversity resources; and shared competencies for the sustainable management of natural resources, the improvement of the environmental quality and the preservation and administration of the reserves and protected natural areas at regional level. Act 53 of said Law establishes the functions of the Regional Government in environmental and territory order matter. So that Regional Governments can execute their assigned competencies according to this Law a process of transference of said competencies should be followed, which has the objective to credit that this level of governance has the institutional capacity to assume them.

Norm	Starting date of implementation	Acts that demonstrate the compatibility of the law with the development / implementation of the project
Legislative Decree N° 1085 It creates the Organism of Supervision of Native Forestry and Fauna (OSINFOR)	June 28th, 2008	It creates the OSINFOR, which has in charge the supervision and fiscalization of the sustainable management and the conservation of native fauna and forestry resources, as well as the environmental services from the forests, granted by the State through the different means of management, recognized by the Native Forestry and Fauna Law and its regulation.
Law 29263 Law on Environmental Crimes	October 2nd, 2008	This Law modifies the penal types of environmental crimes and against the environment and typifies their aggravated forms, such as illegal trade of species of protected flora and fauna, illegal trade of protected flora and fauna aquatic species, illegal extraction of aquatic species, depredation of protected flora and fauna, illegal trade of genetic resources, crimes against forests and forest formations, among other related crimes.
Supreme Decree N° 010-2004-AG	2004	Determine the presentation of an establishment and management forestry plan including complementary management of natural resources, for the granting of diverse concession contracts for reforestation
Supreme Decree N° 013-2004-AG	2004	Advances from Act of Supreme Decree N° 010-2004-AG referred to the granting of concession contracts for reforestation in forestry recovery areas.
Ministerial Resolution N° 0253-2004-AG	2004	Approves Complementary Dispositions for the Implementation and Granting of the Concessions for Forestry and / or reforestation.
Supreme Decree N° 003-2005-AG	2005	Declare of national interest the reforestation in lands with a major capacity for forestry use and in protection lands without a vegetative cover or with scarce tree cover.

ANNEX 2: GLOSSARY OF THE MAIN VEGETAL COVER CATEGORIES

A glossary of the main vegetal cover categories employed in this PDD, especially in the post-deforestation analysis is detailed, together with the operational definition for each case. The definitions were extracted from the CDC-UNALM report for the Interoceanic Road, given to the auditor during the field visit. The categories include forest, agriculture, cattle livestock, roads, hydrography, among other common uses of the land in Madre de Dios.

Type	Description
Hydrography	This class corresponds to the volume and courses of water (rivers, lakes and ponds), being islands in a separate category (see code 19)
Forest	Continuous areas of forest identified by the spectral response. Corresponds to primary and secondary forest
Clouds	Class that reunites all the areas covered by clouds
Shadows	Due to the fact that the area is mostly flat, the class "shadows" corresponds to the shadows created by the clouds
Sand banks	Corresponds to the sandbanks in the river areas, associated to the fluvial dynamics
Islands	As in the previous case, this category is limited to river areas and it refers to the vegetation islands in the area
Agricultural activity	Agricultural activity
Livestock	Deforested areas to install pastures for livestock
Farming	Areas where agricultural, farming or livestock activities are not possible to distinguish and it involves both activities in different proportions
Highways/roads	Paved and unpaved roads and trails
Land fields	Fields and airstrips
Urban areas	Communities and cities
Forestry activity	Areas used as logs storage areas for wood logs in the forest, commonly known as log yards

ANNEX 3: POTENTIAL BIODIVERSITY IMPACTS OF THE PROPOSED PROJECT ACTIVITY

According to the SCS Final Madre de Dios Amazon REDD Project Validation Report, the biodiversity assessment was conducted in partnership with WWF and used an appropriate methodology involving transect samplings. Threats to biodiversity are well-cited, referring to study materials on the effects of development in the Amazonian frontier. The effects of the Trans-Amazonian highway were validated during a field visit across the border into Brazil, where the highway and effects of the highway have been present for many years and area in stark contrast to the current biodiversity conditions in the project area.

1. Biodiversity impacts within the project area under the without REDD project scenario

The absence of the REDD project will have a negative influence on the different biodiversity components, as they currently exist within the Maderacre and Maderyja concessions area. In this sense, the implementation of the REDD project would have a net positive benefit.

Following, a description of the biodiversity risks or impacts that would occur within the concessions in a without REDD project scenario is presented. A without REDD project scenario means a scenario where no forestry management guidelines, custody plans, training plans, skills development and monitoring activities would be carried out due to the lack of financing, fact that would be configured in a scenario without the revenue of carbon credits that are required for the implementation of the REDD project.

FLORA COMPONENT – Negative impacts:

- Loss and degradation of the genetic variability of the forest species caused by:
 - * The implementation of forestry operations (selective logging, collateral damage by the exploitation) without applying the adequate guidelines stated within the Forestry Management Plans. This due to the lack of training of the staff (harvesting without the application of reduced impact logging criteria) and the lack of monitoring of the quality of forestry operations.
 - * The deforestation caused by invaders for the installation of shifting agriculture and pastures for livestock in the absence of an adequate custody system.
- Extinction of local populations of timber species that are currently included within the appendixes II and III of CITES, as the case of Mahogany (*Swietenia macrophylla*) and Cedar (*Cedrela odorata*), and other species that are currently gaining commercial importance within the region, as is the case of hardwood species for flooring (Cumaru - *Dipteryx spp.* and Estoraque - *Myroxylon balsamun*, among others). This due to the invasion of the area by illegal loggers in the absence of sufficient funds for implementing the Custody Plans of the concessions.

- Total loss of the vegetation coverage in certain sectors caused by deforestation by invaders for the installation of human settlements, shifting agriculture and pastures for livestock.
- Alterations in the forest natural regeneration processes after its exploitation due to invasions of the area by illegal loggers.
- Increase in herbaceous and/or weed species invasions due to the deforestation for the installation of crops or pastures, as well as the excessive forest clearing by illegal loggers.
- Increase in the occurrence of pests due to changes in microclimates caused by deforestation and the reduction of fauna controller populations due to illegal hunting and the loss of habitats.

WILDLIFE - Negative impacts:

- Loss and degradation of the genetic variability and local extinction of wildlife by the impacts of illegal hunting (dead animals, displacement of wildlife populations) carried out by the people of areas within the concessions surroundings and by illegal loggers which would entry into the area due to the inability of the concessions to apply their Custody Plans without the revenues of the carbon credits.
- Loss and degradation of habitats and critical sites for wildlife, as “collpas”, wallows, fruit trees and caves or tree hollows, caused by:
 - * The implementation of forestry operations without an adequate application of the guidelines stated within the Forestry Management Plans, this by the lack of training for the personnel (harvesting without applying reduced impact logging criteria) and the lack of monitoring of the quality of the forestry operations.
 - * The deforestation caused by invaders for the installation of shifting agriculture and pastures for livestock.
- Loss and degradation of habitats for fish, caused by:
 - * The increase of sediments and filling of superficial water courses due to soil erosion during the implementation of forestry operations without applying reduced impact logging criteria and by the deforestation caused by invaders for the installation of shifting agriculture and pastures for livestock.
 - * The pollution of superficial water courses with fuel traces and lubricants, due to a poor waste management when carrying out forestry operations and the presence of invaders or illegal loggers within the area.

- Increase in the loss of forest connectivity due to the construction of forestry roads without applying reduced impact logging criteria and thus making difficult the displacement of wildlife.

PHYSICAL COMPONENT:

CLIMATE COMPONENT – Negative impacts:

- Increment in the levels of temperature alteration in microclimates caused by the increase in areas of land with direct exposure to sunlight. This due to the increase of those sectors where infrastructure for harvesting without applying reduced impact logging criteria would be installed and by the deforestation caused by invaders for the installation of shifting agriculture and pastures for livestock.

AIR COMPONENT – Negative impacts:

- Emission of smoke and dust into the air by the poor management of the machinery and burning practices caused by invaders within the timber concessions area before the lack of an adequate monitoring system.

LANDSCAPE COMPONENT – Negative impacts:

- Landscape degradation caused by:
 - * The implementation of forestry operations without applying reduced impact logging criteria.
 - * Forest fires caused by anthropogenic activities within the camping sites and operation sectors.
 - * Forest fires caused by anthropogenic activities of invaders in their slash & burn processes for the installation of shifting agriculture and pastures. The exposure of soils to sunlight facilitates the invasion by herbaceous or weed species which with the increase in the temperature of microclimates favors the occurrence of forest fires.

SOIL COMPONENT – Negative impacts:

- Land degradation due to erosion, compaction and pollution caused by a poor management of machinery and fuels and the application of high impact exploitation techniques.

WATER COMPONENT – Negative impacts:

- Water pollution due to the increase of eroded sediments and traces of fuels carried by currents due to a poor management of machinery and fuels.

2. Biodiversity impacts within the project area under the with REDD project scenario

Following, a brief description of the positive and negative biodiversity impacts that would occur within the concessions area as a result of the implementation of the REDD project is presented.

FLORA COMPONENT – Positive impacts:

- Decrease in the loss and degradation of the genetic variability of the forest species as a result of the implementation of forestry operations applying low impact criteria, according to the guidelines stated within the Management Plans of the concessions, as well as by the implementation of an adequate custody system which will result in avoiding deforestation caused by invaders for the installation of human settlements and/or shifting agriculture and pastures for livestock.
- Minimize the risk of extinction of local populations of timber species that are currently included within the appendixes II and III of CITES, as the case of Mahogany (*Swietenia macrophylla*) and Cedar (*Cedrela odorata*), and other species that are currently gaining commercial importance within the region, as is the case of hardwood species for flooring (Cumaru - *Dipteryx spp.* and Estoraque – *Myroxylon balsamun*, among others). This due to the implementation of an adequate custody system of the area, which will avoid the invasion of the area by illegal loggers.
- Minimize the total loss of the vegetation coverage due to the deforestation caused by invaders for the installation of human settlements, shifting agriculture and pastures for livestock.
- Minimize the risk of alterations in the forest natural regeneration processes as a result of invasions by illegal loggers.
- Reduction of the forestry pests that might occur due to changes in the microclimate caused by a decrease in deforestation and the conservation of fauna controller populations.

WILDLIFE – Positive impacts:

- Reduction of the loss and degradation of the genetic variability of wildlife species thanks to the hunting prohibition and the implementation of an adequate custody system within the concessions area.

- Minimize the loss and degradation of habitats and critical sites for wildlife, as “collpas”, wallows, fruit trees and caves or tree hollows, thanks to the implementation of low impact forestry operations and the implementation of an adequate custody system, which will also avoid the invasion of the area for the installation of shifting agriculture and pastures for livestock.
- Reduction of the loss and degradation of habitats for fish fauna thanks to the implementation of low impact forestry operations and the implementation of an adequate custody system, which will also avoid the invasion of the area for the installation of shifting agriculture and pastures for livestock that could reduce the quality of the water.
- Minimize the risk of loss of forest connectivity due to the application of a forestry exploitation system and construction of forestry roads including the use of low impact criteria and therefore favoring the displacement of wildlife.

In relation to the aforementioned impacts of the project on flora component and wildlife, following there is a description of the current status of the most important species and actions conducted during 2010⁹³:

- * The percentage of remnant individuals post-harvesting of *Swietenia macrophylla* species in Maderacre concession is 40% (DBH > Minimum Harvesting Diameter) and in Maderyja concession is 16.67%. Additionally, the percentage of remnant individuals post-harvesting of *Cedrela odorata* species in Maderacre concession is 80.36% (DBH > MHD) and in Maderyja concession is 59.18%. This amount of remnants in each species, together with the individuals with lower diameter classes, ensure the health of their populations, as well as the fulfillment of their ecological roles in the forest.
- * The average percentage of remnant individuals of hardwood species post-harvesting in Maderacre concession is 58.57% (DBH > MHD). The species with the highest harvesting intensity was *Dipteryx spp.*, leaving as remnants 34.91% of the population above the DBH; even though it is an important quantity of remnant trees that together with the individuals with lower diameter classes guarantee the health of their populations, as well as the fulfillment of their ecological roles in the forest. In Maderyja concession the average percentage of remnant individuals of hardwood species post-harvesting is 48.11%, being also *Dipteryx spp.* the species with the highest harvesting intensity, with 24.12% of remnants.

⁹³ According to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, already submitted to the CCBA.

- * During the 2010 period, there were no hunting events registered or reported within the Madre de Dios Amazon REDD project area. This effective prohibition of hunting, together with the high percentages of remnant individuals of timber species harvested that ensure that these continue to fulfill the ecological roles, guarantees the conservation of controlling fauna populations and therefore the risk of occurrence of forest pests is low.
- * The percentage of sites of importance for wildlife affected within the Madre de Dios Amazon REDD project area, during the 2010 period, is zero.

PHYSICAL COMPONENT:

CLIMATE COMPONENT – Positive impacts:

- Reduction of the levels of temperature alteration in microclimates due to the higher conservation of forest areas that reduce the direct exposure of soils to sunlight.

AIR COMPONENT – Positive impacts:

- Reduction of the smoke and dust emissions into the air due to an adequate management of the machinery and the reduction of emissions by the absence of burning practices thanks to the implementation of an adequate custody system.

During the 2010 period, there were no burning events of forest fires registered within the Madre de Dios Amazon REDD project area. In addition to this, in Maderacre concession 5464 Gl of Diesel and 227 Gl of Gasoline have been consumed for forest operations in the current harvesting and in Maderyja concession 9612 Gl of Diesel and 400 Gl of Gasoline.

LANDSCAPE COMPONENT – Positive impacts:

- Conservation of landscapes due to the implementation of low impact forestry operations, the prohibition of burnings within the exploitation operations of both concessions, as well as the implementation of an adequate custody system that avoids the invasion for the installation of shifting agriculture and livestock.

In this regard, both Maderacre and Maderyja concessions have approved their FSC audits for the 2010 period, which implies that within the Madre de Dios Amazon REDD project area all forest operations are being implemented according to reduced impact criteria, burnings are being prohibited and there is an adequate custody system in operation.

SOIL COMPONENT – Positive impacts:

- Soil conservation, reduction of the erosion, compaction and pollution thanks to an adequate management of the machinery, fuels and the application of reduced impact logging practices.

In this respect, during the 2010 period, there were no deviations of dragging paths nor spills of fuel registered on the soil.

WATER COMPONENT – Positive impacts:

- Water conservation, reduction of water silting and pollution as a result of an adequate management of the machinery and fuels and the application of reduced impact logging practices.

In this sense, during the 2010 period there was obstruction of 3 seasonal watercourses and of low flow within the Madre de Dios Amazon REDD project area. At the conclusion of the field work, these obstructions were rehabilitated. Additionally, no fuel spills into the water were registered.

3. Quantification of the biodiversity impacts within the project area

For the quantification of the impacts, the following scale of values was used. It is important to take into account that in assigning values to the impacts, the magnitude or intensity and the scale to achieve it were considered:

Considering the intensity of the impact

Value	Description
3	High positive impact
2	Medium positive impact
1	Low positive impact
0	No impact
-1	Low negative impact
-2	Medium negative impact
-3	High negative impact

Considering the scope of the impact

Level	Description
3	Large positive impact
2	Intermediate positive impact
1	Focused positive impact
0	No impact
-1	Focused negative impact
-2	Intermediate negative impact
-3	Large negative impact

Following, the quantification matrixes of the biodiversity impacts within the project area are presented for both scenarios without REDD and with REDD project scenario.

Chart 74: Quantification matrix of the biodiversity impacts within the project area under the without Madre de Dios Amazon REDD project scenario

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
Native flora	Loss and degradation of the genetic variability of the forest species	-2	-2	-2
	Extinction of local populations of timber species that are currently included within the appendixes II and III of CITES and other species which are gaining commercial importance within the region	-2	-2	-2
	Total loss of the vegetation coverage in certain sectors due to the deforestation caused by invaders for the installation of human settlements, shifting agriculture and pastures for livestock	-3	-2	-2.5
	Alterations in the forest natural regeneration processes after its exploitation due to invasions of the area by illegal loggers	-2	-1	-1.5
	Increase in herbaceous and/or weed species invasions due to the deforestation for the installation of crops or pastures, as well as the excessive forest clearing by illegal loggers	-1	-1	-1
	Increase in the occurrence of pests due to changes in microclimates caused by deforestation and the reduction of fauna controller populations due to illegal hunting and the loss of habitats	-2	-1	-1.5
SUB TOTAL		-12	-9	-10.5
Wildlife	Loss and degradation of the genetic variability and local extinction of wildlife species due to the impacts of illegal hunting	-2	-2	-2
	Loss and degradation of habitats and critical sites for wildlife, as "collpas", wallows, fruit trees and caves or tree hollows.	-2	-2	-2
	Loss and degradation of habitats for fish fauna	-2	-2	-2
	Increase in the loss of forest connectivity	-1	-1	-1
SUB TOTAL		-7	-7	-7

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
Climate	Increase in the levels of temperature alterations in microclimates due to deforestation	-1	-1	-1
SUB TOTAL		-1	-1	-1
	Smoke and dust emissions into the air due to a poor management of the machinery and burning practices by invaders within the timber concessions before the lack of an adequate monitoring system	-2	-1	-1.5
SUB TOTAL		-2	-1	-1.5
Landscape	Landscape degradation due to the implementation of high impact forestry practices and the occurrence of forest fires	-2	-2	-2
SUB TOTAL		-2	-2	-2
Soil	Soil degradation by erosion, compaction and pollution caused by a poor management of machinery and fuels and the application of high impact exploitation techniques	-2	-2	-2
SUB TOTAL		-2	-2	-2
Water	Water pollution by the increase in eroded sediments and traces of fuels carried by currents, due to a poor management of machinery and fuels	-2	-2	-2
SUB TOTAL		-2	-2	-2
TOTAL		-28	-24	-26

Chart 75: Quantification matrix of the biodiversity impacts within the project area under the with Madre de Dios Amazon REDD project scenario

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
Native flora	Reduction of the loss and degradation of the genetic variability of timber species	2	2	2
	Minimizing of the risk of extinction of local populations of timber species that are currently included within the appendixes II and III of CITES and other species which are gaining commercial importance within the region	3	2	2.5
	Minimizing of the total loss of the vegetation coverage due to the deforestation caused by invaders for human settlements, shifting agriculture and pastures for livestock	3	2	2.5
	Minimizing of the risk of alterations in the forest natural regeneration processes due to invasions of the area by illegal loggers	3	2	2.5
	Reduction of the increasing rate of forestry plagues by changes in the microclimate due to the reduction of deforestation and the conservation of species of fauna controllers	2	2	2
SUB TOTAL		13	10	11.5
Wildlife	Reduction of the loss and degradation of the genetic variability and the local extinction of wildlife species	2	2	2
	Minimizing of the loss and degradation of habitats and critical sites for wildlife such as "collpas", wallows, fruit trees and caves or tree hollows	3	2	2.5
	Reduction of the loss and degradation of habitats for fish fauna	2	2	2
	Minimizing of the risk of loss of forest connectivity	2	2	2
SUB TOTAL		9	8	8.5
Climate	Reduction of the levels of temperature alteration in microclimates due to the higher conservation of forest areas that reduce the direct exposure of soils to sunlight	2	2	2
SUB TOTAL		2	2	2

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
Air	Reduction of the smoke and dust emissions into the air due to an adequate management of the machinery and the reduction of emissions by the absence of burning practices thanks to the implementation of an adequate custody system	2	2	2
SUB TOTAL		2	2	2
Landscape	Conservation of landscapes due to the implementation of reduced impact logging forestry operations, the prohibition of burnings within the exploitation operations of both concessions, as well as the implementation of an adequate custody system that avoids the invasion for the installation of shifting agriculture and livestock.	2	2	2
SUB TOTAL		2	2	2
Soil	Soil conservation, reduction of the erosion, compaction and pollution thanks to an adequate management of the machinery, fuels and the application of reduced impact logging practices.	2	2	2
SUB TOTAL		2	2	2
Water	Water conservation, reduction of water silting and pollution as a result of an adequate management of the machinery and fuels and the application of reduced impact logging practices.	2	2	2
SUB TOTAL		2	2	2
TOTAL		32	28	30

The following charts show a comparative summary between the different scenarios previously analyzed:

Value of the biodiversity impacts within the project area under the with REDD project scenario	
Total biodiversity impact with REDD project	30

Value of the biodiversity impacts within the project area under the without REDD project scenario	
Total biodiversity without REDD project	-26

In summary and considering also the offsite biodiversity impacts (see Annex item D, page 65) the total offsite and within the project area biodiversity impacts in a with and without project scenario can be appreciated in the following charts:

Value of the biodiversity impacts under a with REDD project scenario	
Offsite impacts	13
Impacts within the project area	30
Total impacts in a with project scenario	43

Value of the biodiversity impacts under a without REDD project scenario	
Offsite impacts	-32.5
Impacts within the project area	-26
Total impacts in a without project scenario	-58.5

Taking into account the above charts, it can be appreciated that the net biodiversity benefit of the project is positive, showing that the impact under a without project scenario is negative, while under a with project scenario the impact is not only positive but also the negative impacts under a without project scenario would be minimized or avoided through the implementation of the project.

In this regard, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project states that the potential negative offsite biodiversity impacts are in the PDD. Projects proponents have listed negative offsite impacts of the project and how they will be mitigated. These impacts are:

- * Impacts on flora: loss and degradation of the genetic variability of timber species caused by deforestation by private landowners for the purpose of installation of new land use systems outside the REDD project area, in the framework of its implementation.
- * Impacts on wildlife: loss and degradation of habitats and critical sites for wildlife, as “collpas”, wallows, fruit trees and daves or tree hollows, as a consequence of deforestation within private properties for the installation of new land use systems in the framework of the implementation of the REDD project. If the implementation of land use systems, in the framework of the REDD project, involves the installation of agricultural crops, they could generate changes in nourishing patterns and habitat use of some wildlife species with greater adaptability to changes in their habitats.

