MADRE DE DIOS AMAZON REDD PROJECT

Document prepared by Greenoxx NGO

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Contact	Chairman & CEO: Eng. Rocco Cheirasco Executive Vice-President: Eng. Silvia Gómez Caviglia e-mail: ngo@greenoxx.com; rocco@greenoxx.com; silvia@greenoxx.com Website: www.greenoxx.com Phone: +598 2604 08 69 Address: Costa Rica 1661 | of. 7; CP 11500; Montevideo, Uruguay Skype contact: roccocheirasco; silvia.gomez.caviglia

Madre de Dios
Amazon REDD Project

MADERYJA

Greenoxx
greening the future

Maderacre

TABLE OF CONTENTS

ANNEXES

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 contracts[1] with the Peruvian State in May 2002 for 40 years, renewable for 40 more years, totalling 80 years of contract, for an area of 98.932[2] 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 Project[3], 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

[1] Both contracts will be available to the auditors.

[2] 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. As will be seen in BL-UP, net forest area is 97,817.41 ha, less than this area considering that it has been based in forest map developed by IIAP and shapes from this source overlap only this extension with the project area.

[3] 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

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.

Another secondary source of risk for the future could come from illegal logging, which may affect in a much lower level of risk, the project area. Illegal loggers could be attracted in the future by the abundance of forestry species of high commercial value, as mahogany. Illegal logging, even though it does not necessarily deforest, if happens, could affect in the future the value of the forest and open roads that make accessibility easier, creating the conditions to future deforestation. However, it is clear from different independent studies and from the Participatory Rural Appraisal diagnosis (PRA conducted for the project) that this risk is not significant and the main reason for land use change has been, and remains, the installation of crops and pastures.

An environmental study of the Vilcabamba-Amboró Conservation Corridor was recently carried out by the Peruvian NGO AIDER[4], 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 Ministry of Transport and Communication of Peru[5] (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:

[4] 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.

[5] http://www.mtc.gob.pe/portal/logros.htm

* 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.

In addition, until the paving of IOH, Madre de Dios was an isolated region, more integrated with Brazil than with the rest of the country. Before the construction of this highway, it could take 2-3 days to go to Cusco, while now it takes around 14 hours. 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 was 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 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 mainly by migratory farmers, 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. 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 developd 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 m^3.

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.

1.2 Sectoral Scope and Project Type

According to the sectoral scopes under the VCS Program[6], 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 Requirements[7] 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 Module[8] of the applied REDD Methodology Modules, the following decision tree was used to identify the type of VCS-eligible REDD project activity:

<table>
<tr><td colspan="4">Is the forest land expected to be converted to non-forest land in the baseline case?</td></tr>
<tr><td colspan="2">YES[8]</td><td colspan="2">NO</td></tr>
<tr><td colspan="2">Is the land legally authorized and documented to be converted to non-forest?</td><td colspan="2">Is the forest expected to degrade by fuelwood extraction or charcoal production, in the baseline case</td></tr>
<tr><td>YES[9]</td><td>NO</td><td>YES</td><td>NO</td></tr>
<tr><td>Avoided planned deforestation</td><td>Avoided unplanned deforestation</td><td>Avoided forest degradation</td><td>Proposed project is not a VCS REDD[10] activity currently covered by the module framework</td></tr>
</table>

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

[6] http://www.v-c-s.org/sectoral_scopes.html

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

[8] 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.

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 Proponent

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[9] 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.

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”.

[9] 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.

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.

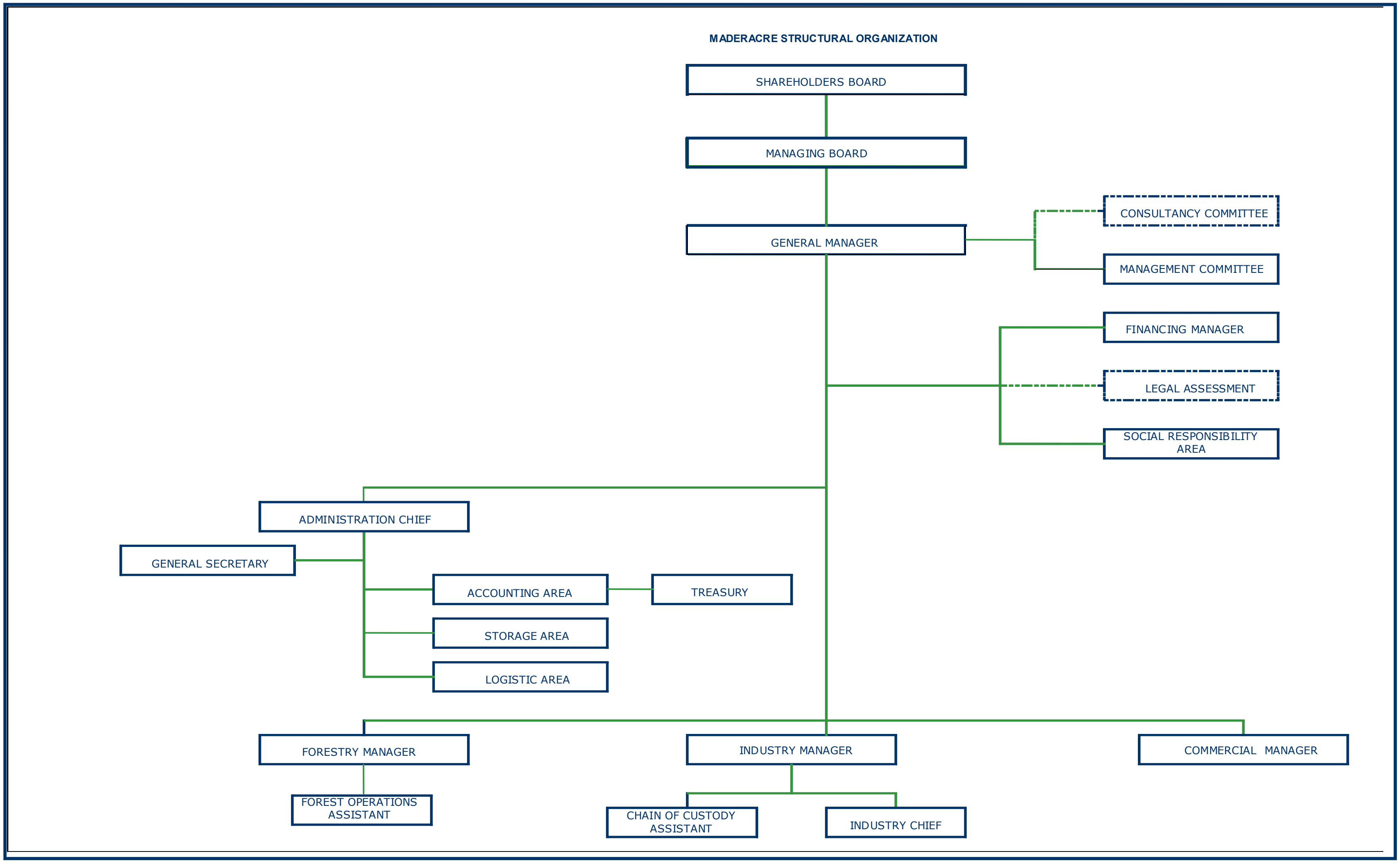


Fig. 1: Maderacre structural organization

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 Ponitifical 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.

Maderacre contact information:

General Manager: José Luis Canchaya Toledo
e-mail: jcanchaya@maderacre.com
Website: www.maderacre.com
Phone: +51 982798119
Address: Av. Leon Velarde S/N, Iñapari, Madre de Dios
Skype contact: joseluiscanchaya

- **Maderyja managing staff**

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

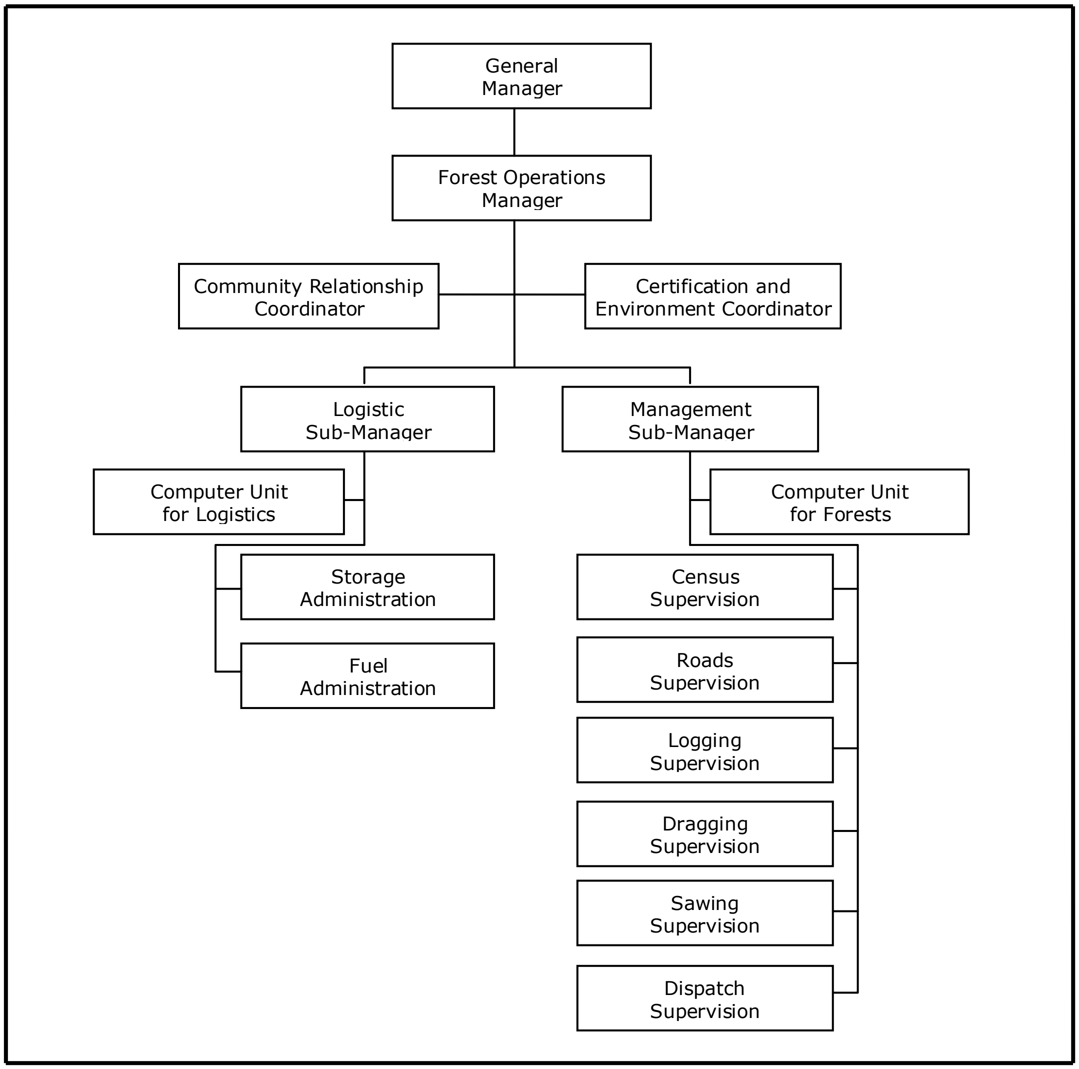


Fig. 2: Maderyja structural organization

* **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 Manger 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.

Maderyja contact information

Responsible for the Social Area: Manuel Via Lima
e-mail: mavili555@hotmail.com
Phone: +51 993504890
Address: Av. Leon Velarde S/N, Iñapari, Madre de Dios
Skype contact: mavili555

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 existance, 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 staring 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 worldly.

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.

Greenoxx NGO contact information

Chairman&CEO: Eng. Rocco Cheirasco
Executive Vice-President: Eng. Silvia Gómez Caviglia
e-mail: ngo@greenoxx.com; rocco@greenoxx.com; silvia@greenoxx.com
Website: www.greenoxx.com
Phone: +598 2604 08 69
Address: Costa Rica 1661| of. 7
CP 11500, Montevideo, Uruguay
Skype contact: roccocheirasco; silvia.gomez.caviglia

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.

Contact information:
Contact person: Jorge Antonio Torres Padilla
e-mail: jtorres@bosques-amazonicos.com
Website: www.bosques-amazonicos.com
Phone: +5182-795944
Address: Jirón San Martín 1084; Tambopata, Puerto Maldonado, Madre de Dios, Peru
Skype contact: jorge-to

- **AIDER NGO**

AIDER's role in the project: technical assistance.

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.

Contact information:

Contact person: Jaime Nalvarte

e-mail: jnalvarte@aider.com.pe

Website: www.aider.com.pe

Phone: +511 421-5835 / 628-7088

Address: Av. Jorge Basadre 180 3º piso Of. 6; San Isidro, Lima 27, Peru

Skype contact:

Maderacre and Maderyja have also signed cooperation agreements [10] 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:

[10] The cooperation agreements will be available to the auditors.

- **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.

  - 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.

Contact information:
Contact person: Nicola Bay
e-mail: nbay@cesvi.org.pe
Website: www.cesvi.org.pe
Phone: +511 261-7678
Address: Av. San Felipe 537; Jesús María, Lima, Peru
Skype contact:

- **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.

Contact information GFTN - WWF:
Contact person: Alfredo Rodríguez Zunino
GFTN Peru Coordinator
WWF Peru Programme Office
Website: www.peru.panda.org
Phone: +511 440-5550 / 440-2133
Address: Trinidad Morán 853; Lince, Lima 14, Peru

- **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 betwen 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.

Contact information:

Contact person: Juan Carlos Guzmán Carlín
Madre de Dios General Coordinator
e-mail: jguzman@ra.org
Website: http://rainforest-alliance.org
Phone: +51-82-57-2393
Address: Fonavi MZ J Lote 11, Puerto Maldonado, Madre de Dios, Peru

- **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 foresty-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.

Contact information:

Contact person: Eng. Walter Nalvarte
e-mail: cnf@cnf.org.pe
Website: http://www.cnf.org.pe/
Phone: +51-651-6197
Address: Jr. Ramón Dagnino 369

- **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.

  Maderacre SAC representative: José Luis Canchaya

Contact information:

Contact person: Dr Tim Baker

e-mail: t.r.baker@leeds.ac.uk

Website: www.geog.leeds.ac.uk

Phone: +44 113 34 33300

Address: Leeds LS2 9JT, UK

- **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.

Contact information:
Contact person: Eng. Ignacio Lombardy
e-mail: dmf@lamolina.edu.pe
Website: www.lamolina.edu.pe
Phone: +511 349-2041
Address: Av. La Molina s/n; La Molina, Peru

- **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.

Contact information:

Contact person: Juan Francisco Castro
e-mail: castro_jf@up.edu.pe
Website: www.up.edu.pe
Phone: +511 219-0100
Address: Av. Salaverry 2020; Jesús María, Lima, Peru

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 activities start to be implemented with intensity on 1st January 2009. By the end of March 2008, an agreement was signed between Greenoxx NGO and both concessions to implement the REDD Project. The project started to be effectively implemented in 2009, with the design of social plans, biodiversity studies, specific modelation and monitoring activities required for the achievement of validation according to the CCB Standard (Climate, Community and Biodiversity). Said validation was obtained by the end of 2009, with Gold Level qualification. This date coincides also with the completion of the pavement of the Inter Oceanic Highway, a fact that completely changed the dymanic of deforestation in the area, In terms of impact, the Inter Oceanic Highway has greatly intensified the risk of deforestation and therefore the measures that project proponents have to implement to be able to combat said risk.

1.6 Project Crediting Period

Crediting period start date: 1st January 2009.

Crediting period end date: 31st December 2046.

Project crediting period: 38 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	X
Mega-project	

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

Years	Estimated GHG emission reductions or removals (tCO2e)
Year 2009	1.074.971
Year 2010	1.223.781
Year 2011	1.231.942
Year 2012	1.092.479
Year 2013	1.108.522
Year 2014	1.025.975
Year 2015	966.446
Year 2016	948.841
Year 2017	953.257
Year 2018	976.940
Year 2019	941.033
Year 2020	930.947

Year 2021	926.815
Year 2022	892.055
Year 2023	847.065
Year 2024	803.437
Year 2025	747.964
Year 2026	628.856
Year 2027	549.494
Year 2028	497.922
Year 2029	437.588
Year 2030	468.368
Year 2031	430.459
Year 2032	411.843
Year 2033	413.912
Year 2034	402.641
Year 2035	403.238
Year 2036	399.346
Year 2037	387.738
Year 2038	339.466
Year 2039	341.506
Year 2040	316.044
Year 2041	339.176
Year 2042	361.427
Year 2043	310.258
Year 2044	322.973
Year 2045	311.941
Year 2046	305.469
Total estimated ERs	**25.072.135**
Total number of crediting years	**38**
Average annual ERs	**659.793**

The estimated total amount of emission reductions of the Madre de Dios Amazon REDD project over the crediting period is 25.072.135 tCO_2e, as is shown in the previous chart, thus classifying the project as a "project" under the VCS Standard[11].

[11] VCS Standard, VCS Version 3, Requirements Document, 8 March 2011, v3.0.

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;

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.

To support 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 within 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 since 2009, hereunder a summary of their progress, the specific actions carried out during 2010 and the results obtained in relation to this outcome is presented[12]:

* In the framework of the Relationship with the Community Advisory Committee, the Madre de Dios Amazon REDD project's objectives and results were spread.

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

* 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 opportunely.

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 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.

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 presented[13]:

- 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 are planned to be done periodically.

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

* 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 9,46 million tonnes in 10 years.

  * In the absence of the Madre de Dios Amazon REDD Project, the CO2 from the atmosphere would increase by 25 million tonnes in 38 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.

- * 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, Mashco 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 almost 400% in the number of workers, 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 Mashco 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 full innovation and school activities within the project area, as well as in the school belonging to the Belgium Native Community.

- Technical tranining 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, 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, 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, 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**
CCB Level	**Gold**
Registry	**Markit Environmental**
GHG Validation and Verification	**Scientific Certification Systems (SCS)**
Sustainable Management Certification	**Forest Stewardship Council (FSC)**

NGOs support	**WWF, CESVI, ProNaturaleza**

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 Maderyja 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.

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. Maderacre and Maderyja 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 in their 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.

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) [14] 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).

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

* 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 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 promote the sustainable and responsible purchasing of forest products and to combat and eliminate all illegal logging activities in the forests. 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 specialists[15], has started in May 2006 and finishes in May 2046. 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).

[15] 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 policyclic 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 # 3[16] 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.

- **Administrative division of the forest**

[16] Alder, D., Baker, N., Wright, HL. (2002) MYRLIN: Methods of Yield Regulation with Limited Information. Oxford University, Oxford Forestry Institute. http:\\www.myrlin.org

* **Five-yearly blocks**

According to the Forest Management Plans, the forestry area of the concessions is divided into four five-yearly blocks with plots of annual harvesting.

* **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 Nº 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 Silvicultral Plan is implemented based on the data achieved in studies such as the Exploratory Inventory and the Diagnostic Sampling[17]. 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.

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

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:

- **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 2: 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 censed 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 and so on, a new time frame will be set taking into account all the lessons learned during the first 20 years of the project.

Chart 3: 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 2009 (1) to 2028 (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 joins 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

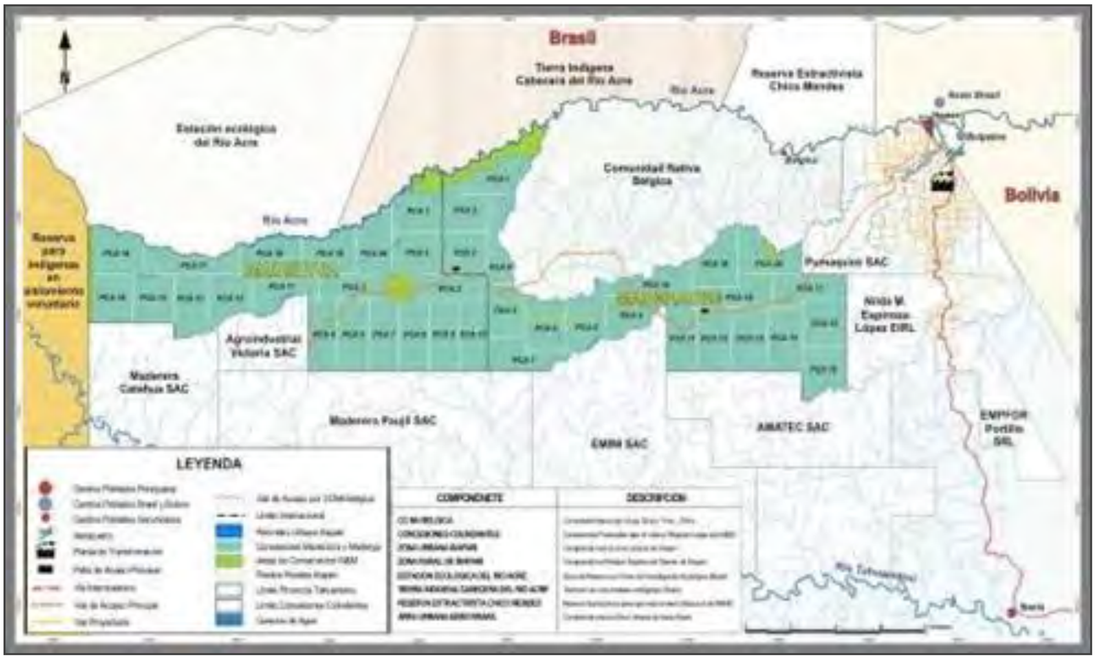


Fig. 4: Location of the Madre de Dios Amazon REDD Project and its boundaries

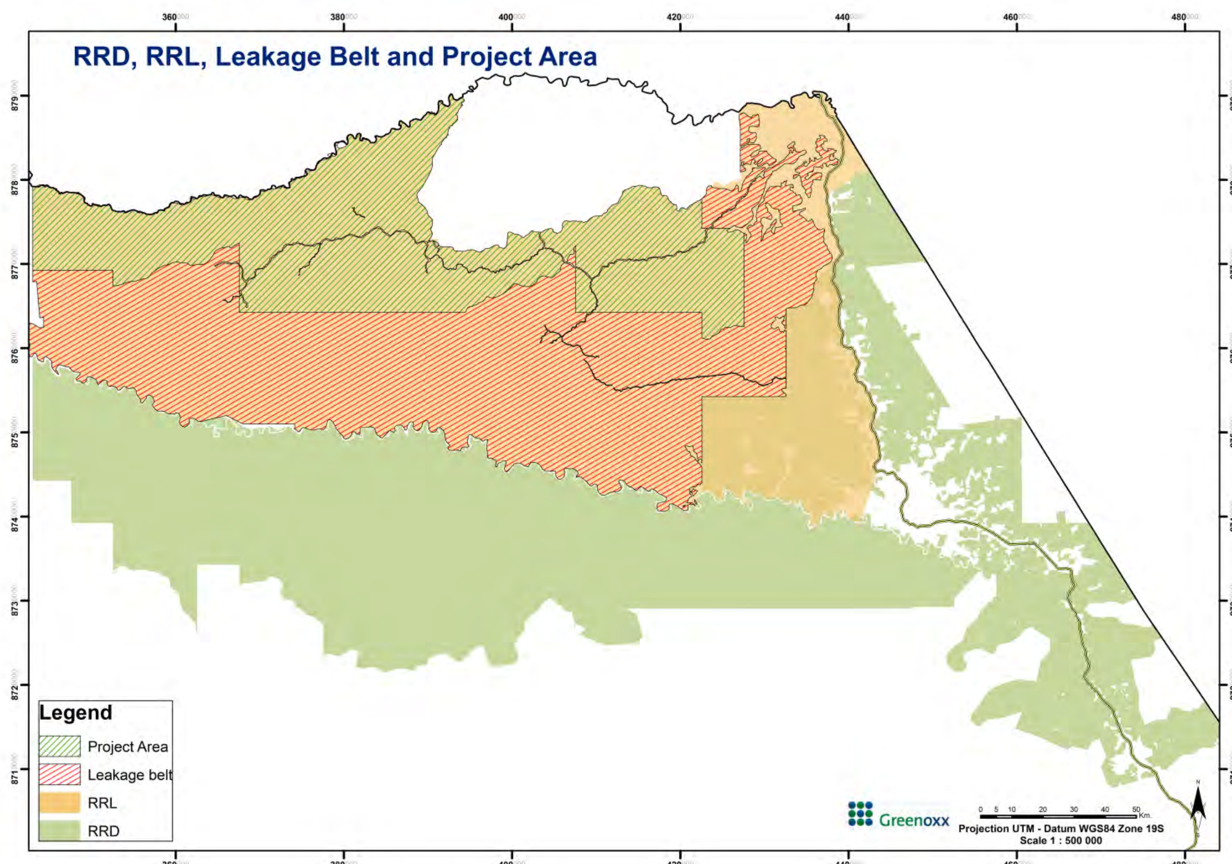


Fig. 5: Map of the project area and location of the vertexes of the project zone (RRL)

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

Chart 4: 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:

Chart 5: Project area, leakage belt and reference regions

	TOTAL
PA	97,817.41
LB	159,018.02
RRL	307,692.66
RRD	300,333.77

The determination of the regions detailed above was carried out taking into account the requirements of the BL-UP Module of the REDD Methodology Modules. See BL-UP module 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 6: Types of rainforest covering the project area

Forest Strata	Project Area	
	Area	**%**
Hill forests	79,290.19	81.06%
Terrace forests	9,845.75	10.07%
Others	130.59	0.13%
Bamboos	8,550.87	8.74%
Tree Swamps		0.00%
Total general	97,817.40	100.00%

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 conclusion of the inter-oceanic road.

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

Chart 7: 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%
Total	**49,376**	**49,556**	**98,932***	**100%**

*** 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.

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 80m^3.

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 m^3.

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 140m^3/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 reported[18]. 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,

[18] 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.

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 per 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 8: Tree species selected to be managed by the concessions

Species		DMC cm	IC%	Maderacre		Maderyja	
Common name	Scientific name			Nº trees/ha	Vcp (m^3/ha)	Nº trees/ha	Vcp (m^3/ha)
Ana caspi	*Copaifera sp.*	70	70	0.148	1.038	0.109	0.451
Azucar huayo	*Hymenaea oblongifolia*	70	80	0.064	0.510	0.050	0.233
Caoba	*Swietenia macrophylla*	75	80	0.030	0.253	0.044	1.141
Capirona	*Calycophyllum spruceanum*	70	80	0.024	0.151	0.213	2.144
Catahua	*Hura crepitans*	80	80	0.197	2.109	0.181	1.998
Catuaba	*Qualea sp.*	60	50	0.015	0.037	0.022	0.118
Cedro	*Cederla odorata*	70	50	0.030	0.148	0.016	0.063
Copaiba	*Copaifera reticulata*	70	50	0.073	0.666	0.134	1.086
Estoraque	*Myroxylon balsamum*	60	50	0.142	0.640	0.094	0.311
Huimba	*Ceiba samauma*	50	50	0.155	1.510	0.063	0.159
Huayruro	*Talissia sp*	80	80	0.112	0.533	0.297	2.061
Ishpingo	*Amburana cearensis*	70	50	0.097	0.688	0.075	0.525
Itauba	*Caesaria decandra*	70	50	0.045	0.190	0.031	0.092
Lupuna	*Bombacaceae*	80	80	0.648	7.047	0.472	6.912
Manchinga	*Brosimum lactescens*	80	80	0.345	2.794	0.253	1.924
Misa	*Eschweilera coriacea*	70	80	0.024	0.084	0.025	0.028
Moena	*Lauraceae*	50	70	0.127	0.253	0.066	0.145
Oje	*Ficus maxima*	80	75	0.086	0.683	0.242	1.935
Palo baston	*Crepidospermum goudotianum*	50	80	0.167	0.828	0.175	0.609
Pashaco	*Fabaceae*	70	70	0.297	1.789	0.109	0.641
Pumaquiro	*Aspidosperma macrocarpon*	60	50	0.012	0.039	0.038	0.373
Quillabordon	*Aspidosperma parvifolium*	50	50	0.061	0.146	0.075	0.384
Quinilla	*Manilkara bidentata*	80	75	0.086	0.873	0.069	0.350
Requia	*Ruagea insignis*	80	50	0.015	0.041	0.016	0.075
Shihuahuaco	*Dipteryx sp.*	80	70	0.552	5.550	0.350	3.370
Tahuari	*Tabebuia serratifolia*	55	80	0.085	0.229	0.172	0.865
Yacushapana	*Terminalia oblonga*	60	80	0.048	0.222	0.047	0.172

Species		DMC cm	IC%	Maderacre		Maderyja	
Common name	Scientific name			Nº trees/ha	Vcp (m^3/ha)	Nº trees/ha	Vcp (m^3/ha)
Yerno en prueba	*Dipterix alata*	60	70	0.042	0.161	0.088	0.589
Zapote	*Quararibea cordata*	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 it germination power is low, reaching only a 20% and loosing 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.* tree

Fig. 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 1m^3/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

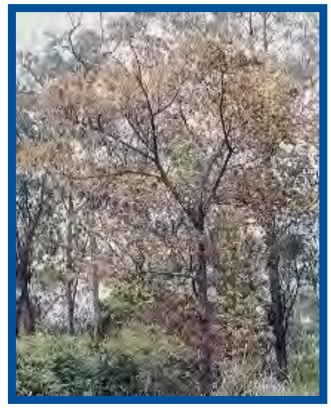


Fig. 19: Ana caspi tree

- *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 reticulate* - 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

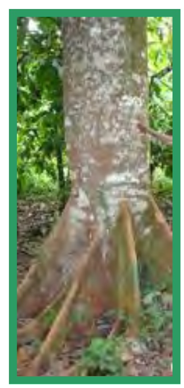


Fig. 24: Copaiba tree trunk

- *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

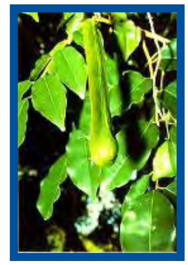


Fig. 27: Estoraque

b) Endangered flora species

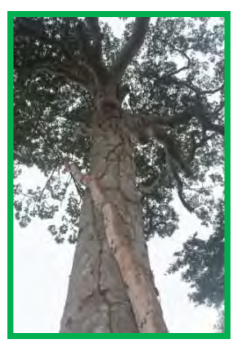
The forests where the project area is located are very important in terms of biodiversity conservation since they are conformed by important populations of the specie *Swietenia macrophyla* (mahogany), and *Cedrela odorata* (cedar), which have been incorporated respectively to the Appendix II and III 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 9: Flora species to be protected

Species to be protected	Justification
Cedar (*Cedrela odorata*)	Law 27308, Forestry and Native Fauna Law (appendix III – CITES).
Mahogany (*Swietenia macrophylla*)	Law 27308, Forestry and Native Fauna Law (appendix II – CITES).
Leche caspi (*Galactodendron utilisima*)	Ministerial Resolution N° 01710-77-AG/DGFF
Wild fig tree (*Ficus anthelmintica*)	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 flora 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 the 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 presented[19]:

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

Phisiography

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, shapes, pedogenetic development, height and types of vegetative cover. Accordingly with this type of topography, the main morpho-dynamic processes that 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 22ºC and 26ºC, 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 41ºC in Iberia (22/08/59), 39ºC in Iñapari (31/03/70) and 38ºC in the Assis-Brasil Station.