Said Report also mentions that mitigation measures for potential negative offsite biodiversity impacts are listed and include the development of productive projects for an efficient use of the land, projects that use less land area for wealth production (used hectares / dollar earned) will be prioritized and strengthening environmental education with village schools in the buffer areas, workshops and audiovisual communication on the reduction of deforestation, degradation and burning of pastures as alternatives for the reduction of climate change. The use of crops in a permanent and diversified agroforestry system and whose species are not of high interest for wildlife will be prioritized.

Finally, it adds that unmitigated negative offsite biodiversity impacts are marginal compared to the biodiversity in the “without-project” scenario. This conclusion is demonstrated and justified in the PDD. Negative offsite biodiversity impacts are minimal, the scope and intensity of these impacts is shown also in the PDD. Most impacts are outside the project area (buffer zone) and there are likely to be mitigated. Project positive impacts on biodiversity are also listed in the PDD. Based on a qualitative assessment done by the project proponents and revised by the auditor, the balance is likely to be positive.

4. Offsite biodiversity impacts under a without REDD project scenario

Following, a description of the offsite biodiversity risks or impacts that would occur in a without REDD project scenario is presented.

A without REDD project scenario means a scenario where no forestry management guidelines, custody plans, training plans, skills development and monitoring activities would be carried out due to the lack of financing, fact that would be configured in a scenario without the revenue of carbon credits that are required for the implementation of the REDD project.

FLORA COMPONENT – Negative impacts:

- Loss and degradation of the genetic variability of the forest species caused by the highly selective illegal logging and the deforestation of forests by private landowners for the installation of shifting agriculture, permanent agriculture and pastures for livestock.
- Local extinction of timber species that are currently gaining commercial importance within the region, as the case of hardwood species for flooring, this due to illegal logging.
- Total loss of vegetation coverage caused by deforestation of private properties for the installation of shifting agriculture, permanent agriculture and pastures for livestock.
- Invasions of intact and residual forests containing exotic species of grains and other herbaceous species used as forage for cattle feed.
- Increase of pests that might occur due to changes in the microclimate caused by deforestation and the reduction of fauna controllers populations due to illegal hunting and habitat loss.

WILDLIFE – Negative impacts:

- Loss and degradation of the genetic variability of wildlife species due to the impacts of illegal hunting on species moderately demanded by the local population.
- Extinction of local wildlife species caused by the impacts of illegal hunting on species highly demanded by the local population.
- Loss and degradation of habitats and critical sites for wildlife, as “collpas”, wallows, fruit trees and caves or tree hollows, as a consequence of deforestation within private properties for the installation of shifting agriculture, permanent agriculture and pastures for livestock.
- Loss and degradation of habitats for fish fauna caused by:
 - * The increase of sediments and filling of superficial water courses due to soil erosion in deforested areas in which cultures free of cover and pastures for livestock have been or would be installed.
 - * The pollution of superficial water courses with fuel traces, lubricants, nutrients incorporation and toxic waste from fertilizers and insecticides used in agricultural and livestock production.

- Fragmentation and loss of forest connectivity due to the construction of roads and the deforestation of large and small areas in a disorderly manner and thus reducing the availability of habitats and resources needed for the existence and development of viable wildlife populations.
- Changes in nourishing patterns and habitat use of some wildlife species with a greater adaptability to changes in their habitats. This is because there are some wildlife species that feed on agricultural crops and tend to increase their populations in areas surrounding said crops cover.

PHYSICAL COMPONENT:

CLIMATE COMPONENT – Negative impacts:

- Increase in the levels of temperature alteration in the region by the increasing in the areas of land with direct exposure to sunlight, this due to the increasing in deforestation.

AIR COMPONENT – Negative impacts:

- Increase in the pollution levels of smoke and dust in the air due to agricultural and livestock activities and the annual burning of new forest areas and pastures already installed for cattle.

LANDSCAPE COMPONENT – Negative impacts:

- Landscape degradation caused by:
 - * The fragmentation and loss of forest connectivity due to the construction of roads and the deforestation of large and small areas of land in a disorderly manner.
 - * Forest fires caused by anthropogenic activities, favored by large areas without forest coverage destined to the installation of pastures, places where high temperature and low humidity conditions facilitate their occurrence.
- Increase in the levels of noise pollution due to the productive activities carried out within the area.

SOIL COMPONENT – Negative impacts:

- Soil degradation due to erosion, compaction and pollution caused by the application of slash and burn practices, overgrazing and the poor management of machinery and fuels.

WATER COMPONENT – Negative impacts:

- Water pollution due to the increase of eroded sediments carried by currents because of poor management of machinery and fuels, as well as the increase in nutrients by the establishment of livestock.

5. Offsite biodiversity impacts under a with REDD project scenario

FLORA COMPONENT – Positive impacts:

- Decrease in the loss and degradation of the genetic variability of the forest species caused by highly selective illegal logging and the deforestation of forests by private landowners for the installation of shifting agriculture, permanent agriculture and pastures for livestock.
- Reduction of the probabilities of extinction of local populations of timber species that are currently gaining commercial importance within the region due to illegal logging, as is the case of hardwood species for flooring. This due to the dissemination work of environmental education and the promotion of the installation of more environmentally friendly land use systems.
- Decrease in the rate of deforestation due to the total loss of the vegetation coverage within private properties for the installation of shifting agriculture, permanent agriculture and pastures for livestock, as a consequence of promoting the installation of more environmentally friendly land use systems.
- Decrease in the risk of invasions of intact and residual forests containing exotic species of grains and other herbaceous species, as a consequence of the reduction of the establishment of livestock that usually uses said species as forage for cattle feed.
- By the reduction of the deforestation and hunting outside the project area, a reduction of pests that might occur due to changes in the microclimate caused by deforestation and the reduction of fauna controllers populations due to illegal hunting and habitat loss would occur.

Negative impacts:

- Loss and degradation of the genetic variability of timber species caused by deforestation by private landowners for the purpose of installation of new land use systems outside the REDD project area, in the framework of its implementation.

Mitigation measures:

- The project has as one of its objectives the strengthening of existing initiatives and the development of productive projects for an efficient use of the land or environmentally friendly projects. Although said projects may imply a change in the use of the land, this objective will be oriented to the implementation of low-impact systems and to reduce deforestation and forest degradation in the communities or sectors located outside the project area. It is intended that the rate of deforestation or degradation by implementing the project is less than the projected in the modeling. In this sense, those projects that use less land area for wealth production (used hectares / dollar earned) will be prioritized.
- Support in strengthening the Environmental Education with the implementation of:
 - * Talks in the village schools within the buffer area of the REDD project, focused on the development of environmental awareness and with emphasis on alternatives for the reduction of climate change through reducing deforestation, degradation and burning of pastures. The target audience will be children and adolescents.
 - * Workshops to strengthen an environmental awareness, with emphasis on the reduction of deforestation, degradation and burning of pastures as alternatives for the reduction of climate change. The target audience will be communities and villages within the buffer area of the REDD project.
 - * Dissemination of audiovisual communications, containing ecologic information, at provincial level.

WILDLIFE COMPONENT – Positive impacts:

- Reduction of the loss and degradation of the genetic variability of wildlife species due to the impacts of illegal hunting on species moderately demanded by the local population.
- Decrease in the risk of extinction of local wildlife species caused by the impacts of illegal hunting on species highly demanded by the local population.
- Reduction of the loss and degradation of habitats and critical sites for wildlife, as “collpas”, wallows, fruit trees and caves or tree hollows, as a consequence of deforestation within private properties for the installation of shifting agriculture, permanent agriculture and pastures for livestock. This due to the dissemination work of environmental education and the promotion of the installation of more environmentally friendly land use systems.

- As a result of the environmental education dissemination work and the promotion of more environmentally friendly land use systems, a reduction of the loss and degradation of habitats for fish fauna would occur. These currently suffer from:
 - * The increase of sediments and filling of superficial water courses due to soil erosion in deforested areas in which cultures free of cover and pastures for livestock have been or would be installed.
 - * The pollution of superficial water courses with fuel traces, lubricants, nutrients incorporation and toxic waste from fertilizers and insecticides used in agricultural and livestock production.
- Reduction of the fragmentation and loss of forest connectivity due to the planned construction of new roads and the reduction of the size of deforested areas for the implementation of REDD projects and thus favoring the availability of habitats and resources needed for the existence and development of viable wildlife populations outside the project area.

Negative impacts:

- Loss and degradation of habitats and critical sites for wildlife, as “collpas”, wallows, fruit trees and caves or tree hollows, as a consequence of deforestation within private properties for the installation of new land use systems in the framework of the implementation of the REDD project.

Mitigation measures:

- The project has as one of its objectives the strengthening of existing initiatives and the development of productive projects for an efficient use of the land or environmentally friendly projects. Although said projects may imply a change in the use of the land, this objective will be oriented to the implementation of low-impact systems and to reduce deforestation and forest degradation in the communities or sectors located outside the project area.

It is intended that the rate of deforestation or degradation by implementing the project is less than the projected in the modeling. In this sense, those projects that use less land area for wealth production (used hectares / dollar earned) will be prioritized.

- If the implementation of land use systems, in the framework of the REDD project, involves the installation of agricultural crops, they could generate changes in nourishing patterns and habitat use of some wildlife species with a greater adaptability to changes in their habitats. This is because there are some wildlife species that feed on agricultural crops and tend to increase their populations in areas surrounding said crops cover. Among these species, the most frequent and those whose existence has been reported within and outside the project area, are the following: majaz (*Agouti paca*), añuje (*Dasuprocta spp.*), conejo silvestre (*Sylvilagus brasiliensis*), sajino (*Tayassu tajacu*), huangana (*Tayassu pecari*), etc.

Mitigation measures:

- If the productive projects to be implemented within the framework of the REDD project involve the installation of agricultural crops, the installation of those crops that imply a permanent and diversified agroforestry system and whose species are not of high interest for wildlife will be prioritized.

PHYSICAL COMPONENT:

CLIMATE COMPONENT – Positive impacts:

- Reduction of the levels of temperature alteration in certain sectors caused by the decreasing in the size and distribution of areas of land with direct exposure to sunlight, this due to the reduction of deforestation by the implementation of projects of more efficient use of the land.

AIR COMPONENT – Positive impacts:

- Decrease in the pollution levels of smoke and dust in the air due to the reduction of the installation of agricultural and livestock systems and the annual burning of new forest areas and pastures already installed for cattle.

Negative impacts:

- Emission of smoke and dust into the air by the installation of processing industries of the inputs from systems of land use installed, in the framework of the implementation of the REDD project.

Mitigation measures:

- If the productive projects to be implemented outside the project area involve the installation of plants or industries, the installation of those showing a lower impact on air emissions, in comparison with similar systems or by the use of modern technologies will be prioritized.

LANDSCAPE COMPONENT – Positive impacts:

- Reduction of landscape degradation caused by the fragmentation of the forests due to the construction of planning new roads and the decrease in the deforestation of large areas.
- Reduction of landscape degradation by the absence of the use of burning practices for the installation of new land use systems, which will also reduce the risk of forest fires in the areas surrounding the new productive projects.

Negative impacts:

- Landscape degradation by the installation of plants or processing industries of inputs from systems of land use installed in the framework of the implementation of the REDD project.

Mitigation measures:

- If the productive projects to be implemented outside the project area involves the installation of plants or industries, those that will be installed in areas already deforested prior to the start of the REDD project and preferably classified as of industrial use will be prioritized.

- Increase in the levels of noise pollution due to the productive activities and the processing industries that will be installed in the framework of the implementation of the REDD project.

Mitigation measures:

- If the productive projects to be implemented outside the project area involve the installation of plants or industries, the installation of those showing a lower impact on the environment due to noise emissions, in comparison with similar systems or by the use of modern technologies will be prioritized.

SOIL COMPONENT – Positive impacts:

- Reduction of soil degradation by the decrease in deforestation due to the installation of poorly managed agricultural and livestock systems.

Negative impacts:

- Land degradation due to erosion, compaction and pollution caused by the implementation of land use systems which imply changes on forest coverage.

Mitigation measures:

- If the productive projects to be implemented outside the project area involve changes on soil coverage, the installation of those systems that minimize changes on forest coverage, which imply the installation of agroforestry systems, as well as those which imply the recovering of degraded areas that currently have coverage other than the forest will be prioritized.

WATER COMPONENT – Positive impacts:

- Reduction of the water pollution from eroded sediments, nutrients, fertilizers and pesticides carried by currents by reducing deforestation for the installation of poorly managed agricultural and livestock systems.

Negative impacts:

- Water pollution due to the increase in eroded sediments, nutrients, fertilizers and pesticides carried by currents by the installation of new land use systems in the framework of the implementation of the REDD project.

Mitigation measures:

- If the productive projects to be implemented outside the project area involve changes on soil coverage, the implementation of those systems which imply the installation of appropriate coverage to reduce the drainage of superficial water, as well as those which minimize changes on forest coverage or imply the installation of agroforestry systems, the recovery of degraded areas that currently have coverage other than the forest and those not involving the use of fertilizers and pesticides highly toxic and difficult to breakdown, will be prioritized.

- Water pollution by dumping of wastes of the transformation processes in the industry installed as part of implementing the REDD project.

Mitigation measures:

- If the productive projects to be implemented outside the project area involve the installation of industries or transformation or processing plants, the installation of those which involve measures of waste management or treatment, sewage and those not involving the use of highly toxic and difficult to breakdown inputs will be prioritized.

In fact, with respect to the mitigation measures mentioned previously, the following actions were conducted during the 2010 period⁹⁴:

- In relation to the support in strengthening the Environmental Education:
 - * 1 lecture / workshop on environmental education.
 - * A training and a guided tour to the facilities of a processing plant located in the Madre de Dios Amazon REDD project area were conducted, involving a total of 30 students from Bertha Elena Elementary School.
 - * 1 video broadcast TV. It was disseminated, on several occasions, a video on TNP Channel about the Madre de Dios Amazon REDD Project, the concessions and their activities, corresponding to a chapter of the “La Buena Tierra” Program (“The Good Earth”), devoted exclusively to it.
 - * 1 demonstrative video. Since this year, it has been broadcasting a video on the concessions and the Madre de Dios Amazon REDD Project in the facilities of the customer sites of Scotiabank.
 - * There is a dissemination program in process of validation, referred to its relevant activities.
- In relation to the productive projects to be implemented outside the project area, within the framework of the REDD project, this activity depends on the “Environmentally Friendly Productive Projects” Program which is currently in process of validation.

⁹⁴ According to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, already submitted to the CCBA.

6. Quantification of the Offsite Biodiversity Impacts

For the quantification of the impacts, the following scale of values was used. It is important to take into account that in assigning values to the impacts, the magnitude or intensity and the scale to achieve it were considered:

Considering the intensity of the impact

Value	Description
3	High positive impact
2	Medium positive impact
1	Low positive impact
0	No impact
-1	Low negative impact
-2	Medium negative impact
-3	High negative impact

Considering the scope of the impact

Level	Description
3	Large positive impact
2	Intermediate positive impact
1	Focused positive impact
0	No impact
-1	Focused negative impact
-2	Intermediate negative impact
-3	Large negative impact

Following, the quantification matrixes of the offsite biodiversity impacts are presented for both scenarios without REDD and with REDD project scenario.

Chart 76: Quantification matrix of the offsite biodiversity impacts under the without Madre de Dios Amazon REDD project scenario

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
Native flora	Loss and degradation of the genetic variability of the forest species caused by the highly selective illegal logging and the deforestation of forests	-2	-2	-2
	Local extinction of timber species that are currently gaining commercial importance within the region	-3	-2	-2.5
	Total loss of vegetation coverage caused by deforestation of private properties for the installation of shifting agriculture, permanent agriculture and pastures for livestock	-3	-2	-2.5
	Invasions of intact and residual forests containing exotic species of grains and other herbaceous species used as forage for cattle feed	-1	-2	-1.5
	Increase of pests that might occur due to changes in microclimates caused by deforestation and the reduction of fauna controllers populations	-1	-2	-1.5
SUB TOTAL		-10	-10	-10
Wildlife	Loss and degradation of the genetic variability of wildlife species due to the impacts of illegal hunting on species moderately demanded by the local population	-2	-2	-2
	Extinction of local wildlife species caused by the impacts of illegal hunting on species highly demanded by the local population	-3	-2	-2.5
	Loss and degradation of habitats and critical sites for wildlife, as "collpas", wallows, fruit trees and caves or tree hollows, as a consequence of deforestation within private properties for the installation of shifting agriculture, permanent agriculture and pastures for livestock	-2	-2	-2
	Loss and degradation of habitats for fish fauna caused by sedimentation and filling and the dumping of fuel traces, lubricants, pesticides and fertilizers	-1	-2	-1.5

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
	Fragmentation and loss of forest connectivity due to the construction of roads and the deforestation of large and small areas in a disorderly manner	-2	-2	-2
	Changes in nourishing patterns and habitat use of some wildlife species with a greater adaptability to changes in their habitats	-1	-2	-1.5
SUB TOTAL		-11	-12	-11.5
Climate	Increase in the levels of temperature alteration in the region by the increasing in the areas of land with direct exposure to sunlight	-2	-2	-2
SUB TOTAL		-2	-2	-2
Air	Increase in the pollution levels of smoke and dust in the air due to agricultural and livestock activities and the annual burning of new forest areas and pastures already installed for cattle	-2	-2	-2
SUB TOTAL		-2	-2	-2
Landscape	Landscape degradation by fragmentation, loss of forest connectivity and forest fires	-2	-2	-2
	Increase in the levels of noise pollution due to the productive activities carried out within the area	-1	-1	-1
SUB TOTAL		-3	-3	-3
Soil	Soil degradation due to erosion, compaction and pollution caused by the application of slush and burn practices, overgrazing and the poor management of machinery and fuels	-2	-2	-2
SUB TOTAL		-2	-2	-2
Water	Water pollution due to the increase in eroded sediments carried by currents due to a poor management of machinery and fuels, as well as the increase in nutrients by the establishment of livestock	-2	-2	-2
SUB TOTAL		-2	-2	-2
TOTAL		-32	-33	-32.5

Chart 77: Quantification matrix of the offsite biodiversity impacts for the implementation of the Madre de Dios Amazon REDD project scenario

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
Native flora	Reduction of the loss and degradation of the genetic variability of timber species	2	2	2
	Reduction of the probabilities of extinction of local populations of timber species that are currently gaining commercial importance within the region due to illegal logging	1	2	1.5
	Decrease in the rate of deforestation due to the total loss of the vegetation coverage within private properties for the installation of shifting agriculture, permanent agriculture and pastures for livestock	1	2	1.5
	Decrease in the risk of invasions of intact and residual forests containing exotic species of grains and other herbaceous species	1	2	1.5
	Reduction of the increasing rate of plagues by changes in the microclimate	1	1	1
	Loss and degradation of the genetic variability of timber species caused by the deforestation of forests by private landowners for the installation of new land use systems outside the REDD project area, in the framework of its implementation	-1	-1	-1
SUB TOTAL		5	8	6.5
Wildlife	Reduction of the loss and degradation of the genetic variability of wildlife species	2	2	2
	Decrease in the risk of extinction of local wildlife species	1	2	1.5
	Reduction of the loss and degradation of habitats and critical sites for wildlife	1	2	1.5
	Reduction of the loss and degradation of habitats for fish fauna	1	1	1
	Reduction of the fragmentation and loss of forest connectivity	1	2	1.5

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
Wildlife	Loss and degradation of habitats and critical sites for wildlife caused by deforestation and forest degradation within private properties for the installation of new land use systems in the framework of the implementation of the REDD project	-1	-1	-1
	Changes in nourishing patterns and habitat use of some wildlife species	-1	-1	-1
SUB TOTAL		4	7	5.5
Climate	Reduction of the levels of temperature change in certain sectors caused by the decreasing in the size and distribution of areas of land with direct exposure to sunlight	1	1	1
	SUB TOTAL	1	1	1
Air	Decrease in the pollution levels of smoke and dust in the air due to the reduction of the installation of agricultural and livestock systems and the annual burning of new forest areas and pastures already installed for cattle	1	1	1
	Emission of smoke and dust into the air by the installation of processing industries of inputs from systems of land use installed in the framework of the implementation of the REDD project	-1	-2	-1.5
SUB TOTAL		0	-1	-0.5
Landscape	Reduction of landscape degradation caused by the fragmentation of the forests	1	1	1
	Reduction of landscape degradation by the absence of the use of burning practices for the installation of new land use systems	1	2	1.5
	Landscape degradation by the installation of plants or processing industries of inputs from systems of land use installed in the framework of the implementation of the REDD project	-1	-1	-1

Biophysical Component	Impact	Intensity of the impact	Scope of the impact	Total value
	Increase in the levels of noise pollution due to the productive activities and the processing industries that will be installed in the framework of the implementation of the REDD project	-1	-1	-1
SUB TOTAL		0	1	0.5
Soil	Reduction of soil degradation by the decrease in deforestation for the installation of poorly managed agricultural and livestock systems	1	1	1
	Land degradation due to erosion, compaction and pollution caused by the implementation of land use systems which imply changes on forest coverage, in the framework of the implementation of the REDD project	-1	-1	-1
SUB TOTAL		0	0	0
Water	Reduction of the water pollution from eroded sediments, nutrients, fertilizers and pesticides carried by currents by reducing deforestation for the installation of poorly managed agricultural and livestock systems	2	2	2
	Water pollution due to the increasing in eroded sediments, nutrients, fertilizers and pesticides carried by currents by the installation of new land use systems in the framework of the implementation of the REDD project	-1	-1	-1
	Water pollution by dumping of wastes of the transformation processes in the industry installed as part of implementing the REDD project	-1	-1	-1
SUB TOTAL		0	0	0
TOTAL		10	16	13

The following charts show a comparative summary between the aforementioned scenarios:

Value of the offsite biodiversity impacts under the without REDD project scenario	
Total biodiversity without REDD project	-32.5

Value of the offsite biodiversity impacts under the with REDD project scenario	
Total biodiversity impact with REDD project	13

Taking into account the above charts, it can be appreciated that the net offsite biodiversity benefit of the project is positive, showing that the impact under a without project scenario is negative while under a with project scenario the impact is not only positive but also the negative impacts under a without project scenario would be minimized or avoided with the implementation of the project.

In addition to this, the impacts described in this document are also valid for offsite biodiversity impacts as an increase in deforested area will have impacts in wildlife for whom these ecosystems are crucial for its survival. It should be mentioned that some of them are endangered species, according to the Red List of UICN and CITES. In the baseline scenario (without project), this scenario also threatens the project and surrounding area at a higher degree.

ANNEX 4: POTENTIAL SOCIAL IMPACTS OF THE PROPOSED PROJECT ACTIVITY

1. Present community conditions offsite the project area

First of all, it is important to mention that there are no settled communities within the project area, thus all the communities described in this chapter belong to the Madre de Dios Amazon REDD Project surroundings.

Following, a description of the communities located offsite the project area is presented, including basic socioeconomic information⁹⁵:

- **The areas of direct (buffer area) and indirect influence of the project**

The definition of the areas of direct and indirect influence of the project was carried out according to a set of criteria that transcend the geographical proximity and, on the contrary, assume a group of aspects related to the characteristics of its operations and the type of interaction that is expected to be created with the different stakeholders of the project. The following chart shows the criteria applied by the company for the establishment of its areas of direct and indirect impact:

Chart 78: List of criteria applied for the establishment of the areas of direct and indirect impact of the project

CRITERIA	AREA OF DIRECT IMPACT	AREA OF INDIRECT IMPACT
Territorial Proximity	Villages, communities, localities and/or human settlements, urban and/or rural, that are located within a radius of 5 km around of the concession, in all directions: Iñapari (capital city and surrounding villages: Villa Primavera, Nueva Esperanza); Assis Brazil.	Villages, communities, localities and/or human settlements, urban and/or rural, that are located within the radius between 5 and 10 km around of the concession, in all directions.
Linking roads	Villages, communities, localities and/or human settlements located on each side of the inter-oceanic road, in the sections that will be travelled in a major intensity by vehicles due to the project operations: Iñapari, Iberia.	Villages, communities, localities and/or human settlements located on each side of the paths and secondary roads where vehicles will travel, in a moderate or low density, as a consequence of the project operations.

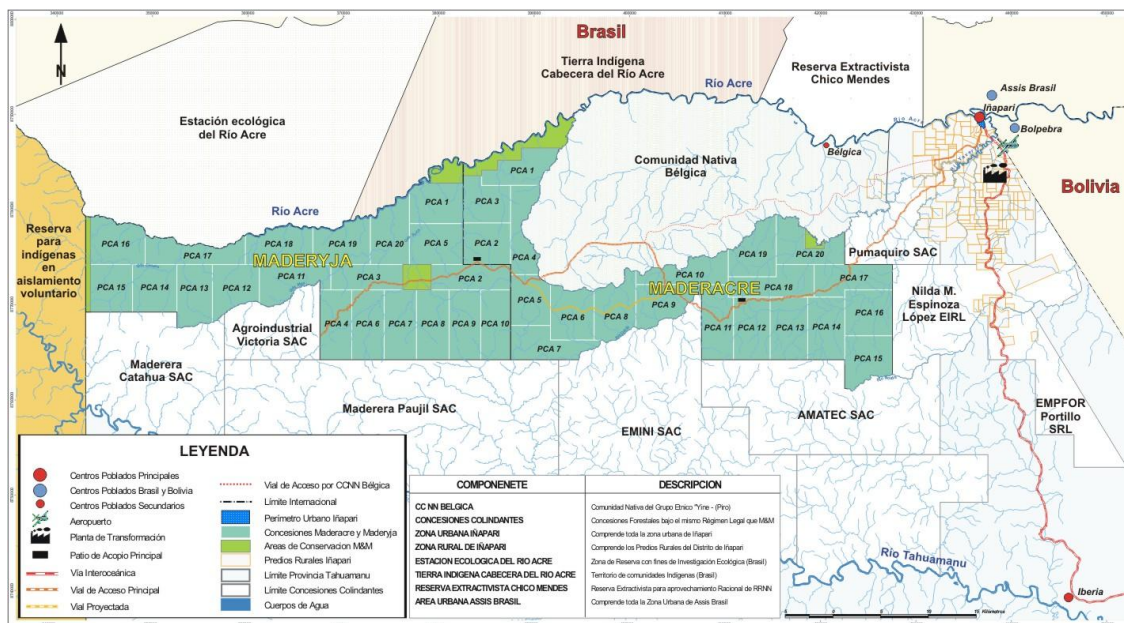
⁹⁵ Based on the document "The Stakeholder Community", developed by the concessions technical staff, 2009. This document will be available to the auditors.

CRITERIA	AREA OF DIRECT IMPACT	AREA OF INDIRECT IMPACT
Commercial interaction	Villages, communities, localities and/or human settlements, with whom the project management will establish commercial relationships needed for the provision of goods and services (within the region, province and district): Iñapari and Assis Brazil	Villages, communities, localities and/or human settlements, with whom the project management will establish sporadic commercial relationships (within the region, province and district): Iberia
Institutional interaction	Cities and localities where the decentralized offices of governmental agencies and NGOs are located, before whom the managers of the project require to perform procedures related to the management of the project and the concession.	Intermediate cities in which there are decentralized offices of public and private organisms with whom sporadic interinstitutional relationships are established.
Population expectations	Villages, communities, localities and/or human settlements, whose inhabitants have developed high expectations, interests or claims related to the potential impacts of the project on their lives, whether in economic, cultural and social aspects, among others.	
Environmental vulnerability	Villages, communities, localities and/or human settlements, whose natural resources can be altered or affected by the operations of the company.	

Fig. 72: Map of the Madre de Dios Amazon REDD project area

According to the proposed criteria, the area of direct influence of the project / concession is constituted by Iñapari (both in its urban area and administrative center and in its rural lands), the villages located to each side of the inter-oceanic road: Villa Primavera, Nueva Esperanza, the Belgium Native Community and the adjoining timber concessions (●). Special consideration must be given to the potential non-contacted tribes of native communities that would live within the concession area or next to them. If it is the case, they are also part of the area of direct influence of the project and the company.

The area of indirect influence is constituted by the cities of Assis in the Brazilian border; Iberia within the Tahuamanu Province and the populations located to both sides of the inter-oceanic road in the Iberia – Puerto Maldonado section (●)



- **The security of livelihood approach for the community analysis**

The community description that is presented in the following pages, is based on a quantitative study that was carried out according to the security of livelihood approach. Said approach guides the analysis of the study findings and was considered since the tools were designed (questionnaire for the rapid survey of households, interview guideline, among others). The security of livelihood approach has the following characteristics:

- Centrality of people:
 - Starts with the analysis of livelihoods of people and how they change over the time.
 - Foresees an active participation of the target population during the whole cycle of the project.
- Be holistic:
 - Recognizes that people adopt multiple strategies to achieve their livelihoods.
 - It is applied through different sectors, geographic areas and social groups.
 - Recognizes multiple actors (the private sector, ministries, community-base organizations and international organisms).
- Be dynamic:
 - Understands the dynamic nature of the livelihoods and the influences on them.
- Based on the potentials:
 - It is based on the potentials and opportunities that people perceive, rather than focusing on their problems and needs. They support and strengthen the livelihood strategies of poor people and their mechanisms to satisfy their needs (even the poorest households have potential).
- Use micro and macro links:
 - Examines the influence of policies and institutions over the livelihood options and highlight the need for policies to be shaped by perceptions from the local level and the poor people priorities.
- Orientate to social sustainability:
 - Sustainability is important to achieve a lasting reduction in poverty. The livelihoods sustainability is based on several dimensions.
 - It is an analytical tool to understand livelihood systems and strategies and their interaction with policies and institutions.

- **Social baseline**

- a. **General aspects**

The district of Iñapari was created on December 12th, 1912, through Law N° 1782. It is a provincial capital and one of the three districts that form the Tahuamanu province, in the department of Madre de Dios. It is located in the southeast border of Peru, in the point of encounter of the Acre and Yaverija Rivers, natural borders with the Federative Republic of Brazil to the north and the Republic of Bolivia to the northeast, respectively.

The district has a total area of 14,853.7 km² and a population density of 0.009 inhabitants per square kilometer⁹⁶. Madre de Dios is the less populous region within the country, the third largest in land area after Loreto and Ucayali (corresponds to 6.6% of the whole national territory) and is home to native populations and populations of settler origin, counting with a total of 24 native communities officially registered belonging to different ethnic-linguistic groups.

The total population of Iñapari is of 1,288 inhabitants and two thirds of this population (74.5%) resides in the rural area. A similar figure to the national tendency (75.9%) and slightly superior to the provincial average (70.8%) and the department average (73.3%), as can be observed in Chart 79 below.

Chart 79: National population and per department, province and district according to the geographical area

Jurisdiction	Urban Population	Urban Population (%)	Rural Population	Rural Population (%)	Total Population
Peru	20,810,288	75.9	6,601,869	24.1	27,412,157
Madre de Dios Department	80,309	73.3	29,246	26.7	109,555
Tahuamanu Province	7,604	70.8	3,138	29.2	10,742
Iñapari District	959	74.5	329	25.5	1,288

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

The Iñapari urban perimeter is formed by two sectors, one human settlement and one urbanization. At the same time, the rural area has four rural communities and one native community. In chart 80 the list of the localities that form the district according to their geographical area.

⁹⁶ Source: Perú: Directorio Nacional de Municipalidades 2000. Instituto Nacional de Estadística e Informática, INEI.

Chart 80: Localities of the district according to geographical area

Area	Locality
Urban	Sector Cercado
	AAHH Virgen del Rosario
	Urbanization Los Mangos
	Sector La Colonia
Rural	Villa Primavera Community
	Nueva Esperanza Community
	San Isidro de Chilina Community
	Noaya Community
	Native Belgium Community

b. Sociodemographic characteristics

Iñapari is a district with a majority of young population, with an average age of 26.3 years. 84.3% of the population has less than 45 years old and 1.9% corresponds to the age range of 0 to 14 years old. On the other hand, the population of elder adults (from 60 and up) is the 5.1% (see chart 81).

Chart 81: Population from the district according to age

Ages in a 5 year range	Number of people	Relative participation (%)
0-4	143	11.1
5-9	136	10.6
10-14	132	10.3
15-19	100	7.7
20-24	117	9.1
25-29	144	11.2
30-34	123	9.6
35-39	102	7.9
40-44	88	6.8
45-49	61	4.7
50-54	45	3.5
55-59	31	2.4
60-64	22	1.7
65-69	23	1.8
70-74	9	0.7
75-79	6	0.5
80-84	4	0.3
85-89	2	0.2
Total	1,288	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

With reference to the population structure per gender, the masculine population is bigger than the feminine in 10.4 percentage points. This tendency is the same than the provincial tendency, where the proportion is 6 men per every 10 inhabitants. Similarly, at a department level, the masculine population is bigger than the feminine one in 8.6 percentage points. However, at a national level, the distribution per gender tends to be slightly bigger for the feminine population (50.3%). This significant difference that can be observed in Madre de Dios, and particularly in the Tahuamanu province, is probably explained due to the significant number of floating population that migrates temporarily to the area in search of working opportunities. Moreover, it should be considered that during the time when the information was gathered for the National Cense of the year 2007, in the province of Tahuamanu a provisional encampment for the workers of the CONIRSA consortium was established in the area, being this entrepreneurial group the one in charge of the construction of the interoceanic road (Corredor Vial Interoceánica Sur).

Chart 82: National population, per department, province and district according to gender

Jurisdiction	Men	Men (%)	Women	Women (%)	Total Population
Peru	13,622,640	49.7	13,789,517	50.3	27,412,157
Madre de Dios Department	59,499	54.3	50,056	45.7	109,555
Tahuamanu Province	6,448	60.0	4,294	40.0	10,742
Iñapari District	711	55.2	577	44.8	1,288

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

With respect to marital status, the predominance is for the conjugal union (cohabitants or unmarried partners) (42.7%) compared to 16.5% of married couples, as observed in chart 83. The single population is in second place, being 33.9% of the population. It is important to take into account that the latter corresponds to a majority of young population of less than 25 years old (68.2%)⁹⁷.

⁹⁷ Source: INEI. XI Censo de Población y VI de Vivienda, 2007

Chart 83: Population within the district of 12 years old or more according to marital status

Marital Status	Number of people	Relative participation (%)
Cohabitants	412	42.7
Separated	49	5.1
Married	159	16.5
Widow	8	0.8
Divorced	9	0.9
Single	327	33.9
Total	964	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

The population of Iñapari has increased significantly in the 14 years that passed in the period between censuses, between the national censuses of 1993 and 2007. In this way, from 841 inhabitants in 1993, this figure increased to 1,288 for 2007, which means that every 100 inhabitants for 1993, 3.8 inhabitants were added in average per year. This tendency is repeated at provincial and department level, where the annual average increase rate is 4.8 and 4.5, respectively. These figures are much higher than the national average, where the annual rate is 1.7 (see chart 84).

Chart 84: Population growth at national, department, provincial and district level

Jurisdiction	Population 1993	Population 2007	Average Annual Growth Rate ¹
Peru	22,128,466	27,412,157	1.7
Madre de Dios Department	67,008	109,555	4.5
Tahuamanu Province	6,443	10,742	4.8
Iñapari District	841	1,288	3.8

¹ Elaborated by Sociologist Claudia Canchaya. Calculation based on the arithmetic or linear growth rate.

Sources: INEI. IX Censo de Población y IV de Vivienda, 1993

INEI. XI Censo de Población y VI de Vivienda, 2007

It must be highlighted that, as will be analyzed below, the variables related to fertility are non significant in relation to the national average. Therefore, this accelerated growth can be attributed, in a significant proportion to the immigration that the department has been experiencing and with even more emphasis, the province and the district.

As observed in chart 85 below, 44.3% of the Iñapari population in 2007 migrated at some point of their life to this district and 32.7% did this after 2002. Similarly, at provincial level, the percentage of immigrants is 45.7% and 32.2% are recent immigrant. At department level this figures are smaller, mainly when analyzing recent immigration (21.1%).

Chart 85: Immigration per place of birth and for the last 5 years at department, provincial and district level

Jurisdiction	Immigrants per place of birth	Immigrants per place of birth (%)	Recent immigrants (5 years)	Recent immigrants (5 years - %)
Madre de Dios Department	44,985	41.1	20,437	21.1
Tahuamanu Province	4,907	45.7	3,123	32.2
Iñapari District	570	44.3	374	32.7

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

It should be highlighted that in many cases, the immigration towards Iñapari occurs first towards the bigger cities, Puerto Maldonado –capital city of the department-and Iberia, neighbor district that counts with the biggest percentage of population in the province. The results of the poll show that approximately 10% of the district population, during the months of May and June, are composed as follows:

Chart 86: Immigrant population of the district according to place of birth

Place of birth	Number of people	Relative participation (%)
Other district of Tahuamanu	18	22.2
Other province of Madre de Dios	12	14.8
Cusco	10	12.3
Puno	6	7.4
Pucallpa	11	13.6
Huancayo	5	6.2
Iquitos	2	2.5
Other department of Peru	12	14.8
Brazil	3	3.7
Bolivia	2	2.5
Total	81	100.0

Elaborated by Sociologist Claudia Canchaya.

Source: Iñapari Poll 2010

As observed in chart 86, the majority of the present population comes, in the first place, from the same department. In this way, 22.2% of the immigrant population was born within the Tahuamanu province – mainly in the Iberia district – and 14.8% in Puerto Maldonado. Likewise, there is an important population that is born in different places in Peru, most importantly in the departments of Pucallpa (13.6%), Cusco (12.3%) and Puno (7.4%). And, being a border district, some people come from the neighbor countries: Brazil (3.7%) and Bolivia (2.5%).

c. Education

The majority of the population of the district has at least primary education (81.7%). Likewise, as seen in chart 87, 12.3% has studies. Around one third of the total population (31.5%) has completed primary studies and 35.2% has completed secondary studies. While the population with superior studies, complete or incomplete is 18.6%. It must be highlighted that 57.8% of these studies are technical.

Chart 87: Educational level of the population of the district

Educational Level	Number of people	Relative participation (%)
No level	147	12.3
Initial Education	29	2.4
Primary	377	31.5
Secondary	422	35.2
Superior Non Univ. Incomplete	46	3.8
Superior Non Univ. Complete	83	6.9
Superior Univ. Incomplete	33	2.8
Superior Univ. Complete	61	5.1
Total	1,198	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

On the other hand, Iñapari, with 3.6% of the population of more than 15 years in an illiteracy situation, is slightly above the provincial and department (3.2%). Figures which are quite below the national average of 7.1% (see chart 88). It must be highlighted that the Iñapari district, as well as the Tahuamanu province and the Madre de Dios department are considered jurisdictions free of illiteracy⁹⁸.

⁹⁸ A jurisdiction is considered “free of illiteracy” when the adult illiteracy rate (population of 15 years old or more) is lower that 4% of the population of 15 years old or more.

Chart 88: Adult illiteracy at national, department, provincial and district level

Jurisdiction	Illiterate Population	%
Peru	1,359,558	7.1
Madre de Dios Department	2,437	3.2
Tahuamanu Province	248	3.2
Iñapari District	32	3.6

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

However, it is within the rural and feminine population of the district where significant rates of illiteracy can be observed. As it can be seen in charts 89 and 90, 7.3% of the rural population does not know how to read and write; and, 5.6% of the women are under this situation.

Chart 89: Adult illiteracy according to geographical area at a national, department, provincial and district level

Jurisdiction	Urban Area	Urban Area (%)	Rural Area	Rural Area (%)	Illiterate Population
Peru	548,790	3.7	810,768	19.7	1,359,558
Madre de Dios Department	1,302	2.4	1,135	5.4	2,437
Tahuamanu Province	115	2.1	133	5.8	248
Iñapari District	16	2.4	16	7.3	32

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

Chart 90: Adult illiteracy per gender at national, department, provincial and district level

Jurisdiction	Men	Men (%)	Women	Women (%)	Illiterate Population
Peru	336,270	3.6	1,023,288	10.6	1,359,558
Madre de Dios Department	746	1.8	1,691	5.1	2,437
Tahuamanu Province	75	1.5	173	6.1	248
Iñapari District	12	2.3	20	5.6	32

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

With reference to the Regular Basic Education (RBE), the district counts with 9 educative institutions, being all managed publicly. There is one institution for initial education (IEI N° 298 Iñapari) and one for secondary education (IEBRS Iñapari), both located within the urban perimeter (see charts 91 and 92). With respect to primary education, the IIEE N° 53003 Elena Bertha, located in the urban area is the only one of the multiple teachers type, while the other 6, located in the rural area, are of the multi-grade one teacher type.

Chart 91: Number of Educative Institutions in the district according to geographic area

Level	Urban Area	Rural Area	Total
Initial	1	0	1
Primary	1	6	7
Secondary	1	0	1
Total	3	6	9

Source: Unidad de Estadísticas Educativas-ESCALE – MINEDU, 2009

Chart 92: Educative Institutions in the district

Level	Name	Population Center	Geographical area
Initial	298 Iñapari	Iñapari	Urban
Primary	53003 Elena Bertha	Iñapari	Urban
	52055 Bélgica	CN Bélgica	Rural
	52056 Noaya	Noaya	Rural
	52060 Nueva Esperanza	Nueva Esperanza	Rural
	52135 San Isidro	San Isidro de Chilina	Rural
	52144 Villa Primavera	Villa Primavera	Rural
	52239 Alto Bélgica	CN Bélgica	Rural
Secondary	IEBRS Iñapari	Iñapari	Urban

Elaborated by Sociologist Claudia Canchaya

Iñapari counts with a total of 279 pupils, more than half (54.1%) correspond to the masculine population. It must be highlighted that it is mainly in secondary education where the gap is increased. 59.7% of the population that attends secondary education are men, while 40.3% are women. With respect to primary school, most of the students attend IIEE Elena Bertha (70.7%). Following the distribution of students 2009 according to level, geographical area and gender:

Chart 93: EBR enrollment in the district by geographic area and sex

Level	Urban Area	Urban Area (%)	Rural Area	Rural Area (%)	Men	Men (%)	Women	Women (%)	Total
Initial	43	100	0	0	22	51.2	21	48.8	43
Primary	116	70.7	48	29.3	86	52.4	78	47.6	164
Secondary	72	100	0	0	43	59.7	29	40.3	72
Total	231	100	48	100	151	100	128	100	279

Source: Unidad de Estadísticas Educativas-ESCALE – MINEDU, 2009

Regarding the access to education, in 2005 Iñapari stood above the provincial, departmental and national figures, especially among the age groups between 4 and 5 years and 12 and 16 years. As can be seen in the following chart, the educational access for the population between 4 and 5 years old is 74.3%, being 72.1% the provincial average, 69.4% the departmental average and 64.8% the national one. In addition to this, 90.1% of the population between 12 and 16 years old has access to education, being 89.4% the provincial average, 80.6% the departmental average and only 70.8% the national one.