At the same time, the minimum absolute temperatures have values of up to 6ºC in Iberia (22/07/57); 6.4ºC in Iñapari (27/07/74) and 6ºC 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 rising 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 10: Wildlife species to be protected

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

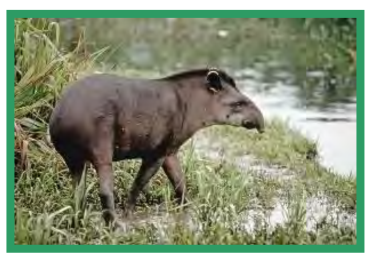


Fig. 39: *Tapirus terrestris*

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 summary[20] of the existent biodiversity conditions within the project area, as well as the conditions in its immediate surroundings defined by the leakage belt determined in the Madre de Dios Amazon REDD Project. 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.

- **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 brasilensis*), giant anteater

[20] Based on the Technical Document "Current Biodiversity Scenario within the Maderacre and Maderyja Concessions Area and their Surroundings", Nelson Kroll, 2009.

(*Myrmecophaga tridactyla*), giant armadillo (*Priodontes maximus*), nine-banded Armadillo (*Dasypus novemcinctus*), puma (*Felis concolor*), jaguar (*Pantera 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 nancymaae),* 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"[21] was carried out by WWF NGO in 2005.

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 summary[22] of the Rapid Evaluation of Native Fauna Process within the project area is presented:

[21] 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.

[22] Based on the document "Summary of the Rapid Evaluation of Native Fauna Process within the Maderacre and Maderyja Concessions", 2009.

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 Maderyja concession. A total area of 375 hectares 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

Chart 11: 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 specie that was more important than others, having found more than one specie 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), Thamnophillidae (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 12: Mammal species registered within the Madre de Dios Amazon REDD project area boundaries

ORDER	FAMILY	Scientific name	Common name
MARSUPIALIA	DIDELPHIDAE	*Philander opossum*	Gray four-eyed opossum
XENARTHRA	MYRMECOPHAGIDAE	*Tamandua tetradactyla*	Collared anteater
XENARTHRA	MYRMECOPHAGIDAE	*Myrmecophaga tridactyla*	Giant anteater
XENARTHRA	BRADYPODIDAE	*Bradypus variegatus*	Brown-throated three-toed sloth
XENARTHRA	DASYPODIDAE	*Cabassous unicinctus*	Southern Naked-tailed Armadillo
XENARTHRA	DASYPODIDAE	*Priodontes maximus*	Giant armadillo
XENARTHRA	DASYPODIDAE	*Dasypus novemcinctus*	Nine-banded armadillo
CHIROPTERA	EMBALLONURIDAE	*Rynchonycteris naso*	Proboscis bat
PRIMATES	CALLITRICHIDAE	*Saguinus fuscicollis*	Saddlebacked tamarin
PRIMATES	CALLITRICHIDAE	*Saguinus imperator*	Emperor tamarin
PRIMATES	CEBIDAE	*Callicebus brunneus*	Brown titi
PRIMATES	CEBIDAE	*Saimiri boliviensis*	Black-capped Squirrel Monkey
PRIMATES	CEBIDAE	*Cebus apella*	Brown capuchin
PRIMATES	CEBIDAE	*Cebus albifrons*	White-fronted Capuchin
PRIMATES	CEBIDAE	*Ateles chamek*	Peruvian spider monkey
PRIMATES	CEBIDAE	*Alouatta seniculus*	Red howler monkey
PRIMATES	CEBIDAE	*Aotus sp.*	Owl monkey
CARNÍVORA	CANIDAE	*Speothos venaticus*	Bush dog
CARNIVORA	PROCYONIDAE	*Potos flavos*	Kinkajou
CARNIVORA	PROCYONIDAE	*Nasua nasua*	Coati
CARNIVORA	MUSTELIDAE	*Eira barbara*	Tayra
CARNIVORA	MUSTELIDAE	*Lontra longicaudis*	Neotropical River Otter
CARNIVORA	FELIDAE	*Felis pardalis*	Ocelot

ORDER	FAMILY	Scientific name	Common name
CARNIVORA	FELIDAE	*Felis concolor*	Cougar or Mountain lion
CARNIVORA	FELIDAE	*Panthera onca*	Jaguar
PERISSODACTYLA	TAPIRIDAE	*Tapirus terrestris*	Lowland tapir
ARTIODACTYLA	TAYASSUIDAE	*Tayassu pecari*	White-lipped peccari
ARTIODACTYLA	TAYASSUIDAE	*Tayassu tajacu*	Collared Peccari
ARTIODACTYLA	CERVIDAE	*Mazama americana*	Red Brocket deer
RODENTIA	SCIURIDAE	*Sciurus spadiceus*	Southern Amazon Red Squirrel
RODENTIA	SCIURIDAE	*Sciurus* cf. *pyrrhinus*	Junín Red Squirrel
RODENTIA	SCIURIDAE	*Sciurus sanborni / ignitus*	Sanborn's squirrel / Bolivian squirrel
RODENTIA	SCIURIDAE	*Sciurillus pusillus*	Neotropical pygmy squirrel
RODENTIA	DASYPROCTIDAE	*Agouti paca*	Lowland paca
RODENTIA	DASYPROCTIDAE	*Dasyprocta variegata*	Brown Agouti
RODENTIA	DASYPROCTIDAE	*Myoprocta pratti*	Green Acouchi
RODENTIA	ECHYMIDAE	*Dactylomys dactylinus*	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 13: Bird species registered within the Madre de Dios Amazon REDD project area boundaries

ORDER	FAMILY	Scientific name	Common name
TINAMIFORMES	TINAMIDAE	*Tinamus major*	Great Tinamou
TINAMIFORMES	TINAMIDAE	*Tinamus guttatus*	White-throated Tinamou
TINAMIFORMES	TINAMIDAE	*Crypturellus cinereus*	Cinereous Tinamou
TINAMIFORMES	TINAMIDAE	*Crypturellus soui*	Little Tinamou
TINAMIFORMES	TINAMIDAE	*Crypturellus undulatus*	Undulated Tinamou
ANSERIFORMES	ANHIMIDAE	*Anhima cornuta*	Horned Screamer
ANSERIFORMES	ANATIDAE	*Cairina moschata*	Muscovy Duck
GALLIFORMES	CRACIDAE	*Ortalis guttata*	Speckled Chachalaca
GALLIFORMES	CRACIDAE	*Penelope jacquacu*	Spix's Guan

ORDER	FAMILY	Scientific name	Common name
GALLIFORMES	CRACIDAE	*Pipile cumanensis*	Blue-throated Piping-guan
GALLIFORMES	CRACIDAE	*Mitu tuberosum*	Razor-billed Curassow
GALLIFORMES	PHASIANIDAE	*Odontophorus gujanensis*	Marbled Wood Quail
CICONIIFORMES	THRESKIORNITHIDAE	*Mesembrinibis cayennensis*	Green Ibis
CICONIIFORMES	CATHARTIDAE	*Cathartes melambrotus*	Greater Yellow-headed Vulture
CICONIIFORMES	CATHARTIDAE	*Coragyps atratus*	Black Vulture
CICONIIFORMES	CATHARTIDAE	*Sarcoramphus papa*	King Vulture
FALCONIFORMES	ACCIPITRIDAE	*Chondrohierax uncinatus*	Hook-billed Kite
FALCONIFORMES	ACCIPITRIDAE	*Elanoides forficatus*	Swallow-tailed Kite
FALCONIFORMES	ACCIPITRIDAE	*Rostrhamus sociabilis*	Snail Kite
FALCONIFORMES	ACCIPITRIDAE	*Harpagus bidentatus*	Double-toothed Kite
FALCONIFORMES	ACCIPITRIDAE	*Ictinia plumbea*	Plumbeous Kite
FALCONIFORMES	ACCIPITRIDAE	*Leucopternis albicollis*	White Hawk
FALCONIFORMES	ACCIPITRIDAE	*Buteogallus urubitinga*	Great Black Hawk
FALCONIFORMES	ACCIPITRIDAE	*Buteo magnirostris*	Roadside Hawk
FALCONIFORMES	ACCIPITRIDAE	*Harpia harpyja*	Harpy Eagle
FALCONIFORMES	ACCIPITRIDAE	*Spizastur melanoleucus*	Black-and-white Hawk-Eagle
FALCONIFORMES	FALCONIDAE	*Daptrius ater*	Black Caracara
FALCONIFORMES	FALCONIDAE	*Ibycter americanus*	Red-throated Caracara
FALCONIFORMES	FALCONIDAE	*Micrastur gilvicollis*	Lined Forest Falcon
GRUIFORMES	PSOPHIIDAE	*Psophia leucoptera*	Pale-winged Trumpeter
GRUIFORMES	RALLIDAE	*Aramides cajanea*	Gray-necked Wood-Rail
GRUIFORMES	HELIORNITHIDAE	*Heliornis fulica*	Sungrebe or American Finfoot
GRUIFORMES	EURYPYGIDAE	*Eurypyga helias*	Sunbittern
CHARADRIIFORMES	SCOLOPACIDAE	*Tringa solitaria*	Solitary Sandpiper
COLUMBIFORMES	COLUMBIDAE	*Claravis pretiosa*	Blue Ground Dove
COLUMBIFORMES	COLUMBIDAE	*Patagioenas subvinacea*	Ruddy Pigeon
COLUMBIFORMES	COLUMBIDAE	*Leptotila rufaxilla*	Grey-fronted Dove
PSITTACIFORMES	PSITTACIDAE	*Ara ararauna*	Blue-and-gold macaw
PSITTACIFORMES	PSITTACIDAE	*Ara macao*	Scarlet macaw
PSITTACIFORMES	PSITTACIDAE	*Ara chloropterus*	Red and green macaw
PSITTACIFORMES	PSITTACIDAE	*Ara severus*	Chestnut-fronted macaw
PSITTACIFORMES	PSITTACIDAE	*Aratinga leucophthalma*	White-eyed Parakeet
PSITTACIFORMES	PSITTACIDAE	*Aratinga weddellii*	Dusky-headed Parakeet
PSITTACIFORMES	PSITTACIDAE	*Brotogeris cyanoptera*	Cobalt-winged Parakeet
PSITTACIFORMES	PSITTACIDAE	*Brotogeris sanctithomae*	Tui Parakeet
PSITTACIFORMES	PSITTACIDAE	*Pionites leucogaster*	White-bellied Parrot

ORDER	FAMILY	Scientific name	Common name
PSITTACIFORMES	PSITTACIDAE	*Pionus menstruus*	Blue-headed Pionus
PSITTACIFORMES	PSITTACIDAE	*Amazona farinosa*	Macaw Mountain Bird
OPISTHOCOMIFORMES	OPISTHOCOMIDAE	*Opisthocomus hoazin*	Hoatzin
CUCULIFORMES	CUCULIDAE	*Coccyzus americanus*	Yellow-billed Cuckoo
CUCULIFORMES	CUCULIDAE	*Coccyzus melacoryphus*	Dark-billed cuckoo
CUCULIFORMES	CUCULIDAE	*Piaya cayana*	Squirrel Cuckoo
CUCULIFORMES	CUCULIDAE	*Piaya melanogaster*	Black-bellied Cuckoo
CUCULIFORMES	CUCULIDAE	*Crotophaga major*	Greater Ani
STRIGIFORMES	STRIGIDAE	*Lophostrix cristata*	Crested Owl
STRIGIFORMES	STRIGIDAE	*Glaucidium brasilianum*	Ferruginous Pygmy-owl
CAPRIMULGIFORMES	NYCTIBIIDAE	*Nyctibius griseus*	Common potoo
CAPRIMULGIFORMES	CAPRIMULGIDAE	*Nyctiphrynus ocellatus*	Ocellated Poorwill
APODIFORMES	APODIDAE	*Chaetura* sp. (*brachyura*?)	Swift
APODIFORMES	TROCHILIDAE	*Glaucis hirsutus*	Rufous-breasted Hermit
APODIFORMES	TROCHILIDAE	*Phaethornis ruber*	Reddish Hermit
APODIFORMES	TROCHILIDAE	*Phaethornis* sp.	Hermit
APODIFORMES	TROCHILIDAE	*Thalurania furcata*	Fork-tailed Woodnymph
TROGONIFORMES	TROGONIDAE	*Trogon curucui*	Blue-crowned Trogon
TROGONIFORMES	TROGONIDAE	*Trogon melanurus*	Black tailed trogon
CORACIIFORMES	ALCEDINIDAE	*Chloroceryle americana*	Green Kingfisher
CORACIIFORMES	MOMOTIDAE	*Electron platyrhynchum*	Broad-billed Motmot
CORACIIFORMES	MOMOTIDAE	*Baryphthengus ruficapillus*	Rufous capped motmot
CORACIIFORMES	MOMOTIDAE	*Momotus momota*	Blue-crowned Motmot
GALBULIFORMES	GALBULIDAE	*Galbalcyrhynchus leucotis*	White-eared Jacamar
GALBULIFORMES	GALBULIDAE	*Brachygalba (goeringi?)*	Jacamar
GALBULIFORMES	GALBULIDAE	*Brachygalba* sp.	Jacamar
GALBULIFORMES	GALBULIDAE	*Galbula albirostris*	Yellow billed jacamar
GALBULIFORMES	GALBULIDAE	*Galbula tombacea*	White chinned jacamar
GALBULIFORMES	BUCCONIDAE	*Notharchus macrorhynchos*	White necked puffbird
GALBULIFORMES	BUCCONIDAE	*Malacoptila sp.*	Puffbird
GALBULIFORMES	BUCCONIDAE	*Monasa nigrifrons*	Black fronted nunbird
GALBULIFORMES	BUCCONIDAE	*Monasa flavirostris*	Yellow-billed Nunbird
GALBULIFORMES	BUCCONIDAE	*Chelidoptera tenebrosa*	Swallow winged puffbird
PICIFORMES	CAPITONIDAE	*Eubucco* (male as *bourcierii*)	Red-headed Barbet
PICIFORMES	RAMPHASTIDAE	*Ramphastos tucanus*	Channel-billed Toucan
PICIFORMES	RAMPHASTIDAE	*Ramphastos vitellinus*	Channel-billed Toucan
PICIFORMES	RAMPHASTIDAE	*Aulacorhynchus prasinus*	Emerald Toucanet
PICIFORMES	RAMPHASTIDAE	*Pteroglossus azara*	Ivory-billed Aracari
PICIFORMES	RAMPHASTIDAE	*Pteroglossus castanotis*	Chestnut-eared Aracari

ORDER	FAMILY	Scientific name	Common name
PICIFORMES	PICIDAE	*Melanerpes cruentatus*	Red fronted woodpecker
PICIFORMES	PICIDAE	*Veniliornis passerinus*	Little woodpecker
PICIFORMES	PICIDAE	*Celeus flavus*	Cream coloured woodpecker
PICIFORMES	PICIDAE	*Celeus torquatus*	Ringed woodpecker
PICIFORMES	PICIDAE	*Campephilus rubricollis*	Red- necked Woodpecker
PICIFORMES	PICIDAE	*Campephilus melanoleucos*	Crimson crested woodpecker
PASSERIFORMES	DENDROCOLAPTIDAE	*Sittasomus griseicapillus*	Olivaceous Woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	*Xiphocolaptes promeropirhynchus*	Strong billed woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	*Xiphorhynchus picus*	Straight-billed Woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	*Xiphorhynchus guttatus*	Buff-throated Woodcreeper
PASSERIFORMES	DENDROCOLAPTIDAE	*Lepidocolaptes albolineatus*	Lineated Woodcreeper
PASSERIFORMES	TYRANNIDAE	*Mionectes oleagineus*	Ochre-bellied Flycatcher
PASSERIFORMES	TYRANNIDAE	*Tolmomyias sp.*	Flatbill
PASSERIFORMES	TYRANNIDAE	*Colonia colonus*	Long-tailed Tyrant
PASSERIFORMES	TYRANNIDAE	*Myiozetetes similis*	Vermilion-crowned Flycatcher
PASSERIFORMES	TYRANNIDAE	*Myiozetetes granadensis*	Gray-capped Flycatcher
PASSERIFORMES	TYRANNIDAE	*Pitangus sulphuratus*	Great Kiskadee
PASSERIFORMES	TYRANNIDAE	*Myiodynastes maculatus*	Streaked Flycatcher
PASSERIFORMES	TYRANNIDAE	*Empidonomus varius*	Variegated Flycatcher
PASSERIFORMES	TYRANNIDAE	*Tyrannus melancholicus*	Tropical Kingbird
PASSERIFORMES	TYRANNIDAE	*Tyrannus savana*	Fork-tailed Flycatcher
PASSERIFORMES	TYRANNIDAE	*Sirystes sibilator*	Sirystes
PASSERIFORMES	TYRANNIDAE	*Myiarchus tuberculifer*	Dusky-capped Flycatcher
PASSERIFORMES	TYRANNIDAE	*Myiobius barbatus*	Sulphur-rumped Flycatcher
PASSERIFORMES	TYRANNIDAE	*Ramphotrigon ruficauda*	Rufous tailed flatbill
PASSERIFORMES	COTINGIDAE	*Tityra cayana*	Black-tailed Tityra
PASSERIFORMES	COTINGIDAE	*Pachyramphus minor*	Pink throated becard
PASSERIFORMES	COTINGIDAE	*Lipaugus vociferans*	Screaming Piha
PASSERIFORMES	COTINGIDAE	*Gymnoderus foetidus*	Bare necked fruitcrow
PASSERIFORMES	PIPRIDAE	*Lepidothrix coronata*	Blue-crowned Manakin
PASSERIFORMES	VIREONIDAE	*Cyclarhis gujanensis*	Rufous browed pepper shrike
PASSERIFORMES	VIREONIDAE	*Vireo olivaceus*	Red-eyed Vireo
PASSERIFORMES	HIRUNDINIDAE	*Atticora fasciata*	White-banded swallow
PASSERIFORMES	HIRUNDINIDAE	*Stelgidopteryx ruficollis*	Southern Rough-winged Swallow

ORDER	FAMILY	Scientific name	Common name
PASSERIFORMES	TROGLODYTIDAE	*Troglodytes aedon*	House Wren
PASSERIFORMES	TROGLODYTIDAE	*Campylorhynchus turdinus*	Thrush-like Wren
PASSERIFORMES	TROGLODYTIDAE	*Henicorhina leucosticta*	White-breasted Wood-Wren
PASSERIFORMES	TROGLODYTIDAE	*Cyphorhinus arada*	Musician Wren
PASSERIFORMES	POLIOPTILIDAE	*Polioptila plumbea*	Tropical Gnatcatcher
PASSERIFORMES	TURDIDAE	*Turdus sp.*	------
PASSERIFORMES	THRAUPIDAE	*Cissopis leverianus*	Magpie Tanager
PASSERIFORMES	THRAUPIDAE	*Lamprospiza melanoleuca*	Red-billed Pied Tanager
PASSERIFORMES	THRAUPIDAE	*Tachyphonus luctuosus*	White-shouldered Tanager
PASSERIFORMES	THRAUPIDAE	*Lanio versicolor*	White-winged Shrike-tanager
PASSERIFORMES	THRAUPIDAE	*Ramphocelus carbo*	Silver-beaked Tanager
PASSERIFORMES	THRAUPIDAE	*Thraupis episcopus*	Blue-grey Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara chilensis*	Paradise Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara schrankii*	Green-and-gold Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara gyrola*	Bay-headed Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara cayana*	Burnished-buff Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara callophrys*	Opal-crowned Tanager
PASSERIFORMES	THRAUPIDAE	*Tersina viridis*	Swallow Tanager
PASSERIFORMES	THRAUPIDAE	*Cyanerpes caeruleus*	Purple Honeycreeper
PASSERIFORMES	DENDROCOLAPTIDAE	*Campylorhamphus procurvoides*	Curve-billed Scythebill
PASSERIFORMES	FURNARIIDAE	*Furnarius leucopus*	Pale-legged Hornero
PASSERIFORMES	FURNARIIDAE	*Synallaxis sp.*	Spinetail
PASSERIFORMES	FURNARIIDAE	*Philydor sp.*	Antomolus
PASSERIFORMES	FURNARIIDAE	*Philydor ruficaudatus*	Rufous-tailed Foliage-gleaner
PASSERIFORMES	THAMNOPHILIDAE	*Cymbilaimus lineatus*	Fasciated Antshrike
PASSERIFORMES	THAMNOPHILIDAE	*Taraba major*	Great Antshrike
PASSERIFORMES	THAMNOPHILIDAE	*Thamnophilus amazonicus*	Amazonian Antshrike
PASSERIFORMES	THAMNOPHILIDAE	*Myrmotherula brachyura*	Pygmy Antwren
PASSERIFORMES	THAMNOPHILIDAE	*Myrmotherula axillaris*	White-flanked Antwren
PASSERIFORMES	THAMNOPHILIDAE	*Myrmotherula longipennis*	Long-winged Antwren
PASSERIFORMES	THAMNOPHILIDAE	*Microrhopias quixensis*	Dot-winged Antwren
PASSERIFORMES	THAMNOPHILIDAE	*Myrmoborus leucophrys*	White-browed Antbird
PASSERIFORMES	THAMNOPHILIDAE	*Myrmoborus myotherinus*	Black-faced Antbird
PASSERIFORMES	COTINGIDAE	*Tityra cayana*	Black-tailed Tityra
PASSERIFORMES	COTINGIDAE	*Pachyramphus minor*	Pink-throated Becard
PASSERIFORMES	COTINGIDAE	*Lipaugus vociferans*	Screaming Piha
PASSERIFORMES	COTINGIDAE	*Gymnoderus foetidus*	Bare-necked Fruitcrow

ORDER	FAMILY	Scientific name	Common name
PASSERIFORMES	PIPRIDAE	*Lepidothrix coronata*	Blue- crowned Manakin
PASSERIFORMES	VIREONIDAE	*Cyclarhis gujanensis*	Rufous-browed Peppershrike
PASSERIFORMES	VIREONIDAE	*Vireo olivaceus*	Red-eyed Vireo
PASSERIFORMES	HIRUNDINIDAE	*Atticora fasciata*	White-banded Swallow
PASSERIFORMES	HIRUNDINIDAE	*Stelgidopteryx ruficollis*	Southern Rough-winged Swallow
PASSERIFORMES	TROGLODYTIDAE	*Troglodytes aedon*	House Wren
PASSERIFORMES	TROGLODYTIDAE	*Campylorhynchus turdinus*	Thrush-like Wren
PASSERIFORMES	TROGLODYTIDAE	*Henicorhina leucosticta*	White-breasted Wood-Wren
PASSERIFORMES	TROGLODYTIDAE	*Cyphorhinus arada*	Musician Wren
PASSERIFORMES	POLIOPTILIDAE	*Polioptila plumbea*	Tropical Gnatcatcher
PASSERIFORMES	TURDIDAE	*Turdus sp.*	Thrush
PASSERIFORMES	THRAUPIDAE	*Cissopis leverianus*	Magpie Tanager
PASSERIFORMES	THRAUPIDAE	*Lamprospiza melanoleuca*	Red-billed Pied Tanager
PASSERIFORMES	THRAUPIDAE	*Tachyphonus luctuosus*	White-shouldered Tanager
PASSERIFORMES	THRAUPIDAE	*Lanio versicolor*	White-winged Shrike-Tanager
PASSERIFORMES	THRAUPIDAE	*Ramphocelus carbo*	Silver-beaked Tanager
PASSERIFORMES	THRAUPIDAE	*Thraupis episcopus*	Blue-grey Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara chilensis*	Paradise Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara schrankii*	Green-and-gold Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara gyrola*	Bay-headed Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara cayana*	Burnished-buff Tanager
PASSERIFORMES	THRAUPIDAE	*Tangara callophrys*	Opal-crowned Tanager
PASSERIFORMES	THRAUPIDAE	*Tersina viridis*	Swallow Tanager
PASSERIFORMES	THRAUPIDAE	*Cyanerpes caeruleus*	Purple Honeycreeper
PASSERIFORMES	DENDROCOLAPTIDAE	*Campylorhamphus procurvoides*	Curve-billed Scythebill
PASSERIFORMES	FURNARIIDAE	*Furnarius leucopus*	Pale-legged Hornero
PASSERIFORMES	FURNARIIDAE	*Synallaxis* sp.	Spinetail
PASSERIFORMES	FURNARIIDAE	*Philydor* sp.	Antomolus
PASSERIFORMES	FURNARIIDAE	*Philydor ruficaudatus*	Rufous-tailed Foliage-gleaner
PASSERIFORMES	THAMNOPHILIDAE	*Cymbilaimus lineatus*	Fasciated Antshrike
PASSERIFORMES	THAMNOPHILIDAE	*Taraba major*	Great Antshrike
PASSERIFORMES	THAMNOPHILIDAE	*Thamnophilus amazonicus*	Amazonian Antshrike
PASSERIFORMES	THAMNOPHILIDAE	*Myrmotherula brachyura*	Pygmy Antwren
PASSERIFORMES	THAMNOPHILIDAE	*Myrmotherula axillaris*	White-flanked Antwren
PASSERIFORMES	THAMNOPHILIDAE	*Myrmotherula longipennis*	Long-winged Antwren

ORDER	FAMILY	Scientific name	Common name
PASSERIFORMES	THAMNOPHILIDAE	*Microrhopias quixensis*	Dot-winged Antwren
PASSERIFORMES	THAMNOPHILIDAE	*Myrmoborus leucophrys*	White-browed Antbird
PASSERIFORMES	THAMNOPHILIDAE	*Myrmoborus myotherinus*	Black-faced Antbird
PASSERIFORMES	THAMNOPHILIDAE	*Hypocnemis hypoxantha*	Yellow-browed Antbird
PASSERIFORMES	THAMNOPHILIDAE	*Myrmeciza atrothorax*	Black-throated Antbird
PASSERIFORMES	THAMNOPHILIDAE	*Myrmeciza hemimelaena*	Chestnut-tailed Antbird
PASSERIFORMES	THAMNOPHILIDAE	*Myrmeciza hyperythra*	Plumbeous Antbird
PASSERIFORMES	THAMNOPHILIDAE	*Hylophylax naevius*	Spot-backed Antbird
PASSERIFORMES	FORMICARIIDAE	*Formicarius colma*	Rufous-capped Antthrush
PASSERIFORMES	FORMICARIIDAE	*Formicarius analis*	Black-faced Antthrush
PASSERIFORMES	TYRANNIDAE	*Serpophaga hypoleuca*	River Tyrannulet
PASSERIFORMES	THRAUPIDAE	*Chlorophanes spiza*	Green Honeycreeper
PASSERIFORMES	EMBERIZIDAE	*Sporophila castaneiventris*	Chestnut-bellied Seedeater
PASSERIFORMES	EMBERIZIDAE	*Arremon taciturnus*	Pectoral Sparrow
PASSERIFORMES	ICTERIDAE	*Psarocolius decumanus*	Crested Oropendola
PASSERIFORMES	ICTERIDAE	*Psarocolius bifasciatus*	Amazonian Oropendola
PASSERIFORMES	ICTERIDAE	*Cacicus cela*	Yellow-rumped Cacique
PASSERIFORMES	ICTERIDAE	*Icterus icterus (jamacaii)*	Turpial
PASSERIFORMES	ICTERIDAE	*Molothrus oryzivorus*	Giant Cowbird
PASSERIFORMES	FRINGILLIDAE	*Euphonia* sp. (*chlorotica*?)	Euphonia
PASSERIFORMES	FRINGILLIDAE	*Euphonia cyanocephala.*	Golden-rumped Euphonia
PASSERIFORMES	FRINGILLIDAE	*Euphonia xanthogaster / rufiventris*	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

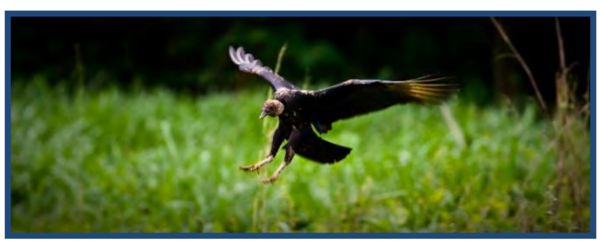


Fig. 46: Bird species

Fig. 47: Bird species

Fig. 48: Bird species

Fig. 49: Bird species

Fig. 50: Bird species

~ **Reptiles**

Chart 14: Major reptile species registered within the Madre de Dios Amazon REDD project area

ORDER	FAMILIY	Scientific name
		Bothriopsis bilineata
		Oxybelis
		Boa constrictor
		Corallus caninus
		PAUCAR MACHACO
		Paleosuchus
SAURIA	TEIIDAE	*Kentropyx altamazonicus*
CHELONIA	TESTUDINIDAE	*Geochelone MOTELO*
CHELONIA		*Podocnemis TARICAYA*
CHELONIA		*Podocnemis expansa*

Fig. 51: Caiman

Fig. 52: Turtle

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

Fig. 53: Sloth

Fig. 54: Jaguar

Fig. 55: Toucan

Fig. 56: King Vulture

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 records, 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 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 found 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, collpas[23] 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:

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

Chart 15: “Collpas” sites within the Madre de Dios Amazon REDD project area

Collpa Nº	Coordinates		Species found
1	376725 E	8773475 N	*Brotogeris cyanoptera “collpeando” and Ara chloropterus and Amazona farinosa Low areas apparently used by Tapirus terrestris*
2	376440 E	8771770 N	*Brotogeris cyanoptera “collpeando” and Brotogeris sanctithomae and Aratinga weddellii Low areas apparently used by Tapirus terrestris*
3	378890 E	8771820 N	*Brotogeris cyanoptera “collpeando” and Brotogeris sanctithomae Low areas apparently used by Tapirus terrestris*
4	374010 E	8777010 N	*Visited by Tayassu tajacu and Mazama americana Is the only collpa important for mammal species*

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 variegate – 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.