Chart 94: Educational access at the national, departmental, provincial and district level

Jurisdiction	Acces 4-5	Acces 6-11	Acces 12-16
Peru	64.8	92.5	70.8
Madre de Dios Department	69.4	94.5	80.6
Tahuamanu Province	72.1	96.2	89.4
Iñapari District	74.3	97.0	90.1

Source: Unidad de Estadísticas Educativas-ESCALE – MINEDU, 2005

However, this situation changes in relation to the completion rates. As shown in the following chart, the district has completion rates of primary and secondary education significantly below the provincial, departmental and national averages. In this sense, 79.5% of the population between 15 and 19 years old has at least primary school completed, while 67.2% of the population between 12 and 14 years old has completed primary school. Regarding the secondary level of education, the situation is even less positive. Less than a third (31.3%) of the population between 17 and 19 years completes high school and less than a half (45.7%) of the population between 20 and 24 years old completes this level of education. This trend is explained by the delay and the dropout rate, especially at the secondary level.

Chart 95: Completion rate of primary and secondary school at the national, departmental, provincial and district level

Jurisdiction	Completion Primary School 12-14	Completion Primary School 15-19	Completion Secondary 17-19	Completion Secondary 20-24
Peru	75.2	92.5	53.8	67.1
Madre de Dios Department	80.8	98.0	54.2	65.0
Tahuamanu Province	71.6	91.4	36.8	51.1
Iñapari District	67.2	79.5	31.3	45.7

Source: Unidad de Estadísticas Educativas-ESCALE – MINEDU, 2005

Although there is no available data to account for the educational performance at the district level, the Madre de Dios 2009 results of the Census Evaluation of Students (in Spanish Evaluaci3n Censal de Estudiantes – ECE), applied to second grade students of primary school are striking. As shown in the following chart, only 4.2% of the students reach a sufficient level in mathematics, figure that is far below the national average of 13.5%. Taking as a reference the results of the ECE 2008, in 2009 Madre de Dios experienced a decline with respect to the previous year (5.7%). In this sense, Madre de Dios constitutes the department that obtained the major setback in this area. With respect to Reading Comprehension, 12.4% of the students reach a sufficient level in this area, figure that is also below the national average (23.1%). Despite showing an increase compared to the ECE 2008, this is lower than the national increase (6.2 percentage points) and fails to be significant (2 points).

Chart 96: Sufficient performance in Mathematics and Reading Comprehension at the departmental and national level

Jurisdiction	Suff. Perf. 2nd Primary Math. 2009			Suff. Perf. 2nd Primary Read. Comp. 2009		
	2009 (%)	2008 (%)	Difference 2009-2008	2009 (%)	2008 (%)	Difference 2009-2008
Peru	13.5	9.4	4.1	23.1	16.9	6.2
Madre de Dios Department	4.2	5.7	-1.6	12.4	10.4	2.0

Source: Unidad de Medicaci3n de la Calidad Educativa-UMC – MINEDU, 2009

Lastly, within the region, the educational offer for University level and superior non-university level is very low. There is only one occupational school and an institute for higher education for forming teachers, located in Puerto Maldonado city. There are two universities, a national one and a private one, located in the regional capital.

d. Health care

The three main causes of morbidity within the district are acute infections of the respiratory tract (17.2%), diseases of the oral cavity (11.2%) and intestinal infectious diseases (7.5%), as shown in the following chart. The main cause of illness care in Iñapari Health Centre and Villa Primavera Health Post are acute infections of the respiratory tract (17.5% and 13.5% respectively), followed by diseases of the oral cavity (11.4% and 7.5% respectively). In the case of the Belgium Health Post, the main cause is diseases of the oral cavity (18.4%) and in second place acute infections of the respiratory tract (13.8%).

It should be highlighted that these three types of diseases have, among their causes, environmental factors such as the sudden temperature change –mainly in the dry season due to the presence of “frijas”-, the dust –due to the lack of asphalt in most of the paths-, smoke –mainly in the dry season when people normally carry out burning to open fields and roads- and the presence of high temperatures which tend to break down food quickly.

Chart 97: Main causes of morbidity within the district between the 1st of January and the 31st of December 2008

Health Centre	Acute infections respiratory tract		Diseases oral cavity		Intestinal infectious diseases		Total morbidity
	N	%	N	%	N	%	
H.C. Iñapari	994	17.5	644	11.4	454	8.0	5,669
H.P. Belgium	12	13.8	16	18.4	8	9.2	87
H.P. Primavera	57	13.8	31	7.5	- ¹	-	414
Total	1,063	17.2	691	11.2	462	7.5	6,170

¹ There is no available data; it does not appear within the 10 main causes of morbidity.

Source: CLAS Tres Fronteras Iñapari, 2008

The Iñapari Health Centre belongs to the Iberia micro network. It is administered with participation of the local people and managed by the Committee on Health Care Administration (in Spanish Comité de Administración en Salud – CLAS) “Tres Fronteras” of Iñapari. The health care services that the Iñapari Health Centre offers are the following:

- Emergency Topic
- General Medicine
- Dentistry
- Obstetrics
- Growth and Development Control from 0 up to 3 years (CRED)
- PAI Control (vaccine program)
- Pharmacy
- Laboratory
- Affiliation to the Comprehensive Health Insurance

In relation to the levels of malnutrition and food security, between both districts, Iberia presents a higher rate of chronic malnutrition. This is associated with the lack of water and sanitation services and poor practices of nutrition and hygiene. In the other hand, there are alarming levels of anemia in pregnant women, which in the case of Iñapari amounts 50%, situation that is closely linked to problems of maternal mortality.

Chart 98: Anemia in pregnant women and chronic malnutrition

	Population 0 - 14 years	% of anemia in pregnant women	% of chronic malnutrition 0 - 59 months
Iñapari	76	50%	9.66%
Iberia	527	47.69%	16.54%

e. Housing

With respect to the housing conditions, 19.8% of the Iñapari population lives in overcrowding homes. This figure, as shown in the following chart, is significantly below the provincial average (26.7%) and the departmental average (29.3%). However, it is a considerable figure that exceeds the national average of 14.2%.

Chart 99: People living in overcrowding homes at the national, departmental, provincial and district level

Jurisdiction	Number of homes	Relative participation (%)
Peru	957,825	14.2
Madre de Dios Department	30,000	29.3
Tahuamanu Province	2,429	26.7
Iñapari District	229	19.8

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

Most of the homes of the district are owned by their inhabitants (own tenure - 61.6%), which are mostly fully paid (56.1%). A significant proportion of the homes are rented (21.2%) and 13.7% of them have been courtesy of the working centre, as detailed in the chart below:

Chart 100: Type of household tenure within the district

Tenure	Number of homes	Relative participation (%)
Rented	73	21.2
Owned, paying in installments	19	5.5
Owned, fully paid	193	56.1
Courtesy of the working centre	47	13.7
Other form	12	3.5
Total	344	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

As can be seen in the chart below, the majority of homes are built predominantly with wood paneling. Thus, in 83.1% of the walls of houses and 70.9% of floors this type of material predominates. In the second place, there is a preference for brick or cement, comprising 12.2% of households where this material predominates on the walls and 17.7% of homes where the cement block predominates.

Chart 101: Predominant material in walls and floors of the district homes

Material	Predominant in walls (N° of homes)	Predominant in walls (% of homes)	Predominant in floors (N° of homes)	Predominant in floors (% of homes)
Brick or cement	42	12.2	61	17.7
Adobe or mud	6	1.7	-	-
Wood, paneling	286	83.1	244	70.9
Stone or ashlar with lime/cement	7	2.0	-	-
Mud	-	-	20	5.8
Tiles/terrazos	-	-	16	4.7
Parquet or polished wood	-	-	2	0.6
Other	7	2.0	1	0.3

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

f. Acces to basic services

According to the 2007 Census, the water supply of the 40.4% of the district households is done through the public network outside their homes; 21.2% by the public network within their homes and 26.7% through water wells.

However, the daily water supply lasts mainly from 1 hour (39.1%) to 2 hours a day (52.7%). In the charts below, the type of access to water and the hours of supply per day are specified.

Chart 102: Water supply of the district homes

Access to water	N° of homes	%
Public network inside	73	21.2
Public network outside	139	40.4
Pilon of public use	15	4.4
Water well	92	26.7
River, canal	9	2.6
Neighbor	15	4.4
Other	1	0.3
Total	344	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

Chart 103: Hours of supply per day in the district homes

Amount	N° of homes	%
1 hour	86	39.1
2 hours	116	52.7
3 hours	6	2.7
4 hours	3	1.4
24 hours	9	4.1
Total	220	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

With respect to access to drain, most of the homes have blocked well or latrine (29.7%), as shown in the following chart. 20.3% have toilet (from the public network) outside the home and 16.9% within the house. However, more than 20% of households have no toilet at all.

Chart 104: Connection of toilet in the district homes

Access to drain	N° of homes	%
Public sewer network inside	58	16.9
Public sewer network outside	70	20.3
Septic tank	35	10.2
Blocked well or cesspool / latrine	102	29.7

Access to drain	N° of homes	%
River, canal or channel	6	1.7
Do not have	73	21.2
Total	344	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

On the other hand, most of the homes have electric lighting, while 36.6% still lacks this service (as shown in the chart below). The flow of energy is provided by a generator located in the Iberia district. The supply of this service is 18 hours a day, from Monday to Friday between 6 am to 12 am of the following day and on Saturdays and Sundays from 7 am to 1 am of the following day.

Chart 105: Electric lighting in the district homes

Electric lighting	N° of homes	%
Do have	218	63.4
Do not have	126	36.6
Total	344	100

Source: INEI. XI Censo de Población y VI de Vivienda, 2007

Finally, as shown in the chart below, most of the households use gas for cooking (51.7%) in second place is the use of firewood (23.8%) and in a lesser extent coal (12.8%).

Chart 106: Fuel or energy used for cooking in the district homes

Fuel or energy	N° of homes	%
Gas	178	51.7
Firewood	82	23.8
Kerosene	1	0.3
Coal	44	12.8
Electricity	0	0

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

g. Poverty and development

In Iñapari, only 10.4% of the population lives below the poverty line and 1.7% are in an extreme poverty situation. As shown in the following chart, these figures are quite lower than the rates of the province, department and country. In Tahuamanu, 16.5% of the population is poor and 2.4% is extremely poor. In Madre de Dios, 15.6% are in poverty situation and 1.8% in extreme poverty, while at the national level the total poverty rate is 39.3% and the extreme poverty is 13.7%. It should be highlighted that Madre de Dios constitutes the second least poor department at the national level, behind Ica; and Iñapari is the least poor district of Peru.

Chart 107: Monetary poverty rate at the national, departmental, provincial and district level

Jurisdiction	Total poverty (N° of people)	Total poverty (%)	Extreme poverty (N° of people)	Extreme poverty (%)
Peru	10,770,967	39.3	3,764,688	13.7
Madre de Dios Department	17,503	15.6	2,065	1.8
Tahuamanu Province	1,539	16.5	193	2.4
Iñapari District	116	10.4	16	1.7

Source: INEI. Sistema de Consulta de Indicadores de Pobreza, 2007

In relation to the non-monetary poverty indicators, Iñapari has an average Human Development Index (HDI) of 0.6570. As shown in the chart below, the HDI of the district exceeds the provincial (0.6540), the departmental (0.6304) and the national (0.6234) HDIs. The same chart shows that the district has a Life Expectancy at Birth of 76.8 years, which is similar to the provincial average (76.7 years). These figures are significantly higher than the departmental average of 71.6 years, and also than the national average of 73.1 years. It should be highlighted that within Peru, the Tahuamanu province and the Iñapari district have the highest Life Expectancy at Birth average at the provincial and district level respectively.

Chart 108: HDI and Life Expectancy at the national, departmental, provincial and district level

Jurisdiction	HDI	Life Expectancy at Birth (years)
Peru	0.6234	73.1
Madre de Dios Department	0.6304	71.6
Tahuamanu Province	0.6540	76.7
Iñapari District	0.6570	76.8

2007 Data

Source: UNPD. Informe sobre Desarrollo Humano Perú, 2009

h. Information and communication services

Regarding the information and communication services, the district has two TV broadcast channels: one corresponding to the National Television of Peru signal and the other is controlled by the Municipality. The latter rebroadcasts programs of other various national TV channels. Additionally, given the fact that it is located in a border area, it captures the signal from the Rede Globo channel of Brazil. There are also two companies providing the cable television service: Direct TV and Cable Mágico (Telefónica Group).

There are three radio stations. One of them, of municipal property, rebroadcasts the RPP scheduling; and the others, of private property, are called “Bom Sucesso” and “Acre Studio”.

Since 2007, there are services of fixed and mobile phones. The companies which provide this service are:

- Fixed telephone: Telefonica, through the Fono Ya service.
- Cell phone: Claro and Movistar (Telefonica Group).

According to the data from the INEI 2007 (see chart below), only 4.9% of the households have fixed telephone. However, 34.9% of homes have mobile or cell phone. It should be highlighted that only one house has connection to the Internet service and 2.6% to the cable television service.

Chart 109: Information and communication services in the district

Service	N° of homes	%
Fixed telephone	17	4.9
Cell phone	120	34.9
Connection to the Internet	1	0.3
Cable television	9	2.6

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

In relation to the mail service, there is a SERPOST agency and an agency of the Courier OLVA company. Likewise, interprovincial transportation companies offer the parcel service.

Finally, since 2007 there is an agency of the La Nacion Bank. The customer service hours of the Bank are from Monday to Friday from 8 am to 5 pm and on Saturdays from 8 am to 1 pm. There is also an ATM Multired 24 hours a day.

i. Economy

As it was previously mentioned, Iñapari has a considerable percentage of young population, part of which constitutes the Economically Active Population (EAP) of the district. In this sense, 53.6% of the population corresponds to the EAP, figure that is above the provincial average of 52.6%. Likewise, as shown in the chart below, it is a considerable percentage which exceeds largely the departmental (46.2%) and the country (38.8%) averages.

Chart 110: Economically Active Population (EAP) at the national, departmental, provincial and district level

Jurisdiction	EAP ¹	%	Total Population ²
Peru	10,637,880	38.8	27,412,157
Madre de Dios Department	50,592	46.2	109,555
Tahuamanu Province	5,646	52.6	10,742
Iñapari District	690	53.6	1,288

Sources: ¹INEI. XI Censo de Población y VI de Vivienda, 2007

²INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

According to the following chart, 95.7% of the EAP of Iñapari is employed, figure that is similar to the national average (95.5%) but lower than the departmental (97.2%) and provincial (97.5%) averages. It should be highlighted that, as shown in chart 113, the percentage of men and women of the employed EAP is similar, with a slight advantage among men (0.5 percentage points above).

Chart 111: Employed EAP at the national, departmental, provincial and district level

Jurisdiction	Employed EAP	%	EAP
Peru	10,163,614	95.5	10,637,880
Madre de Dios Department	49,179	97.2	50,592
Tahuamanu Province	5,505	97.5	5,646
Iñapari District	660	95.7	690

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

Chart 112: Employed EAP within the district by gender

Sex	Employed EAP	%
Men	479	95.8%
Women	181	95.3%
Total	660	-

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

As shown in the chart below, one third of the employed EAP serves mainly as unskilled worker type (33.6%). Secondly, are the skilled occupations in activities related to agriculture and livestock (15.7%), followed by personal service workers and merchants (11.7%). The chart below details the main occupations of the EAP in the district:

Chart 113: Employed EAP of the district by main occupation

Main Occupation	N° of people	%
Exec. and leg. Members, pub. adm. and emp	4	0.6
Profes., scientists and intellectual	44	6.7
Middle level technicians and assimilated jobs	57	8.6
Office managers and employees	35	5.3
Pers. Serv. workers and Merchants	77	11.7
Agriculture., livestock and fishery skilled workers	101	15.3
Workers and oper. mines, quarries, man. ind. and others	47	7.1
Const. workers, paper conf., ind., instr.	63	9.5
Unskilled workers, salesman and related.	222	33.6
Other	10	1.5
Total	660	100

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

On the other hand, the main economic activities in which a considerable percentage of the EAP is employed are: agriculture, livestock, silviculture (43.8%) and, in second place, the market (10.3%). In the following chart, these economic activities are specified:

Chart 114: Employed EPA in the district by economic activity

Main occupation	N° of people	%
Agric., livestock, hunting and silviculture	289	43.8
Fishing	1	0.2
Mining and quarrying	0	0
Manufacture. industry	45	6.8
Electricity, gas and water supply	1	0.2
Construction	39	5.9
Trade	68	10.3
Sale, maint. and rep. vehicles and bikes	8	1.2
Hotels and restaurants	42	6.4
Trans., storage and communication	33	5
Financial intermediation	3	0.5
Real estate, businesses and rents	10	1.5
Pub. Admin. and defense; social security affil.	50	7.6
Education	24	3.6
Social services and health care	15	2.3
Other activ., soc. comm. serv. and pers.	15	2.3
Private households with domestic service	17	2.6
Organiz. and extraterritorial bodies	0	0
Total	660	100

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

j. Main economical activities

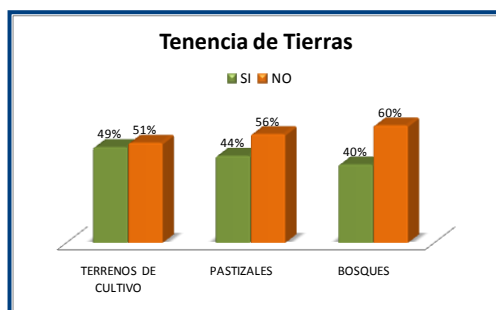
The economy is based mainly on primary extractive activities, where agriculture, hunting and forestry represent the 32% of the PBI of the department, while mining contributes with 15% of the regional internal gross product. Other major activities in the regional conomic dynamics are tertiary activities, whose contribution to the internal gross product reaches 41%. At a regional level, activities such as farming, livestock and forestry are the most important from an occupational point of view since it involves almost 25% of the population of the region.

k. Land tenure

In the area of direct influence of the project, approximately 50% of the families have a land to cultivate (although, as it will be seen afterwards, not the same proportion is devoted to agriculture as its main activity).

The size of these lands usually ranges from 1 to 25 hectares. Likewise, and related to cattle raising, 44% have grassland, of greater size (37% between 26 to 50 hectares). In addition to this, 40% indicated to have forests within their properties, in areas between 1 and 50 hectares. Probably due to the size, grasslands are the most valued by these families.

Graph 1: Land tenure



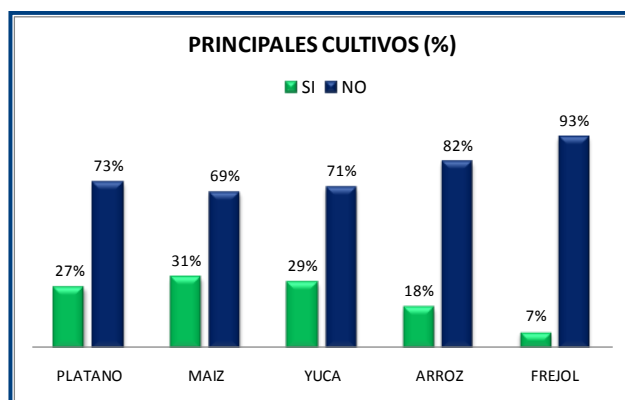
I. Agriculture

The area suitable for agriculture at a department level covers 15% of the territory (lands currently used represent 6%). The agricultural activities are carried out applying traditional technologies, primarily shifting agriculture.

The main crops are: rice, corn, yuca, beans, grass, papaya and bananas, among others. The cultivated area with these products reached a total of 11,535 has in 2001 within Tahuamanu Province (7398 has in Iberia and 2702 has in Iñapari).

Agricultural production only reaches subsistence levels and does not cover the local demand. Therefore, a cyclical shortage during the fourth quarter is produced and the people are supplied with rice, hard yellow corn, soybean and vegetables from other regions.

Graph 2: Main crops



In general, production volumes are low scale, basically conditioned by single-family farming practices, which usually uses workforce from their own family. According to this, the value of its production is not significant to the family budget (they usually combined diverse economic activities). In the case of yuca and rice, 67% consider that their value is less than S / 1,000.

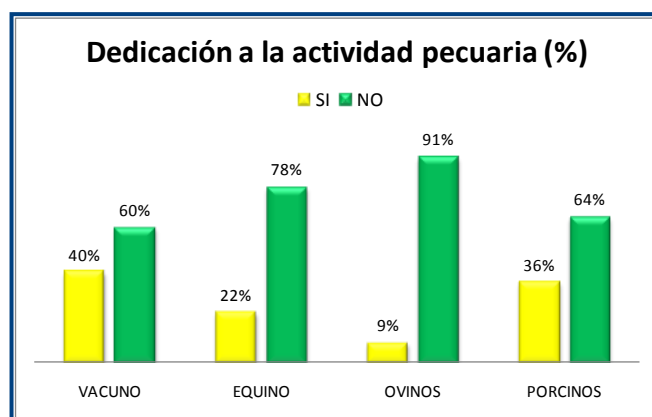
With respect to the destiny of the production and despite the low volumes, a clear linkage with regional and local markets can be observed. Except for the rice, most of the products are sold in percentages that mostly exceed 50%, mainly yuca and corn.

m. Cattle raising

The livestock business develops the raising of cattle, pigs, sheep and poultry, but without taking care of the management and recovering of pastures. Regarding the value of their cattle, a weakness in the commercial or entrepreneurial approaches of families is evidenced. In general, there is much difficulty to establish the productive costs and even the value of their livestock, despite of recognizing the investment and efforts made for the genetical improvement. 54% believes that the value of their cattle ranges from 10.000 and 40.000 nuevos soles.

With respect to the sheep and according to the size of the herd, most values it between 1.000 and 5.000 nuevos soles. Said valuations show that there is awareness of the higher levels of capitalization and, on the other hand, visualization of the opportunity of an economic activity which allows them to articulate to markets (considering the lack of competitiveness of livestock within these communities due to the poor conditions of the road).

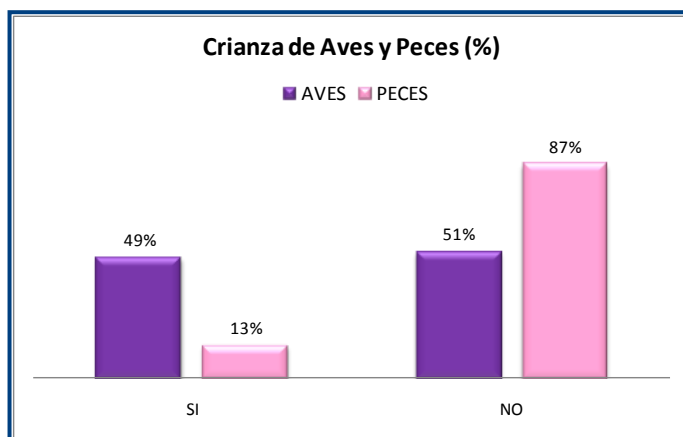
Graph 3: Cattle raising



n. Small livestock

The bird valuation is still diffuse, while it is not a massed practice nor performed necessarily orientated to sale or market. Fish breeding, though, does constitute a larger economic activity for the small group of families that have been devoted to it, and has have a clear orientation to some province or regional market. Regarding the valuation of fish farms, 33% believe that they may cost between 80 and 100 thousand of nuevos soles.

Graph 4: Small livestock (birds and fishes)



o. Perspectives of family and local economy

Introducing the following set of questions (presented on the following graphs) is when it is found the best evidence of a positive perception with respect to the presence of private investments within the area. In general, there is an optimistic attitude about the future, in the evaluation of their own resources and in their survival and development strategies. In 2009, approximately 53% of household heads that evaluate the previous year as “best” in terms of revenue and 42% indicating that they have had better/bigger food consumption. This confirmed, in fact, that there have been economic opportunities (this statement considering that this higher consumption is not related with the agricultural production itself).

In relation to the future, a major proportion of household heads believe that their situation will improve, whether in income, food consumption or production.

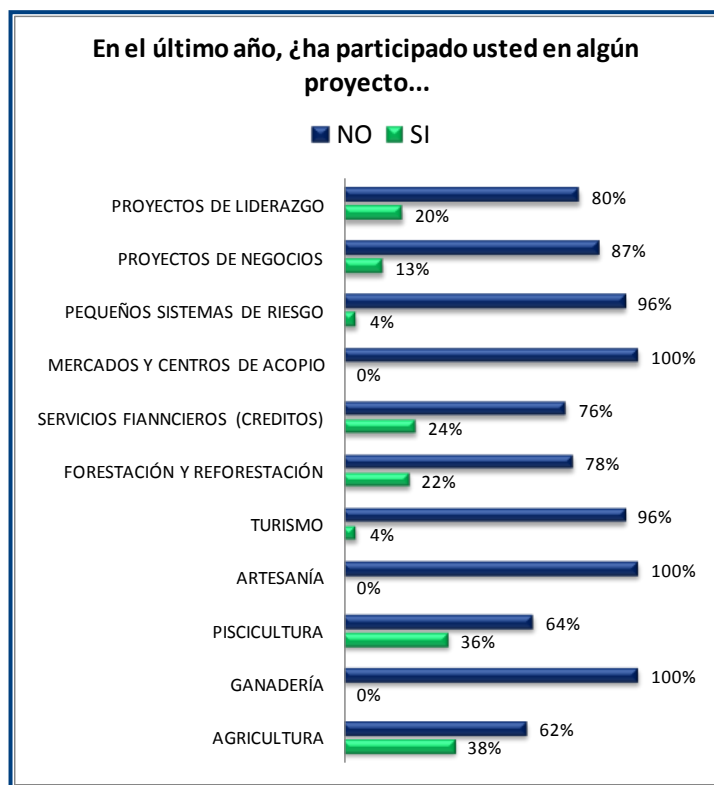
This optimistic attitude towards the future constitute a huge relational value that the company could capitalize on, striving to know to which investment strategies they would direct their resources in order to effectively accompany the efforts made by the inhabitants to develop themselves, and not to replace their enterprise or establish functional actions to the immediate interests of both parties.

p. Participation in projects of economic promotion

In general, the participation in economic promoting projects is very low in productive families of Iñapari. A major percentage (36%) indicates they participated in fisherie projects, probably motivated by the business opportunity they see in said activity. There were no projects executed for irrigation, storage and markets, tourism and handicrafts activities and no one of the respondents has participated in such projects. It attracts the attention that none of the interviewed people says they have participated in livestock projects, being this one of the most important activities, mainly for rural properties.

The offer of projects comes primarily from the residents' own initiatives, which have some capital and decide to invest and innovate their subsistence means.

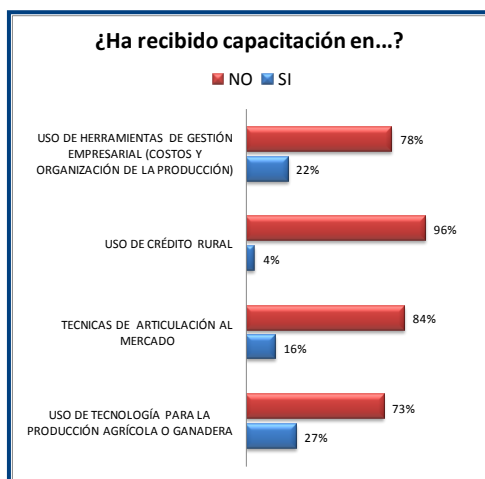
Graph 5: Participation in projects



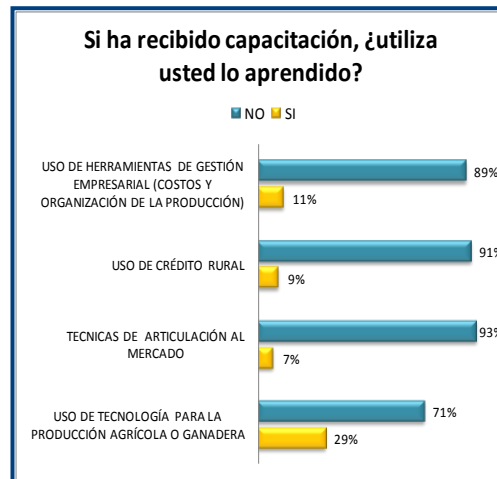
q. Access to technical assistance

As it can be seen in the following graphs, training and technical assistance is also scarce for Iñapari inhabitants.

Graph 6: Training activities



Graph 7: Application of the lessons learned



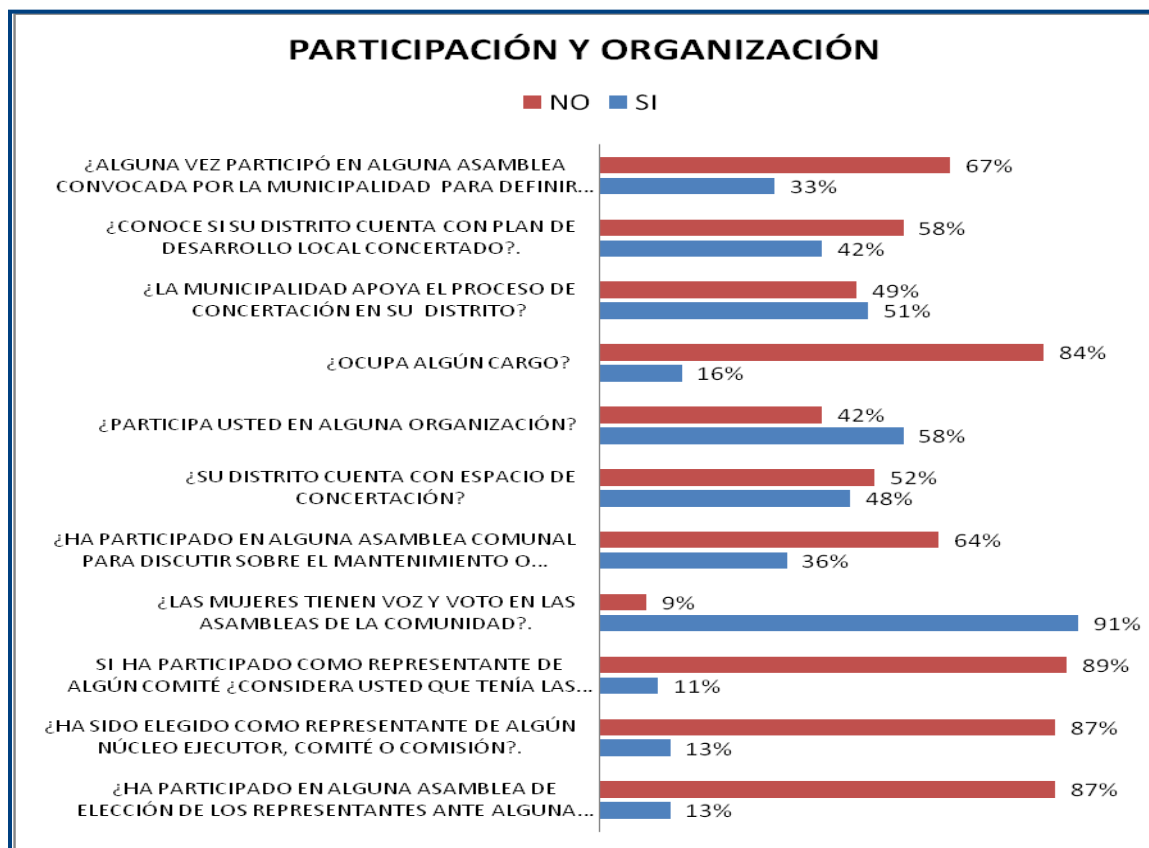
r. Participation and consultation processes

With respect to the participation of residents in instances of co-management and joint decision between them and public institutions such as the municipality or private as mixed forums, certain dynamism can be observed:

- Greater participation in deciding and organizing the care and maintenance of social and productive infrastructure: 36%.
- High perception of equal rights between men and women: 91%.

However, it is interesting to observe and interpret that other types of demands are emerging in relation to the quality of their participation. Although there is a higher dynamism, the perception that their participation is not given equal opportunities is very large (only 11% referred so). Said perception is related, probably, to mistrust of public institutions, the presence of new private enterprises and the thought that the other party will not comply with their commitments.

Graph 8: Participation and organization



s. Religion and holidays

Most of the district's population (76%) belongs to the Catholic religion, while 16.7% belong to any of the evangelical churches of the zone (see the chart below). The district has a Catholic Parish and three Evangelical Temples.

Chart 115: Religion of the district's population over 12 years old

Religion	N° of people	%
Catholic	733	76.0
Evangelical	161	16.7

Source: INEI. Sistema de consulta de indicadores demográficos, sociales y económicos, 2007

Among the main religious holidays that are celebrated within the district, the following should be mentioned:

- Virgen del Rosario, patron saint of the district. The celebration takes place on October 7th (day of the Virgin) and is organized by the Municipality.
- St. George, patron of the Livestock Farm of the Cardozo-Flores Family, which is called with the same name, St. George. The celebration takes place on the farm during the weekend that is closest to the 23rd of April (Holy Day).
- **Communities within the surrounding area of the project**

Within the project surroundings, correspondent to the leakage belt sector of the area of influence of the Maderija concession, the Belgium Native Community is established and also one or more groups of families of indigenous peoples in voluntary isolation within the Madre de Dios Territorial Reserve, which have no permanent settlements.

- **Belgium Native Community**

The Belgium Native Community is a community of the Yine indigenous tribe, established on the border between Peru and Brazil, at the site of the former ancient rubber farm of the same name. The nearest major village is Iñapari, capital city of the district. The permanent population of said community is 70 inhabitants, distributed among 16 families. The settlement pattern is scattered and sedentary.

These community families are located in three sites or areas called Japan, Belgium and High Belgium (Japón, Bélgica and Alto Bélgica in Spanish). The most populous site is Belgium, where 11 families are settled and the services for the community are concentrated.



Fig. 73: Belgium Native Community area



Fig. 74: Belgium Native Community



Fig. 75: Belgium Native Community



Fig. 76: View of the Belgium Native Community area

Setting of the Community Resources

HUMAN CAPITAL	
Health	Low level of health and insufficient medical care. The most important diseases are: parasitism, respiratory infection and diarrhea. The cases registered during one year within the 70 residents' population of the community were: 185 of parasitism, 94 of respiratory infections and 37 of diarrhea. Another health problem is the high consumption of alcohol by men, starting at the age of 12. The medical care is provided in a makeshift and temporary local, with insufficient equipment and staffed by only one person (health technician). The dispersion of the population requires long journeys for medical visits that are usually done on foot because the health post is not equipped with a vehicle and fuel. This also hinders the transfer of critically ill patients to higher level medical care.
HUMAN CAPITAL	
Education	The population of the community has a low level of education. 70% of household heads are illiterate and there are few residents who have finished primary school education. There community has two primary schools located in the Belgium and High Belgium sites, with Spanish language teachers. There is no bilingual education nor facilities for initial or secondary school education. The families give priority to subsistence activities rather than class attendance, and therefore the levels of school absenteeism are high.
Knowledge and skills	The adult population of the community has knowledge and skills to develop their traditional activities, including knowledge on the activities that are common for the indigenous peoples: subsistence agriculture, collecting of forest products (especially rubber), hunting, fishing, development of tools and crafts, forestry extraction, rustic breeding of chicken, pigs and cattle; emphasizing knowledge for survival within the forests and hunting. Currently training activities on forestry management are being developed, although related to operational working capabilities for forestry workers.

NATURAL CAPITAL	
Land and production	The territorial scope of the community is 53,394 hectares that are legally distributed in 17,620 hectares with ability for agriculture and livestock, 31,502 hectares with forestry potential and 4,272 hectares for protection. The community's agricultural production is rice, beans, bananas and yuca, mainly for household consumption. Annually, each family slashes and burns a plot of up to two hectares in order to install their crops, without taking into account the aptitude of the land in the site selection. Agricultural products are sold due to the necessity for extra money, for school supplies, medicines and medical care for example. Said sales are carried out in the Brazilian village of Assis, where higher prices than in the Peruvian village of Iñapari are paid.
Water & aquatic resources	The community lands are abundant in resources, such as various permanent and temporary water courses. The main water courses are the Acre and Yaveryja rivers, northern and southern boundaries of the village area and the Japón and Josefina streams, which are its east and west boundaries. The fishing provides an important part of its diet to the population. Currently, a decrease in the amount of fishes attributed to the illegal fishing by brazilians can be observed.
Trees and forest products	The community has 31,502 hectares of lands with forestry potential, where logging takes place with timber purposes under contracts with a lumber company. Likewise, within the forest there are a great amount of rubber trees which previously held a significant production of latex, but this activity is currently suspended due to the lack of demand for this product. Additionally, there are stands of chestnut, which currently are not commercially exploited.

NATURAL CAPITAL	
Wildlife	Wildlife within the community lands is the typical of low lands wet tropical forests and still maintains significant populations. There are large and medium mammals, as well as birds and reptiles that are traditionally employed as food.
Wild food & fibers	The forest provides palm fruits and wild tree fruits which are used as food, as well as fibers and other materials for varied uses, ranging from housing construction to the tool and craft development.
Environmental services	The community lands still have much of its natural cover of primary forest, maintaining thus its water regulation, carbon storage, biodiversity conservation and landscape beauty role.

SOCIAL CAPITAL	
Networks and connections - Patronage	The community is currently supported by the timber company associated in the logging of the forest, as well as by the technical assistance and funding for the development of its social infrastructure and productive capacities from organizations such as the Madre de Dios Special Project, CESVI and WWF.

SOCIAL CAPITAL	
Networks and connections - Neighbourhoods	In the community surroundings, within the Peruvian territory, the timber concessions of the companies Pumaquiro SAC and Maderacre SAC, as well as an agricultural property are established; and within the Brazilian territory, the Head of the Acre River Indigenous Land (in Spanish Tierra Indígena Cabecera del Río Acre) and the Chico Mendes Extractive Reserve are established. The community has no relationship with the Pumaquiro SAC timber concession. Both Maderacre SAC and Maderyja timber concessions are developing cooperation relationships related to the certification process of the concessions and currently have an agreement allowing the transit of vehicles through the community territory. Within the Head of the Acre River Indigenous Land and the Chico Mendes Extractive Reserve there are established indigenous communities of the Yaminahua and Manchineri tribes. The people from the Belgium Native Community do not maintain stronger linkages with Yaminahua people due to cultural differences, but they have developed strong linkages with the Manchineri communities.
Networks and connections - Kinship	The families of the community are of ancient permanence in the Acre River and are related to families of the Brazilian Manchineri indigenous people. Men from the Belgium Native Community go to start their families in the Manchineri communities and from these communities women come to join Yine families.
Formal and informal groups	The communal organization includes four formally constituted committees: the production committee, the committee of the glass of milk, the health committee and the sports committee. The goal of the production committee is to audit the timber activity of the company within the community forests and the accounting of the wood volumes and the revenues corresponding to the community. The committee of the glass of milk's main goal is the management of the State food assistance for the community children. The health committee was constituted to promote the community involvement in improving the public health service that is provided to the community. The sports committee's main goal is to organize and coordinate sporting activities within and outside the community area and it is the busiest. The production committee, as well as the health and sport one, are led by males and only the committee of the glass of milk is headed by a woman, who nevertheless requires much support for the fulfillment of her duties.
Collective representation	The collective representation of the community is defined by legal standards of rural communities, according to which the Head of the Community is the legal representative, who serves on the Board with the Secretary, the Treasurer, the Prosecutor and, in the case of the Belgium Native Community, the Production and Commercialization Secretary. The Members of the Board are elected by vote of the Communal Assembly.

SOCIAL CAPITAL	
Mechanisms for participation in decision-making	The community is conducted according to the law of native communities, which establishes the organization of the communities and the formal decision making mechanisms. According to this law, the Communal Assembly, integrated by people registered as “comuneros”, is the decision making body and the mechanism of participation includes the submission of proposals and voting. Decisions are taken by majority vote. The assistance and participation of women in the assemblies is reduced.
Infrastructure - Transport - Roads, Vehicles	Transportation from the village of Iñapari to the Belgium site of the community takes place through land and river roads. Land transportation has two pathways. The first one is a logging road of 30 km, which starts in the inter-oceanic road. This road can be used by all types of vehicles during the dry season, when its crossing takes up to 2 hours. Its use is however limited during the rainy season, when it is sometimes even close. The second one is a trail parallel to the Acre River, to be done on foot, which starts in the village of Iñapari and takes at least 5 hours to cross it and requires fording the Acre river several times. This pathway is used particularly by indigenous people. The waterway is the Acre river, from the international bridge. This is the pathway mostly used by indigenous people and is crossed by canoe or motorboat. The route from the bridge to the Belgium site of the community takes 4 hours using a motorboat. In the dry season the transit is limited due to the low water levels. The transportation to the other two sites of the community is also via land and river, although the terrestrial pathway is a trail that can only be done on foot.
Infrastructure - Secure shelter & buildings	The community infrastructure, within its three sites, is made up of family homes, communal buildings and school and health centers. All the housing and communal buildings are built of wood and other local materials: wood floors and walls palm leave roofs. Wood has replaced the whipped “pona” since the beginning of the agreement with the company, which gave the necessary lumber to the families. The school and health centers are brick and concrete buildings, with “calamina” roofs and built by the Madre de Dios Special Project.
PHYSICAL CAPITAL	
Infrastructure - Water supply & sanitation	The water that is consumed in the community belongs from a well or river, without previous treatment. The water supply service is concentrated in the Belgium site of the community and is limited. A well, a bomb and an elevated tank are used for supplying untreated well water to some homes and to the health post. There are no sanitation services available for the community.

PHYSICAL CAPITAL	
Infrastructure - Energy	A power generator with diesel engines is available for the community and located in the Belgium site of the community, which provides with daily electricity, from 6 pm up to 9 pm, for street lighting and domestic use of the 11 families of the site. Fuel costs are paid by the community itself. In addition to this, the community has solar energy equipments (panels, batteries), which are used for telephone, radio and television services.
Infrastructure - Communications	The community has telephone, radio and television services, concentrated in the Belgium site. It has also a satellite telephone device for the whole community, which is in the house of a villager. The radio service is especially for radio communication in the health care network and has a communication equipment at the health post. The television is satellite and the community has a satellite dish which allows the reception of two channels. The most used service within the community is the telephone.
Tools and technology - Seed, fertiliser, pesticides	Local agriculture, which is mainly for family consumption, does not use external inputs (fertilizers, pesticides). The seed used for agriculture is part of the previous harvest, which is stored.