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 joins 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 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 presented[24]:

a) Current Peruvian Forest Laws

In 2000, Law Nº 27.308 of Forestry and Wildlife was enacted. It was regulated in 2001 by Supreme Decree (DS) Nº 014-2001-AG, starting its implementation in 2002. The main elements of this regulatory framework, governing timber concessions, are:

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

- 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)[25], totaling 24,586,458 hectares[26].

- Concession contracts for forest exploitation in the PPF, transferable before the Forestry Authority, occur in two ways[27]:

  * By Auction, between 10,000 and 40,000 ha for 40 years renewable.
  * 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 required[28].

- The right of use is paid per hectare of concession and defined in the adjudication process[29].

- There is a promotional regime to promote good forest management (Voluntary Forest Certification)[30].

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.

[25] Of the three main forest deparments, the PPF of Iquitos are created through R.M. Nº 1349-2001-AG, the PPF of Madre de Dios through R.M. Nº 1351-2001-AG and the PPF of Ucayali through R.M. Nº 026-2002-AG.

[26] Source INRENA (2002).

[27] Source: Law of Forestry and Wildlife Nº 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.

[28] 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.

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

[30] Law of Forestry and Wildlife Nº 27308; Regulation of the Law of Forestry and Wildlife, Art. 338 to 343.

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"[31].

- 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"[32].

- Among the rights of the forest concessionaires, "the use of other wild flora resources, touristic services and environmental services within the concessioned area" is established[33].

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 Nº 27308) and its respective Regulation. The government body responsible for monitoring compliance with said law is the Forest and Wildlife General Direction (DGFFS), 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.

[31] Law Nº 27308. Title I Art. 2 Inc. 2.3.

[32] Regulation of the Law Nº 27308. Title IV Cap. III. Art. 40.

[33] Regulation of the Law Nº 27308. Title V. Art. 87.

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 renewable and for a total area of 98.932[34] hectares: 49.376 hectares for Maderacre and 49.556 hectares for Maderyja (contracts Nº 17-TAH/C-J-001-02 and Nº 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 Nº 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 Nº 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.

- 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)[35].

- The extent of each concession is for 40 years renewable. Said contracts may be renewed after that period depending on the approval of five-yearly audits carried out by the DGFFS[36].

- An annual fee for the right of use must be paid, during the term of the agreement[37]. Tourism activities or the use of environmental services that the concessionaire carries out within the concessions area is included in this single annual payment[38].

[34] 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.

[35] 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".

[36] See the reference in the Third Clause of the Agreement.

[37] See the reference in clause 4.1. of the Agreement.

[38] See the reference in clause 4.3 of the Agreement.

- 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 Plan[39] 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 Plan[40] 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 2007[41].

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:

- 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.

[39] See the reference in clause 6.1 of the Agreement.

[40] See the reference in clause 8.1 of the Agreement.

[41] Certificate No. SW-FM/CoC-002176.

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.

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 renewable for 40 more years and for a total area of 98.932 hectares[42]: 49.376 hectares for Maderacre and 49.556 hectares for Maderyja (contracts Nº 17-TAH/C-J-001-02 and Nº 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.

[42] 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.

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 renewable for 40 more 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.

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 Edition[43] 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 Greenoxx Global Environmental Program Madre de Dios Amazon REDD Project conforms to the CCB Project Design Standards (First Edition) at the Gold Level".

In addition to this, the SCS Statement of CCB Standards Compliance[44] 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 Standards[45], the CCB Standards have become the most widely used and respected international standard for the multiple-benefits of land-based carbon projects.

[43] "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

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

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

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.

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

- Financial models developed for the Madre de Dios Amazon REDD 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

List of modules/tools employed

	Module	Code	Version	Link
Always Mandatory	REDD Methodology Framework (REDD-MF)	VM0007	1.1	VM0007 REDD Methodology Modules (REDD-MF) Version 1.2
	Methods for monitoring of greenhouse gas emissions and removals (M-MON)	VMD0015	2.0	Methods for monitoring of greenhouse gas emissions and removals (M-MON), v2.0
	Estimation of uncertainty for REDD project activities (X-UNC)	VMD0017	2.0	VMD0017 Estimation of uncertainty for REDD project activities (X-UNC) Version 2.0
	Methods for stratification of the project area (X-STR)	VMD0016	1.0	Methods for stratification of the project area (X-STR), v1.0
Baseline	Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP)	VMD0007	3.0	VMD0007 Estimation of baseline carbon stock changes and greenhouse gas emissions from unplanned deforestation (BL-UP) Version 3.0
Leakage	Estimation of emissions from activity shifting for avoided unplanned deforestation (LK-ASU)	VMD0010	1.0	Estimation of emissions from activity shifting for avoided unplanned deforestation (LK-ASU), v1.0
Pools	Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools (CP-AB)	VMD001	1.0	Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools (CP-AB), v1.0

Emissions	Estimation of greenhouse gas emissions from biomass burning (E-BB)	VMD0013	1.0	Estimation of greenhouse gas emissions from biomass burning (E-BB), v1.0
	Estimation of emissions from fossil fuel combustion*	VMD0014	1.0	Estimation of emissions from fossil fuel combustion (E-FFC), v1.0

	Tools	Code	Version	Link
Risk	Tool for AFOLU non-permanence risk analysis and buffer determination (T-BAR)		3.1	T-BAR Tool for AFOLU non-permanence risk analysis and buffer determination Version 3.1
Additionality	Tool for the Demonstration and Assessment of Additionality in VCS AFOLU Project Activities (T-ADD)	VT001	3.0	VT001 Tool for the demonstration of assessment of additionality in VCS AFOLU project activities (T-ADD) Version 3.0
Significance	Tool for testing significance of GHG emissions in A/R CDM project activities (T-SIG)	EB_31	1.0	Tool for testing significance of GHG emissions in A/R CDM project activities

Optional modules that were excluded and justification

	Tools	Code	Version	Justification
Pools	Estimation of carbon stocks in the dead-wood pool	VMD0002		As demonstrated with the results of field inventories, dead wood is not significant in its contribution to carbon stock emissions. In that sense, as it is optional, it has been excluded from the monitoring.

Pools	Estimation of carbon stocks in the long-term wood products pool	VMD0005		The harvested wood product pool will be the same in the project scenario and the baseline scenario. Therefore, it was conservatively excluded in accordance with the REDD-MF module.
Emissions	Estimation of emissions from fossil fuel combustion	VMD0014		The estimation of CO_2 by combustion of fossil fuel, according to module E-FFC is optional. However, its quantification is proposed if CO_2 emissions of combustion of fossil fuel with project are larger than the estimated emissions in baseline. There is no information about the number of machinery, equipment, trucks, etc. that would be incorporated annually as a consequence of agriculture or farming activities during baseline (after deforestation) in the project area. In the other hand, there is strong evidence that these activities are carried in self-consumption/ small-scale way, which is supposed to minimally use fuel consuming' machinery. Therefore, it was decided not to measure the variable. This is a conservative approach.
Emissions	Estimation of direct N2O emissions from nitrogen application" –		latest CDM-EB approved version	No application of fertilizers is supposed in the post-deforestation activities given their traditional management. Therefore, it was decided not to measure this variable.

2.2 Applicability of Methodology

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

- **REDD-MF**

  - 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 as can be seen in the maps from the reference period (2000-2008) included in BL-UP.
  - Within the Madre de Dios Amazon REDD project area there are no forested wetlands, thus this methodology is applicable. This has been demonstrated by analyzing the technical report of forest maps from Ecological Economic Zoning.
  - 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. Maderacre & Maderyja are very recognized locally, regionally and nationally as good forest managers. They generate many economic and social benefits to surrounding communities.
  - The Madre de Dios Amazon REDD Project baseline deforestation falls within the unplanned deforestation category. Deforestation in Madre de Dios in forest concessions is not allowed as has been demonstrated in the legal section of VCS-PD.
  - 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 used for these land uses. As was demonstrated in Additionality analysis, in the baseline scenario, deforestation will cross into the project area as a result of pressure of new migrants and new road networks.
  - 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. Reforestation is not a common practice, mainly by absence of real public promotion policies, with financial funds to implement at a large scale.
  - Leakage avoidance activities do not include agricultural lands flooded to increase production and intensifying livestock production. Leakage activities, as listed in VCS-PD, do not include any kind of flooded crops or livestock production.

- **BL-UP:**

  - 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. The average size of deforestation agents allows classifying them as small-scale.
  - 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 fuel wood collection is not occurring. A PRA has been conducted, and according to monitoring requirements, a new one will be applied every 2 years.

- **LK-ASU**
  - Applies as far as BL-UP is used

- **CP-AB**
  - Above ground tree biomass pool has been accounted as can be seen in the results from field inventories.
  - Above ground non-tree biomass pool has been excluded as it was not significant in previous results of regional inventories.
  - Below ground tree biomass is being accounted as it is significant. As can be seen in Excel calculations file, standard factor (1.24) has been used to account this pool.

- **E-BB**
  - As fire is used to clear forestlands and also used periodically in post-deforestation land uses (burning of grassland and agricultural lands), other GHG are being accounted.

- **M-MON**
  - The ex-ante stratification is fixed for this baseline and will not be changed.

- **X-STR**
  - Stratification of pre-deforestation forest classes was made using official data from the Madre de Dios Region.

- **X-UNC**
  - A precision target of a 95% confidence interval equal or less than 15% of the recorded value has been used to determinate the number of plots.
  - Emission's uncertainty has been accounted as zero, as official data has been used to estimate the proportion of burned forest after deforestation, being this the main source of emissions of other GHGs.

2.3 Project Boundary

a. Geographical boundaries

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

The Project Area is formed by the forest concessions Maderacre and Maderyja, both located in the district of Iñapari, Province of Tahuamanu and Region of Madre de Dios. It is bordered in the South by River Tahuamanu; in the East, by other forest concessions; in the North by Acre River (the natural frontier with Brazil) and the Belgium Indigenous Community; and by West with Reserved Zone Alto Purus. The coordinates of the boundaries of the project are presented in following table and map:

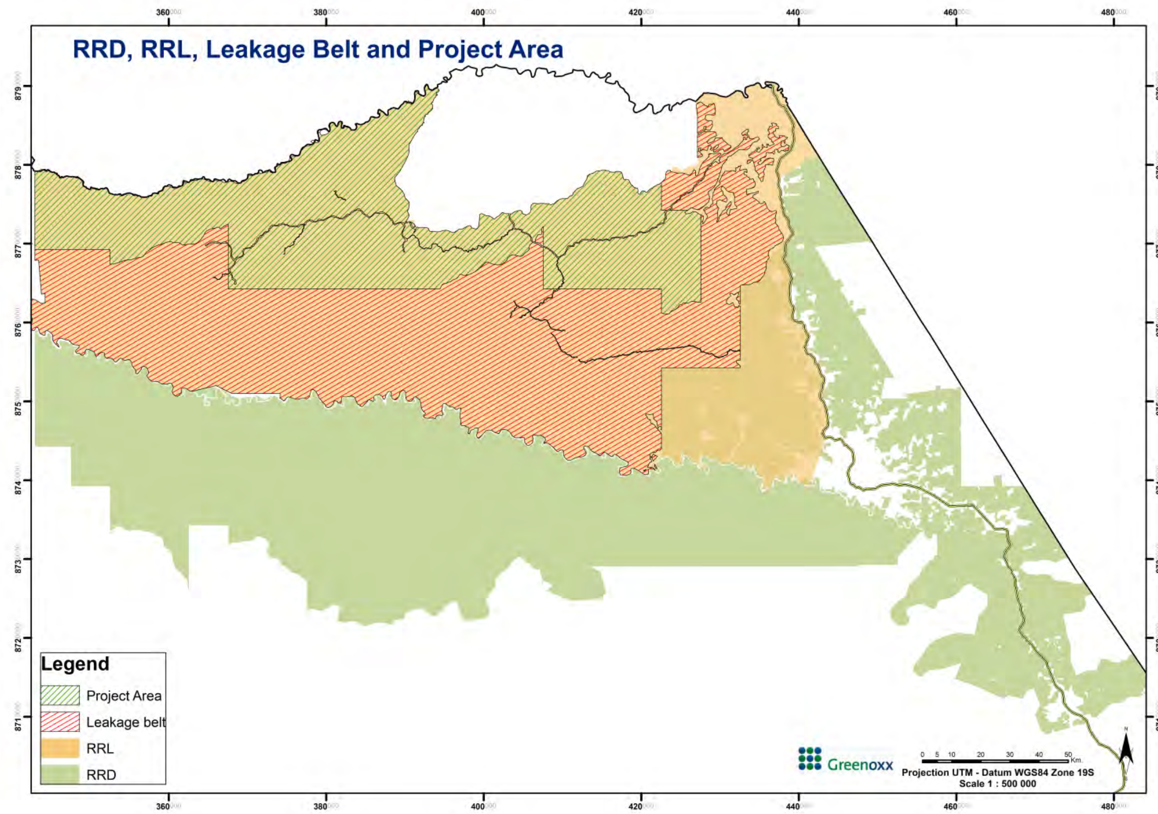


Fig. 57: Defined boundaries for the proposed project

- **Geographical coordinates of each polygon vertex**

Chart 16: 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

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

Chart 17: Project area, leakage belt and reference regions

	TOTAL
PA	97,817.41
LB	159,018.02
RRL	307,692.66
RRD	300,333.77

All the aforementioned were determined according to the requierements of the BL-UP Module[46] 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 historical reference period covers from 2000 to 2008.

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

  - Crediting Period Start date: 1st January 2009
  - Crediting Period End date: 31st December 2046
  - Duration of crediting period: 38 years

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

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

[46] "**Estimation of carbon stock changes in baseline and greenhouse gas emissions from unplanned deforestation**", Bosques Amazónicos Technical Area, application of the BL-UP Module of the approved VCS REDD Methodology Modules, August 2012.

- **Duration of the monitoring periods**

  The duration of the monitoring period is 1 year and verifications will be carried out every 5 years.

c. Carbon pools

- In the baseline scenario, the following carbon pools have been considered: aboveground biomass, belowground biomass 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 18: 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	Excluded	Not significant
Harvested wood products	Excluded	The harvested wood product pool will be the same in the project scenario and the baseline scenario. Therefore, it was conservatively excluded in accordance with the REDD-MF module.
Litter	Excluded	Not significant
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) 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 19: 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_2O	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_2O	Yes	Incorporation of nitrogen fertilizer
		Other		
	Biomass burning	CH4	Yes	Due to burning of forest aboveground biomass for the development of post-deforestation activities
		N2O	Yes	Due to burning of forest aboveground biomass for the development of post-deforestation activities

<table>
<tr><td rowspan="8">Project</td><td rowspan="4">Source 1</td><td>CO_2</td><td></td><td rowspan="8">In a project scenario, there would not be deforested areas and thus no post-deforestation activities which emit Greenhouse Gases will be carried out</td></tr>
<tr><td>CH_4</td><td></td></tr>
<tr><td>N_2O</td><td></td></tr>
<tr><td>Other</td><td></td></tr>
<tr><td rowspan="4">Source 2</td><td>CO_2</td><td></td></tr>
<tr><td>CH_4</td><td></td></tr>
<tr><td>N_2O</td><td></td></tr>
<tr><td>Other</td><td></td></tr>
</table>

e. Sources of leakage

The application of the LK-ASU Module of the approved VCS VM0007 REDD Methodology Modules was considered[47], leakage due to displacement of unplanned deforestation.

2.4 Baseline Scenario

The identification was undertaken following Step 1 of 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, which includes the identification of alternatives scenarios, supported by an analysis of their consistency. In our case, we identified three possible scenarios: the continuation of the pre-project land use, and the land-use change for typical activities of the region and an intermediate scenario. Scenario 2 was selected to be the baseline scenario, and is described below:

Description

The activities currently pressing the proposed area are agriculture and cattle raising, especially in the areas closest to the Interoceanic Highway (IOH), secondary roads and riverbanks. These two activities usually take place together, which is easily seen in the actual use of cultivated areas of farms (35% agricultural crops - 65% pastures)[1].

Agriculture and livestock are characterized by being mainly of subsistence or small scale. According to the 3rd National Agricultural Census of 1994, 61% of the agricultural units in the region had less than 100 ha, a percentage that has remained until today (Regional Directorate of Agriculture - GOREMAD). Moreover, according to data from this census, only 3% of the units had their own machinery (tractor, sprayer, etc.). In turn, the average annual income of agricultural

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

[1] Plan Estratégico Concertado de Madre de Dios, 2002 – 2011.

producers of Madre de Dios in 2007 was equal to 5,951 soles[2], which represents 496 soles per month while the minimum wage in the country is 675 soles per month[3].

In addition there is a high degree of informality in the possession of agricultural units (29%[4] do not have ownership title), which hinders the development of both activities because it limits access to formal credit sources.

Despite all the aforementioned, the pressure for new land to develop agricultural activities in the region is very large. In 2005 it was estimated that, while effective demand for land was equal to 5,370 units (including units with ownership title and position title), the potential demand reached 10.091 units[20].

The analysis of deforestation between years 2000 and 2006[5] shows that land conversion has taken place mainly along the Interoceanic Highway, at a rate of 26,186.72 ha per year. In the area of the Madre de Dios Amazon REDD Project, the main reason for land use change has been, and remains, the installation of crops and pastures.

Indeed, the paving of the Interoceanic Highway recently completed and the construction of secondary roads not only facilitate access to the forest, but by reducing the costs of transporting agricultural products to major markets, improve the profitability of alternative activities.

Another consequence of the completion of the works on the Interoceanic is that it facilitates the interaction between regional markets and southern Brazil markets, and given that there are no trade tariff between the two countries[6], many investors could explore the possibilities of installing highly profitable export crops. It is worth to stress that this expected increased flow between the two markets can also facilitate the entry of Brazilian deforestation agents like major producers of cattle or soybeans, which are present in the states of Acre and Rondonia.

As a result, the areas near the IOH are preparing to meet the demand of the population in the southern Andes, the own population of Madre de Dios (which is on the increase) and of the Brazilian population, making it necessary to install new areas for crops and pastures to supply the growing food demand, given that it exceeds the productive capacity of existing properties. Thus deforestation enters the proposed project area.

The expected scenario to year 2046 shows deforestation exacerbated for land use change due to agricultural activities and livestock, practiced by these migrant settlers. This can be seen in the map in Fig. 58.

Deforestation will be given by the direct relationship it has with the increasing profitability of livestock and agriculture.

[2] DIREAG/GOREMAD, 2007.
[3] Supreme Decree n° 011-2011-TRl of the Ministry of Labor and Employment Promotion.
[4] Data from the PETT offices of Regional Enforcement (OPERs), shown in the record of the project "Cadaster, land titling and registration in 28 districts adjacent to the Interoceanic Highway, routes: i) Iñapari-Puente Inambari ii) Bridge Inambari, Carabaya, Azangaro, Lampa iii) Inambari Bridge –Urcos".
[5] Analysis of deforestation areas using 5TM Landsat images of years 2000 and 2006.
[6] Peru for being a *Partner Country* of the Southern Common Market (MERCOSUR) has free commerce with member countries, including Brazil.

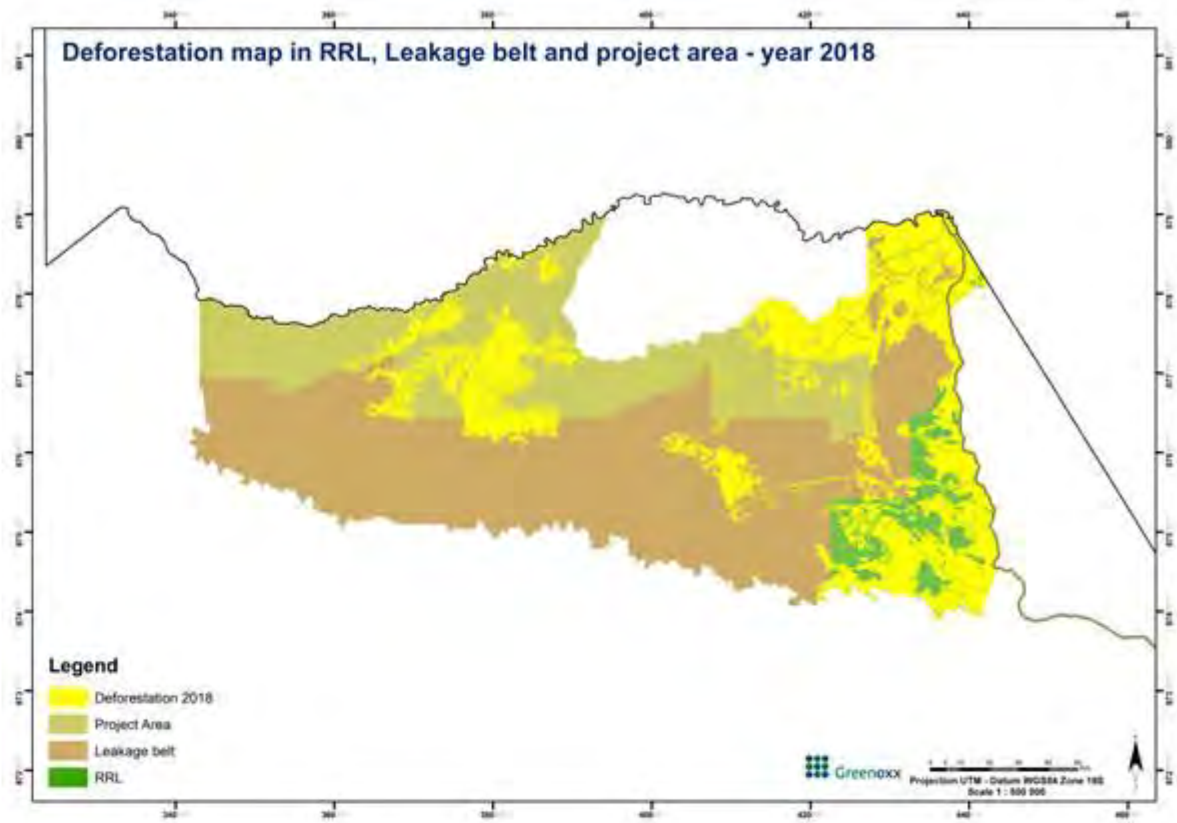


Fig. 58. Projected Deforestation up to year 2018 covering Project Areas and Leakage Belt areas

Thus, the result will be a deforestation of 54,075.3 hectares of forests in the Project Area and 58,526.01 hectares in the Leakage Belt by the year 2046, which is the year that the proposed project will end its proposed crediting period.

The complete justification can be seen in BL-UP module.

2.5 Additionality

INTRODUCTION

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 has been accelerated with the paving of the Interoceanic road.

Furthermore, it is important to highlight that, currently, most of timber companies, 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 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"[48]

First, it is important to mention that within the Project Area, none of the proposed Project activities violates any law[49].

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 deforestation by immigrant settlers and by illegal logging events, they will ask local governments for help in the implementation of surveillance systems. This proposal will be received by the authorities, which will organize, together with Madreracre 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

[48] 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.

[49] 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.

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 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 settlers. Moreover, considering that the concessions would not be able to implement an effective surveillance and monitoring system within the project area, 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 deforestation by immigrant settlers and illegal logging events 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 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 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 more considering that the administration and management of regional governments and authorities responsible for safeguarding forest areas have a history of success in this regard. 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

Currently, the sustainable forest management of the almost 100,000 hectares of primary forests that Maderacre and Maderyja concessions managed as timber concessions since 2002[50] 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.

[50] Timber Concession Contracts for 40 years renewable.

The cash flow of the concessions in the "WITHOUT Madre de Dios Amazon REDD Project" Scenario, calculated for the 2009-2046 period, includes the income from the sale of standing wood, based on the exploratory inventory data[51] 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
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

[51] Inventory carried out with 95% of confidence over the total area of the concessions, data that was also used for the carbon calculations.

Social Responsibility
Administrative Costs

The result shows a cash flow with a positive Net Present Value (NPV) (in Spanish Valor Actual Neto VAN)[52] for both concessions, which is translated into a certain Economic NPV per hectare[53] for both concessions. 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$ 19.52 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)[54]; 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.

[52] 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."

[53] 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 Maderyja).

[54] 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".

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:

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 expected[55], which means higher profitability than the livestock and agriculture activities within the zone, projected at 39% to 64% 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 10% 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 sensitized[56], it can be appreciated that even with a reduction of 5% of the price throughout the 2009-2046 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 with REDD
+10%	US$ 79.75
+5%	US$ 74.71
Current	US$ 69.66
-5%	US$ 64.62
-10%	US$ 59.57

[55] 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.

[56] 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 VCUs 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 with REDD
+10%	US$ 68.26
+5%	US$ 68.96
Current	US$ 69.66
-5%	US$ 70.37
-10%	US$ 71.07

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 – OSINFOR[57]) 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.

[57] 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,
- 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

To carry out the process and quantification of Baseline Emissions, indications set forth in modules BL-UP, X-STR, C-AB, E-BB, were followed. Baseline emissions were determined considering the deforestation rate calculated for RDD and the deforestation model that located the deforestation every year. Following is a summary of the main processes and equations; details are presented on each module developed for the project.

STRATIFICATION

Stratification for carbon stocks consist in grouping forest areas in homogeneous groups in terms of carbon stocks, using stratification factors (such as type of forest/vegetation, type of soil/geology, management) that could affect carbon stocks, so that less sample parcels would be required to reach certain level of precision.

For the stratification of the project area, the Forest Map of the ZEE study of Madre de Dios (IIAP, 2009) has been used. It is a multidimensional model with physiographic, floristic, physiognomic and ecological variables. The use of an existing map is outlined in the ***Approach A*** for stratification of the GOFC-GOLD Sourcebook (2010), and the Forest Map in question complies with all the requirements. The Sourcebook also recommends having a maximum of ten strata; therefore they were grouped according to their type of vegetation and physiography. The following Table shows the ZEE forest strata present in the PA, with the final re-stratification

Chart 20. Simplified Forest Strata for the Project based on the ZEE strata

	Code	Forest Type ZEE	Simplified Stratification	Code
A		FOREST	FOREST	
11	BPTbi	Low flooded terraces with bamboo (paca) forest	Terrace Forests	BT
2	BTbi	Low flood terrace forest		
3	BTm	Mid terrace forest		
4	BTaC	High terraces forest with Brazil nut stands		
28	BTaPa	High terrace forest with swamp areas		
12	BPTm	Mid terrace with bamboo (paca) forest		
13	BPTa	High terrace with bamboo (paca) forest		
6	BCb	Low hills forest	Hilly Forests	BC
7	BCbS	Low hills forest with *Shiringa* stands		
15	BPCb	Low hills with bamboo (paca) forest		
16	BPCbS	Low hills with bamboo (paca) forest and *Shiringa* stands		
20	Ptbi	Bamboos of low flooded terraces	Bamboos (Pacal)	P
21	PTm	Bamboos of mid terraces		
22	PTa	Bamboos of high terraces		
23	PCb	Bamboos of low hills		
1	BLlm	Meandering plains forest	Tree Swamps	PA
29	PaA	Swamp trees		

The following table shows the final stratum in the Project Area and Leakage:

Chart 21. Stratum area for the PA and LB

Stratum	Code	LB	PA
		Ha	Ha
Hilly forests	BC	134,515.75	79,290.19
Terrace forests	BT	17,183.17	9,845.75
Others	Ot	1,622.92	130.59
Bamboos	P	3,103.45	8,550.87
Tree swamps	PA	2,592.74	-
Total		**159,018.03**	**97,817.4**

As stated before, the stratum NB is not included in the calculations because it does not have carbon stocks, thus the total forest area does not include its areas.

ESTIMATION OF CARBON STOCKS BEFORE AND AFTER DEFORESTATION

a) Forest carbon stocks (Initial Use)

As in Table 18 only the above- and belowground biomass pool was included in the calculation of carbon stocks of forest strata. CP-AB module was followed as summarized presented below[]:

- A carbon inventory was carried out, through a stratified sampling of 217 fix area plots inside the PA.
- The individuals included in the inventory were Trees, Palms and Bamboos.
- The parameters measured were DBH, total and commercial height and tree health.
- The conversion from field parameters (DBH in case of trees and TH in case of palms) to biomass was done by the use of allometric equations from recognized researchers. In case of bamboos, a fixed biomass per individual was used (taken from studies of bamboos forest in Colombia).
- The subsequent conversion from biomass to carbon stock was done by multiplying standardized factors as: Carbon Fraction, Ratio of Molecular Weight of CO_2 to carbon for AG carbon stocks, and Root-to-shoot Ratio for BG carbon stocks.

The following table shows the tons of CO_2/ha for each stratum of the project.

Chart 22. Carbon stocks of all land use and land cover classes in baseline

n°	ID	Name	Above Ground t CO_2-e ha^{-1}	Below Ground t CO_2-e ha^{-1}	Cstock t CO_2-e ha^{-1}
002		Hilly Forest	407,34	97,76	505,10
003		Terrace forest	441,78	106,03	547,81
004		Bamboos	487,48	117,00	604,48
005		Others	-	0,00	0,00
006		Tree swamps	438,24	105,18	543,42
008	DP	Deforestation for Pastures	15,11	3,52	18,63
009	DF	Deforestation for Farming*	28,82	2,93	31,75*
010	DI	Deforestation for Infrastructure	0,00	0,00	0,00
011	DA	Deforestation for Agriculture (Corn)	28,82	2,93	31,75

* The total carbon stock of Farming has been established to be equal than Agriculture´s.

The Carbon Stocks for the Forest Strata come from the Forest Inventory of the Project.

The Carbon Stocks of post-deforestation land-uses were taken from Alegre, J. Arevalo, L. Ricse, A.

With this information it was determined the initial carbon stock in the Project Area and then the annual loss due to deforestation. The following table shows the annual carbon stock that would be lost in baseline for the first 10 years of the project, according to the deforestation projected for each stratum. During the 38 years of life of the project, there would be a loss of 27,626,600 tCO_2 due to the total elimination of 54,075.3 ha of forest in the Project Area. In Chart 23 there is the same estimate for the first 10 years of the project, which imply 11,419,937 tCO_2 due to the total elimination of 21,982.8 ha deforested.

Chart 23. Carbon stock in pre-deforestation forest classes in the project area

Carbon stock changes in initial (pre-deforestation) forest classes in Project Area																Total C stock change in initial forests	
Strata i		0		Hilly Forests		Terrace Forests		Bamboos		Others		Tree swamps		0		Cumulative	Annual
T	Year	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
1	2009	-	-	1.718	867.997	523	286.370	55	33.519	5	-	-	-	-	-	1.187.886	1.187.886
2	2010	-	-	3.212	1.622.434	1.348	738.707	264	159.367	7	-	-	-	-	-	2.520.509	1.332.623
3	2011	-	-	4.453	2.249.053	2.203	1.206.786	670	404.969	7	-	-	-	-	-	3.860.807	1.340.298
4	2012	-	-	5.561	2.808.960	2.808	1.538.168	1.177	711.514	8	-	-	-	-	-	5.058.642	1.197.836
5	2013	-	-	6.643	3.355.119	3.446	1.887.501	1.703	1.029.638	14	-	-	-	-	-	6.272.258	1.213.615
6	2014	-	-	7.858	3.969.261	3.917	2.145.703	2.129	1.287.124	14	-	-	-	-	-	7.402.088	1.129.830
7	2015	-	-	9.152	4.622.614	4.264	2.335.696	2.501	1.511.700	15	-	-	-	-	-	8.470.010	1.067.922
8	2016	-	-	10.463	5.284.879	4.592	2.515.747	2.843	1.718.603	20	-	-	-	-	-	9.519.229	1.049.219
9	2017	-	-	11.865	5.992.975	4.859	2.661.556	3.175	1.919.411	27	-	-	-	-	-	10.573.942	1.054.713
10	2018	-	-	13.348	6.741.811	5.164	2.828.904	3.441	2.079.997	30	-	-	-	-	-	11.650.712	1.076.769

Chart 24. Carbon stock in pre-deforestation forest classes in the Leakage area

Carbon stock changes in initial (pre-deforestation) forest classes in Leakage Belt																Total C stock change in initial forests	
Strata i		-		Hilly Forests		Terrace Forests		Bamboos		Others		Tree swamps		-		Cumulative	Annual
T	Year	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
1	2009	0	0	1.324	668.885	284	155.474	1	609	117	0	4	1.918	0	0	826.886	826.886
2	2010	0	0	2.225	1.123.635	467	255.993	7	3.961	257	0	4	1.918	0	0	1.385.507	558.621
3	2011	0	0	2.999	1.514.985	701	384.128	71	42.660	406	0	4	1.918	0	0	1.943.691	558.184
4	2012	0	0	3.960	2.000.035	941	515.576	198	119.754	469	0	4	1.918	0	0	2.637.282	693.592
5	2013	0	0	4.747	2.397.496	1.230	673.812	376	227.319	555	0	8	4.383	0	0	3.303.009	665.727
6	2014	0	0	5.566	2.811.507	1.566	858.005	617	372.973	620	0	8	4.383	0	0	4.046.868	743.859
7	2015	0	0	6.469	3.267.275	1.904	1.043.027	829	501.259	698	0	8	4.383	0	0	4.815.945	769.076
8	2016	0	0	7.341	3.707.767	2.275	1.246.275	1.028	621.622	740	0	10	5.479	0	0	5.581.143	765.198
9	2017	0	0	8.284	4.184.414	2.634	1.443.172	1.199	724.617	776	0	10	5.479	0	0	6.357.681	776.538
10	2018	0	0	9.158	4.625.669	3.003	1.645.039	1.303	787.388	808	0	10	5.479	0	0	7.063.576	705.894

b) Carbon stocks of Post-Deforestation Land-uses

The document developed in the BL-UP module explains the complete analysis of the Study which determined the future activities in the areas post-deforestation. This study is the "Monitoring of the land use between Puerto Maldonado and Iñapari corresponding to section 3: Interoceanic Highway for 1990, 2000 and 2005"[2] held in October 2007.

In the case of the Madre de Dios Amazon REDD Project, land use will change to: Farming, Pastures, Agriculture and Infrastructure (the farming class is considered as a mixed surface between pastures and agriculture), based on the following proportions:

Deforestation for Pastures	Deforestation for Farming*	Deforestation for Agriculture (Corn)	Deforestation for Infrastructure
53.73%	40.47%	3.37%	2.41%

(*)Increase in urban areas, roads.

To set the carbon stock of these new land uses, information from each of the systems was considered according to studies[3] conducted in the Peruvian jungle which is presented below:

Pasture : 18.63 t CO_2/ha
Farmland (Corn) : 31.75 t CO_2/ha

Corn was used as it is the main crop developed in the Project Area and because it has a higher stock (more conservative) compared to rice, which is also an important crop in the region[4].

The stock of farming (mixed of pastures and croplands) use was estimated conservatively by using the highest carbon stock of its components, in this case, farmland: 31.75 t CO_2/ha

The stock in infrastructure is zero.

Chart 25 shows deforested areas in the first 10 years of Baseline, divided between different post-deforestation-activities according to the percentages already mentioned; and in Chart 27, the post-deforestation stocks per year in such areas.

[2] CDC, UNALM, Fráncfort zoological society, INRENA, 2007.
[3] Alegre, J. Arevalo, L. Ricse, A. Reservas de Carbono según el uso de la tierra en dos sitios de la Amazonia Peruana. Agroforestería para la Producción Animal en América Latina - II - Memorias de la Segunda Conferencia Electrónica (Agosto de 2000-Marzo de 2001). FAO.
[4] Agrarian Agency of MDD.

Chart 25. Annual areas of post-deforestation classes within the project area in the baseline case (activity data per non-forest class)

Area of post-deforestation classes established on deforested areas within the Project Area							
Strata f		Deforestation for Pastures	Deforestation for Farming*	Deforestation for Agriculture (Corn)	Deforestation for Infrastructure	Deforestation for Illegal Mining	Total
% historic		53,73%	40,47%	3,37%	2,41%	0,00%	Cumulative
T	Year	ha	ha	ha	ha	ha	ha
1	2009	1.236,7	931,6	77,6	55,5	-	2.301,7
2	2010	2.595,6	1.955,2	162,9	116,4	-	4.830,8
3	2011	3.939,8	2.967,8	247,3	176,7	-	7.332,6
4	2012	5.133,2	3.866,8	322,2	230,2	-	9.553,7
5	2013	6.342,9	4.778,0	398,2	284,4	-	11.805,0
6	2014	7.478,3	5.633,3	469,5	335,3	-	13.918,2
7	2015	8.560,1	6.448,2	537,4	383,8	-	15.931,6
8	2016	9.627,8	7.252,5	604,4	431,7	-	17.918,7
9	2017	10.706,3	8.064,9	672,1	480,1	-	19.926,1
10	2018	11.811,4	8.897,4	741,5	529,6	-	21.982,8

Chart 26. Annual areas of post-deforestation classes within the leakage area in the baseline case (activity data per non-forest class)

Area of post-deforestation classes established on deforested areas within the Leakage Belt							
Strata f		Deforestation for Pastures	Deforestation for Farming*	Deforestation for Agriculture (Corn)	Deforestation for Infrastructure	Deforestation for Illegal Mining	Total
% historic		53,73%	40,47%	3,37%	2,41%	0,00%	Cumulative
t	Year	ha	ha	ha	ha	ha	ha
1	2009	929,6	700,2	58,4	41,7	-	1.730,1
2	2010	1.589,6	1.197,5	99,8	71,3	-	2.958,6
3	2011	2.246,5	1.692,2	141,0	100,7	-	4.181,0
4	2012	2.993,5	2.254,9	187,9	134,2	-	5.571,3
5	2013	3.715,6	2.798,9	233,3	166,6	-	6.915,2
6	2014	4.501,1	3.390,6	282,6	201,8	-	8.377,1
7	2015	5.323,4	4.010,0	334,2	238,7	-	9.907,6
8	2016	6.122,1	4.611,7	384,3	274,5	-	11.394,2
9	2017	6.933,1	5.222,6	435,2	310,9	-	12.903,4
10	2018	7.673,3	5.780,2	481,7	344,1	-	14.281,2

Chart 27. Carbon stock in post-deforestation (non-forest) classes in the project area

Carbon stock changes in final (post-deforestation) non forest classes in Project Area												Total C stock change in final post-deforestation classes	
Strata f		Deforestation for Pastures		Deforestation for Farming*		Deforestation for Agriculture (Corn)		Deforestation for Infrastructure		Deforestation for Illegal Mining		Cumulative	Annual
t	Year	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
1	2009	1.237	23.040	932	29.578	78	2.465	55	-	-	-	55.083	55.083
2	2010	2.596	48.356	1.955	62.078	163	5.173	116	-	-	-	115.608	60.524
3	2011	3.940	73.399	2.968	94.229	247	7.853	177	-	-	-	175.481	59.873
4	2012	5.133	95.632	3.867	122.771	322	10.231	230	-	-	-	228.634	53.153
5	2013	6.343	118.168	4.778	151.701	398	12.642	284	-	-	-	282.511	53.877
6	2014	7.478	139.320	5.633	178.857	469	14.905	335	-	-	-	333.083	50.572
7	2015	8.560	159.474	6.448	204.730	537	17.062	384	-	-	-	381.266	48.183
8	2016	9.628	179.366	7.252	230.266	604	19.190	432	-	-	-	428.821	47.556
9	2017	10.706	199.459	8.065	256.061	672	21.339	480	-	-	-	476.859	48.038
10	2018	11.811	220.047	8.897	282.491	741	23.542	530	-	-	-	526.080	49.220

Chart 28. Carbon stock in post-deforestation (non-forest) classes in the leakage area

Carbon stock changes in final (post-deforestation) non forest classes in Leakage Belt													Total C stock change in final post-deforestation classes	
Strata f		Deforestation for Pastures		Deforestation for Farming*		Deforestation for Agriculture (Corn)		Deforestation for Infrastructure		Deforestation for Illegal Mining			Cumulative	Annual
t	Year	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
1	2009	930	17.318	700	22.232	58	1.853	42	-	0	-		41.403	41.403
2	2010	1.590	29.615	1.197	38.019	100	3.168	71	-	0	-		70.803	29.400
3	2011	2.246	41.852	1.692	53.728	141	4.478	101	-	0	-		100.057	29.255
4	2012	2.993	55.769	2.255	71.595	188	5.966	134	-	0	-		133.330	33.272
5	2013	3.716	69.221	2.799	88.865	233	7.406	167	-	0	-		165.492	32.162
6	2014	4.501	83.855	3.391	107.651	283	8.971	202	-	0	-		200.477	34.985
7	2015	5.323	99.174	4.010	127.318	334	10.610	239	-	0	-		237.103	36.626
8	2016	6.122	114.055	4.612	146.422	384	12.202	275	-	0	-		272.679	35.576
9	2017	6.933	129.163	5.223	165.817	435	13.819	311	-	0	-		308.798	36.119
10	2018	7.673	142.954	5.780	183.521	482	15.294	344	-	0	-		341.769	32.970

ESTIMATION OF THE TOTAL CHANGE OF CARBON STOCKS IN BASELINE

The purpose of this step was to complete the baseline assessment by calculating changes in the carbon stocks. Based on changes in the land use from initial classes (or stratum) of forest to final classes (non-forest), considering changes in the respective stocks, it was estimated the total change in carbon stocks for the reference period of the project (until 2046) equal to 26.911.652 t CO_2 and for the first 10 years of the project equal to 11.124.632 t CO_2.

Chart 29. Total net baseline carbon stock change in the project area

Classes		Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change in **Project Area**	
		cumulative	annual	cumulative	annual	annual	cumulative
t	Year	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e	tCO_2-e	tCO_2-e
1	2009	1.187.886	1.187.886	55.083	55.083	1.132.803	1.132.803
2	2010	2.520.509	1.332.623	115.608	60.524	1.272.098	2.404.901
3	2011	3.860.807	1.340.298	175.481	59.873	1.280.425	3.685.326
4	2012	5.058.642	1.197.836	228.634	53.153	1.144.682	4.830.009
5	2013	6.272.258	1.213.615	282.511	53.877	1.159.738	5.989.747
6	2014	7.402.088	1.129.830	333.083	50.572	1.079.258	7.069.005
7	2015	8.470.010	1.067.922	381.266	48.183	1.019.739	8.088.745
8	2016	9.519.229	1.049.219	428.821	47.556	1.001.663	9.090.408
9	2017	10.573.942	1.054.713	476.859	48.038	1.006.675	10.097.083
10	2018	11.650.712	1.076.769	526.080	49.220	1.027.549	11.124.632

Chart 30. Total net baseline carbon stock change in the Leakage area

Classes		Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change in Leakage Belt	
		Cumulative	Annual	Cumulative	Annual	Annual	Cumulative
t	Year	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e	tCO_2-e	tCO_2-e
1	2009	826.886	826.886	41.403	41.403	785.483	785.483
2	2010	1.385.507	558.621	70.803	29.400	529.222	1.314.704
3	2011	1.943.691	558.184	100.057	29.255	528.929	1.843.633
4	2012	2.637.282	693.592	133.330	33.272	660.320	2.503.953
5	2013	3.303.009	665.727	165.492	32.162	633.564	3.137.517
6	2014	4.046.868	743.859	200.477	34.985	708.874	3.846.391
7	2015	4.815.945	769.076	237.103	36.626	732.451	4.578.842
8	2016	5.581.143	765.198	272.679	35.576	729.622	5.308.464
9	2017	6.357.681	776.538	308.798	36.119	740.419	6.048.883
10	2018	7.063.576	705.894	341.769	32.970	672.924	6.721.807

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:

$$\Delta C_P = \sum_{t=1}^{t^*} \sum_{i=1}^{M} \left(\Delta C_{P,DefPA,i,t} + \Delta C_{P,Deg,i,t} + GHG_{P-E,i,t} - \Delta C_{P,Enh,i,t} \right)$$

Where,

$\Delta C_{P,DefPA,i,t}$ = 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

To determine the leakage indications set forth in module LK-ASU were followed, and this section contains a summary thereof.

The Project Area and Leakage Belt are located in the province of Tahuamanu (covering the District of Tahuamanu, Iberia and Iñapari).

In order to calculate the proportion of deforestation by immigration, the information provided in the National Census of 2007[58] has been considered, as showed in the following table.

[58] Data Consult System of Settlements and Disperse Population. National Census 2007: XI of Population and VI of Housing. INEI

Chart 31. Population by Economic Activity and Residence Period in the Leakage Belt

Activity by group	Iñapari				
	≥ 5 year living in the district	< 5 year living in the district	Total	Residents	Migrants
Agriculture - cattle raising, hunting and forestry	175	118	293	26%	18%
Financial intermediate	2	1	3	0%	0%
Fishing	1	-	1	0%	0%
Construction	19	21	40	3%	3%
Manufacturing industries	25	20	45	4%	3%
Retail Trade	37	27	64	6%	4%
Wholesale trade	2	3	5	0%	0%
Transport, storage and communications	15	18	33	2%	3%
Hotels and restaurants	22	22	44	3%	3%
Teaching	11	13	24	2%	2%
Private households and domestic services	9	10	19	1%	1%
Pub. Admin. and defense	23	27	50	3%	4%
Other act. Com. Serv. and personal	8	7	15	1%	1%
Health and Social services	4	11	15	1%	2%
Sale, maintenance and repair of motor vehicle & motorcycle	4	4	8	1%	1%
Real state act., business and rents	2	8	10	0%	1%
Electricity supply, gas and water	-	1	1	0%	0%
Total	359	311	**670**	54%	46%

Source: National Census 2007. Compiled by author

Of all the activities the population carries out, only Agriculture and Livestock, presented under the same category in the table, are considered as a direct cause of deforestation. Taking the sum of both districts it results that 43.73% of the population is engaged in activities that cause deforestation, of which only 17.61% are migrants.

Chart 32. Population Responsible of Deforestation by Residence Period in the area

IÑAPARI	% with more than 5 years in area	% with less than 5 years in area	Total Population %
Causing Deforestation (Agriculture, Livestock)	49%	38%	**44%**
Not Causing Deforestation	51%	62%	**56%**
TOTAL			**100%**

Source: In-house calculations

Estimation of Leakage inside the Leakage Belt

According to the module, the estimated carbon stock changes and the GHG emitted in the Project Area should be multiplied by a factor less than 1, which represents the percentage of deforestation that would be displaced in the Leakage Belt. This factor has been obtained by analyzing the activities that cause deforestation within groups of people in the districts of Tahuamanu and Las Piedras, as mentioned above.

Chart 33. Percentage expected at the Interior of the Leakage Belt.

Actors	Deforesters by Agriculture & Cattle Ranching %	Proportion not changed by Project Activity	Expected Proportion of Inhabitants engaged in deforestation %		
Migrants	17.61	0.10	1.76	1.76	**4.37**
Residents	26.12	0.10	2.61	2.61	

As can be seen above, 26.12% of deforestation in the project area will be carried out by residents and 17.61% by migrants.

With the farmers, whose activity is often of subsistence and from which they obtain a low revenue, the REDD Project aims to work and conduct surveillance, monitoring and training activities for the implementation of sustainable activities. This is why it is estimated that 10% (worst scenario) of such population will not change their line of business and will maintain the deforestation activity while 90% could revert to alternative sustainable economic activities promoted by the project.

Therefore, with these data, it is estimated that the population that will cause deforestation and will migrate to the Leakage Belt will be **4.37%.**

In the case of the project and according to the Model of Deforestation developed for the project, the areas to be deforested within the Project Area will be 21,982.8 ha in 2018 and 54,075.3 ha by year 2046 (expiration of the REDD Project).

The total emissions in the PA in the baseline would be equal to 11’419,936.96 t CO_2 in 2018 and 27’626,600.19 t CO_2 by 2046. When multiplied by 0.0437 (factor determined as the displacement of areas to the Leakage Belt) these amounts result in 499,409.18 and 1’208,148.34 t CO_2 respectively of emissions by deforestation displacement from the Project Area to the Leakage Belt. This should be verified during monitoring.

Estimation of leakage outside the Leakage Belt

Once the deforestation displacement to the leakage belt area is determined, it was also estimated the displacement to areas outside the leakage belt. To that end it has been defined the total area of forest available nationwide (TOTFOR), which has been equal to the total area of forest in the country as there is no information of the forest area in buffers around roads and rivers. The forest in protected areas (PROTFOR) and forest under management (MANFOR) were excluded.

$$AVFOR = TOTFOR - PROTFOR - MANFOR$$

The forest area nationwide has been considered as there is no information of the total area of 5Km of roads and rivers. The national TOTFOR in the Peruvian jungle is of 70’180,130.4 ha (PROCLIM, 2000). The PROTFOR[3], considering protected areas within the forest area is of 16’452,255.72 ha in total. Nationwide the areas of forest management are 8,586,493.5[4] ha (7,480,783 ha of timber concessions and 1’105,710 of non-timber concessions: Brazil nuts, Rubber, reforestation, wildlife, etc.)

AVFOR = TOTFOR – PROTFOR – MANFOR

AVFOR = 70´180,130.4 - 16´452,255.72 ha - 8´586,493.55)

AVFOR = 45’141,381.13

The proportion of the forest area in the Leakage Belt with relation to the national area is given by

$PROP_{LB}$ = LBFOR / AVFOR

The LBFOR area was defined as the total forest area in the LB minus the areas under active management, represented by Forest Timber Concessions (153,289.32 ha).

$PROP_{LB}$ = (159,018.02 - (153,289.32)) / 45´141,381.13
$PROP_{LB}$ = 0.00013

According to the methodology, the stratification of AVFOR by carbon stock has to be made. There are studies of carbon stock nationwide, in different stratum or types of forests. However, such studies have not been homogenized to date. At a country level, there is an ongoing work. For this step, the data established for Peru in the Second Communication on Climate Change[59] was used to derive the country average carbon stock: the emissions by land use change in natural forests for period 1990 – 2000 (56,827 Gg CO_2 equivalent) divided by the deforested areas on the same period (149,631.76 has). The resulting carbon stock for available forest outside LB is 379.779 t CO_2/ha

The average of the carbon stock in the Leakage Belt has been determined based on the average carbon stock by stratum, and the representation of each in the Leakage Belt (LB) (weighted average), being equal to 518.69 t CO_2

$PROP_{CS}$ = C_{OLB} / C_{LB}

$PROP_{CS}$ = 379.779 t CO_2/ha / 518.69 t CO_2/ha

$PROP_{CS}$ = 0.73

[3]Information of the Forest Bureau of the Ministry of Agriculture
[4] It was considered the NPA located in the Peruvian Jungle
59 http://www.minam.gob.pe/dmdocuments/SCNCC-MINAM.pdf (pag 72).

An important value to calculate the leakage outside the Leakage Belt is the proportion of migrant residents ($PROP_{IMM}$) that presumably will go into the region to carry out activities involving deforestation. This $PROP_{IMM}$ is equal to 0.18 and was determined based on the data presented in Table 30. The detail is shown in the table below.

Chart 34. Proportion of Migrant Population which Deforests in the Project Area.

Iñapari Population	Deforester Migrants N°	Deforester Migrants %	**$PROP_{IMM}$**
670	118	18%	**0.18**

Then the proportional leakage of the areas with migrant population (LK_{PROP}) will be:

$$LK_{PROP} = PRO_{IMM} * (1 - PROP_{LB}) * PROP_{CS}$$

$$LK_{PROP} = 0.18 * (1 - 0.00013) * 0.73$$

$$\mathbf{LK_{PROP} = 0.05125 = 13.178\%}$$

Finally, the leakage caused by deforestation actors that will be displaced outside the Leakage Belt, will be equal to the subtraction of the carbon stock changes in Baseline and the changes in stock in a Scenario with project, multiplied by the LK_{PROP}.

$$\Delta C_{LK\text{-}ASU,OLB} = (\Delta C_{LK\text{-}ASU,OLB} - \Delta C_{P,LB}) * LK_{PROP}$$

To year 2018 (the first 10 years of the project):

$$\Delta C_{LK\text{-}ASU,OLB} = (6,721,807.00 – 4,313,383.55) * 0.13178$$

$$\Delta C_{LK\text{-}ASU,OLB} = 317,374.44 \ tCO_2$$

To year 2046 (all years with Project accreditation):

$$\Delta C_{LK\text{-}ASU,OLB} = (28,514,222.03 – 18,297,576.28) * 0.13178$$

$$\Delta C_{LK\text{-}ASU,OLB} = 1,346,317.31 \ tCO_2$$

Emissions of Leakage Prevention Activities

The activities proposed for the project were designed to reduce deforestation inside the Project Area and the Leakage Belt, given that the latter is principally formed by other forest concessions and agricultural farms.

The following activities have been considered by the project to prevent the occurrence of leakage:

- Agroforestry and Silvopasture training to families from Iñapari and Belgica Indigenous Community.

- Training in alternative sustainable economic activities as ecotourism, rubber management, fish farming, etc., to promote the adequate management of non-timber resources in the reference region

Total Estimations of Leakage due to Unplanned Deforestation Displacement

$$\Delta\ C_{LK\text{-}AS,unplanned} = \Delta\ C_{LK\text{-}ASU\text{-}LB} + \Delta\ C_{LK\text{-}ASU,OLB} + GHG_{LK,E}$$

To year 2018 (the first 10 years of the project):

$$\Delta C_{LK\text{-}AS,unnplaned} = 499{,}409.18 + 317{,}374.44 + 0$$

$$\Delta C_{LK\text{-}AS,unnplaned} = 816{,}783.62\ tCO_2$$

And,

To year 2046 (all years with Project accreditation):

$$\Delta C_{LK\text{-}AS,unnplaned} = 1.208.148{,}34 + 1{,}346{,}317.31 + 0$$

$$\Delta C_{LK\text{-}AS,unnplaned} = 2{,}554{,}465.65\ tCO_2$$

3.4 Summary of GHG Emission Reductions and Removals

The total net of GHG reductions of the REDD Project are calculated as follows:

$$C_{REDD,t} = \Delta C_{BSL} - \Delta C_P - \Delta C_{LK}$$

Where,

$C_{REDD,t}$ = Total GHG emission reduction

ΔC_{BSL} = Net emissions under baseline

ΔC_P = Net emissions under project scenario

ΔC_{LK} = Net emissions by leakage

As shown in the calculations developed, there is no variation in carbon stocks by deforestation in the with-project case (ex-ante), as the Madre de Dios Amazon REDD Project will carry out activities to avoid the projected deforestation in 100%. On the other hand, there is no sufficiently reliable estimation about the increase in biomass by the actions of enrichment in the Project Area.

Therefore, based on the monitoring to be carried out calculations ex post will be made for this item.

The emissions due to leakage inside and outside the Leakage Belt that have been calculated following Module LK-ASU amount to 816,783.62 tCO_2 for the first 10 years. The percentages and indexes found in the different steps of the estimation are based in the analysis of the official information on the population, as the National Census of 2007 and current studies of the area carried out by NGO's and different researchers.

Therefore, the Total Reduction of GHGs Emissions in the Project Area would be equal to 10,603,153 tCO2 (11.419.937 - 816,783.62 tCO2) for the first ten years and 25,072,135 tCO2 for the entire life of the project. However, the project should be monitored to verify stock changes by deforestation (unlikely to occur) and if the leakage established (ex-ante) is in fact attributable to the project or the amount has been overestimated and increase the carbon stock in a project scenario by enrichment in the project area.

Estimation on the VCS buffer

The Buffer retention is estimated as a percentage of the subtraction between the Total Emissions by Unplanned Deforestation in Baseline and the Emissions in the Scenario with Project, regardless of the discounts by leakage. Previously, each one has to subtract their emissions by burning of fossil fuels and the incorporation of nitrogen.

The retention rate is determined according to the risk classification of the project, using the VCS tool for AFOLU of Risk of Non Permanence. According to the calculations, it has a total percentage of 10% buffer.

Therefore the retention of Buffer Credits to year 2018 should be:

$$\text{Buffer}_{\text{UNPLANNED}} = \{(11{,}419{,}937 - 0^{*}) - 0^{**}\} \times 10\% = 1{,}141{,}994 \ tCO_2$$

And to 2046 (end of the accreditation period):

$$\text{Buffer}_{\text{UNPLANNED}} = \{(27{,}626{,}600 - 0^{*}) - 0^{**}\} \times 10\% = 2{,}762{,}660 \ tCO_2$$

** It was already explained that the emissions due to the burning of fossil fuels and the incorporation of nitrogen fertilizers in baseline were not considered.*

*** There are no changes in carbon stocks in Scenario with Project (ex - ante) due to the planned prevention activities, and because none of them have considered using fertilizers.*

Uncertainty Analysis

The analysis of uncertainty of carbon stocks was developed according to the module X-UNC.

The assumptions made were:

- The uncertainty from emissions should be accounted as zero, since we used a conservative number (55%) in its calculation, and it is the percentage taken from literature.

- The uncertainty from Pools: Dead-wood, Litter, Soil organic, Wood products; and sources: Fossil fuel combustion and N_2O emissions from nitrogen application, were not analysed as they are not included in baseline calculations.