FINANCIAL CAPITAL	
Savings	Saving money is not a local practice. The reserves or sources of money for special and emergency expenses are the forest (wood and wildlife meat), the stored agricultural products (rice, beans) and the domestic animals, particularly chicken, pigs and cattle.
Incomes	Since 2005, the largest community income is derived from logging in the forests of its territory, which is developed under the Mutual Cooperation Agreement between the Native Community Belgium and the Forestry Operators of Iñapari, effective till 2010. The community receives the value of 20% of the roundwood production that is extracted annually from the forest, which is exploited by the associated timber company according to a General Management Forestry Plan for 42,609 ha. According to the aforementioned agreement, each member of the community should receive 400 soles per month, in advance and on account of the 20% of the total profits of the timber production. If at the end of the campaign there is a positive balance, it is spend on community interest. Families also obtain additional revenue from the sale of other forest products (wildlife meat), sale of agricultural and livestock products and salaries, especially for working in forestry activities developed within the community lands.

FINANCIAL CAPITAL	
Credit/debt - formal, informal, NGOs	Credit is not a necessity for the community due to the absence of commercial activities that require investment. The forestry activity that is developed within the community forests is carried out with the exclusive investment of the associated timber companies. In the future, if a commercial production of rubber latex, chestnut fruit or other products is developed as an initiative directly led by residents of the community, credit will be necessary.
Wages	Family income regarding salaries is currently originated from the employment of young men in forestry activities, where they work as forestry workers (woodcutters, loggers, assistants, guides) and receive a daily wage of 20 soles.

- **Indefinite community of indigenous people in voluntary isolation**

Maderyja concession is adjacent to the Madre de Dios Territorial Reserve, established to protect populations of indigenous people in voluntary isolation of Mashco Piro tribe and other tribes not yet identified, estimated at around 600 people, distributed in familiar groups of indeterminate size. The area of the territorial reserve that is located within the leakage belt of the project is considered area of temporary use of one or more family groups which are temporarily established and carry out hunting, fishing and gathering activities, according to their costumes and with their own and unknown notions of territoriality that may affect the scope of the project.

Given the ignorance of the characteristics of this community, the schedule for initiating contacts that should be determined by their own choice and according to the established rules for their defense, the project objectives must be stated in terms of contributing to maintain their isolation, protecting the integrity of the reserve, until they decide, by their own choice, to join the regional society. In addition to this, it must be considered that these groups can cross the boundaries of the territorial reserve, of which they have no conscience, entering into the concession area. According to this, appropriate protocols should be developed, taking particularly into account the high vulnerability of this population to diseases, which could cause high mortality.

2. Inclusion of the genus component and the Belgium Native Community in the implementation of the Madre de Dios Amazon REDD Project

a. Belgium Native Community and the REDD Project

The relationship between the Belgium Native Community and the REDD Project (compose by the two forestry concessions) is described in the following chart:

Chart 116: Double way impacts between the project – concessions and the Belgium N.C.

Dimension	Towards the REDD Project - concessions	Towards the Belgium NC
Economic / Logistic	- There is no commercial bond between both parts, however, the inhabitants of the Belgium NC are potential workers for the concessions and potential Wood suppliers. - In addition, a common access road is shared and maintained by the concessions and their commercial allies.	- The Belgium NC, at the same time, has not formalized an interest to work jointly. In previous years the company represented a job opportunity for the community population. Currently, this possibility still exists. - It has surveillance role in the access road.
Cultural / Communication	- The communication between the Project and neighbor community has been strengthened in the last years as demonstrated through the Agreement signed with Maderacre and to be signed with Maderyja in the very short term. - Due to the aforementioned, the concessions have the policy to maintain the most absolute respect towards the decisions and the course to be taken by the Belgium NC, since the latter is totally autonomous. - An organizational culture of intercultural respect and permanent investigation is generated.	- The Project will try to have a positive influence in the culture of the community in terms of conservation and management of its forests and decrease in the pressure towards their rainforest. - The Belgium NC counts with an extent area and a population density of 0.11 individuals per km2, which allows them to supply themselves without the necessity to establish 'formal' communications with the project for that purpose. Therefore, the need to establish a coordination to grant hunting permits, entering the areas or traditional rites of the "comuneros" is on the companies' side.
Social	- These are based in many years living together relationships between the community families and the families of the partners of the concessions. - The concessions have opted for an approach of intercultural respect, which determines protocols and attitudes towards the situation of the indigenous population.	- The implementation of the REDD Project will allow the support to information programs, education and promotion of opportunities for the development of the neighbor population.

Dimension	Towards the REDD Project - concessions	Towards the Belgium NC
Organizational	- Currently, the project and the Belgium NC are united on the management of the forestry resources, since the community is participating of the FORIN Project. Said project is in its beginning stage, and the project is already in process of maintaining the sustainable management certification. - It implies the establishment of policies, acting and organization strategies that should be assumed by directors and workers of the company.	- In terms of social organization for production, the preoccupation for the sustainable use of the forestry resources is shared. The Belgium NC is been influenced by the good management practices of the project, which operates as a learning "show case" for this community.

The way to incorporate the implementation has different levels. First, in the framework of the Cooperation Agreement signed between the Community and Maderacre and to be signed between the Community and Maderyja⁹⁹, to strengthen the following activities:

1. Revision and updating of the Management Documents for the management and use of the forest of the Community, including the Forest Management General Plan.
2. Elaboration of an agreement for the transfer of experiences, use of tools and knowledge for the planning, use and transformation of the timber resources of the community, through a gradual process of every day training.
3. Elaboration of the regulation for the use of the access road and an agreement for the re-opening and annual maintenance of said road.
4. Preferential contract of the community inhabitants that have participated and approved the training process of the companies.
5. Signing of joint agreements with other institutions of international cooperation, institutions for investigation, national and foreign Universities, to carry out investigation activities that contribute to the management and use of the natural resources.

⁹⁹ Agreement subscribed on October 11th 2008 between Maderacre and the Belgium Native Community and Agreement to be subscribed in the short term between Maderyja and said Community, with similar characteristics to that already signed between Maderacre and the Community.

6. Agreement to provide legal, administrative and management of forestry resources assessment to the community.

Additionally, to strengthen the role of the Native Community in the implementation of the objectives of the REDD Project, through the following specific actions:

Chart 117: Actions to strengthen the role of the Belgium N.C. in the implementation of the project objectives

Activities of the REDD Project	Specific action with the Belgium NC
Objective 1: Support the development and implementation of productive and environmentally friendly projects in the sectors of the Iñapari District identified in the buffer area	
Socialization and diffusion of the objectives of the project	Include the Native Community in the Workshops and other diffusion media
Identification and selection of the proposals for environmentally friendly productive projects	Include the Community within the potential beneficiaries. Offer assessment for the formulation of their proposals.
Development of competences of the members of the associations related to the selected projects.	Give priority in training to the members of the Native Community.
Elaboration of the project profiles of the selected projects.	Active participation of the Native Community in the formulation of the selected profiles.
Look for financing and / or co-financing of the approved profiles (funds)	
Support for the implementation of the approved projects.	Permanent assessment.
Monitoring of the projects.	Establish the potential impacts of the selected projects on the Native Community as a key element to monitor.
Objective 2: Strengthen the surveillance and control of the forestry concessions	
Revision and update of the custody plan.	Coordinate the Native Community Plan in the shared boundaries with the forestry concessions.
Installation of a control post PCA5 Maderacre	Inform the Native Community of the installation of the Control Post in the Maderacre Concession.
Delimitation of 100% of the boundaries of the concessions.	Coordinate with the Native Community the delimitation of the shared boundaries.
Installation of "Hitos" in the vertexes of the concessions.	Coordinate with the Native Community the installation of hitos shared with the forestry concessions.

Activities of the REDD Project	Specific action with the Belgium NC
Improve the signaling of the concessions.	Include the Native Community in the signaling of the road section that is shared by the users.
Carry out periodic and annual patrolling in vulnerable sectors.	Inform the Native Community of the patrolling and if necessary of any abnormal situation that could affect their area.
Annual monitoring of possible invasions with the use of satellite images.	Inform the Native Community of any results that could affect their area.
Ocular verifying of sectors potentially identified as invasion points (due to deforestation).	Inform the Native Community of any results that could affect their area.
Development and implementation of mechanisms for the diffusion of Environmental Education to children, teenagers and communities involved in the project.	Include the Native Community and its School as a beneficiary of the program.

b. The genus component in the REDD project and how this is included

The genus approach is very important in the implementation of the REDD project, as well as in the preferential hiring policies and other mechanisms that the concessions currently apply.

Genus inequality is manifested in the results of the survey to the question: ¿Women have voice and vote in the Community Assemblies? To which only 9% answered affirmatively¹⁰⁰.

The REDD Project will include the genus approach in the activities to develop in the following manner:

Chart 118: Genus approach in the activities to develop

Activities of the REDD Project	Specific action with women
Objective 1: Support to the development and implementation of environmentally friendly projects in the sectors of the Iñapari District identified in the buffer area	
Socialization and diffusion of the objectives of the project	Emphasis in the diffusion and assistance to Workshops of women: employees, housewives, students, , etc.
Identification and selection of the proposals for environmentally friendly productive projects	Establish the participation of women in the projects proposed as an important qualification factor.

¹⁰⁰ Source: Rapid Household Survey.

Activities of the REDD Project	Specific action with women
Development of competences of the members of the associations related to the selected projects.	Give priority to the training of feminine personnel.
Elaboration of the project profiles of the selected projects.	Inclusion of genus indicators in the profiles.
Look for financing and / or co-financing of the approved profiles (funds)	
Support for the implementation of the approved projects.	Permanent assessment.
Monitoring of the projects.	Include the genus component amongst the indicators to monitor.

3. Relationship between Maderacre and Maderyja concessions and the community

One of the main management tools used by both timber concessions is their Relationship with the Community Plan¹⁰¹. It orientates the social responsibility of the concessions in their relationships with other involved social and institutional actors of the environment. These documents are permanently reviewed and adjusted to the constant social and environmental changes with influence on the concessions and are available for all the staff of both concessions. The relationship with the community policies defined for both concessions and stated in their Relationship with the Community Plans are almost the same and consist briefly of:

- **Support to the local development** - giving priority to the following areas of activity: strengthening of social organizations; improving the quality of basic education (particularly of boys and girls of Iñapari and Belgian Native Community); making possible the access to technical-productive training courses for young people (mostly considering the future job opportunities for all of them into the forestry sector); territorial arranging for the best use of the localization advantages in a care of the environment framework.
- **Support to the creation of an environmental conservation culture** - giving priority to the following areas of activity: information and environmental education strategies, in order to sensitize local communities on the importance of caring for the environment; disseminate the forest management plan of the concessions and best practices considered in the exploitation of their natural resources; support to local initiatives for environmental education; support to local initiatives related with waste management; create the concept of an ecological country.

¹⁰¹ Said documents will be available to the auditors.

- **Transparency and permanent communication in both ways, from and to local communities** - giving priority to the following areas of activity: design of a communication plan to disseminate all the information related to the operations carried out by the concessions; design and development of a system for responding opportunely to any social actor consultation and complain; take part in all the dialog and coordination activities among social citizens; apply and monitor the entrepreneurial policy of hiring preferably local people for the forestry operations.

In this sense, a protocol for the opportunely response to any citizen, organization or institution consultation and complain is also attached in the Relationship with the Community Plan of the concessions. Said protocol consists on:

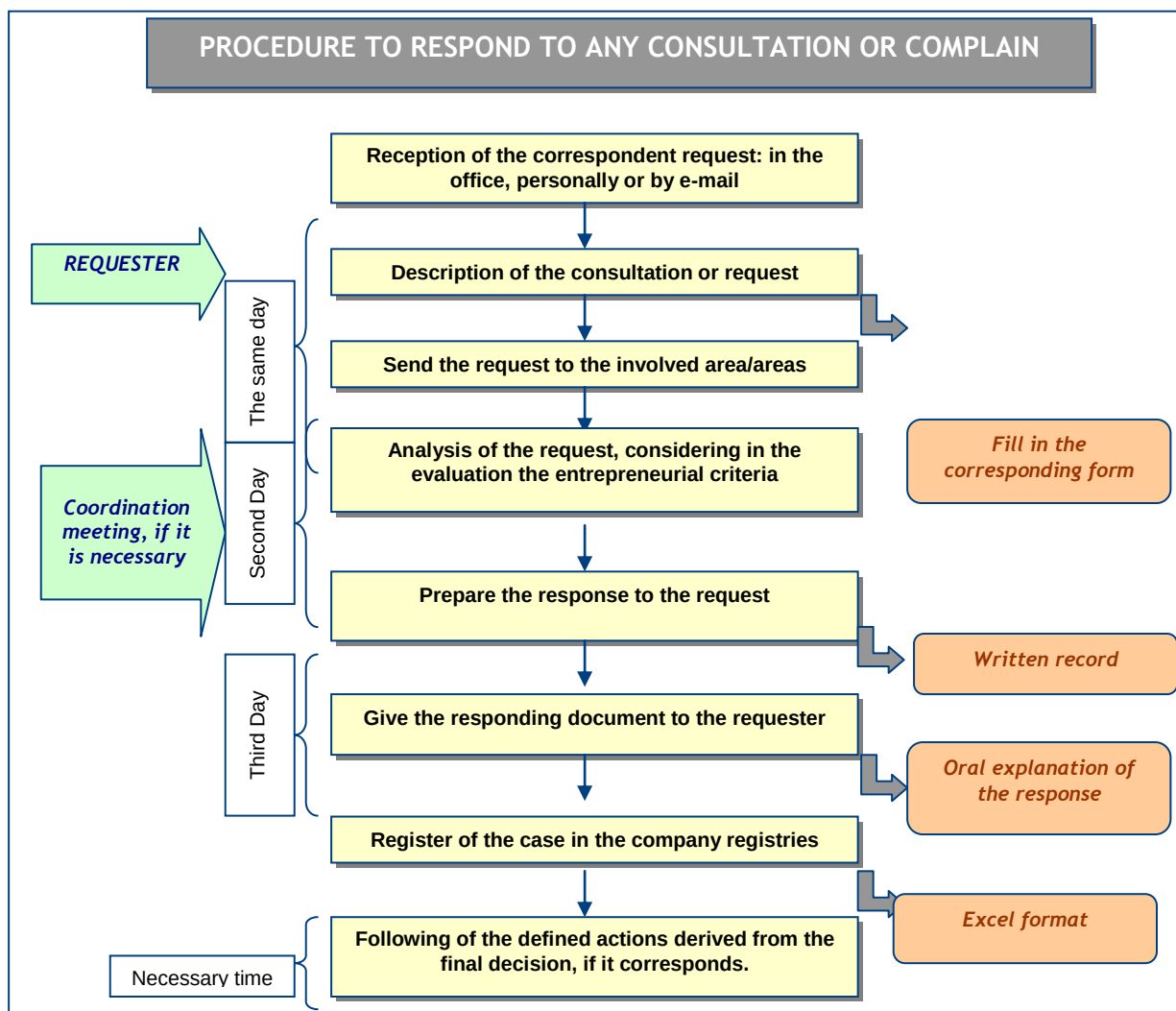


Fig. 77: Procedure to respond to any consultation or complain

Additionally, both concessions have a clearly defined protocol or procedure to inform all the involved stakeholders about any unusual operations that the concessions should have to carry out. Said procedure consists on:

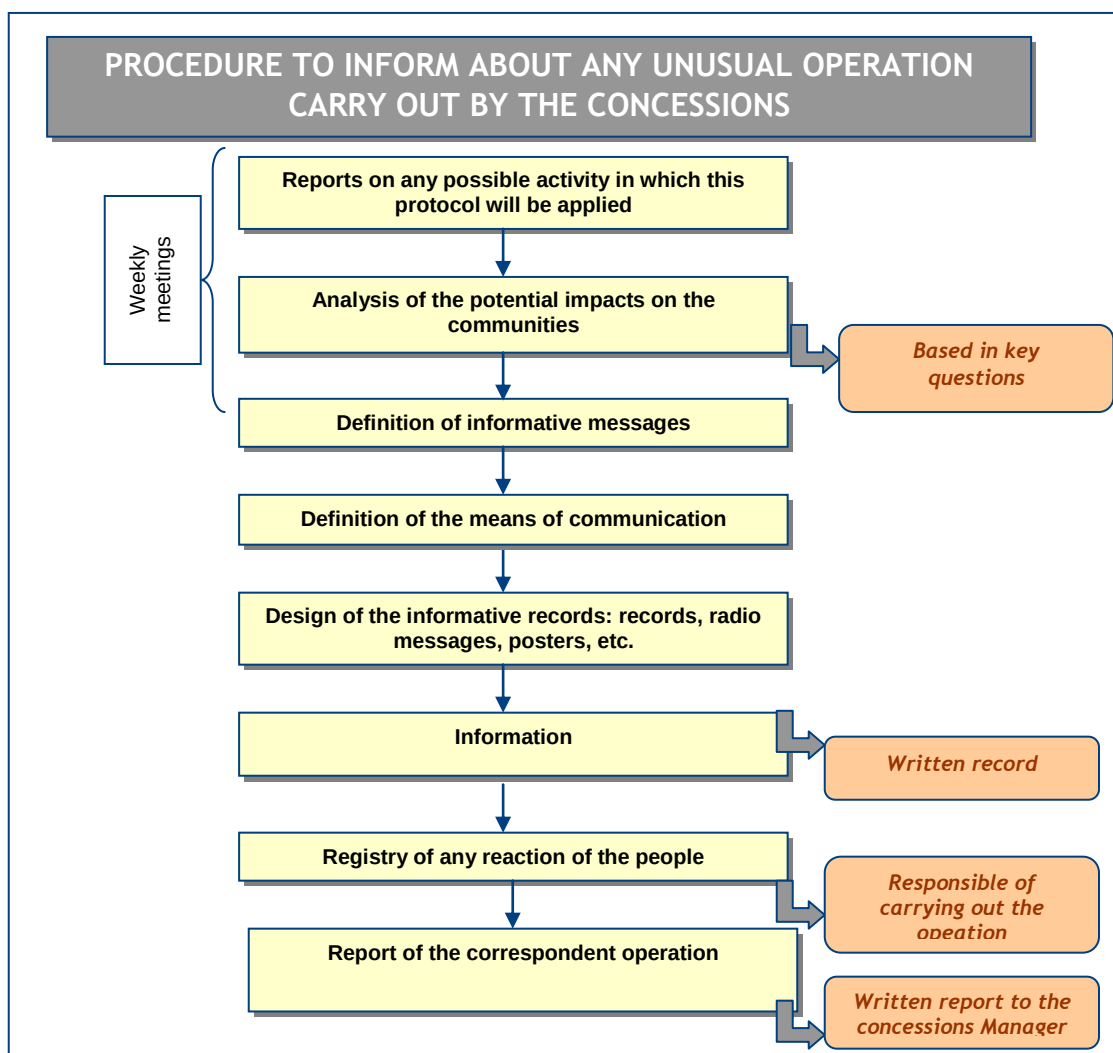


Fig. 78: Procedure to inform about any unusual operation

- **Process of handling conflicts** - prioritizing the following areas of activity: a protocol to define said process will be designed, giving special priority to the dialog between the involved parties and the search for creative solutions; establish the needed agreements with the aim to collaborate in any conflictive situation; establish agreements for the use, maintenance, control and custody of any way of terrestrial communication.

In this sense, Maderacre and Maderyja have set specific protocols with the aim to clearly define the procedure to follow before any conflictive situation that the concessions should have to face and they are presented following. Maderacre procedure to handle any conflictive situation:

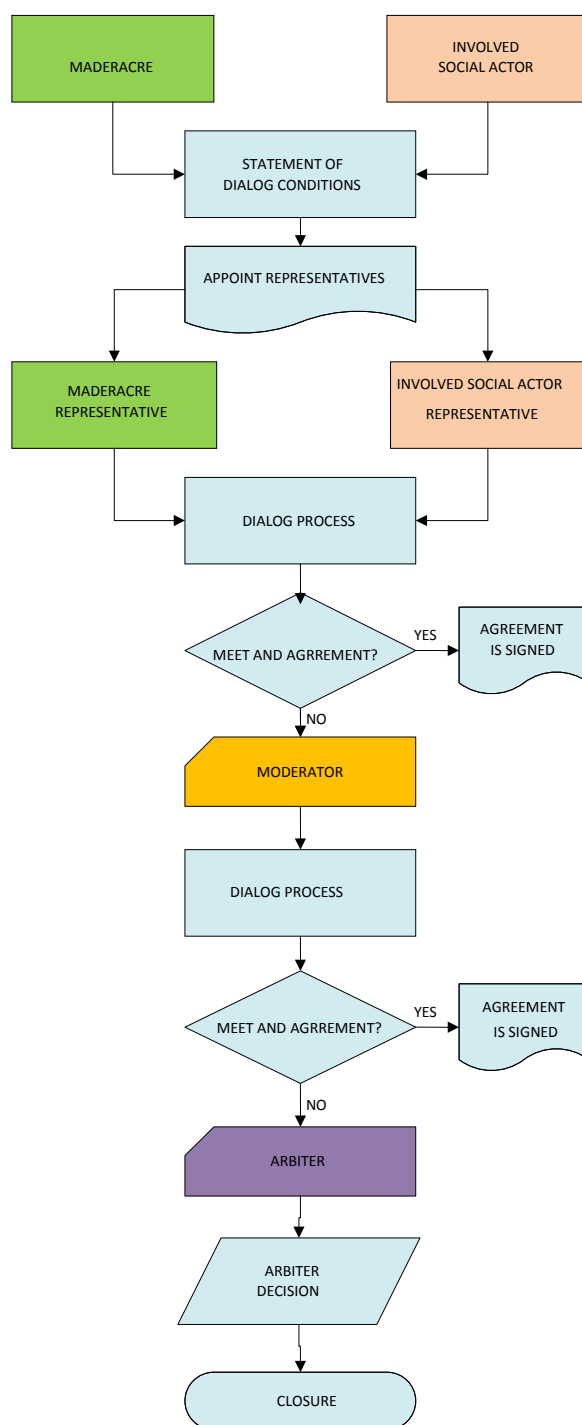


Fig. 79: Maderacre procedure to handle conflictive situations

Maderyja procedure to handle any conflictive situation:

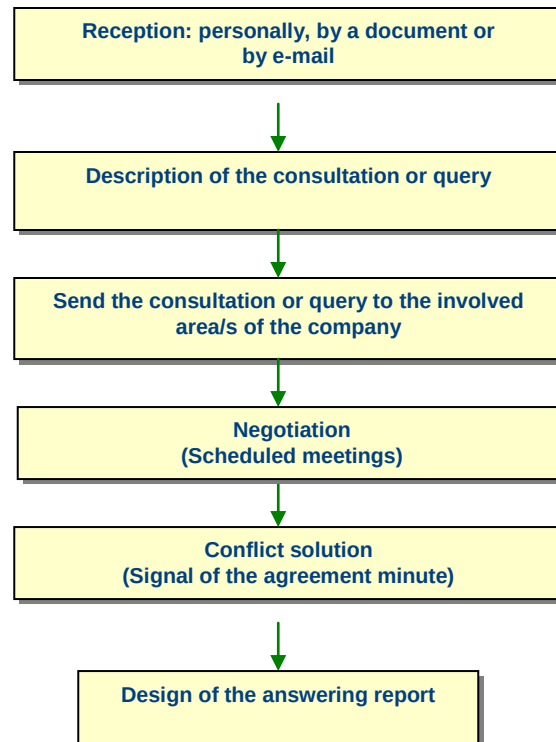


Fig. 80: Maderyja procedure to handle conflictive situations

The Maderyja concession protocol for handling any conflictive situation is based on a permanent and active communication in order to identify the problems, interests and questions of all the involved parties. In case a negotiation process is needed to solve a conflictive situation, a negotiation based on the interests of all the involved parties will be developed.

In relation to the process for handling unresolved conflicts and grievances during project planning and implementation, the SCS Final CCBA Validation Report states that both concessions have established procedures for handling conflicts and grievances, and thus handle matters related to the REDD project. The procedure to respond to any kind of consultation or complaint takes 3 days from the time the request to receiving a response (orally). Unusual operations are registered during weekly meetings, whereas conflictive situations have a different treatment in each company. In the case of Maderacre, two meetings are set between the company and the person or group get to an agreement, if not, a moderator is called, and if there is still no agreement in place, an arbitrator intervenes in order to get to an agreement and get to closure. For Maderyja, the conflict communication is received in person, by document or by email, described and sent to the appropriate area of the company related to it. A negotiation process follows and then a solution is reached, and finally an answering report designed.

- **Researching and Publications** - giving priority to the following areas of activity: 1% of the concessions profits will be invested in the development of researching activities within the concession area; promote the development of agreements between the concessions and other educational and researching institutions as educational organizations, researching centers and NGOs.

In this sense and as it was described in chapter B, Maderacre has signed cooperation agreements with educational institutions, as the Management Forest Department of La Molina Agrarian National University and the Faculty of Economy of the University of the Pacific.

Each of these agreements give benefits to both involved parties, as well as to the whole local and national communities regarding to the results of the researches that are being carried out on *Swietenia macrophylla* within the concession area that will be opportunely disseminated and available to everybody, and the opportunity for the Economy students to comply with the requirements of their University career and apply all their knowledge in an in-field situation.

The agreement signed with WWF, as it was previously mentioned, implies a sustainable and responsible management of the natural and human resources by Maderacre, thus the preservation and conservation of them is assured minimizing the possible impacts for local communities.

As it was also previously mentioned, it is important to add that currently Maderyja is in process of signing agreements with WWF and with the National Forestry Chamber.

- **Suitability with the FSC principles and criteria** - taking into account the permanent suitability between Maderacre and Maderyja social policies and the FSC social principles and criteria, in order to maintain the voluntary FSC forest certification achieved by both concessions.

Four Community Development Programs are defined in the Relationship with the Community Plans of Maderacre and Maderyja timber concessions and are presented in the following chart:

Chart 119: Community Development Programs

Program	Activities
Strengthening of social organizations	• Strengthening of social local coordination networks for the improvement of the regional productivity. • Influence the local government for the design of policies forwarding the development of sustainable economic activities. • Give training courses and technical support basically in relation with the main entrepreneurial management tools to social organizations. • Design and implementation of a system which includes prices and market information.
Improvement of the quality of basic education	• Establishment of alliances with educational institutions. • Curricular enrichment. • Activities within the concession area.
Technical-productive training courses for young people	• Establishment of alliances with educational and technical institutions. • Carry out the training program. • Allow students to work or carry out researching activities within the concession area. • Working experiences.
Support to territorial arrangement	• Agreements with the local government. • Integration of a responsible commission. • Information collecting. • Visits to prioritized zones. • Arrange actions with any other involved institution or organization. • Carry out the workshop "Basic proposal for territorial arrangement". • Design and development of the territorial arrangement defined plan.

It is important to also mention that in the Relationship with the Community Plans, a detailed timeframe was set for the aforementioned social programs and its correspondent activities that both concessions have been carrying out.

Additionally, Maderacre concession has created a Consultative Committee on the Relationship with the Community activities, which provides the necessary transparency to the whole timber concessions activities and in consequence to this specific project activity. The main purpose of this Committee is to give the correspondent advice to the staff in the design and implementation of its social policies.

As it was mentioned before, both timber concessions have a strong commitment with the sustainable development of all its forestry activities, in order to significantly contribute to the growth and welfare of the surrounding communities and in the medium term become a model enterprise of reference in the forestry sector of the whole country.

To this aim, this Consultative Committee must assure:

- that all the different stages of the project comply with the economical, ethical, environmental and social higher standard levels and also with the principles and criteria of the FSC;
- that the relationship between all the involved regional, local and community parties that are somehow impacted by the operations of the concessions is fair and transparent and respectful to the legitimate interests of each of them.

Said Consultative Committee will be integrated by experienced people, with a high degree of sensitiveness on social, environmental and community subjects. They must have strong knowledge of the current challenges that all the forestry enterprises working in the Peruvian Amazon area face and also they have to be locally representative. For the achievement of the defined goals, this Committee will be independent of the Maderacre structural organization but the definition of its integration will be decided together by the concession and the committee.

As a result of the work of this Committee, an annual public report will be developed, which will include: the activities carried out by it, including the meetings with third parties; the identification of the crucial social aspects that the concession has to deal with, including a detail of the recommendations given to Maderacre. The concession commits to disseminate this information by means of its websites or any other available.

Some operating rules were defined for this Committee. Among them, it should be highlighted:

- A coordinator should be elected between all its members, who will last in said function for a year.
- It will meet regularly at least four times a year, with a required minimum presence of the half of its members every time. The agreements approved at each meeting will be stated in the correspondent acts.
- Maderacre commits to give the required administrative support to the Committee in all its activities. To this aim, the Social Responsibility Chief of the concession was indicated as its Technical Secretary.

In this sense and in order to implement its Relationship with the Community Plan, Maderya has designed the following structure:

- Technical Committee of Relationship with the Community: integrated by the Administrative Manager, the Forestry Operations Manager and the Responsible of Relationship with the Community. Its main responsibilities are:
 - a) Propose the general policies related to the relationship with the community to be approved by the entrepreneurial board.
 - b) Establish the operative actions to be developed related to the relationship with the community area.
 - c) Review the Annual Operative Plan of the Relationship with the Community area.
 - d) Approval of any protocol or procedure related with the relationship with the community area.
 - e) Establish a timeframe for the economic support of the activities that will be carried out.
 - f) Analysis and approval of the requests for social support.
- Relationship with the Community area within the structural organization of the concession: is the area in charge of the planning of the social strategies and activities of the concession and giving support and advice to the other management areas of Maderya. The main objective is to be involved as an enterprise in the social and economic dynamic of the environment, designing the actions that Maderya should carry out to support the development of local communities.

In relation to the Social Programs included within the Madre de Dios Amazon REDD Project, the SCS Final CCBA Validation Report of it states the following:

- The current and future training activities are targeted to wide range of groups. Some of the training activities are listed in the social community plans for both concessions. Maderacre social programs include: strengthening social organizations, improving basic education and enhancing technical-productive education for youth and support to territorial ordering. Maderyja social programs include: coordination and strengthening institutions, support to basic education, support to health and support to technical capacity building for youth.
- Maderacre has created a Consultative Committee for the community activities currently implemented and to be implemented, which provides the necessary transparency to the whole timber concessions activities. The main purpose of this Committee is to give the correspondent advice to the staff in the design and implementation of its social policies, programs and plans. In the community plan, the activities are targeted according to the expressed needs of the communities. The President of this Committee is a woman and also 3 out of its 4 members are women. Maderyja has a Technical committee for community relationships. Within their community programs, the technical capacity building is targeted to youth, both male and female. The same applies for Maderacre, where this program is targeted to youth (6-8) from the local Agricultrual School in Iñapari. Specific actions to accomplish within the project objectives and targeted to women include: emphasis in the dissemination and assistance to workshops to women (employees, housewives, students, etc.); establish the participation of women in the environmentally friendly productive projects proposed as an important qualifying factor for funding these projects; give priority to the training of female personnel; inclusion of gender indicators in the environmentally friendly productive projects' profiles; include the gender component amongst the indicators to monitor within the projects.
- A specific training plan addressed to local families, will be designed to strengthen local capacity in issues such as: organizational strengthening, leadership, environmentally friendly productive activities, entrepreneurial management. This training plan will include a post-training follow-up plan to evaluate the level of learning of knowledge shared and the impacts in their quality of life. In addition, actions to strengthen the role of the Belgium N.C. in the implementation of the project objectives are outlined in the PDD. Some include: include the Native Community in the workshops and other dissemination media; include the Native Community as one of the potential beneficiaries and offer support for the formulation of their proposals; give priority in training to the members of the Native Community; active participation of the Native Community in the formulation of the selected profiles; establish the potential impacts of the selected projects on the Native Community as a key element to monitor; coordinate the Native Community Plan about the shared boundaries with the forestry concessions respect to the custody plan; inform the Native Community of the installation of the Control Post PCA5 in Maderacre

Concession; coordinate with the Native Community the delimitation of the shared boundaries; coordinate with the Native Community the installation of shared milestones with the forestry concessions; include the Native Community in the signaling of the road section that is shared by the users; inform the Native Community of the patrolling and if necessary of any abnormal situation that could affect their area; inform the Native Community of any results that could affect their area respect to site verification (on site and through satellite imagery); include the Native Community and its School as a beneficiary of the Environmental Education program.

- Based on field visit discussions, positions are filled with capable professionals regardless of their origin. Currently, professionals from Lima, Ucayali and Pasco fill management positions; technical positions are filled with technicians and professionals from Iñapari and Ucayali; some workers come from San Martin and Ucayali. All other positions are filled with locals. It is worth noting that the nearest town to the concessions is Iñapari. This is a very small town that has a primary and secondary school and one technical agricultural school. The nearest university and technical institute of tertiary education is in the capital of Madre de Dios, Puerto Maldonado. Certified forest management practices have recently started in Peru, Ucayali, Madre de Dios and Piura, therefore experienced professionals on certified forest management are scarce in the country. Maderacre and maderija are building technical capacity of youth to fill in future employment opportunities as shown in their Social Community Plans. Two potential vulnerable groups: the Native Belgium Community and Women in the buffer area, can benefit of the REDD project through dissemination of activities, in particular targeted to them other activities.
- According to the face-to-face interview with workers and physical evidence shown (contracts, benefits register), employees are aware of their benefits and rights, such as health insurance, retirement benefits, compensation for time of service, school subsidy, etc.

4. Present labor conditions of Maderacre and Maderija personnel

As it was previously mentioned, both concessions take special care of the labor conditions of its personnel and its well-being. To this end and according to the FSC Certification, it must be said that both concessions fulfilled with all the laws and regulations related with human resources rights and duties. Furthermore, the salaries paid by them are into the average range of the regional and national forestry sector.

In order to assure that all the concessions staff knows clearly the main objectives, policies, practices and regulations of the companies, as well as forestry methods and techniques applied in the concessions operations, the Forestry Operations Manual and the Forest Management Practices Rulebook¹⁰² are given to all of them when they join the company.

One of the main objectives of the timber concessions is their personnel safety. Thus, all the Peruvian regulations related with this issue are taken into account and security equipments are available for all the people who work in any risky operation. In addition to this, training courses on occupational security and first aid are given to their personnel. Moreover, a First Aid Manual¹⁰³ was developed by the concession and is also given to all their workers when they start working at the company. They must keep it always with them as a guidance to make the needed consultations in case of an in-field accident or illness.

It includes all the necessary information to handle the wide range of situations that should occur during the forestry operations. Among its contents, it should be mentioned:

- First evaluation of the victim.
- The priorities of the first aid.
- Vital signs.
- Injuries classification.
- What to do?
- Bleedings.
- Brakes and traumatisms.
- Bandages and bandaging.
- Victims transport.
- Shock status and types of shocks.
- Cardiorespiratory stroke and basic revival.
- Choking.
- Epilepsy.
- Sea, river and pool rescue.
- Bites, stings, burns, electrocution, intoxication, women in labor.
- Geographic distribution of transmissible illnesses.
- Vaccination scheme (WHO - World Health Organization)
- First aid kit (content and precautions).

¹⁰² Both documents, the Forestry Operations Manual and the Forest Management Practices Rulebook, will be available to the auditors.

¹⁰³ This First Aid Manual will be available to the auditors.

All the issues related with their personnel safety (protection equipments, protection measures, etc.), responsibilities of each one, measures to undertake and penalties in case of not compliance are stated in the Security Rulebook of the concessions. It has special items related with care for the environment and relationship with others communities population. This Rulebook will be also available for the Verifier during his visit.

Both timber concessions believe that some changes in the people attitude with respect to the forest and its valuable resources are needed in order to make them really respect, appreciate and take care of it. By means of adequate training courses this could be achieved. Some training courses on low impact forestry methods and techniques are given to the concessions personnel as well, among them:

- Low impact exploitation activities (directed felling, forestry roads and paths, dragging of wood, etc.).
- Waste management.
- Occupational security and first aid.
- Sustainable forestry management principles.
- Forestry systems.
- Use of geographical assistance equipments (GPS, compasses, clinometers).

Both concessions believe that all the labor conditions have a strong influence in workers productivity. Therefore, both timber concessions make a great effort to give their people the best working conditions as possible. In this sense, Maderacre and Maderyja regard carefully to their workers nutrition and rest, trying to make their diet as balanced as possible and scheduling the operations taking into account the big physical effort required for them and the resting time that is needed in consequence. Among the measures outlined by the timber concessions regarding this issue, it should be highlighted: to install the camping sites as close as possible to the working place; to take into consideration the number of workers that will live there in order to design the required services in an according size; to develop some living together rules giving priority to the mutual respect between people and the environmental care; to maintain the security equipments and the first aid kit in good conditions so as to assure the health and safety of all their workers.



Fig. 81: Information sign



Fig. 82: Information sign



Fig. 83: Camping site



Figs. 84 to 86: Camping site conditions within the Madre de Dios Amazon REDD project area

5. Offsite community impacts under a without REDD project scenario

The absence of the REDD project will produce a negative influence in the different offsite community components. In this sense, the implementation of the project would have a net positive benefit.

Following, a brief description of the community risks or impacts that would occur in a without project scenario is presented. A without REDD project scenario means a scenario where the different social programs and plans would not be executed due to the lack of financing, fact that would be configured in a scenario without the revenue of carbon credits that are required for the implementation of the REDD project.

Impacts on the Social Components:

- The supply of opportunities to access to information and mechanisms of social education related to models of sustainable use of the forest will be smaller, limited mostly to the strategies of some governmental institutions, NGOs whose presence is itinerant and other timber concessions, among whom Maderacre and Maderya are leaders. There is evidence that the aforementioned information efforts are still insufficient and will be even more in a scenario of increase immigration.

- As it can be seen in the community description, mainly with respect to social participation, the dynamism of the population - public institutions relationships is based on the necessity of developing some work or the traditional dialogue mechanisms around an agenda that is not necessarily looking at the social and economic processes occurring within the region as a consequence of the construction of the inter-oceanic road and the economic growth of the latest years. In the absence of this REDD project, there will be fewer opportunities to enrich this dialogue and direct it to issues of sustainable development, protection culture, sustainable management, etc.
- In addition to this, and considering the direct impact, the lack of a strategy oriented to promote the formality of the ownership of the lands, determine boundaries, establish control posts, etc., could be the missing factor to trigger the perpetuation of informal practices of production and employment in the area of direct impact of the project and the concession.
- Even though the companies will keep their efforts to strengthen the local and regional institutionalism through the promotion of association mechanisms with private entities, the dynamism of the bilateral dialogue and the participation on the planned mechanisms, there is no guarantee that the commercial and fiscal constraints of the concession - State relationship can be surpassed. The REDD project development would contribute with the concessions efforts but from a perspective of development project-State relationship, which usually and by its nature is a less conflictive relationship.
- The increase in the coverage and quality of the basic services will be based on the natural rhythm of the public and service enterprises investment. Although the inter-oceanic road could speed up this expansion, there is no guarantee that it will be made taking into account protection and sustainable management of natural resources considerations. The REDD project would help to incorporate said criteria when planning the service provision.

Impacts on the Socioeconomic Components:

- Employment opportunities will be increased due to the territorial dynamism that the inter-oceanic road will generate. However, and considering the disorderly growing that is being observed, there will be a lack of skilled, responsible and focused on the conservation of forest resources labor offer.
- Discount of the investment and/or local and provincial spending that would have result from the implementation of the REDD project. Considering that this is a long-term project, the injection of an important amount of financial resources that would have contributed to the sustainability of many small and medium businesses would not exist.

- The alternative economic activities will emerge as practical experimentation of families that require more diversified livelihood strategies. It is possible that the failure of these practices turn them to apply dependant and aggressive survival mechanisms towards the forests.

6. Offsite community impacts under a with REDD project scenario

Following, a brief description of the offsite positive and negative community impacts that would occur as a result of the implementation of the REDD project is presented. In the case of the identified negative impacts, the prevention or mitigation measures that the project will implement are also described.

Impacts on the Social Components:

Positive:

- The opportunities to access to information and communication for building a culture of sustainable management and conservation of the forests would be expanded. Said opportunities are a result from the companies' efforts in both the managing of their timber concessions and the implementing of the REDD project. With appropriate communication strategies and having the support and management transparency of the public institutions, the creation of a culture favorable to the principles of sustainable forest management can be foreseen.
- There will be a direct impact on the strengthening of the social capital of diverse organizations of the Iñapari District, particularly those who include the Local Economic Development and the protection of the natural resources in their agendas.
- With the development of sustainable productive projects, promoted by the REDD project, the feasibility of the sustainable economic activities that reduce the pressure on the forests could be considered demonstrated. From these model experiences, innovative chain reactions that build sustainable productive chains can be generated, and in the long-term, give economic opportunities for the livelihoods of families, mainly immigrants.
- The corresponding governmental sectors will be institutionally strengthen, particularly those corresponding to decentralized offices, through a dynamic interaction and the demonstration that a responsible business model is feasible, serious and respectful of the highest standards in relation to forest management.

- The opportunities and resources for research on forestry practices will be extended. The resources from the REDD project will be added to those that are already devoted by the concessions to research and forest monitoring (based on their demonstration plots) in order to empower them.
- The population of the geographically closest area will be benefited by the extension and investment on basic services that the companies have planned helped by the REDD project. Despite these actions may be complementary to other public and private investments, they are extremely important as they require coordination and convergence of resources and efforts for the provision of basic services in areas of high demographic dispersion, as the Iñapari District.

Negative:

- Oversized demands for support and social assistance from the population

Mitigation measures:

- Information and communication programs that are already currently undertaken, to inform about the nature of the project and the sustainable forest management approaches.
- Identifying, prioritizing and seeking funding local development projects, particularly supporting sustainable and environmentally friendly economic chains.
- Programs to attract local labor, both skilled and unskilled.
- Development of the skills and capacities of the members of the associations linked to the selected projects.

- Immigration flow increase as a consequence of knowing the existence of a project that can use workforce or take actions for social investment.

Mitigation measures:

- Programs to attract local labor, skilled and unskilled.
- Support to business initiatives to absorb the immigrant families both as work labor and socially.
- Signalizing and protection programs of the boundaries of the concessions.
- Coordination and supporting actions with adjoining concessions to protect concessioned forests in general.

- Increase of the car flow through the inter-oceanic road, as well as through paths, due to the project operations.

Mitigation measures:

- Training courses for the project personnel and also for the different actors linked to the productive chain of MADERACRE and MADERYJA and to the REDD project to ensure the strict compliance with all the road and environmental safety measures for the use of the roads.
- Road signalizing and citizenship education programs in relation to road traffic.

- Entrance of foreign people with practices and cultural expressions that differ from the local ones.

Mitigation Measures:

- Induction programs on principles of interculturalism and respect to local populations, for all the employees of the company and the project.
- Permanent review and training for workers, contractors and general population about the relationship with the community protocols.

- Increased demand for supervision, control and coordination actions by public institutions that could generate extra workload or overflow of the installed capacity.