- The uncertainty resulting from calculations to estimate aboveground biomass, based on measured tree variables (DBH, specific density), is already included in the biomass equation itself

Estimation of Verified Carbon Units

- Considering what is indicated in the module, to know the verifiable carbon units in time t, the adjustment by uncertainty should be carried out as well as the reduction by risk buffer. For the development of this item it has been estimated the VCU of each year, as evidenced in the table below.

$$VCU_t = (Adjusted\_C_{REDD,t_2} - Adjusted\_C_{REDD,t_1}) - Buffer_{TOTAL} \quad (8)$$

Where:

VCU_t	Number of Verified Carbon Units at time $t = t_2 - t_1$; VCU
$Adjusted\_C_{REDD,t2}$	Cumulative total net GHG emissions reductions at time t_2 adjusted to account for uncertainty; t CO_2-e
$Adjusted\_C_{REDD,t1}$	Cumulative total net GHG emissions reductions at time t_1; t CO_2-e
$Buffer_{TOTAL}$	Total permanence risk buffer withholding; t CO_2-e

Chart 35. Verifiable Carbon Units in the first 10 years of the Project

T	Year	$\Delta C_{BSL,unplanned}$	ΔC_P	$\Delta C_{LK-AS,unplanned}$	$C_{REDD,t}$	$Buffer_{UNPLANNED}$	VCU_t
1	2009	1.162.914	-	87.943	1.074.971	116.291	**958.679**
2	2010	1.305.876	-	82.095	1.223.781	130.588	**1.093.193**
3	2011	1.314.396	-	82.454	1.231.942	131.440	**1.100.503**
4	2012	1.175.042	-	82.564	1.092.479	117.504	**974.974**
5	2013	1.190.498	-	81.976	1.108.522	119.050	**989.472**
6	2014	1.107.895	-	81.920	1.025.975	110.789	**915.186**
7	2015	1.046.807	-	80.361	966.446	104.681	**861.765**
8	2016	1.028.258	-	79.417	948.841	102.826	**846.015**
9	2017	1.033.409	-	80.152	953.257	103.341	**849.916**
10	2018	1.054.842	-	77.902	976.940	105.484	**871.456**
Total		**11.419.937**	**-**	**816.784**	**10.603.153**	**1.141.994**	**9.461.160**

In conclusion, there will be 9.461.160 tCO_2 of verifiable carbon credits during the first 10 years, and 22.309.475 tCO_2 during the entire life of the project.

Chart 36. Verifiable Carbon Units of the Project by 2046

T	Year	$\Delta C_{BSL,unplanned}$	ΔC_P	$\Delta C_{LK-AS,unplanned}$	$C_{REDD,t}$	$Buffer_{UNPLANNED}$	VCU_t
1	2009	1.162.914	-	87.943	1.074.971	116.291	**958.679**
2	2010	1.305.876	-	82.095	1.223.781	130.588	**1.093.193**
3	2011	1.314.396	-	82.454	1.231.942	131.440	**1.100.503**
4	2012	1.175.042	-	82.564	1.092.479	117.504	**974.974**
5	2013	1.190.498	-	81.976	1.108.522	119.050	**989.472**
6	2014	1.107.895	-	81.920	1.025.975	110.789	**915.186**
7	2015	1.046.807	-	80.361	966.446	104.681	**861.765**
8	2016	1.028.258	-	79.417	948.841	102.826	**846.015**
9	2017	1.033.409	-	80.152	953.257	103.341	**849.916**
10	2018	1.054.842	-	77.902	976.940	105.484	**871.456**
11	2019	1.016.709	-	75.676	941.033	101.671	**839.362**
12	2020	1.005.070	-	74.123	930.947	100.507	**830.440**
13	2021	999.417	-	72.602	926.815	99.942	**826.873**
14	2022	965.015	-	72.961	892.055	96.502	**795.553**
15	2023	918.279	-	71.214	847.065	91.828	**755.237**
16	2024	873.208	-	69.771	803.437	87.321	**716.117**
17	2025	816.921	-	68.958	747.964	81.692	**666.272**
18	2026	697.122	-	68.265	628.856	69.712	**559.144**
19	2027	617.139	-	67.645	549.494	61.714	**487.780**
20	2028	564.248	-	66.326	497.922	56.425	**441.498**

21	2029	503.011	-	65.422	437.588	50.301	**387.287**
22	2030	533.807	-	65.439	468.368	53.381	**414.988**
23	2031	494.516	-	64.057	430.459	49.452	**381.007**
24	2032	474.989	-	63.146	411.843	47.499	**364.344**
25	2033	474.126	-	60.214	413.912	47.413	**366.500**
26	2034	463.776	-	61.135	402.641	46.378	**356.263**
27	2035	463.774	-	60.535	403.238	46.377	**356.861**
28	2036	457.464	-	58.118	399.346	45.746	**353.599**
29	2037	445.081	-	57.342	387.738	44.508	**343.230**
30	2038	394.654	-	55.188	339.466	39.465	**300.000**
31	2039	398.082	-	56.576	341.506	39.808	**301.698**
32	2040	370.389	-	54.345	316.044	37.039	**279.005**
33	2041	393.507	-	54.331	339.176	39.351	**299.825**
34	2042	413.147	-	51.720	361.427	41.315	**320.112**
35	2043	361.665	-	51.407	310.258	36.167	**274.092**
36	2044	374.314	-	51.342	322.973	37.431	**285.541**
37	2045	362.047	-	50.105	311.941	36.205	**275.737**
38	2046	355.188	-	49.719	305.469	35.519	**269.950**
Total		**27.626.600**	**-**	**2.554.466**	**25.072.135**	**2.762.660**	**22.309.475**

4 MONITORING

4.1 Data and Parameters Available at Validation

Data Unit / Parameter:	Regional Forest / Non-forest Cover Benchmark Map
Data unit:	ha
Description:	Map that shows the stratification and location of forest and non-forest areas in the Reference Region RRD at the beginning of the accreditation.
Source of data:	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have an adequate resolution and they are an available tool to all public.
Measurement frequency:	At minimum 3 times over the 10 years leading up to baseline renewal.
QA/QC procedures to be applied:	Through the accuracy assessment.
Any comment:	The stratification was based on the Ecological and Economic Zoning of the Region of Madre de Dios. It was developed by the IIAP in 2009 and the regional government uses it as its official source. Non-forest has been determined as beach and water bodies areas. In addition, there are other areas that are access roads (rivers, bridges, alternate roads, the Interoceanic Highway).
Used in equations:	3

Data Unit / Parameter:	Project Forest Cover Benchmark Map.
Data unit:	ha
Description:	Map that shows the stratification and location of forest areas in the Project area at the beginning of the accreditation (100% forested).
Source of data:	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have the adequate resolution and they are an available tool to all public.
Measurement frequency:	At minimum every 10 years prior to baseline renewal.
QA/QC procedures to be applied:	Through the accuracy assessment.
Any comment:	The stratification was based on the Ecological and Economic Zoning of the Region of Madre de Dios. It was developed by the IIAP in 2009 and the regional government uses it as its official

	source. Non-forest has been determined as beach and water bodies areas. In addition, there are other areas that are access roads (rivers, bridges, alternate roads, the Interoceanic Highway). To date there is no other use but forest usage.
Used in equations:	3, 8.

Data Unit / Parameter:	Leakage Belt Forest Cover Benchmark Map.
Data unit:	ha
Description:	Map that shows the stratification and location of forest in the Leakage belt at the beginning of the accreditation (100% forested).
Source of data:	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have the adequate resolution and they are an available tool to all public.
Measurement frequency:	At minimum every 10 years prior to baseline renewal.
QA/QC procedures to be applied:	Through the accuracy assessment.
Any comment:	The stratification was based on the Ecological and Economic Zoning of the Region of Madre de Dios. It was developed by the IIAP in 2009 and the regional government uses it as its official source. Non-forest has been determined as beach and water bodies areas. In addition, there are other non-forested areas that used as access roads (rivers, bridges, Interoceanic Highway, alternate roads).
Used in equations:	3

Data Unit / Parameter:	A_i
Data unit:	Ha
Description:	Total area of each stratum *i*.
Source of data:	Landsat satellite images.
Justification of choice of data or description of measurement methods and procedures applied:	Frequency at a minimum every 10 years prior to baseline renewal.
Any comment:	Ex-ante it is assumed that strata area will remain constant.
Used in equations:	19

Data Unit / Parameter:	$A_{RRD, unplanned, hrp}$
Data unit:	Ha
Description:	Total deforested area during the term of reference (until 2008) in the RRD.
Source of data:	Value taken from the Landsat 7 satellite images, used by the Deforestation Model of Madre de Dios.
Justification of choice of data or description of measurement methods and procedures applied:	The Landsat images have the adequate resolution and they are a free and available tool to all public.
Any comment:	Monitored for purpose of baseline revisions.

Data Unit / Parameter:	*CF*
Data unit:	$t\ C\ t^{-1}$ d.m.
Description:	Carbon fraction of dry matter.
Source of data:	Value taken from IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3
Justification of choice of data or description of measurement methods and procedures applied:	The value chosen is 0.49 t C t-1 d.m. for Tropical Forests.
Any comment:	n/a
Used in equations:	19

Data Unit / Parameter:	*CFj*
Data unit:	$t\ C\ t^{-1}$ d.m.
Description:	Carbon fraction of biomass for tree species j.
Source of data:	Value taken from IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3.
Justification of choice of data or description of measurement methods and procedures applied:	The value chosen is 0.49 t C t-1 d.m. for Tropical Forests.
Any comment:	n/a
Used in equations:	11

Data Unit / Parameter:	D*j*
Data unit:	t d.m. m^{-3}
Description:	Basic wood density in t d.m. m^{-3} for species *j*.
Source of data:	National species-specific densities. For species-specific wood densities not available, it is used the mean wood density value Regional average (0.60 t d.m.m-3- tropical America) from Reyes 1992 and Brown, S. 1997.
Justification of choice of data or description of measurement methods and procedures applied:	Species densities have been taken from different sources of national species-specific researches being the main ones: - Evaluation of mechanical and physical properties and probable uses of the wood of 20 species in Jenaro Herrera, Loreto – Perú (Aróstegui and Acevedo). - Summary of technical information of 32 tree species. Peruvian Confederation of Wood. 2008. CPM. CITE Madera. - Global wood density database. (Chavé et al., 2009).
Any comment:	n/a
Used in equations:	11

Data Unit / Parameter:	D_{mn}
Data unit:	t d.m. m^{-3}
Description:	Mean wood density of commercially harvested species.
Source of data:	National species-specific densities. For species-specific wood densities not available, it is used the mean wood density value Regional average (0.60 t d.m.m-3- tropical America) from Reyes 1992 and Brown, S. 1997.
Justification of choice of data or description of measurement methods and procedures applied:	Species densities have been taken from different sources of national species-specific researches being the main ones: - Evaluation of mechanical and physical properties and probable uses of the wood of 20 species in Jenaro Herrera, Loreto – Perú (Aróstegui and Acevedo). - Summary of technical information of 32 tree species. Peruvian Confederation of Wood. 2008. CPM. CITE Madera. - Global wood density database. (Chavé et al., 2009).
Any comment:	n/a
Used in equations:	19

Data Unit / Parameter:	f_j (X,Y)
Data unit:	t d.m. tree^{-1}
Description:	Allometric equation for species j linking measured tree variable (s) to aboveground biomass of living trees, expressed as t d.m. tree^{-1}
Source of data:	The Chavé formula for trees and Winrock for palm trees.
Justification of choice of data or description of measurement methods and procedures applied:	Both formulas have been taken from: - Pearson, T., Walker, S. and Brown, S. 2005. Sourcebook for Land Use, Land-Use Change and Forestry Projects. Winrock International and the World Bank Biocarbon Fund. 57pp. - Chave, J, et. Al. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecología 145: 87-99.
Any comment:	The validation of the equations will be performed with either of both methods presented in VMD0015 module: - Limited Measurements - Destructive sampling
Used in equations:	35

Data Unit / Parameter:	Carbon stock in all pools in the forest stratum.
Data unit:	T CO_2 e / ha
Description:	Carbon stock by stratum in baseline before deforestation.
Source of data:	Determined from carbon inventories carried out in the Project Area.
Value applied:	Hill Forest: **505.10** Terrace Forest: **547.81** Bamboos: **604.48** Tree swamp: **543.42** DP: **18.63** DA: **31.75** DI: **-** DC: **31.63**
Justification of choice of data or description of measurement methods and procedures applied:	- The inventory was made inside the Project Area. - Parcels were built in the different stratum. - DBH and HT were taken from each individual found. - It was determined the aerial biomass based in the Chavé formula for trees and Winrock for palm trees. - Factor 0.24 was used to determine the root biomass according to module CP-AB.
Any comment:	The exact data for each stratum is found in module CP-AB.

Data Unit / Parameter:	Change in the land use.
Data unit:	%
Description:	Percentages of the project area that will change the land use after deforestation.
Source of data:	Determined according to the studies of land use carried out in the region of Madre de Dios. - CDC, UNALM, SZF, INRENA 2007.
Value applied:	Clean cultivation 4% Grasslands 54% Agriculture and livestock 40% Infrastructure 2%
Justification of choice of data or description of measurement methods and procedures applied:	The study mentioned has been carried out in areas that include the Project Area, or next to them. Furthermore, this data is updated and actors that are also in our areas have been considered.
Any comment:	n/a

Data Unit / Parameter:	Emissions by biomass burning.
Data unit:	T CO_2 e
Description:	Tons of CO_2 equivalents, coming from emissions of CH_4 and N_2O by forest and agriculture residues burning.
Source of data:	Factors of module E-BB were used (table 2.6 and 2.5) for tropical forest. Likewise, it was used the combustion factor of table 2.6 by agriculture biomass burning. The deforested forest percentage that is burnt after deforestation has been taken from official sources[60].
Value applied:	Used values: - 55 % of the deforested forest is burnt. - Combustion factor. Tropical Humid Forest = 0.5 Agriculture Residues (Corn) = 0.8 - Emission Factor Tropical Forest = 6.8 (CH_4) and 0.2 (N_2O) Agriculture Residues = 2.7 (CH_4) and 0.07 (N_2O).
Justification of choice of data or description of measurement methods and procedures applied:	The percentage of 55% is moderate. Some experts consulted consider that 100% of hectares that are torn down are burnt.
Any comment:	n/a

[60]Deforestation map of the Peruvian Amazon – 2000. MINAM (2009).

DATA AND PARAMETERS MONITORED FOR VERIFICATION

Data Unit / Parameter:	Project Forest Cover Monitoring Map.
Data unit:	ha
Description:	Map evidencing the stratification and location of the forest in the Project area at the beginning of each verification period. It has to be evidenced if within the Project area there are deforested areas.
Source of data:	Satellite images and field verification of deforested areas if any (GPS).
Description of measurement methods and procedures to be applied:	By using satellite images covering the Project Area it would be determined if there are any variations in the forest stratum identified in the project area. In case there are deforested areas it would be verified in field and confirmed by using GPS.
Frequency of monitoring/recording:	Every 5 years with images. Verification of deforested areas will be permanent in field by the surveillance carried out by the monitoring equipment.
Value applied:	Same as the coverage map at the beginning of the project. No deforestation is contemplated within the project area.
Monitoring equipment:	*Software GIS, available satellite images, GPS, professional monitoring equipment in field.*
QA/QC procedures to be applied:	*Permanent verification of the area of the project surfaces.*
Any comment:	*Stratification is the same as the one used at the beginning of the term.*
Used in equations:	3

Data Unit / Parameter:	Leakage Belt Forest Cover Monitoring Map.
Data unit:	ha
Description:	Map evidencing the stratification and location of the forest in the Leakage Belt at the beginning of each verification period. It has to be evidenced if there are deforested areas.
Source of data:	Satellite images and field verification of deforested areas if any (GPS).
Description of measurement methods and procedures to be applied:	By using satellite images covering the Leakage Belt it would be determined if there are any variations in the forest stratum identified in the Leakage Belt. In case there are deforested areas it would be verified in field and confirmed by using GPS.
Frequency of monitoring/recording:	Every 5 years with images.
Monitoring equipment:	*Software GIS, available satellite images, GPS, professional monitoring equipment in field.*
QA/QC procedures to be applied:	*Permanent verification of the area of the project surfaces. Also, through the accuracy assessment.*
Any comment:	*Stratification is the same as the one used at the beginning of the term.*
Used in equations:	3, 8.

Data Unit / Parameter:	Degradation PRA Results
Data unit:	Surveys and/or interviews.
Description:	The PRA will be executed from interviews and/or surveys to local actors with the purpose of identifying the existence of degradation potential within the area of the project due to: • Extraction of firewood. • Illegal logging If ≥ 10% of the surveys indicate that there is a risk of degradation then the procedures to verify and estimate the degradation should be executed. An additional result of the PRA would be the penetration distance that should be applied to calculate the area with degradation potential (buffer area).
Source of data:	PRA
Description of measurement methods and procedures to be applied:	It would be developed according to the provisions set forth in the M-MON.
Frequency of monitoring/recording:	Every 2 years.
Value applied:	Degradation is considered 0 at the beginning of the project.
Monitoring equipment:	*PRA sociologist in charge with focusing criteria.*
QA/QC procedures to be applied:	There would be templates to carry out surveys and/or interviews.
Any comment:	n/a
Used in equations:	Section 5.2.2.1

Data Unit / Parameter:	Results of Limited Degradation Survey
Data unit:	Stumps.
Description:	Verification of degradation processes in the project area.
Source of data:	Field measurements.
Description of measurement methods and procedures to be applied:	If PRA indicates there is degradation potential, then the procedures to verify the degradation occurrence should take place. Sampling transects are distributed across the buffer area with the purpose of identifying if there are new tree-stumps. Transects should cover a surface of no less than 1% of the buffer area.
Frequency of monitoring/recording:	Each time the PRA indicates there is degradation potential to the project area.
Value applied:	Degradation is considered 0 at the beginning of the project.
Monitoring equipment:	GPS, compass, tape line.
QA/QC procedures to be applied:	Trained staff for field measurement.
Any comment:	n/a
Used in equations:	3

Data Unit / Parameter:	$A_{burn, i, t}$
Data unit:	Ha
Used in equations:	Section 2.2.2
Description:	Area burnt in stratum *i* at time t. The monitoring will be carried out, if there is any record of any burnt area within the project area, on each stratum and year of the project.
Source of data:	Field measurements.
Description of measurement methods and procedures to be applied:	If there is a record of a burning, it will be indicated the type of forest and burnt area to determine the GHG emissions (CH_4 and N_2O). If possible, the new use of the land will also be indicated.
Frequency of monitoring/recording:	Every time there is an occurrence.
Monitoring equipment:	GPS
QA/QC procedures to be applied:	n/a
Any comment:	Ex-ante burnt areas (baseline) have been determined by interviewing experts and by what it is known in the region of Madre de Dios. The obtained value will be used in the EBB module.

Data Unit / Parameter:	$A_{DefPA, i, t}$
Data unit:	Ha.
Description:	Deforested area in the Project area by type of forest.
Source of data:	Satellite images.
Description of measurement methods and procedures to be applied:	The images used will be compatible with the ones already used in the estimations ex-ante in order to be compared.
Frequency of monitoring/recording:	Every 5 years with satellite images. Constant monitoring in field.
Value applied:	According to what has been observed on each monitoring, it has been considered to be zero for project scenario.
Monitoring equipment:	*Software GIS, available satellite images, verification in field with GPS and professional equipment.*
QA/QC procedures to be applied:	n/a
Any comment:	If there is a change in the land use, the new use and GHG emission (CH_4 or N_2O) will be registered by arboreal and agricultural biomass burning, and incorporation of nitrogen. This will be registered and recorded.
Used in equations:	3

Data Unit / Parameter:	$A_{DefLB, i, t}$
Data unit:	Ha.
Description:	Deforested area in the Leakage belt by type of forest.
Source of data:	Satellite images.
Description of measurement methods and procedures to be applied:	The images used will be compatible with the ones already used in the estimations ex-ante in order to be compared.
Frequency of monitoring/recording:	Every 5 years with satellite images. Constant monitoring in field.
Value applied:	According to what has been observed on each monitoring.
Monitoring equipment:	*Software GIS, available satellite images, verification in field with GPS and professional equipment.*
QA/QC procedures to be applied:	n/a
Any comment:	*Deforestation shall be confirmed at least every five years in the Leakage belt and verified with what is determined in baseline in order to assess if there is any leakage or not caused by the project.*
Used in equations:	4

Data Unit / Parameter:	$A_{DegW, i}$
Data unit:	Ha
Description:	Area under potential degradation process. Buffer area resulting from PRA, if it shows that there is potential degradation in the Project Area.
Source of data:	GIS delineation and ground trothing.
Description of measurement methods and procedures to be applied:	The buffer area shall be composed from all access points. The length is obtained from the PRA results, and the width shall be equal to the length.
Frequency of monitoring/recording:	Must be repeated each time the PRA indicates a potential for degradation
Monitoring equipment:	GIS software
QA/QC procedures to be applied:	n/a
Any comment:	There is no evidence of depredated areas or parcels ex-ante within the project area.
Used in equations:	8

Data Unit / Parameter:	$A_{DECKS, i, t}$
Data unit:	ha
Description:	Area of logging decks in stratum *i at time* t.
Source of data:	Field measurements.
Justification of choice of data or description of measurement methods and procedures applied:	A systematic sampling to ensure all decks within area logged are identified and a conservative estimate of area produced.
Frequency measurement:	At least every 5 years.
Any comment:	Ex-ante estimations of emissions are based on average size and number of decks produced due to logging in the region.
Used in equations:	18

Data Unit / Parameter:	$A_{DistPA, q, I, t}$
Data unit:	ha
Description:	Area impacted by natural disturbance in the project stratum *i* converted to natural disturbance stratum *q* at time *t*; ha.
Source of data:	Satellite images and GPS coordinates.
Justification of choice of data or description of measurement methods and procedures applied:	Minimum monitoring unit equal to a minimum of 11 Landsat pixels or one hectare.
Frequency measurement:	At least every 5 years.
Any comment:	Ex ante estimations of emissions from natural disturbances will be based on historic incidence of such event in the Project region.
Used in equations:	20

Data Unit / Parameter:	$A_{ROAD, I, t}$
Data unit:	ha
Used in equations:	17
Description:	Area of roads in stratum *i* at time *t*.
Source of data:	Field measurements.
Justification of choice of data or description of measurement methods and procedures applied:	The area of roads is based on the length of roads times the average width of roads. Both length and width of roads will be estimated through systematic samplings, with sufficient number of measurements, and a precision equal or less than 15% of the mean at 95% confidence interval.
Frequency measurement:	At least every 5 years.
Any comment:	Ex-ante estimations are based on average length of roads produced per unit area due to logging in the region.
Used in equations:	17

Data Unit / Parameter:	$A_{RRL, forest, t}$
Data unit:	Ha
Used in equations:	n/a
Description:	Remaining area of forest in RRL.
Source of data:	Satellite images.
Description of measurement methods and procedures to be applied:	The images used will be compatible with the ones already used in the estimations ex-ante in order to be compared.
Frequency of monitoring/recording:	Must be monitored at least every 5 years or if verification occurs on a frequency of less than every 5 years examination must occur prior to any verification event.
QA/QC procedures to be applied:	n/a
Any comment:	There is no evidence of degraded areas or plots ex-ante within the project area.

Data Unit / Parameter:	AP_i
Data unit:	Ha.
Used in equations:	8
Description:	Total degraded area verified by sampling plots.
Source of data:	Ground measurement.
Description of measurement methods and procedures to be applied:	The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone.
Frequency of monitoring/recording:	Every time the Limited Degradation Survey indicates degradation (existence of stumps), or at least every 5 years.
Value applied:	It has been determined as “0” the ex-ante depredation within the project area.
Monitoring equipment:	GPS, field equipment: tape line, compass. And field staff.
QA/QC procedures to be applied:	Trained staff for field measurement.
Any comment:	There is no evidence of depredated areas or parcels ex-ante within the project area.
Used in equations:	8

Data Unit / Parameter:	$C_{DegW, i, t}$
Data unit:	T CO_2 -e
Description:	Biomass carbon of removed trees through degradation process within the project area.
Source of data:	Field measurement.
Description of measurement methods and procedures to be applied:	With the tree-stumps identified during the evaluation of sampling parcels of the buffer area, the following procedures should be considered: - Take the diameter of the tree-stumps that will be assumed as DBH. In case they are too big (for example, due to buttress roots), then the specimen should be identified and place other individuals of the same species standing next to it. Then, measure their DBH and tree-stumps diameter. With this data, DBH should be estimated as from the tree-stumps diameter of the individuals deforested. - With DBH data, the carbon stock of individuals deforested is calculated using an allometric equation, yet to be defined. - It will be assumed that all stock will be send to the atmosphere.
Frequency of monitoring/recording:	Every time there is a degradation event or at least every 5 years.
Value applied:	*It has been determined as "0" for the ex-ante degradation within the project area.*
Monitoring equipment:	*GPS, field equipment: tape line, compass. And field staff.*
QA/QC procedures to be applied:	n/a
Calculation method:	Through an allometric equation, using the DBH as one of its variables.
Any comment:	n/a
Used in equations:	8

Data Unit / Parameter:	$C_{AB\_tree\_dest,i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in aboveground tree biomass assumed to be killed per unit area resulting from the creation of the skid trail per stratum.
Source of data:	CP-AB and documentation stating maximum size tree able to be killed during skid trail creation.
Justification of choice of data or description of measurement methods and procedures applied:	It is assumed that $C_{AB\_tree\_dest,i}$ = $C_{AB\_tree,i}$ in the baseline.
Any comment:	n/a
Frequency of monitoring/recording:	Every 5 years.
Used in equations:	15

Data Unit / Parameter:	$C_{BB\_tree\_dest,i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in belowground tree biomass assumed to be killed per unit area resulting from the creation of the d trail per stratum.
Source of data:	$C_{AB\_tree\_dest,i}$
Justification of choice of data or description of measurement methods and procedures applied:	Estimation of belowground biomass will be performed following the procedures set in module CP-AB.
Any comment:	The root-to-shoot ratio 0.24 is used (same used in baseline carbon stock calculations).
Frequency of monitoring/recording:	Every 5 years.
Used in equations:	15

Data Unit / Parameter:	F_{LU}
Data unit:	Dimensionless
Description:	Land use factor before or after conversion.
Source of data:	Stock Change Factors are provided in Tables 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4.
Justification of choice of data or description of measurement methods and procedures applied:	F_{LU} values for Tropical temperature and Moist/wet regime: A. For different activities to cropland Long term cultivated – 0.48 Paddy rice – 1.10 Perennial/ Tree crop – 1.00 Set aside (<20 yrs.) – 0.82 B. For Land-use conversions to cropland Native forest (non-degraded) – 1 Shifting cultivation (Shortened fallow) – 0.64 Shifting cultivation (Mature fallow) – 0.8 C. For grassland management Default value – 1
Any comment:	n/a
Used in equations:	16

Data Unit / Parameter:	F_{MG}
Data unit:	Dimensionless
Description:	Management factor before or after conversion.
Source of data:	Stock Change Factors are provided in Table 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4.
Justification of choice of data or description of measurement methods and procedures applied:	F_{MG} values for Tropical temperature and Moist/wet regime: A. For different activities to cropland Full tillage – 1.00 Reduced – 1.15 No-till – 1.22 B. For Land-use conversions to cropland Managed forest – 1.00 C. For grassland management Nominally manage (non-degraded) – 1 Moderately degraded grassland – 0.97 Severely degraded – 0.7 Improved grassland – 1.17
Any comment:	n/a
Used in equations:	16

Data Unit / Parameter:	F_I
Data unit:	Dimensionless
Description:	Input factor before or after conversion.
Source of data:	Stock Change Factors are provided in Table 5.5, 5.10, and 6.2 of the IPCC 2006GL Volume 4.
Justification of choice of data or description of measurement methods and procedures applied:	F_i values for Tropical temperature and Moist/wet regime: A. For different activities to cropland Low – 0.92 Medium – 1.00 High without manure – 1.11 High with manure – 1.44 B. For Land-use conversions to cropland Managed forest – 1.00 C. For grassland management Medium (only to improved grassland) – 1 High (only to improved grassland) – 1.11
Any comment:	n/a
Used in equations:	16

Data Unit / Parameter:	L_{sk}
Data unit:	m
Description:	Length of skid trail sk.
Source of data:	Field measurements
Justification of choice of data or description of measurement methods and procedures applied:	A systematic sampling with random start within a sampled known logged area within the project boundary will produce an estimate of the length of skid trails created. The total length of skid trails in the project area equals the mean length of skid trails per unit area times the total area logged.
Any comment:	n/a
Frequency of monitoring/recording:	Every 5 years.
Used in equations:	13

Data Unit / Parameter:	$V_{EXT, z, i, t}$
Data unit:	m^3
Description:	Volume extracted from logging stratum *z* in stratum *i* at time *t*.
Source of data:	Records and reports (based on field measurements) documenting amount of wood extracted within project boundary.
Justification of choice of data or description of measurement methods and procedures applied:	Documentation includes : • Delineation of the location. • Total area logged in the Project area. • Methods used to measure the amount of wood extracted. Both the greater and smaller diameter of the log will be measured, as well as its total length. The Smalian formula will then be used to estimate the volume of wood extracted: V=[π/4 (A+a)/2]*L Where: V = Volume A = Area of the section with greater diameter a = Area of the section with smaller diameter L = Total length • Methods to estimate and catalog the volume of wood felled and extracted.
Any comment:	n/a
Frequency of monitoring/recording:	Every 5 years.
Used in equations:	10

Data Unit / Parameter:	$V_{EXT, j, z, i, t}$
Data unit:	m^3
Description:	Volume of timber extracted of species j for logging stratum z, in stratum i at time t.
Source of data:	Records of wood extracted.
Justification of choice of data or description of measurement methods and procedures applied:	Frequency: Monitored at least 5 years. Procedures will be the same applied to the estimation of the volume extracted from logging stratum *z* in stratum *i* at time *t* ($V_{EXT, z, i, t}$).
Any comment:	n/a
Used in equations:	11

Data Unit / Parameter:	W_{SKID}
Data unit:	m
Description:	Mean width of skid trails.
Source of data:	Field measurements.
Justification of choice of data or description of measurement methods and procedures applied:	Systematic sampling with a random start to produce an average width of skid trails. The width equals the distance between trees undamaged by the skid trail creation. The sampling will achieve a precision of equal or less than 15% of the mean at a confidence interval of 95%.
Any comment:	n/a
Used in equations:	14

PARAMETERS ORIGINATING IN OTHER MODULES

Data Unit / Parameter:	$A_{BSL, PA, unplanned, t}$
Data unit:	Ha
Description:	Annual area of unplanned baseline deforestation in Project Area at year *t*.
Module parameter originates in:	BL-UP
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	13 and Section 2.2.2
Data Unit / Parameter:	$C_{BSL, i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in all pools in the baseline per stratum.
Module parameter originates in:	BL-UP
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	5, 17, 18, 19, 24, 27

Data Unit / Parameter:	$C_{AB, tree, i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in aboveground biomass in trees in the project case per stratum.
Module parameter originates in:	CP-AB
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	6, 24, 29

Data Unit / Parameter:	$C_{BB, tree, i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in belowground biomass in trees in the project case per stratum.
Module parameter originates in:	CP-AB
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	6, 24, 29

Data Unit / Parameter:	$C_{SOC, i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Carbon stock in soil organic carbon in the project case in stratum i.
Module parameter originates in:	CP-S
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	16, 24, 29

Data Unit / Parameter:	$C_{SOC, PD\text{-}BSL, i}$
Data unit:	T CO_2-e ha^{-1}
Description:	Mean post-deforestation stock in soil organic carbon in the post deforestation in stratum i.
Module parameter originates in:	CP-S
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	6

Data Unit / Parameter:	$E_{BiomassBurn, i, t}$
Data unit:	T CO_2-e
Description:	Non- CO_2 emissions due to biomass burning in stratum i in year t.
Module parameter originates in:	E-BB
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	30

Data Unit / Parameter:	*R*
Data unit:	T root d.m. t^{-1} shoot d.m.
Description:	Root to shoot ratio appropriate to species or forest type / biome.
Module parameter originates in:	CP-AB
Any comment:	Corresponding information is included in the VCS PD.
Used in equations:	36

4.2 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 98,927.38[61] 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 verification of the deforestation 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 strategies 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.