Mitigation Measures:

- Participation in forums for coordination and consultation with the State, to establish efficient mechanisms of supervision and control.
- Development of modern and transparent management tools which help in providing information and the relationship with public institutions.
- Programs to support the local institutionalism, particularly with respect to the training of their staff on the project and the approaches that sustain it, as well as on forestry management.

Impacts on the Socioeconomic Components:

Positive:

- Increase in the generation of work posts, with competitive salaries with the province and the region.

In this sense, the employment projection figures for the execution of the REDD project are presented in the following chart.

The project will increase local employment opportunities currently offered by the concessions, both for skilled and unskilled labor, rising from 08 workers in 2006 to 30 from the second year. That means an increase of almost 400%. It is important to mention that from the second year, the demand for local workers was prioritized.

Chart 120: Projection of employment demand in the following years

	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6 - 10
Skilled (technical college or university studies)	12	15	15	15	15	15
Unskilled	5	15	15	15	15	15
Total	17	30	30	30	30	30

	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6 - 10
Local workers (from the Province)	04	19	19	19	19	19
Foreign workers	13	11	11	11	11	11
Total	17	30	30	30	30	30

- Dynamism of the regional and local economy, from a supplier system that favors small and medium-size entrepreneurs and direct them to productive chains linked to timber and other environmentally friendly economic activities. In this sense, the demand of goods and services projection figures within the REDD project area are presented in the following chart. Likewise, significant financial resources will be injected to small and medium-size entrepreneurs from the Province, particularly of Iñapari, Iberia and Puerto Maldonado.

This in response to the logistic needs of the project and the management of the concessions. At a provincial level, a Fund for the promotion of local initiatives will be established, where cash will enter as fresh capital for the required businesses and services. In a regional scenario, annual acquisitions will raise from the current S/ 150,000 “nuevos soles” to S/ 300,000.

Chart 121: Projection of goods and services demand in the following years

GOODS AND SERVICES THAT WILL BE ACQUIRED WITHIN THE PROVINCE	AVERAGE MONTHLY PURCHASE AMOUNT s/					
	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6 - 10
1. Basic food	24,000	36,000	36,000	36,000	36,000	180,000
2. Transport	6,000	12,000	12,000	12,000	12,000	60,000
3. Lodging	4,800	7,200	7,200	7,200	7,200	36,000

GOODS AND SERVICES THAT WILL BE ACQUIRED WITHIN THE PROVINCE	AVERAGE MONTHLY PURCHASE AMOUNT s/					
	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6 - 10
4. Food	6,000	10,000	10,000	10,000	10,000	120,000
5. Qualified service	0	36,000	36,000	36,000	36,000	180,000
6. Workforce	96,000	210,000	210,000	210,000	210,000	1,050,000
7. Desk and office materiales	4,200	4,800	4,800	4,800	4,800	24,000
8. Fuels and lubricants	24,000	30,000	30,000	30,000	30,000	150,000

GOODS AND SERVICES THAT WILL BE ACQUIRED FROM OTUSIDE OF THE PROFINCE	AVERAGE MONTHLY PURCHASE AMOUNT s/					
	Year 1	Year 2	Year 3	Year 4	Year 5	Years 6 - 10
1. Equipment	3,000	5,000	5,000	5,000	5,000	25,000
2. Transport	10,000	15,000	15,000	15,000	15,000	75,000
3. Lodging	6,000	10,000	10,000	10,000	10,000	50,000
4. Food	7,500	12,000	12,000	12,000	12,000	60,000
5. Qualified service	100,000	150,000	150,000	150,000	150,000	750,000
6. Workforce	6,000	50,000	50,000	50,000	50,000	250,000
7. Desk and office materials	5,000	10,000	10,000	10,000	10,000	50,000
8. Fuels and lubricants	6,000	45,000	45,000	45,000	45,000	225,000

- Strengthening of alternative economic activities for families living in the areas closest to the concessions and for immigrant families. From projects promoted by the REDD project, new factors of competitiveness and market linkage will be identified.

- In terms of competitiveness, there will be a contribution from the project on creating greater opportunities of technical and working training, and therefore better performances of the families in their economic activities will be achieved.

In fact, with respect to the positive impacts on the socio-economic component and the mitigation measures mentioned previously, the following actions were conducted by the Madre de Dios Amazon REDD Project during the 2010 period¹⁰⁴:

- In relation to the opportunities to access to information and communication for building a culture of sustainable management and forest conservation and the direct impact that there will be on the strengthening of the social capital of diverse organizations of the Iñapari District, there is a program developed in this respect which is in the process of validation. However, the concessions have been participating in consultation bodies, such as the Forest Management Committee of the Acre River, assuming in it the position of Vice President, through its designated representative, Eng. Nelson Kroll Kohel. There is also a Relationship with the Community Advisory Committee. In these and through the participation in various events, the concessions report their activities and the scope of the Madre de Dios Amazon REDD Project. Additionally, training for staff and local suppliers is conducted.
- Related to the strengthening of the governmental sectors, particularly those corresponding to decentralized offices, in addition to the program which is in the process of validation that develops this subject, state institutions are being strengthened through the participation in consultation bodies, as well as the participation as speakers at various events where the scope of the management that has been carried out is disseminated. In this sense, during the first half of the year (2010), the concessions had participated in seven events where the Madre de Dios Amazon REDD Project was exposed and explained to national and foreign (Brazil) officials: Meeting of the Management Committee of Acre River, Business Roundtable with the participation of GFTN USA-Peru organized by WWF-CERF Project, Mahogany Group Meeting, Dialog Event “Environmental Services and REDD in Madre de Dios: Current Status”, Meeting of the Working Group for the Management of the Yaverija River Sub Basin, Meeting of the Working Group of the Forum MAP Region and Symposium Forest Management in the Brazilian Amazon and Seminar Celebrating 30 years of Forest Research in Tapajós National Forest by Embrapa, Eastern Amazon.

¹⁰⁴ According to the “2010 Monitoring Report of the Madre de Dios Amazon REDD Project”, already submitted to the CCBA.

- In relation to the development of sustainable productive projects, promoted by the REDD Project, that will reduce the pressure on the forests, build sustainable productive chains and, in the long-term, give economic opportunities for the livelihoods of families (mainly immigrants), in addition to the program which is in the process of validation that includes the support to sustainable productive projects within the community, the scope of the Madre de Dios Amazon REDD Project was already reported to the population through the RRCC Advisory Committee.
- With respect to the extension of opportunities and resources for research on forestry practices (research and forest monitoring), two research investigations were supported during the year: one, carried out by UNAMAD on Forest Dynamics and Structure, through the establishment of permanent monitoring plots, the evaluation of natural regeneration and the growth of the species of interest; the other, carried out by the University of Leeds, to measure biomass and carbon, where students of the La Molina Agrarian National University and the University of San Antonio Abad of Cusco had participated.
- In relation to the extension and investment on basic services that the companies have planned, helped by the REDD Project, they had to be postponed due to the limited funds collected during the 2009-2010 period. For this reason, budget execution has to be prioritized rather than the work of monitoring. The Madre de Dios Amazon REDD Project hopes to strengthen the investment in basic services as a consequence of the improvement of the sale of carbon credits or other additional income generated by the management of other forest resources framed within the Management Plans of the concessions.
- Regarding the increase in the generation of work posts, with competitive salaries within the Province and the region, from one year to another the generation of working posts has increased. In the case of permanent workers, it went from 7 people in 2009 to 9 in 2010. Also, in the case of temporary workers rose from 4 people in 2009 to 12 in 2010.
- Related to the dynamism of the regional and local economy, from a supplier system that favors small and medium-size entrepreneurs and direct them to productive chains linked to timber and other environmentally friendly economic activities, it is important to mention that local suppliers are aligned with the guidelines of the concessions and the Madre de Dios Amazon REDD Project: 1 forest management contractor, 1 logging contractor, 1 feeding contractor, 1 provider of hardware inputs and 3 fuel suppliers.

- In relation to the injection of significant financial resources to small and medium-size entrepreneurs from Ptovince, particularly of Iñapari, Iberia and Puerto Maldonado, said resources will be achieved through the support for project development of initiatives of small producers of the area (under the scenario of income received from the sales of carbon credits). The next stage is the registration of small producers in the area of influence of the project.
- With respect to the contribution on creating greater opportunities of technical and working training, in addition to the program that is in the process of validation which includes this issue, the concessions have been training their staff as well as local people through the RRCC Advisory Committee. In this sense, the training activities are included within the Annual Operative Plan. During 2010, a total of six training activities were carried out for workers on the following topics: Chain of Custody Procedures, Forestry Census, Reduced Impact Logging, FSC Certification, Industrial Safety and First Aid.
- Regarding the coordination and supporting actions with adjoining concession to protect concessioned forests in general, there has been coordination actions with a total of 7 concessions. In this sense, there is one contract for the use and exploitation of the access path to the concessions. In relation to the opening of the path to the concessions, there has been coordination actions between the following concessions: Maderacre SAC, Maderyja SAC, Agro Industrial Victoria SAC, Catahua SAC, Pumaquiro SAC, Transforestal, through 3 meetings and there is one service contract for the use and exploitation of the road, which specifies measures for the protection and care of the forest. Two meetings were also made, in the framework of the Forest Management Committee, related to the establishment of control posts on the access to the concessions, which at the same time serve as control mechanisms for the protection of the Reserve of Indigenous People in Voluntary Isolation and the Alto Purús National Park, where the following institutions participated: Maderacre SAC, Maderyja SAC, Agro Industrial Victoria SAC, Pumaquiro SAC, Amatec SAC, Razor-billed Curassow SAC and other civil society actors.
- Related to the road signalizing and citizenship education programs in relation to road traffic, three new information signs at the access road to the timber concessions and the Madre de Dios Amazon REDD project area have been installed. Additionally, talks have been given to people in charge of forest transporting, mainly aimed at road safety and care of the roads. Finally, due to the low intensity of traffic on the access road to the concession and the almost exclusive use of it for wood extraction, the need for a signage program and driver education has not been yet identified.

- In relation to the induction programs on principles of interculturalism and respect to local populations, for all the employees of the company and the project, it is important to take into account that this topic is developed within the Social Responsibility Program, which was part of the training provided to workers on FSC Forest Certification. It was provided to 100% of the workers (20).
- Regarding the participation in forums for coordination and consultation with the State, to establish efficient mechanisms of supervision and control, the project participates in one body, the Forest Management Committee, where the Technical and Forestry Administration of Tahuamanu – GOREMAD participates.
- With respect to the development of modern and transparent management tools which help in providing information and the relationship with public institutions, the following documents are available for public consultation: Protocol to Queries and Requests of Citizens, Protocol for the Public Information on Non-routine Operations of the Company, Action Protocol for Constructive Conflict Transformation and the Annual Public Summary of Activities.

7. Quantification of the offsite community impacts described above

For the quantification of the impacts, the following scale of values was used. It is important to take into account that in assigning values to the impacts, its magnitude or intensity was considered:

Considering the intensity of the impact

Value	Description
3	High positive impact
2	Medium positive impact
1	Low positive impact
0	No impact
-1	Low negative impact
-2	Medium negative impact
-3	High negative impact

In the following page, the quantification matrixes of the community impacts are presented for both the with REDD and the without REDD project scenarios, showing that the net community benefit of the project is positive:

Chart 122: Quantification matrix of the offsite community impacts under a without Madre de Dios Amazon REDD Project

Component	Impact	Intensity of the impact
Social	The supply of opportunities to access to information and mechanisms of social education related to models of sustainable use of the forest will be smaller, limited mostly to the strategies of some governmental institutions, NGOs whose presence is itinerant and other timber concessions, among whom Maderacre and Maderyja are leaders. There is evidence that the aforementioned information efforts are still insufficient and will be even more in a scenario of increased immigration	-2
	In the absence of this REDD project, there will be fewer opportunities to enrich this dialogue and direct it to issues of sustainable development, protection culture, sustainable management, etc.	-2
	In addition to this, and considering the direct impact, the lack of a strategy oriented to promote the formality of the ownership of the lands, determine boundaries, establish control posts, etc., could be the missing factor to trigger the perpetuation of informal practices of production and employment in the area of direct impact of the project and the concession	-3
	Even though the companies will keep their efforts to strengthen the local and regional institutionalism through the promotion of association mechanisms with private entities, the dynamism of the bilateral dialogue and the participation on the planned mechanisms, there is no guarantee that the commercial and fiscal constraints of the concession - State relationship can be surpassed.	-1
	The increase in the coverage and quality of the basic services will be based on the natural rhythm of the public and service enterprises investment. Although the inter-oceanic road could speed up this expansion, there is no guarantee that it will be made taking into account protection and sustainable management of natural resources considerations	-3
	SUBTOTAL	-11

Component	Impact	Intensity of the impact
Socioeconomic	Employment opportunities will be increased due to the territorial dynamism that the inter-oceanic road will generate. However, and considering the disorderly growing that is being observed, there will be a lack of skilled, responsible and focused on the conservation of forest resources labor offer	-2
	Discount of the investment and/or local and provincial spending that would have result from the implementation of the REDD project. Considering that this is a long-term project, the injection of an important amount of financial resources that would have contributed to the sustainability of many small and medium businesses would not exist	-3
	The alternative economic activities will emerge as practical experimentation of families that require more diversified livelihood strategies. It is possible that the failure of these practices turn them to apply dependant and aggressive survival mechanisms towards the forests	-1
	SUBTOTAL	-6
TOTAL		-17

Chart 123: Quantification matrix of the offsite community impacts for the implementation of the Madre de Dios Amazon REDD Project

Component	Impact	Intensity of the impact
Social	The opportunities to access to information and communication for building a culture of sustainable management and conservation of the forests would be expanded	3
	There will be a direct impact on the strengthening of the social capital of diverse organizations of the Iñapari District	2
	With the development of sustainable productive projects within the community, promoted by the REDD project, the feasibility of the sustainable economic activities that reduce the pressure on the forests could be considered demonstrated	2
	The corresponding governmental sectors will be institutionally strengthen, particularly those corresponding to decentralized offices, through a dynamic interaction and the demonstration that a responsible business model is feasible, serious and respectful of the highest standards in relation to forest management	2
	The opportunities and resources for research on forestry practices will be extended	3
	The population of the geographically closest area will be benefited by the extension and investment on basic services that the companies have planned helped by the REDD project	2
	Oversized demands for support and social assistance from the population	-2
	Immigration flow increase as a consequence of knowing the existence of a project that can use workforce or take actions for social investment	-1
	Increase of the car flow through the inter-oceanic road, as well as through paths, due to the project operations	-1
	Increased demand for supervision, control and coordination actions by public institutions that could generate extra workload or overflow of the installed capacity	-1
SUB TOTAL		9

Component	Impact	Intensity of the impact
Socioeconomic	Increase in the generation of works posts, with competitive salaries within the province and the region	3
	Dynamism of the regional and local economy, from a supplier system that favors small and medium-size entrepreneurs and direct them to productive chains linked to timber and other environmentally friendly economic activities	3
	Strengthening of alternative economic activities for families living in the areas closest to the concessions and for immigrant families	2
	In terms of competitiveness, there will be a contribution from the project on creating greater opportunities of technical and working training, and therefore better performances of the families in their economic activities will be achieved	2
SUB TOTAL		10
TOTAL		19

The following charts show a comparative summary between the different scenarios previously analyzed:

Value of the community impact under the without REDD project scenario	
Total community impact without REDD project	-17

Value of the community impact under the with REDD project scenario	
Total community impact with REDD project	19

Taking into account the above charts, it can be appreciated that the net community benefit of the project is positive, showing that the impact under a without project scenario is negative while under a with project scenario the impact is not only positive but also the negative impacts under a without project scenario would be minimized or avoided with the implementation of the project.

In this regard, the SCS Final CCBA Validation Report of the Madre de Dios Amazon REDD Project mentions that the livelihoods framework was used to describe the communities around the project. The net benefits of the project were calculated using qualitative indicators according to the best knowledge of the project proponents and based on indicators discussed during the field audit. The assessment is based on a list of activities that would benefit the community in the buffer zone (there are no inhabitants within the project area) with and without the project. In particular, planned REDD activities under outcome 1, Contribute to the sustainable development of rural producers living in the buffer zone, related to local development planned with authorities and families, promoting local environmentally friendly productive initiatives. Conclusion: based on the quantitative and qualitative baseline and qualitative estimations made by the project proponents, it is reasonable to think that the net community benefit of the project is positive.

It adds that project proponents clearly understand the potential negative offsite community impacts of the project. Socioeconomic impacts of the project area only positive. The negative social impacts on the project include: oversized demands for support and social assistance from the population; immigration flow increase as a consequence of knowing the existence of a project that can use workforce or take actions for social investment; increase of the car flow through the inter-oceanic road, as well as through paths, due to the project operation; entrance of foreign people with practices and cultural expressions that differ from the local ones; increased demand for supervision, control and coordination actions by public institutions that could generate extra workload or overflow of the installed capacity.

For the mitigation of offsite negative social and economic impacts, said Validation Report mentions that information and communication programs are already in place; identifying, prioritizing and seeking funding for local development projects, particularly supporting sustainable and environmentally friendly economic chains; programs to attract local labor, both skilled and unskilled; development of the skills and capacities of the members of the associations linked to the selected projects; support to business initiatives to absorb the immigrant families both as work labor and socially; signaling and protection programs for the boundaries of the concessions; coordination and supporting actions with neighbor concessions to protect forests under concession in general; training courses for the project personnel and also for the different actors linked to the productive chains of Maderacre and Maderyja and to the REDD project to ensure the strict compliance with all the road and environmental safety measures for the use of the roads; road signaling and citizenship education programs in relation to road traffic; induction programs on principles of interculturalism and respect to local populations, for all the employees of the company and the project; permanent review and training for workers, contractors and general population about the relationship with the community protocols; participation in forums for coordination and consultation with the State, to establish efficient mechanisms of supervision and control; development of modern and transparent management tools which help in providing information and the relationship with public institutions; programs to support the local institutionalism, particularly with respect to the training of their staff on the project and the approaches that sustain it, as well as on forestry management.

According to the SCS Final Validation Report of the project, the assessment for identifying likely unmitigated negative offsite social and economic impacts against the social and economic benefits of the project within the project boundaries seems logical and within reasonable limits. The net community benefit of the project is positive, not only the impact under a without project scenario is negative but a with project scenario impact is positive and minimize some of the without project negative impacts.

Finally, the results of the monitoring actions that were taken during the 2010 period are presented following¹⁰⁵:

- In relation to give priority to hire local labor, according to the tab that was applied to workers in June 2010, 34.8% of them are from Iñapari, meaning that their mothers lived there when they were born.
- Related to the priority given to local suppliers, approximately 70% of the amount of payments (in US\$) for suppliers contracts correspond to local suppliers.

¹⁰⁵ According to the "2010 Monitoring Report of the Madre de Dios Amazon REDD Project", already submitted to the CCBA.

- Regarding the training opportunities that are provided to the company staff, it is important to mention that 100% of the workers have been trained in the following subjects: Chain of Custody Procedures, Forestry Census, Reduced Impact Logging, FSC Certification, Industrial Safety and First Aid. In the case of Chain of Custody Procedures, only the plant staff was trained, cause it is a specific topic within their jurisdiction. A total of six training sessions took place and a total of 29 hours have been devoted to providing said training: Chain of Custody Procedures (2 hours), Forestry Census (5 hours), Reduced Impact Logging (8 hours), FSC Certification (2 hours), Industrial Safety (6 hours) and First Aid (6 hours).
- With respect to the active participation in consultation bodies, at present there is a designated representative for the Forest Management, which is the current Vice-President. Additionally, a representative has been designated to serve on the Management Committee of the Yaverija River Sub basin, which is in the process of formation and the Madre de Dios Amazon REDD Project is participating in this process.
- Related to the priority given to local suppliers, approximately 70% of the amount of payments (in US\$) for suppliers contracts correspond to local suppliers.
- In relation to the conduction of guided visits to the facilities of the Processing Plant and to the concessions, a guided visit to the Processing Plant located within the Madre de Dios Amazon REDD project area was carried out, involving a total of 30 students from the Elena Bertha Elementary School of Iñapari. There was also a guided visit to the project area with a group of students from the Madre de Dios National University (UNAMAD) and another guided visit was held and a training by the Wildlife General Direction of Peru to Forestry Auditors specialists on the use of equipment and FIELDMAP technology for 6 days.
- With regard to the promotion of good practices on social responsibility to the company's suppliers, two of the project's suppliers (SERFORES and VALERIA Representations) have been applying positive practices in social responsibility by providing proper equipment to their staff, as well as integration activities among them and, at the same time, social outreach in the community.

- Regarding the opportunities for practice that are provided and the research by students from public and private universities that is supported, to date there is one agreement signed with the University of Leeds for the development of investigation studies and practices, within the concessions. At the same time, a similar agreement is about to be signed with UNAMAD, to work on the same subject. In addition to this, a total of 2 research studies were conducted: one, by the UNAMAD, on Forest Dynamics and Structure, through the establishment of permanent monitoring plots, evaluation of natural regeneration and growth of the species of interest; and the other, by the University of Leeds, where students from the La Molina Agrarian National University and the University San Antonio Abad of Cusco, participated in the measurement of biomass and carbon. A summary of both research studies supported and conducted the past year was published, which is available on the website of the Network of Millers Forest Engineers. Likewise, their dissemination on the concession's website, in process of restructuring, is also planned.
- A plan to disseminate the nature of the Madre de Dios Amazon REDD Project has been developed and is currently in the process of validation.

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