[61] * 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.

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.

2. Monitoring of the parameters described in the item 4.2. of this Monitoring Plan (Data and Parameters Monitored):

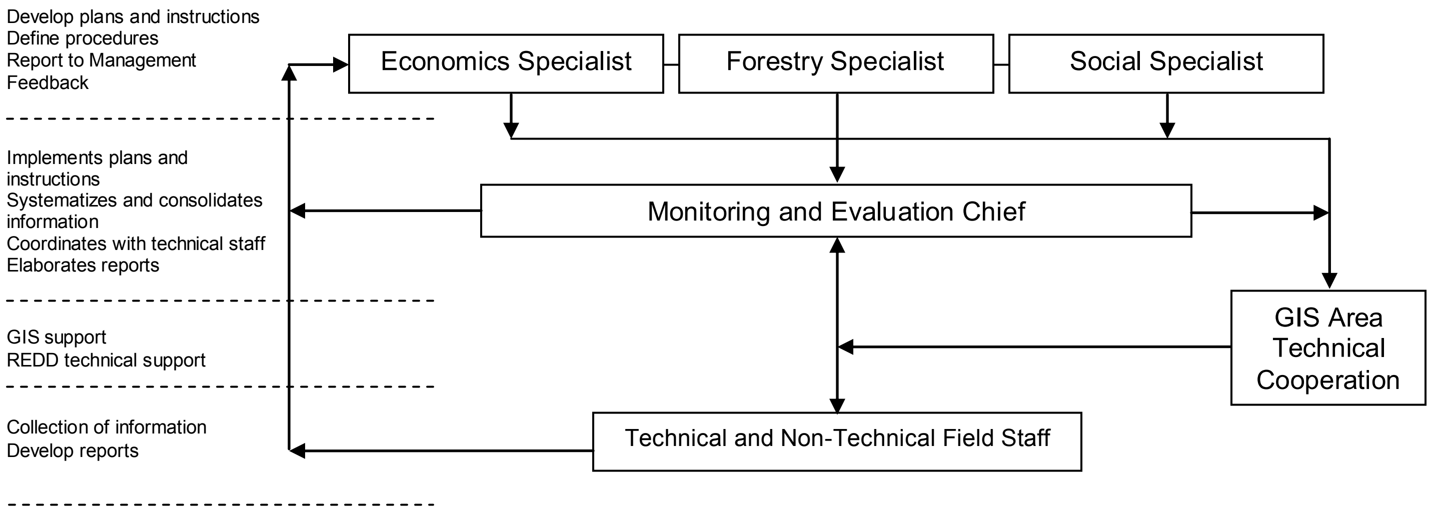
a) Forest cover map – Strata within the project area
b) Forest cover map – Strata within the project leakage belt
c) Results of the PRA
d) Degradation results
e) Burned area
f) Deforested area within the project area
g) Deforested area within the project leakage belt
h) Potentially degraded area within 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

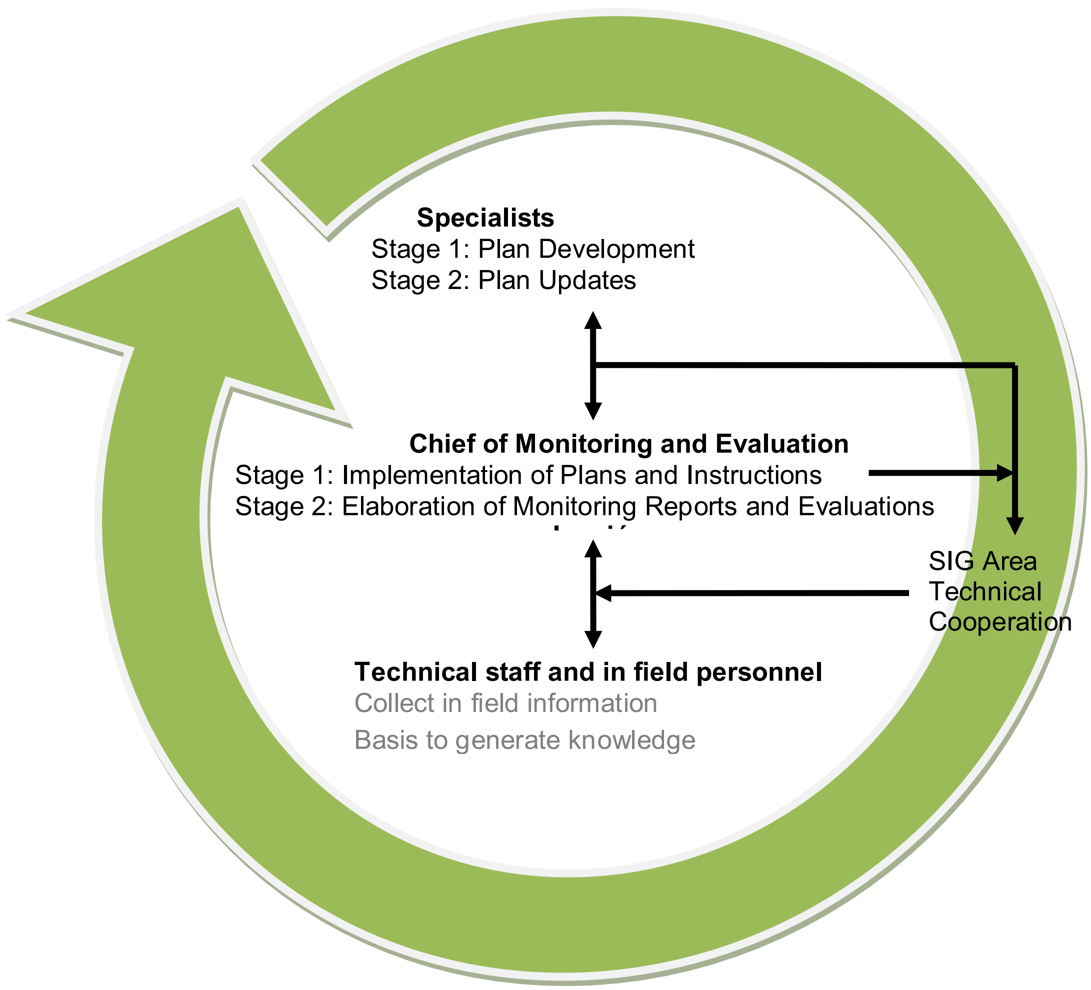
The project is based in the premise of the “Adaptative Management”, in this sense every intervention on the forest are sustained in previous information collected in field as a knowledge basis. Based on this knowledge is that Management Plans, Operative Plans and the rest of the necessary instructions for the implementation of the project, the interventions on the forest and the treatment of the social component are defined.

The permanent implementation of the Monitoring Plan allows the identification of the tendencies of the different parameters, including those that are useful to evaluate the compliance with the objectives of the Project. This knowledge that is generated allows the adaptation of the system (plans and the rest of the instructions).

The information collected in field by the technical staff is systematized by the Monitoring and Evaluation Chief, who at the end of the year (November-December) presents the Monitoring Report for the period to the specialists who together with other members of the project, will elaborate the Operative Plan of the following period, identifying additionally which manuals of instructions or protocols should be updated or adapted to the occurring changes. Since the following up in the implementation of the project is permanent, if important changes occur, the system can be updated during the same period, without having to wait for the report at the end of said period.

Following, the information flow in the framework of the adaptative management of the project is presented:

ADAPTATIVE MANAGEMENT



PLANIFICATION AND MONITORING

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 renewed.

- 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: $\Delta Cp,Deg,i,t = 0$.

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 $\Delta Cp,Deg,i,t = 0$ 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 ≥ 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, phisiography, 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 phisiography 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 37. Conservation areas within the Madre de Dios Amazon REDD project area

Conservation Area	Area (has)	Perimeter (m)	Vertex	Vertexes East (x)	Vertexes North (y)	References
MRA AC1	1792,09	38377,03	V-1	394127	8789789	Over Acre River
			V-2	392919	8786483	Over Yaveryja River
			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	
			V-13	418410	8775924	
			V-14	418410	8778074	Over Yaveryja River

Conservation Area	Area (has)	Perimeter (m)	Vertex	Vertexes East (x)	North (y)	References
MRY AC1	695,29	13374,39	V-1	382557	8784837	Over Acre River
			V-2	382557	8782804	
			V-3	379013	8782810	Over Acre River
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	
			V-10	343000	8769249	
			V-11	343000	8779329	Over Acre River

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 trees[62] (individuals with good shape, healthy, a straight tree trunk and a well developed canopy).

[62] Seedling trees: at the beginning of the forest operations a proportion or 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 & Maderyja timber species in the long term.

- ✓ 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, Moracea, Lecythidaceae, Bombacaceae and Leguimonosae 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.

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. pacales, 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, none of the 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 Consultant[63], 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.

The following analysis considers the positive and the negative impacts that these operations produce on the environment.

[63] Said study, carried out by Roberto Kometter, WWF Consultant, will be available to the auditors.

- **Positive environmental impacts of Maderacre and Maderyja operations**

a) Related with the additional sequestration of CO_2 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 CO_2 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 CO_2 from the atmosphere is also achieved.

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 CO_2 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 migratory agriculture within the concession area is reduced, as well as the risk of illegal logging if that should occur in the future.

Said risks are also minimized considering the availability of roads to allow permanent patrolling inside the forests in order to prevent and control any agricultural activities and illegal logging 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 38. Environmental impacts and mitigation measures

Operation	Possible risk	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 ditchs. 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	Possible risk	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 signalized 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	Chainsaws must be always in good conditions for their use and any possible oil leakage will be avoided. Oil spillovers must be prevented when chainsaws are recharged. Training courses for all the personnel with respect to the forestry management plan and the rulebook of forestry operations.

Operation	Possible risk	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 chainsaw 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	Possible risk	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 smalles 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	Possible risk	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.
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	Possible risk	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 2011 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)[64].

Methodology employed

The methodology applied to the collection of Stakeholder comments was based on the application of the following methods:

[64] 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 Espinllo	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 since then 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 Committe 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:

<u>Technical Administration of Forest and Wildlife of Tahuamanu (ATFFS)</u>

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.

<u>Bosques Amazónicos (BAM)</u>

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 table. AIDER and BAM, 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 thorugh email and also to the two main foresters’ egroups 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[65]:

* 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 trough the RRCC Advisory Committee. Also, training for staff and local suppliers is conducted.

* 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

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

of Tahuamanu – GOREMAD participates. The Project have participed 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 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 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, 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 39. 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[66]	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.

[66] 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 Nº 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 9º and 10º 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 Nº 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 Nº 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 Nº 013-2004-AG	2004	Advances from Act of Supreme Decree Nº 010-2004-AG referred to the granting of concession contracts for reforestation in forestry recovery areas.
Ministerial Resolution Nº 0253-2004-AG	2004	Approves Complementary Dispositions for the Implementation and Granting of the Concessions for Forestry and / or reforestation.
Supreme Decree Nº 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 actitvity	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 risks:

- 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 possible invasion of the area by illegal loggers in the future 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.

- Increase in herbaceous and/or weed species invasions due to the deforestation for the installation of crops or pastures, as well as the possibility of forest clearing.

- 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 invaders that would enter 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 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, compression 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.

- 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.

- 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:

∗ 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 MHD; 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.

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.

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, compression and pollution thanks to an adequate management of the machinery, fuels and the application of reduced impact logging practices.

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.

The 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, were habilitated. Additionally, no fuel spills into the water is allowed to be left.

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 40. 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	-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 invaders	-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 41: 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	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 offisite biodiversity impacts 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	
Offiste 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	
Offiste 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.

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 fo 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 requires less land area per certain income (dollar earned/ used hectares) 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. Negative offsite biodiversity impacts are minimal, the scope and intensity of these impacts is shown. Most impacts are outside the project area and there are likely to be mitigated. Project positive impacts on biodiversity are also listed. 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 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.

- 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 o 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 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, 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 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 a certain level of income (dollars earned/used hectares) 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 a certain level of income (dollar earned/used hectares) 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 don't have forest coverage 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 don't have forest coverage 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 period[67]:

- 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.

[67] 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 42. 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 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 43. 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	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 information[68]:

- **The areas of direct 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 trascend 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 44. List of criteria applied for the establishment of the areas of direct and indirect impact of the project

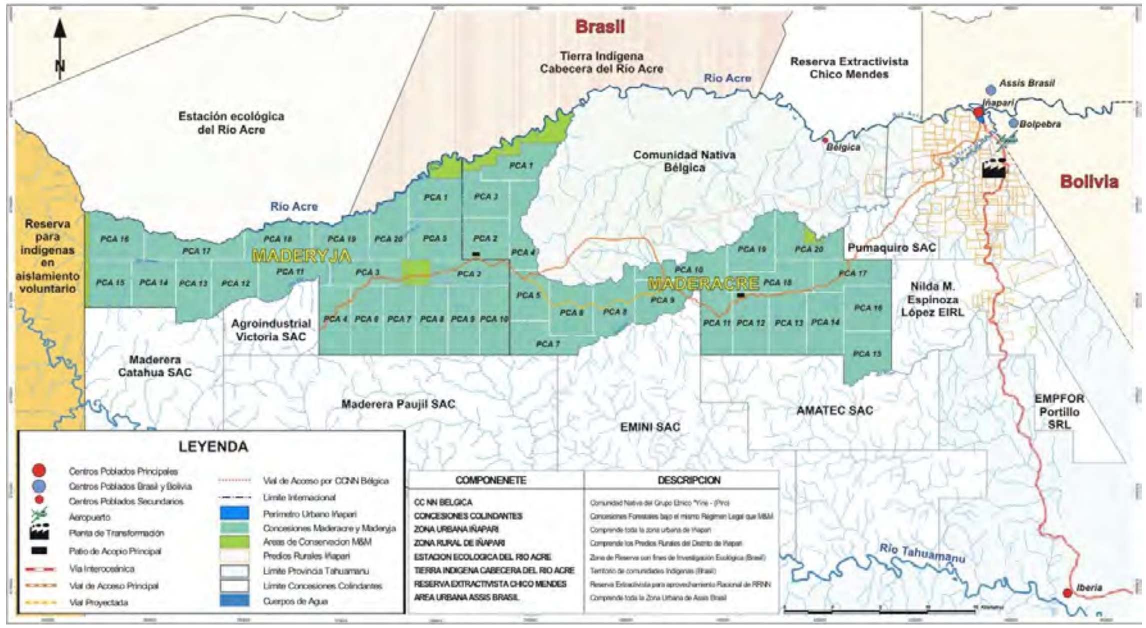
CRITERIA	AREA OF DIRECT IMPACT	AREA OF INDIRECT IMPACT
Territorial Proximity	Villages, communities, localities and/or human settlements, urban and/or rural, that are located within a radius of 5 km around of the concession, in all directions: Iñapari (capital city and surrounding villages: Villa Primavera, 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.

[68] 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 descentralized 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 descentralized 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 settlments, whose natural resources can be altered or affected by the operations of the company.	

Fig. 59. 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.

- Address 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 km^2 and a population density of 0.09 inhabitants per square kilometer[69]. Madre de Dios is the less populated 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 1,288 inhabitants and two thirds of this population (74.5%) resides in the urban 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 45 below.

Chart 45.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, a settlement and an urbanization. At the same time, the rural area has four rural communities and one native community. In chart 46 the list of the localities that form the district according to their geographical area.

[69] Source: Perú: Directorio Nacional de Municipalidades 2000. Instituto Nacional de Estadística e Informática, INEI.

Chart 46. 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 47).

Chart 47. 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 that 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 camp for the workers of CONIRSA consortium was established in the area, (the company in charge of the construction of the IOH) was established in the area.

Chart 48. 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%)[70].

[70] Source: INEI. XI Censo de Población y VI de Vivienda, 2007

Chart 49. 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 censes, between the national censes 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 50).

Chart 50. 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 51 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 51. 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 52. 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 53, 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 53. 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 54). 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 illiteracy[71].

[71] 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 54. 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 55 and 56, 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 55. 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 56. 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 57 and 58). 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 57. 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 58. 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 59. 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 60. 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 61. 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 Evaluación 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 62. 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 Medicación 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 "friajes"-, 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 63. 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 chronical 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 64. Anemia in pregnant women and chronical malnutrition

	Population 0 - 14 years	% of anemia in pregnant women	% of chronical 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 65. 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 66. 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 67. 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/terrazzos	-	-	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. Access 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 68. 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 69. 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 70. 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 71. 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 72. 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 73. 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 74. 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**

[1] 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 75. 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 76. 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: [1]INEI. XI Censo de Población y VI de Vivienda, 2007
[2]INEI. 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 78, the percentage of men and women of the employed EAP is similar, with a slight advantage among men (0.5 percentage points above).

Chart 77. 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 78. 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 79. 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 80. Employed EAP 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

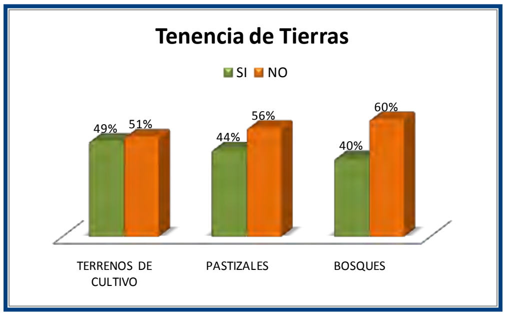
The economy is based mainly on primary extractive activities, where agriculture, hunting and forestry represent the 32% of the PBI of the department, while mining contributes with 15% of the regional internal gross product. Other major activities in the regional conomic dynamic are tertiary activities, 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.

Fig. 60. Land tenure (yes/no)



CROPS PASTURES FORESTS

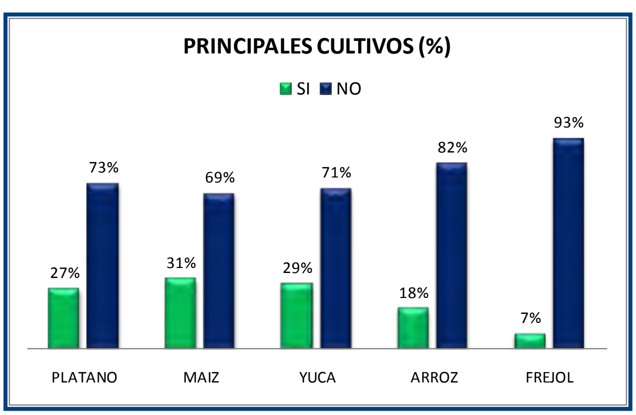
I. Agriculture

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.

Fig. 61. Main crops % (yes/no)



BANANA CORN YUCA RICE BEANS

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.

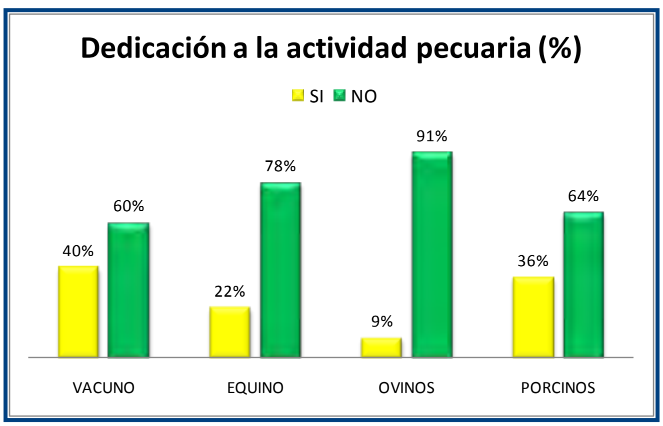
With respect to the destiny of the production and despite the low volumes, a clear linkage with regional and local markets can be observed. Except for the rice, most of the products are sold in percentages that mostly exceed 50%, mainly yuca and corn.

m. Cattle raising

The livestock business develops the raising of cattle, pigs, sheeps 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 entrepeneurial 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).

Fig 62. Dedication to cattle raising activity (%) yes/no

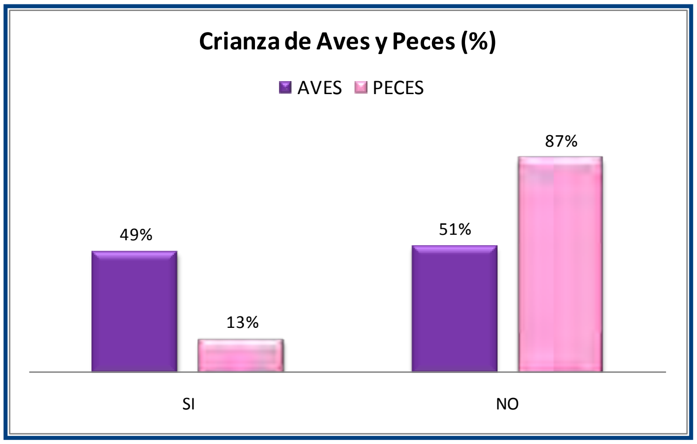


BOVINE EQUINE OVINE PORK

n. Small livestock

The bird valuation is still difuse, while it is not a massed practice nor performed necessarily orientated to sale or market. Fish bredding, 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.

Fig 63. 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.

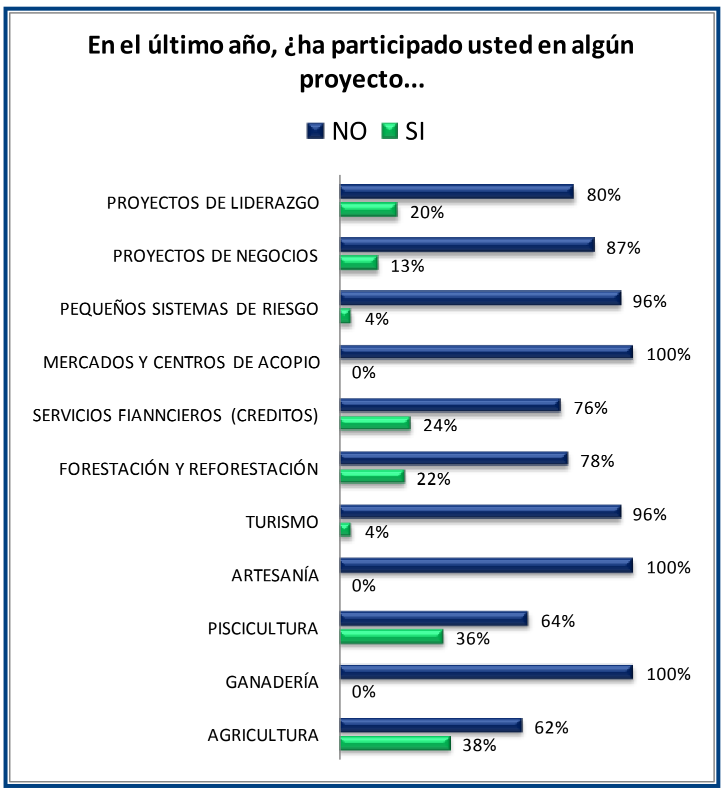
This optimistic attitude towards the future constitute a huge relational value that the company could capitalize on, striving to know to which investment strategies they would direct their resources in order to effectively accompany the efforts made by the inhabitants to develop themselves, and not to 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 fishery 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.

Fig 64. Participation in projects (NO/YES)

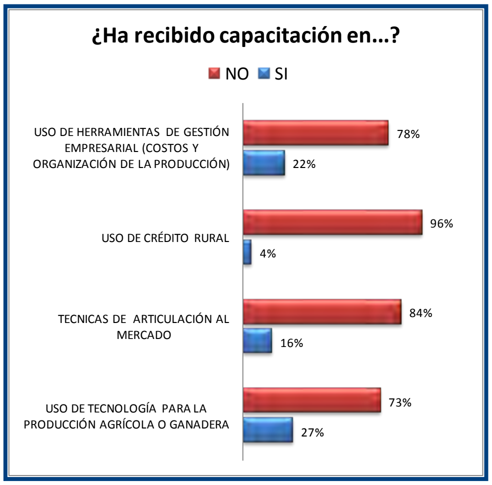


Leadership projects / Business projects / Small irrigation systems / markets and stock centers / financial services (credits) / Forestry and reforestation / Tourism / Crafts / Fisheries / Cattle raising / Agricuture

q. Access to technical assistance

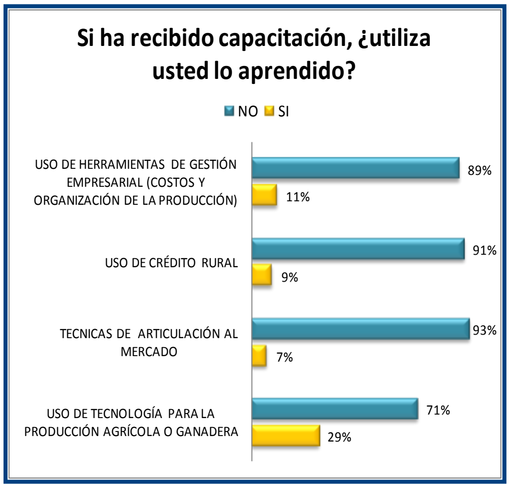
As it can be seen in the following graphs, training and technical assistance is also scarce for Iñapari inhabitants.

Fig 65. Training activities (No/Yes)



Use of enterpeneurial management tools (costs and organization of production)
Use of rural credit
Technics for market articulation
Use of technology for agriculture or cattle production

Fig 66. Application of the leasons learned (No/Yes)



Use of enterpeneurial management tools (costs and organization of production)
Use of rural credit
Technics for market articulation
Use of technology for agriculture or cattle production

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 interprete 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 giving 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.

Fig 67. Participation and organization (No/Yes)

Have you participated in any assembly organized by the municipality to define...
Do you know if your district counts with a local concentrated development plan?
Does the Municipality support the concentration process in your District?
Do you have any role?
Do you participate in any organization?
Does your District count with concentration space?
Have you participated in any communal assembly to discuss about maintenance or...
Do women have voice and vote in the community assemblies?
If you have participated as a representative of any committee, do you consider that you had the...
Have you been elected as a representative of any executive nucleus, committee or commission?
Have you participated in any assembly for the election of the representatives before any...

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 81. 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, 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 settlings.

- **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. 68: Belgium Native Community area

Fig. 69: Belgium Native Community

Fig. 70: Belgium Native Community

Fig. 71: 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. The 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 nuts, 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 trial 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 rout 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 trial 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 techology - 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. 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, 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 82: 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 Maderyja[72], 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, institutes for investigation, national and foreign Universities, to carry out investigation activities that contribute to the management and use of the natural resources.

[72] 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 83: 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
Objetive 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.
Objetive 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 affirmatively[73].

The REDD Project will include the genus approach in the activities to develop in the following manner:

Chart 84: 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.

[73] 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 Plan[74]. 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.

[74] 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 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 Community Relationship Plan of the concessions. Said protocol consists on:

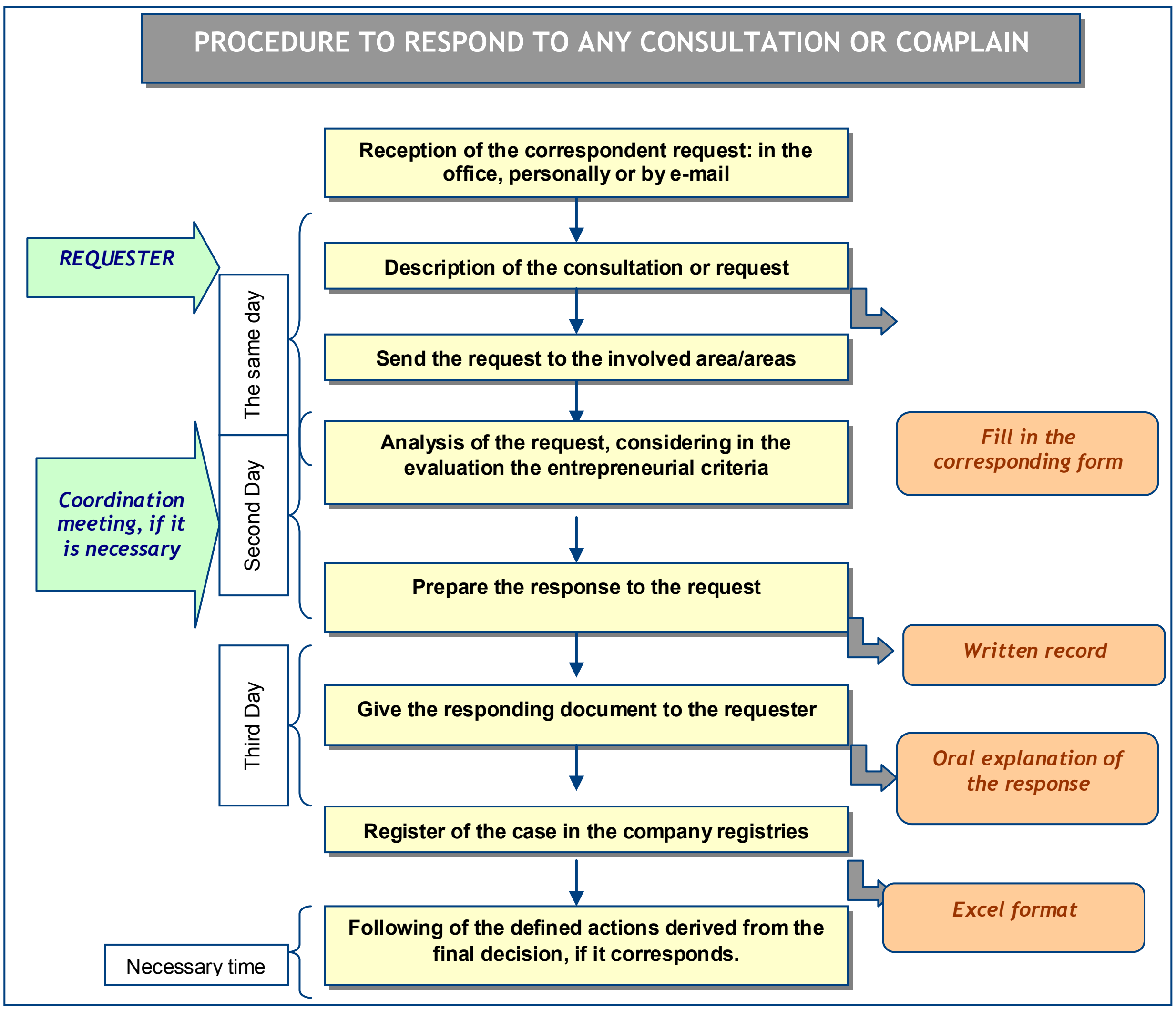


Fig. 72: Procedure to respond to any consultation or complain

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:

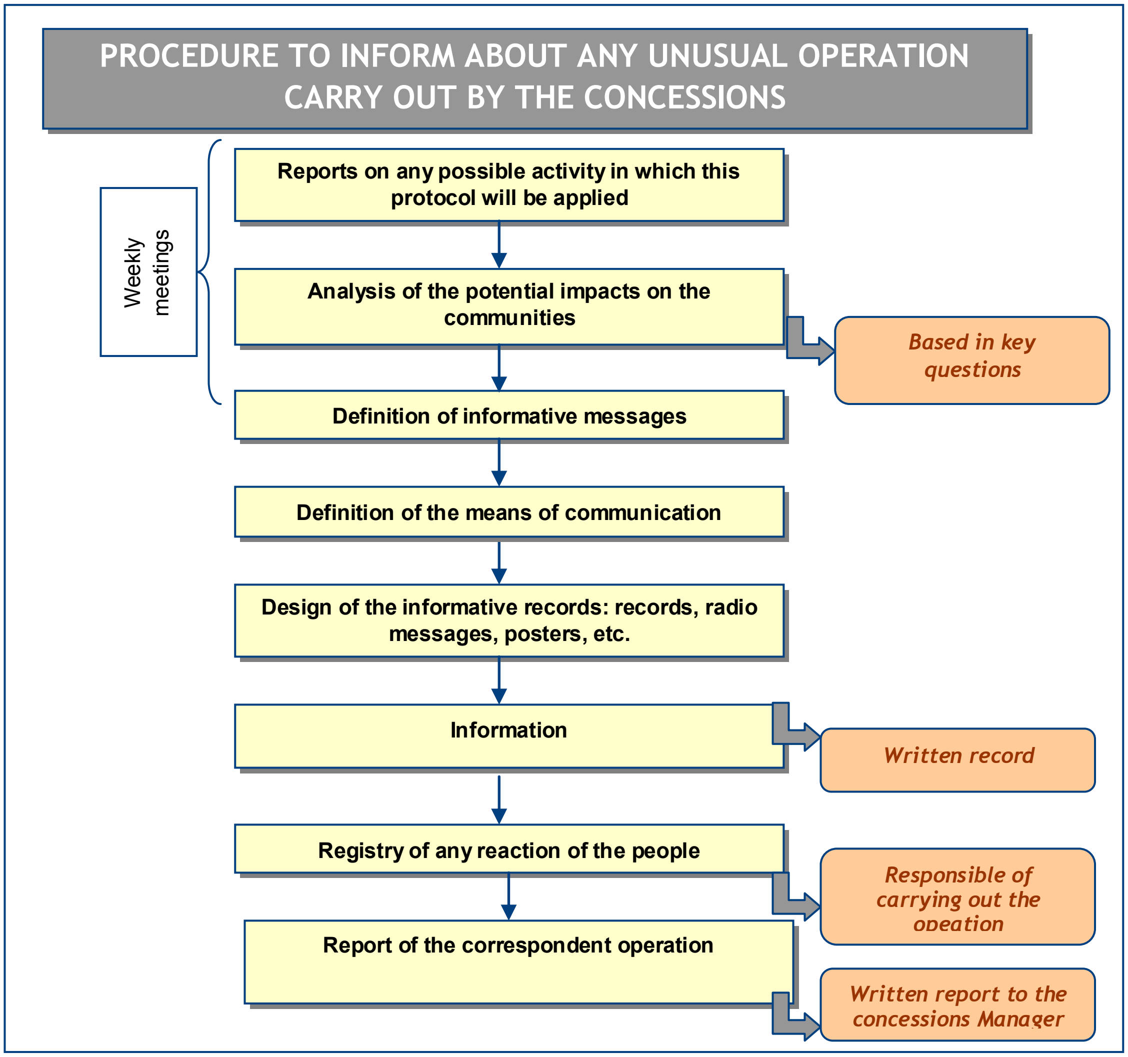


Fig. 73: Procedure to inform about any unusual operation

- **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 below. Maderacre procedure to handle any conflictive situation:

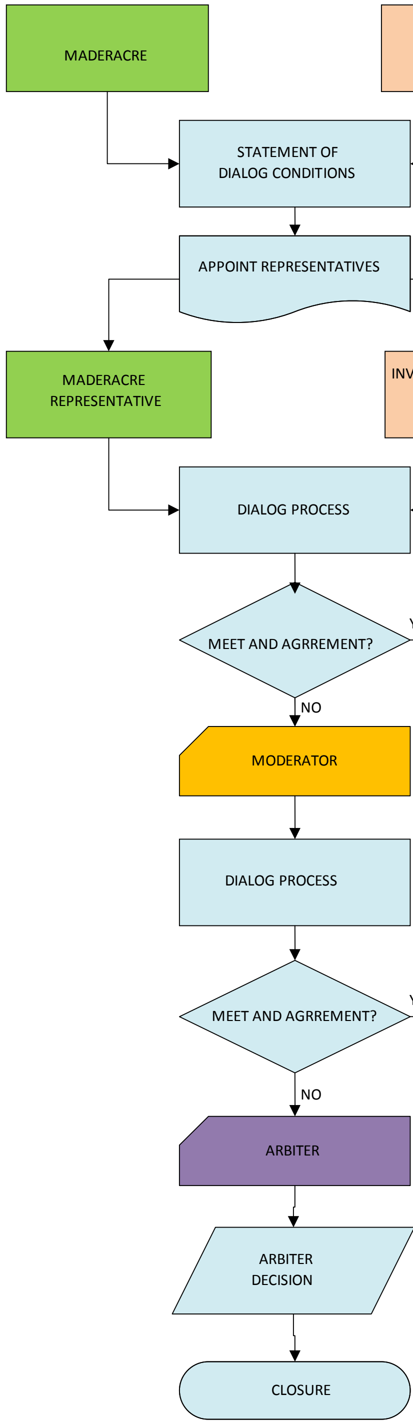


Fig. 74: Maderacre procedure to handle conflictive situations

Maderyja procedure to handle any conflictive situation:

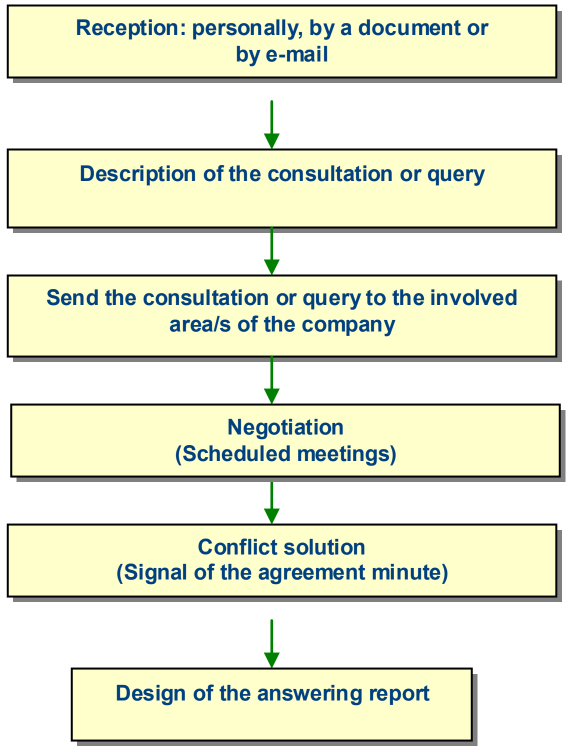


Fig. 75: Maderyja procedure to handle conflictive situations

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 an get to closure. For Maderyja, the conflict communication is received in person, by document or by email, described an 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 Community Relationship Plans of Maderacre and Maderyja timber concessions and are presented in the following chart:

Chart 85: 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 Community Relationship 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 fare 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 it 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 it Technical Secretary.

In this sense and in order to implement its Community Relationship Plan, Maderyja 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 Maderyja. The main objective is to be involved as an enterprise in the social and economic dynamic of the environment, designing the actions that Maderyja 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 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 Communithy 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; informe the Native Community of any results that could affect their area respect to site verification (on site and through satellite imagery); include the Native Communinty 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 Maderyja 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, 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 Maderyja 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 Rulebook[75] are given to all of them when they join the company.

[75] Both documents, the Forestry Operations Manual and the Forest Management Practices Rulebook, will be available to the auditors.

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 Manual[76] 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).

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.

[76] This First Aid Manual will be available to the auditors.

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. 76 to 78: 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 Maderyja 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 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 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 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 86: 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, 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 87: 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/					
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 OUTSIDE OF THE PROVINCE	**AVERAGE MONTHLY PURCHASE AMOUNT s/**					
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:

- 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.

- 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.

- 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 employment 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 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 have 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.

- 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 88: 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 89: 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 nearby areas (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, 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; signalizing 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 signalizing 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 following[77]:

- 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.

- 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

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

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.

- 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.

ANNEX 5

MADRE DE DIOS AMAZON REDD PROJECT

Estimation of carbon stock changes in baseline and greenhouse gas emissions from unplanned deforestation

I. APPLICABILITY

- Baseline agents of deforestation are rural families (either residents in the reference region or immigrants) without any right to deforest the area (as it has been granted for wood logging). Based on historical pattern, these agents will clear the land for ranching (54%), mixed agriculture/grazing (40%), crop production (3%) and settlements (2%); in all cases, at a subsistence or small-scale[78].
- According to independent studies, reforestation is not a common practice neither there is a governmental program to promote reforestation.
- At pre-project, no unsustainable fuel wood collection is occurring within the project boundaries, as was confirmed by a Participatory Rural Appraisal.

The Output Parameters from this module are:

Table 1: Parameters

Parameters	SI Unit	Description
$\Delta C_{BSL,unplanned}$	t CO_2-e	Net greenhouse gas emissions in the baseline from unplanned deforestation
$\Delta C_{BSL,LK,unplanned}$	t CO_2-e	Net CO_2 emissions in the baseline from unplanned deforestation in the Leakage Belt
$A_{BSL,PA,unplanned,t}$	ha yr^{-1}	Projected area of unplanned baseline deforestation in the Project Area in year *t*
$A_{BSL,LK,unplanned,t}$	ha yr^{-1}	Projected area of unplanned baseline deforestation in the Leakage Belt Area in year *t*

II. PROCEDURE

The baseline was developed following the procedures of this module, and is intended to represent the expected deforestation in the Tahuamanu Province, where the Project Area is located. It takes into consideration the existing particularities.

As required, the baseline has to be revisited every ten years in order to have valid projections. The approach selected is based on historic deforestation trends, called *Simple Historic*. The steps undertaken are presented:

PART 1: DEFINITION OF BOUNDARIES

1.1 Definition of the spatial boundaries of the analytical domain

1.1.1 Reference Region

[78] Evidence in REDD-MF module.

1.1.1.1 Reference Region for Projecting Rate of Deforestation (RRD)

Defined as the spatial delineation of the analytic domain from which information of deforestation rates and spatial patterns of deforestation are obtained, projected into the future and monitored. For that purpose, it shall be representative of the general patterns of unplanned deforestation.

In order to obtain said areas, as two of them are required for unplanned deforestation, an analysis of existing literature has been made:

The reported impacts of the deforestation in forest areas around similar road infrastructure projects have helped us to establish the boundaries of the reference region, given that the Madre de Dios department is crossed by the Interoceanic highway which accounts for much of the historic deforestation in a direct and indirect way.

Wood extraction effects through rivers and forest roads have been observed up to 50 km way from principal roads (Dourojeanni, 2006b – Page 34 and Delgado, 2008 – Page 19) in the Peruvian Amazon. Moreover, Brindao *et al*. stated that in the well-developed road network of more than 241,000 km in the Brazilian Amazon, all the deforestation is concentrated in a 50 km buffer from roads.

Laurence *et al*. (2002) wrote that highways impart more impact than roads and distance from highways was the single most important predictor of deforestation … because "*they promote efficient, year-round access to forest*". In Peru, it is predicted that the environmental and social impacts that will occur after the improvement and paving (recently finished) of the IOH will not be the same as those observed in the past, and that intensity, amplitude and speed of those actions will be dramatically increased (Dourojeanni, 2006b), as seen.

In addition, until the paving of IOH, Madre de Dios was an isolated region, more integrated with Brazil than with the rest of the country. Before the construction of this highway, it could take 2-3 days to go to Cusco, while now it takes around 14 hours.

As a result of this review, it became clear that the boundary of the Reference Region for MDD had to be determined by the presence of roads in it, so that all areas at risk of deforestation would be covered. For this purpose, the official map of Madre de Dios and its road network, updated by the VIAS Project developed by ACCA (2007) and road network of access to the concessions proportioned by Maderacre and Maderyja were used.

According to the module, the RRD area should be minimum equal to MREF (minimum size of reference region for projecting rate of deforestation), where:

RAF (Reference Area Factor) = $7500 \times PA^{-0.7}$
RAF = $7500 \times (97{,}817.4)^{-0.7}$
RAF = 2.409

MREF = RAF x PA
MREF = 2.409 x 97,817.4
MREF = 235,605.9 ha

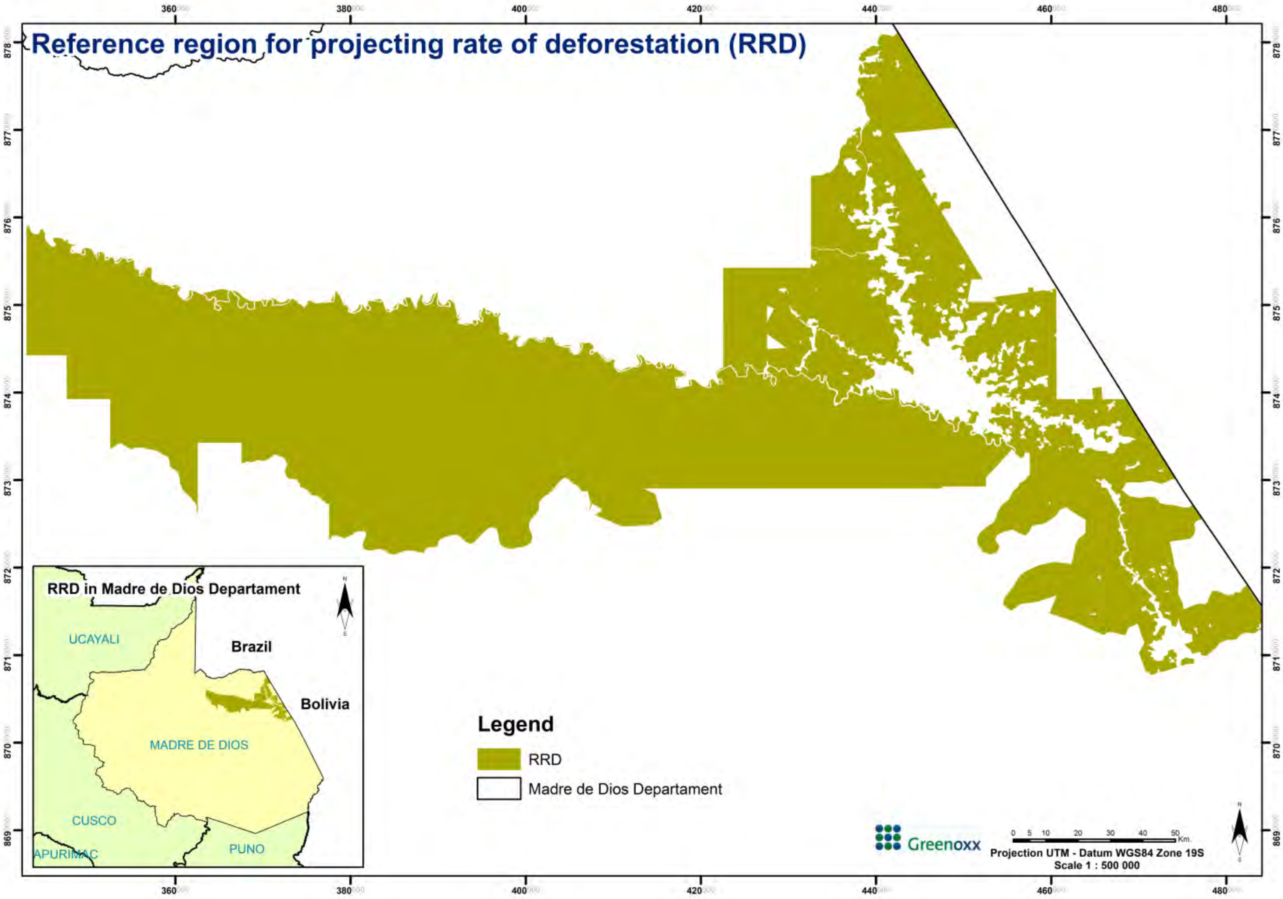
This selected area of the above mentioned buffer includes forest and non-forest lands, and given that a RRD requirement is that it must cover only forest at the beginning of the historical period, the non-forest lands up to year 2000 were removed.

After these deductions, forest obtained made a total of 300,333.8 ha forming the RRD for Madre de Dios REDD Project.

Therefore, the RRD established complies with the criteria:

- It is 100% forest at the start of the historical reference period (2000).
- It is bigger than MREF
- It is formed by parcels and is representative of the general patterns of deforestation that affect the Project Area

Map 1: Reference Region for projecting rate of deforestation



a) Main Agents of Deforestation

The two major agents of deforestation are agriculturalists and ranchers. As seen before, both are expected to cause deforestation in the PA, given that the profits for implementing pastures for cattle and crops will increase due to the paving of the IOH.

The selected RRD covers the areas where these agents are present. It is not possible to calculate the proportion of agriculturalist versus ranchers considering that rural families usually develop both activities[79]. According to National Census[80], most of occupations related with rural activities do not distinguish between cattle ranchers and agriculturalists. The proportion of residents (lived in area >5years) versus migrants (lived in area <5 years) in RRD and PA were taken from the National Census of 2007 as can be seen in following table.

Table 2: Composition of local population by region and project districts

Region / Origin	Residents	Migrants
RRD[81]	2,443	1,159
	68%	32%
PA[82]	359	311
	54%	46%

b) Landscape factors

[79] 40% of the deforested areas from 2000 to 2005 in the Stretch 3 of IOH have a combination of agriculture and pastures. CDC-SZF-INRENA, 2007.
[80] From Data Consult System of Settlements and Disperse Population. *National Census 2007: XI of Population and VI of Housing.* INEI. Can be found in http://iinei.inei.gob.pe/iinei/RedatamCpv2007.asp?id=ResultadosCensales?ori=C
[81] Includes the province of Tambopata and the district of Las Piedras
[82] Includes the district of Iñapari

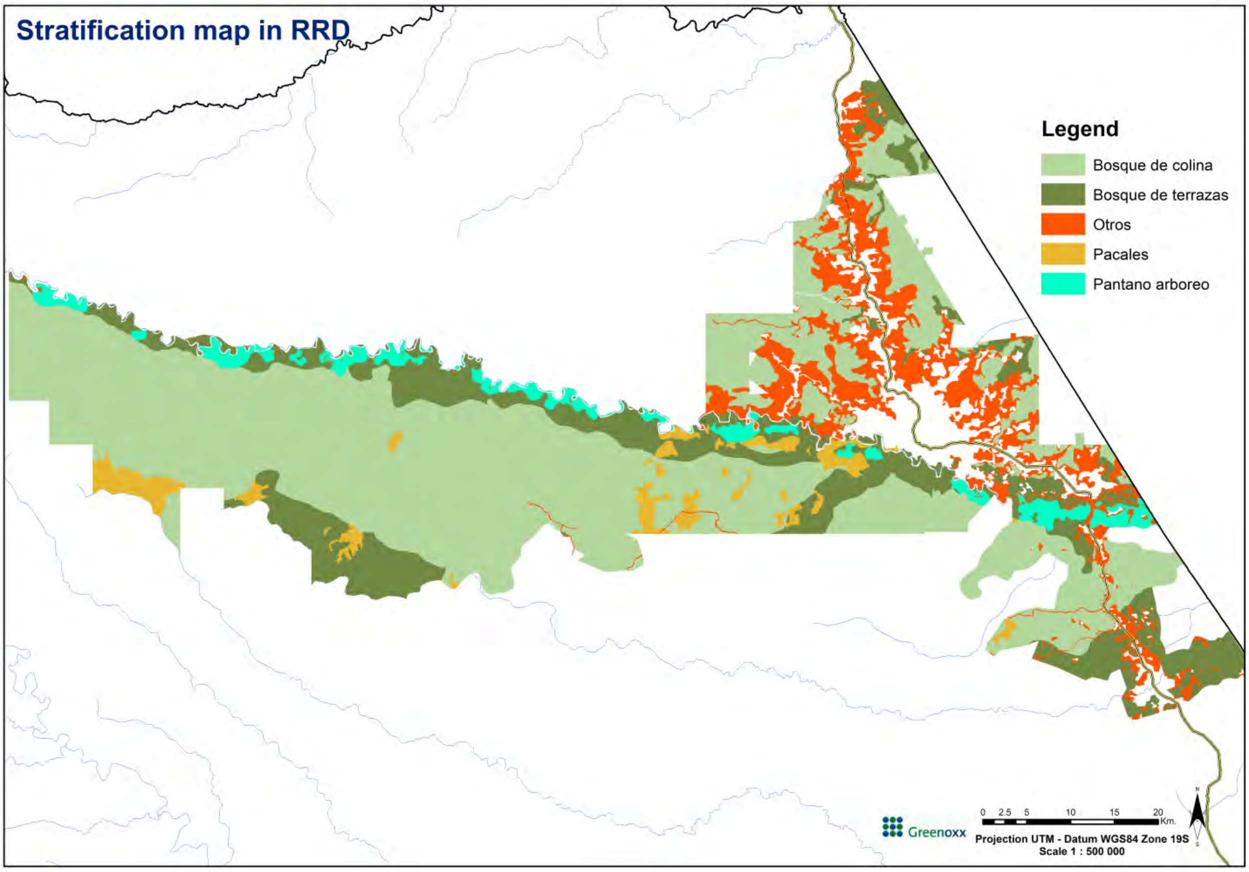
The Forest Strata used in all the project boundaries is based on the Forest Map of the Economic Ecologic Zoning made by IIAP in year 2009 for the entire MDD region.

Table 3: Forest Strata

Forest Strata	RRD		Project Area	
	Area	%	Area	%
Hill forests	185,592.17	61.79%	79,290.19	81.06%
Terrace forests	57,166.32	19.03%	9,845.75	10.07%
Others	35,171.43	11.71%	130.59	0.13%
Bamboos	10,975.14	3.65%	8,550.87	8.74%
Tree Swamps	11,435.89	3.81%		0.00%
Total general	300,340.95	100.00%	97,817.40	100.00%

The following map shows the forest types throughout the RRD:

Map 2: RRD Forest Stratification



The land suitable for conversion is based on the Soil Use Capacity Map established in the ZEE, which was also used for the next comparison:

Table 4: Land suitable for conversion in RRD and PA

Forest Strata	RRD		Project Area	
	Area	%	Area	%
Agricultural crops	33,683.21	11.21%	2,814.45	2.88%
Permanent crops	77,027.48	25.65%	14,111.26	14.43%
Others	593.34	0.20%	130.59	0.13%
Forestry production	188,509.92	62.77%	80,761.10	82.56%
Protection lands	526.99	0.18%		0.00%
Total general	300,340.95	100.00%	97,817.41	100.00%

The slope and elevation were compared using DEM, and as can be seen in following chart, both factors are similar in PA and RRD.

Table 5: Elevation and Slope Classes

Elevation	PA	RRD
0 to 500	100%	100%
500 + m		

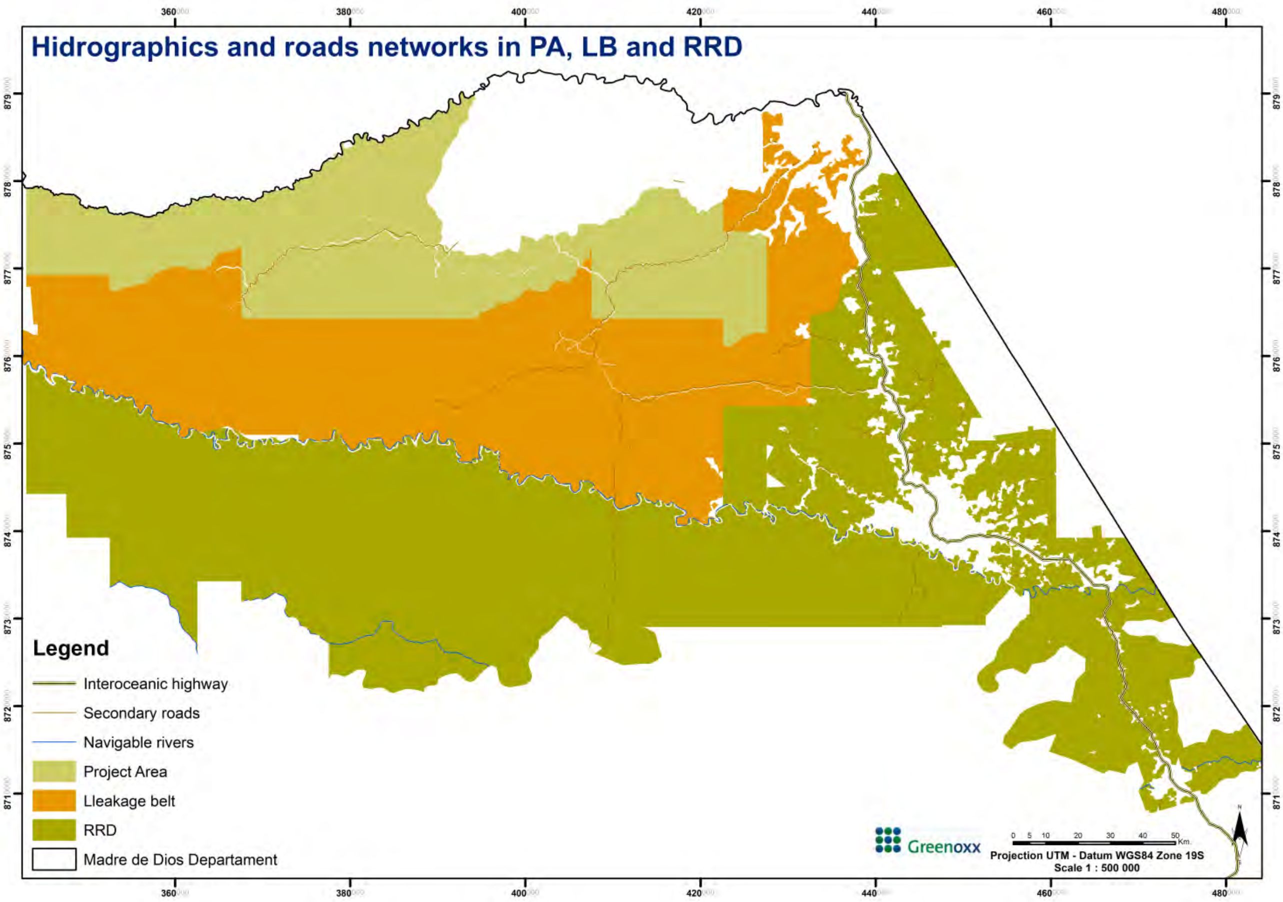
Slope (%)	PA	RRD
<15%	0.22%	0.50%
>15%	99.78%	99.50%

The main classes of land suitable for conversion in PA are also the most representative in RRD. This is also the case in Forest Strata results. Furthermore, the slope and elevation in both boundaries are very similar. Thereby the new RRD accomplishes the proportionality criteria requested for the methodology.

c) Transportation Networks and Human Infrastructure

In the case of transportation factors, navigable rivers and roads are not part of forest concessions and, as they have not been classified as forest, they cannot be part of PA neither of RRD (at the start of the historical reference period). Nevertheless, rivers and roads cross these boundaries, and no significant differences in density are seen in Map 3.

Map 3: Hydrographic and Road Networks in Project Area, Leakage Belt and RRD



d) Social factors

As RRD and PA are under the same political jurisdiction, social and regulatory factors can be considered similar. As shown in Table 2, there are no significant differences within areas in terms of population composition (ethnic, birth place, etc.) neither density. Fortunately, Madre de Dios is not under the effect of political violence.

Table 6: Settlement Density in project Area and RRD

Settlements	PA	RRD
n° / km^2	n.a.	0.003

Considering that the surrounding areas of the Project Area are forest concessions, no settlements are allowed to be established. In that sense, this variable can't be measured and compared with the density of settlements in the RRD.

e) Policies and regulations

As explained before, RRD is located also within Madre de Dios Region (where REDD project is being developed completely), where, as part of national decentralization policy, many competences are being transferred to Regional Governments. This includes the administration of natural forests, including the review and approval of management plans. Territorial Ordering is also under responsibility of local authorities. For this reason, RRD does not cross to another sub-national administrative unit and Project Area is completely under administrative control of Regional Government of Madre de Dios, the same as RRD. Even more, both are under the same province unit, Tahuamanu.

f) Exclusion of planned deforestation

As showed in REDD-MF document, in MDD there are no large-scale productive activities. Agriculture and cattle ranching, which are the main causes of deforestation in the region are carried out in a self-consumption, small–scale way. The few existing regional plans for the Agricultural sector haven't identified spaces where these activities could expand themselves in the future.

Regional plans to guide the expansion of infrastructure and urban areas are also non-existent. In the Economic and Ecologic Zoning of Madre de Dios (ZEE) made by IIAP[83], there is an identification of the suitability for urban-industrial use inside the region (ZEE, 2009 – Map 20); and by comparing the RRD, it is evident that the latter comprises areas with low and very-low suitability for urban-industrial use. The few ones in the medium, high and very-high category, located along the IOH, were already removed when the deduction of non-forest areas was done.

Based on an independent study developed by the consortium CSF-GRADE[84], a profitability function has been calculated for corn production (as the best reference for agricultural activity) and meat production (as the reference of cattle ranching). Both functions have been integrated to calculate the maximum opportunity cost of alternative land use where, in each pixel, the higher value (between both) has been used in order to obtain the opportunity cost map.

The Profitability functions consider different geographic, technological and economic factors, for instance: quality of soil, rainfall, labor, investment, density (animals per hectare) among others.

Even though there are other economic activities in MDD, like Brazil nut harvesting and ecotourism, they are compatible with the maintenance of the forest cover and don't represent alternative activities for wood logging, hence they were not considered in the following analysis neither they cause degradation on forest. Degradation is mainly pushed by illegal loggers or rural families but, based on Participatory Rural Appraisal it does not affect significantly project area. Actually, Madre de Dios is mostly damaged by deforestation threat.

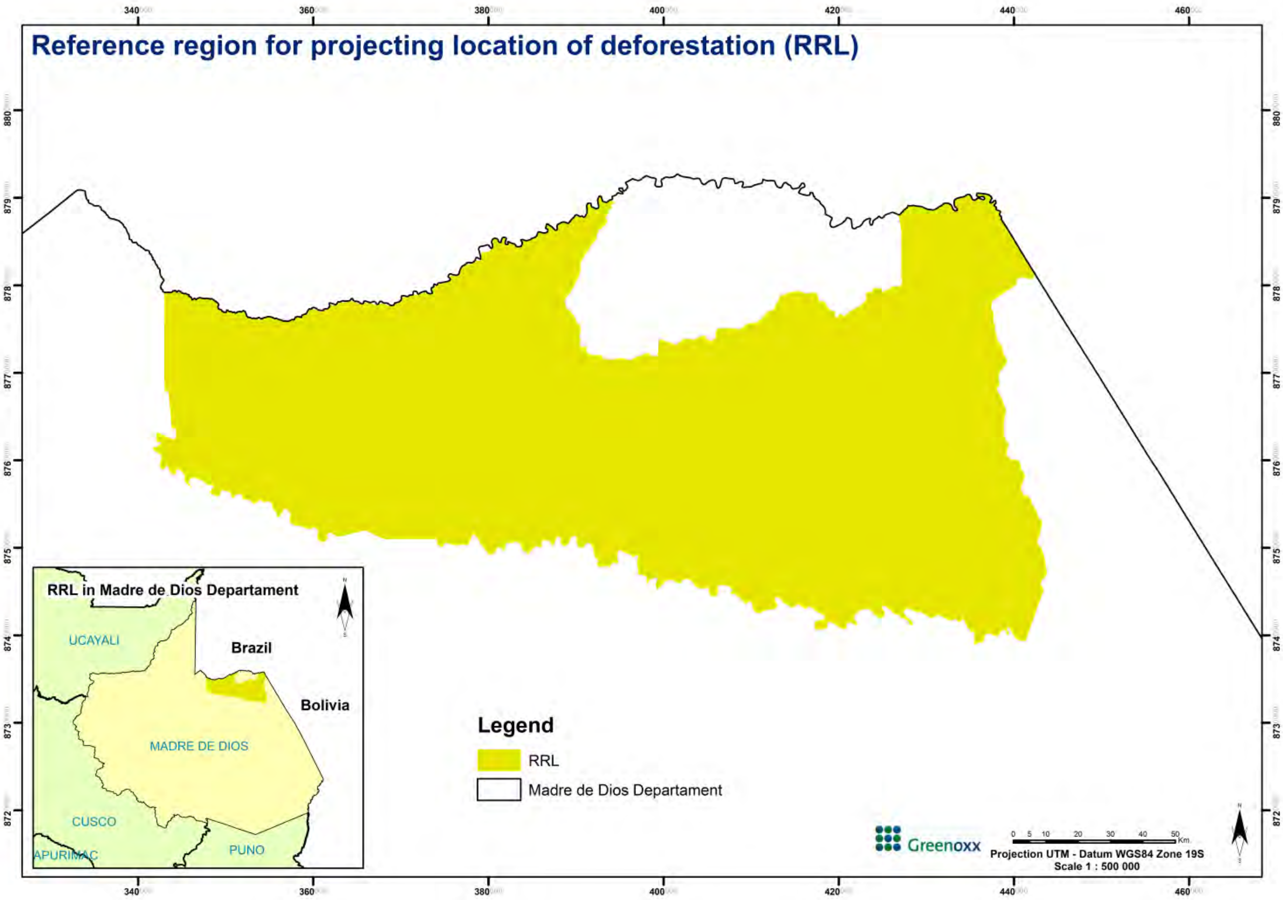
As roads are permanently growing, and the profitability depends directly on transportation costs (which is highly correlated with the status and length of existing roads), the opportunity cost is the approach used to predict future deforestation. The average historical rate is the rate used to estimate the baseline rate.

1.1.1.2 Reference Region for Projecting Location of Deforestation (RRL)

The Reference Region for Projecting location of deforestation is a continuous parcel of 307,692.66 hectares, where no deductions of non-forest land were made. It overlaps a sector of the RRD, and its area of forest equals the area of the RRD (-11%). The boundaries of RRL and the overlapping sector can be seen in Map 5.

[83] IIAP, Research Institute for Peruvian Amazon, is a public institution in charge of develop scientific researches specialized in Amazon Region (www.iiap.org.pe).
[84] Fleck *et al*. Estrategias de conservación a lo largo de la carretera Interoceánica en Madre de Dios, Perú. Un análisis económico-espacial. (2010)

Map 5: Reference Region for locating deforestation



RRL consists of 10.67% of non-forest areas, and 89.33% of forest. It includes the PA and LB as required, and the proportion of forests suitable for conversion to the deforestation agents' land-use practices of the RRL and the PA are the same (± 30%) at the start of the baseline period, as demonstrated by:

1) Soil Suitable for Conversion

As for RRD, we have used the Soil Use Capacity Map from ZEE to determine the most suitable land for conversion given that it shows the soil natural capacity for the development of other land uses.

Table 7: Soil suitable for conversion in RRL and Project Area

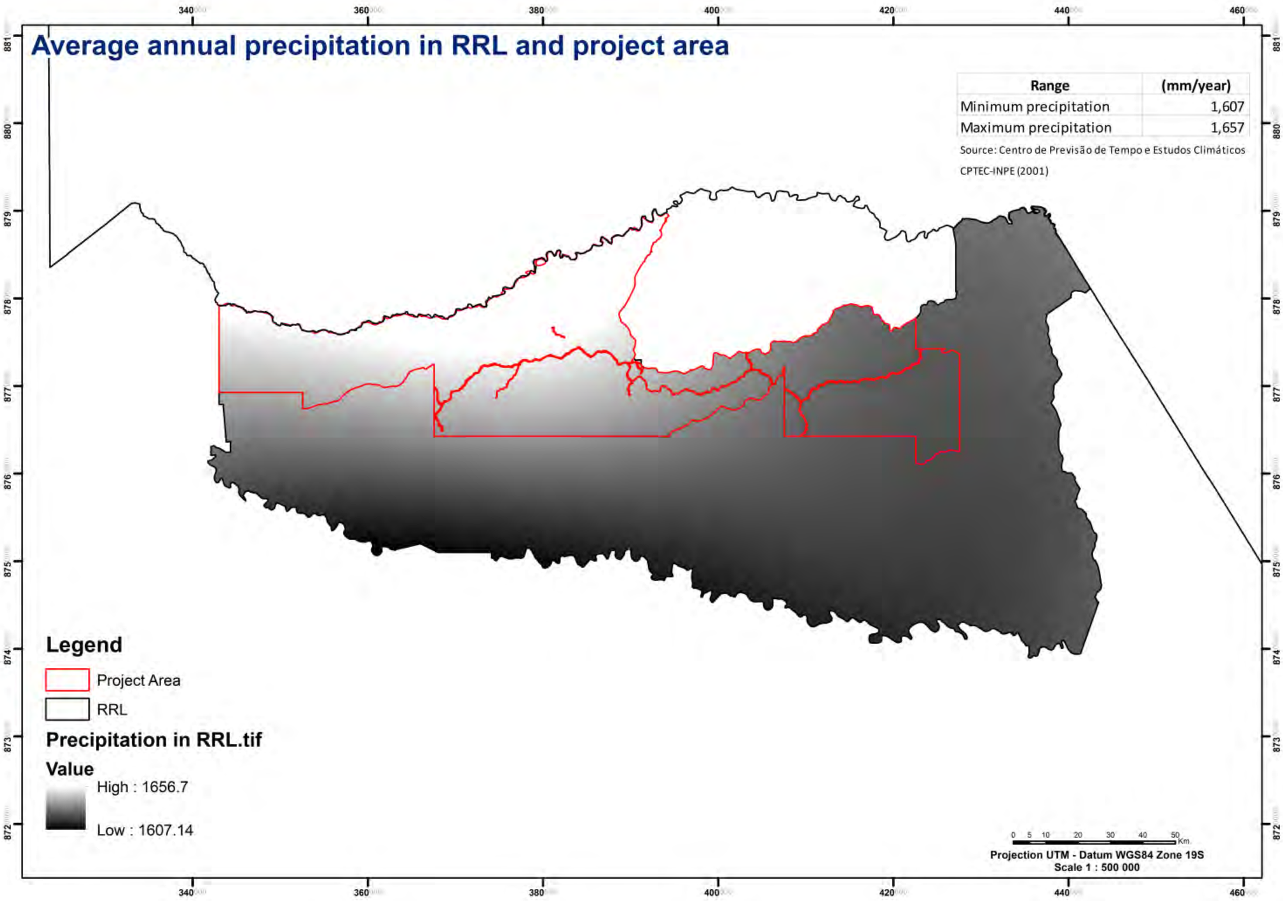
Soil Use Capacity	RRL	PA
	%	%
Agricultural crops	3.69%	2.88%
Permanent crops	12.87%	14.43%
Others	0.28%	0.13%
Forestry production	83.15%	82.56%
Protection lands	0.00%	0.00%
Total	100	100

2) Rainfall Regime

The average annual precipitation in the Madre de Dios Plain[85] normally varies between 1500 and 3000 mm per year. The dry season goes from May to November (8 months), while the wet season goes from December to March (4 months) and holds approximately more than 50% of the annual rainfall. According to IIRSA SUR-WALSH (2007), a characteristic of these southeastern lowlands, where the Stretch III of the Interoceanic Highway[86] is located, is that there is the possibility of having very dry months during the dry season; in contrast to the central and northern lowlands of the country.

The above mentioned is consistent with the graphic information (spatialized rainfall values) obtained for the period 1991-2001 by CPTEC-INPE (2001), which shows that RRL and Project Area have the same precipitation regime. This information is presented in the following map:

Map 6. The Average Annual Precipitation Map for the period 1996-2001



3) Elevation

RRL and Project Area are located in the Madre de Dios Plain[87], which is below 500 AMSL. In fact, the whole area of both boundaries is in the first 500 m elevation class, as seen in the next table.

[85] Economic Ecologic Zoning of Madre de Dios. IIAP-GOREMAD, 2009.
[86] *Estudio de Impacto Socio Ambiental (EISA) del Corredor Vial Interoceánico Sur, Perú-Brasil*. Chapter 4.2.2. IRRSA SUR – WALSH. March, 2007.
Can be found in http://www.mtc.gob.pe/portal/transportes/asuntos/proyectos/pvis/tramo_3/eisa/4.2.2_Clima.pdf.
[87] In the ZEE final document, the Madre de Dios Region is divided in 3 major biophysical units defined by many factors as geology, physiography, vegetation and others. The broader unit is the Madre de Dios Plain.

Table 8: Elevation Classes in RRL and Project Area

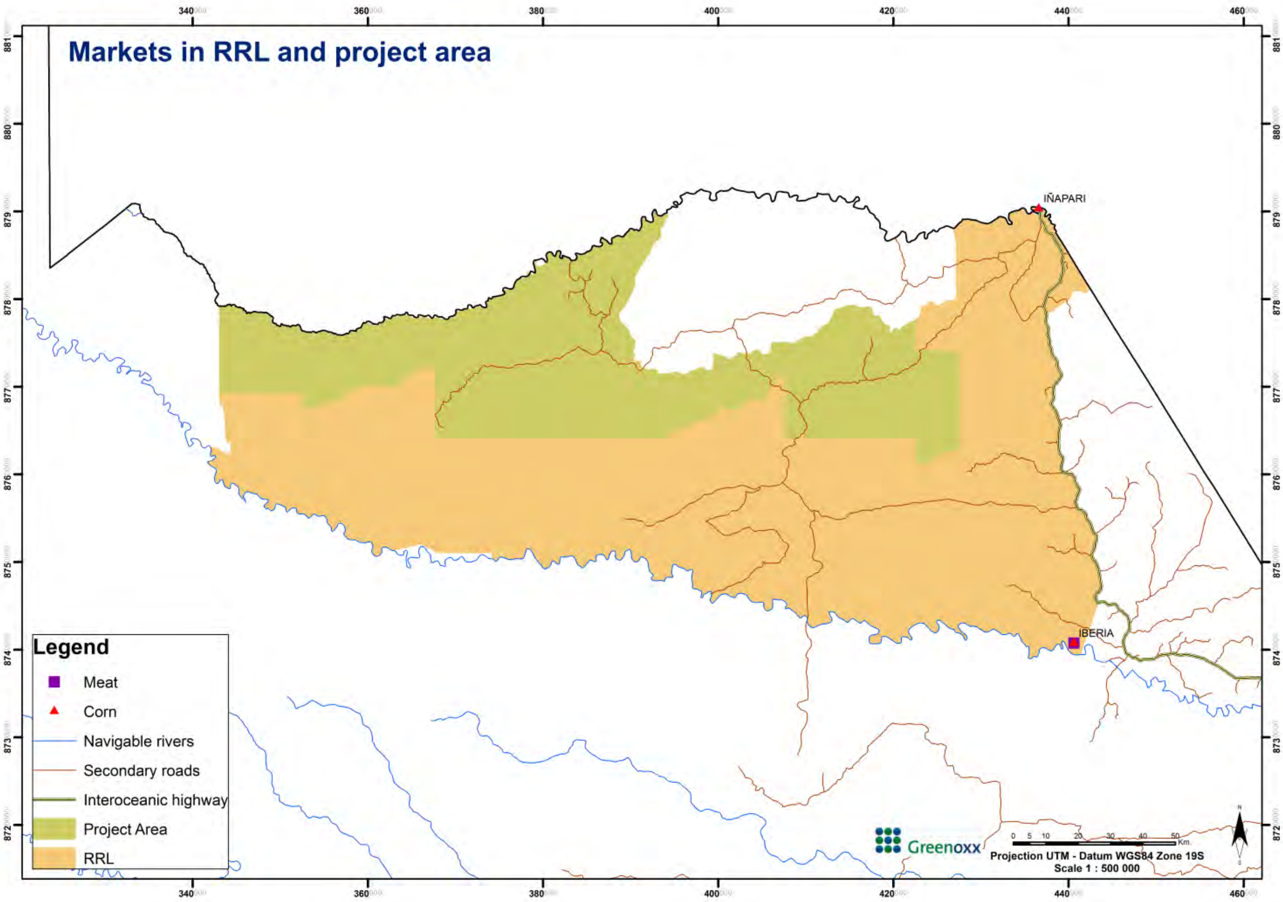
Elevation (m)	PA	RRL
0 a 500	100%	100%

4) Markets

Access to markets is the variable which has the greatest impact on agrarian profitability, ergo, in the deforestation rate and location. For this reason, it is quite important to identify markets for agrarian products in order to determine if both areas, RRL and PA, have similar accessibility to markets. In both cases, the main market is the city of Iberia, the capital of Tahuamanu Province, which has a slaughterhouse, needed for the commercialization of meat. Agricultural products as corn can be traded in all cities as it is a product used as food for chicken, which is a typical rural activity in Peru.

The smaller towns also around the OIH have been named as Secondary markets in Map 7 (in blue). They connect principal markets, suppliers of commodities, with the other small towns located in more distant areas through river courses and secondary roads. As PA is evenly distributed inside RRL, they both have the same access to markets.

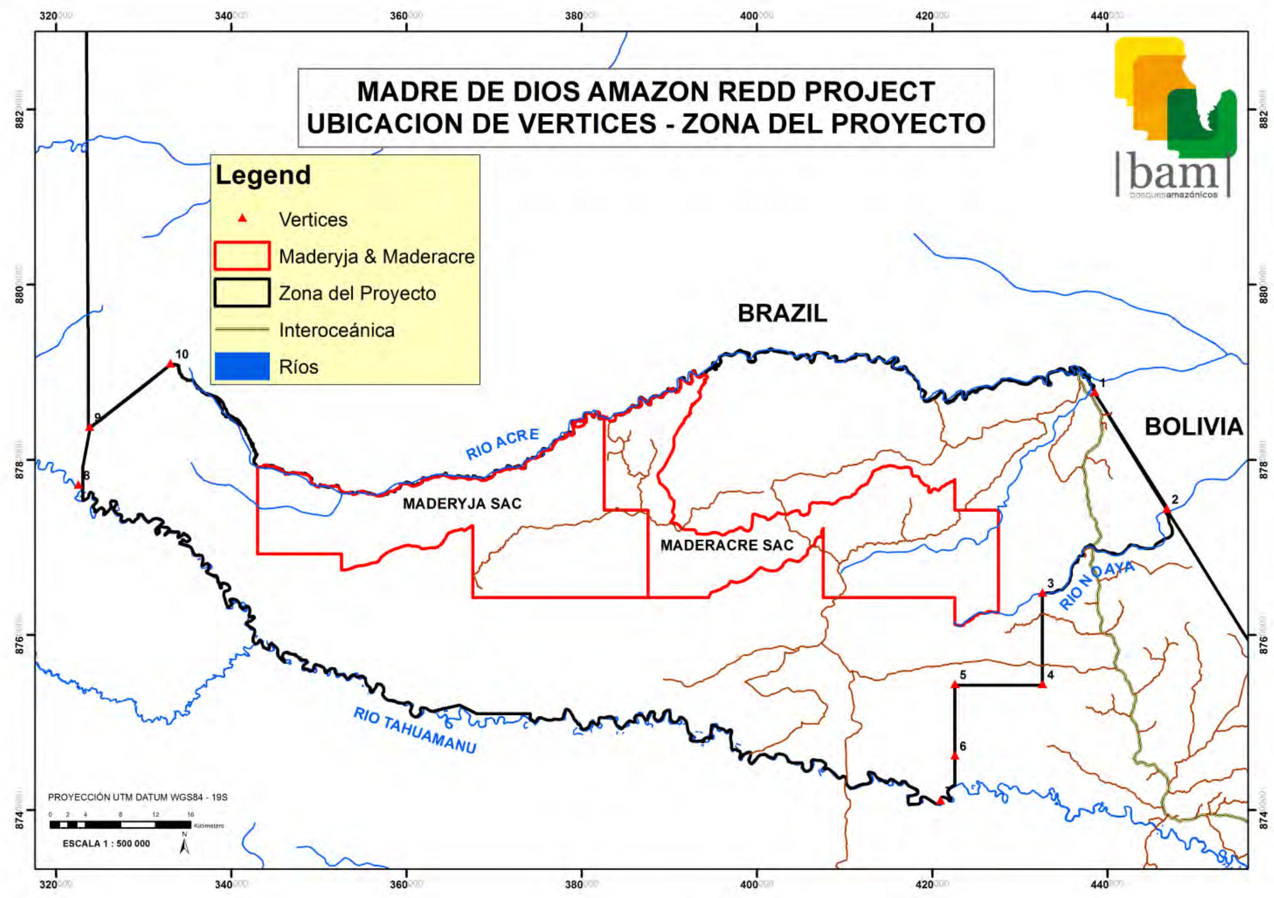
Map 7: Location of Markets in and around RRL and Project Area



1.1.2 Project Area

The Project Area is formed by the forest concessions Maderacre and Maderyja, both located in the district of Iñapari, Province of Tahuamanu and Region of Madre de Dios. It is bordered in the South by River Tahuamanu; in the East, by other forest concessions; in the North by Acre River (the natural frontier with Brazil) and the Belgium Indigenous Community; and in the West by the Reserved Zone Alto Purus. The coordinates of the boundaries of the project are presented in following table and map:

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



The boundaries of PA were defined based on the legal boundaries of each concession contract. The area for the Project is **97,817.41 hectares** of 100% forest land at the beginning of the project activity.

1.1.3 Leakage Belt

The Leakage Belt (LB) area of the Project has been determined by the surrounding area of the PA. Because of the similarity of conditions inside the PA and the LB, it is assumed that the deforestation agents will displace their traditional activities from the PA to this region.

The same work of defining net areas, as the one made for PA, was done. National Protected Areas were removed; therefore the LB net area is **159,018.02** hectares. It is also immersed in the RRL and includes other forest concessions and agricultural plots, mainly.

A similar analysis of factors between PA and Leakage Belt has been done:

As the main area of the LB is composed by other forestry concessions, there are no differences in location (as can be seen in Map 8), type of landholder (companies), among other relevant factors between PA and LB; therefore the regulatory and social factors are the same for both.

In the case of transportation factors, navigable rivers and roads are not part of forest concessions and they cannot be part of the PA and the LB as they have not been classified as forest. For this reason, density cannot be calculated as it would be zero in both cases, even though some of these rivers and roads cross within concessions that are part of the project area and, in other cases, rivers and roads are natural boundaries between the project area and leakage belt, as can be seen in Map 3 of page 8, that also shows that there are no significant differences in density of rivers and roads throughout the relevant area classes (PA, LB, RRD).

The landscape factors are considered in the following tables and all of them confirm the similarity between the two boundaries.

Table 9: Proportionality of Types of Forest in LB and PA

Forest Strata	Leakage Belt		Project Area	
	Area	%	Area	%
Hill forests	134,515.75	84.59%	79,290.19	81.06%
Terrace forests	17,183.17	10.81%	9,845.75	10.07%
Others	1,622.92	1.02%	130.59	0.13%
Bamboos	3,103.45	1.95%	8,550.87	8.74%
Tree Swamps	2,592.74	1.63%		0.00%
Total general	159,018.03	100.00%	97,817.40	100.00%

Table 10: Land suitable for conversion in LB and PA

Soil Use Capacity	Leakage Belt		Project Area	
	Area	%	Area	%
Agricultural crops	5,745.08	3.61%	2,814.45	2.88%
Permanent crops	10,755.48	6.76%	14,111.26	14.43%
Others	582.40	0.37%	130.59	0.13%
Forestry production	141,935.06	89.26%	80,761.10	82.56%
Protection lands		0.00%		0.00%
Total	159,018.02	100.00%	97,817.41	100.00%

Table 11: Elevation and Slope in LB and PA

Elevation	PA	LB
0 to 500	100%	100%
500 + m		

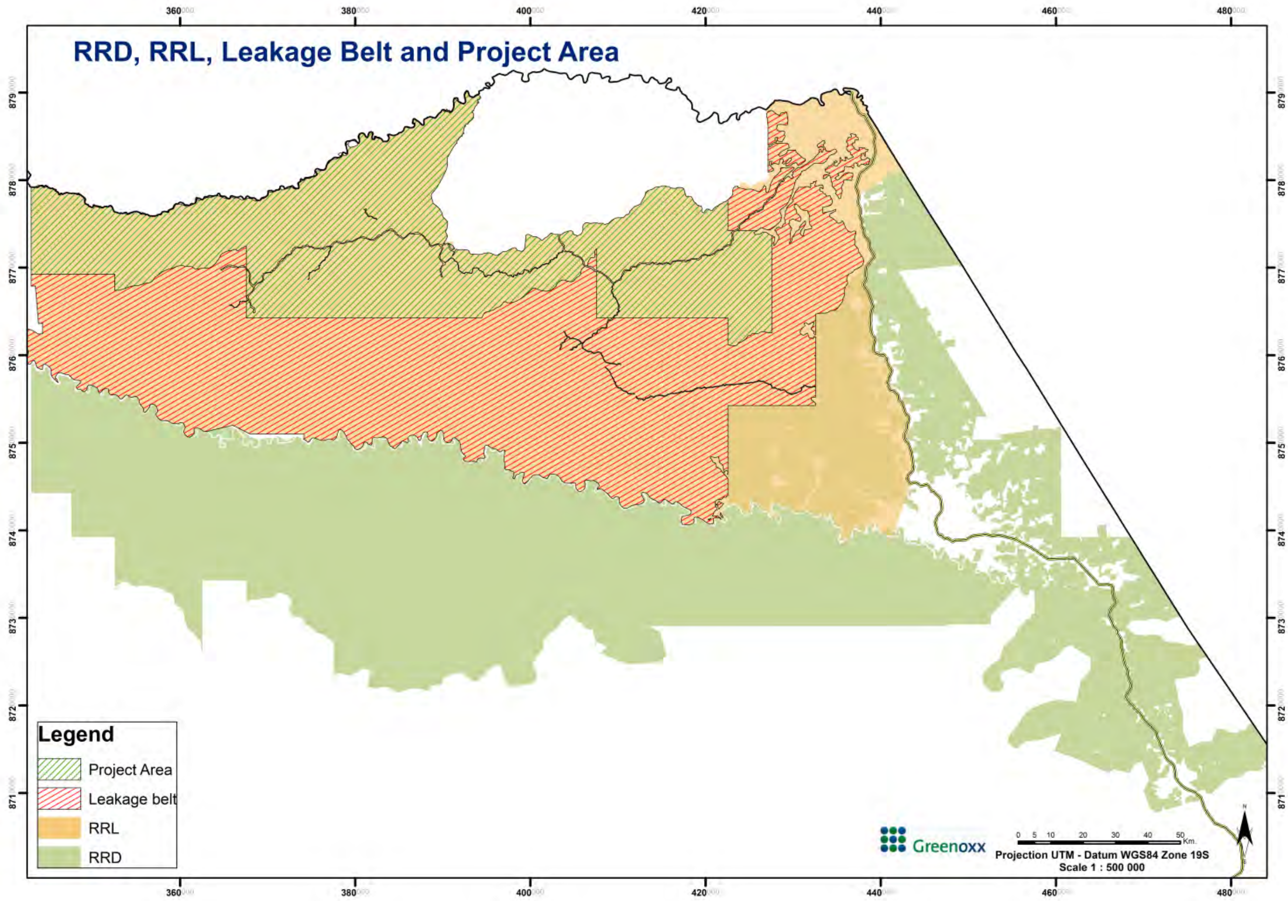
Slope (%)	PA	LB
<15%	99.78%	99.61%
>15%	0.22%	0.39%

In conclusion, the Leakage Belt:

- Includes forested areas closest to the PA.
- All parts are accessible and reachable by the project baseline deforestation agents.
- The landscape and transportation factors were considered for the determination of the LB.
- Policies, regulations and social factors of the LB are of the same type or have the same effect as in the PA.
- The LB area is more than 90% of the Project Area in 2009.

Finally, a map with all the boundaries of the Madre de Dios REDD Project is presented next:

Map 9: Defined boundaries for the proposed project



Step 1.2 Temporal Limits

Start date and ending date for Historic Reference Period

The historic reference period goes from year 2000 to year 2008, and includes the analysis of 2000, 2005 and 2008 images.

Starting Date and Ending Date for the Project Crediting Period

Start date of the Project Activities: 01/01/2009
Start date of the Crediting Period: 01/01/2009
End date of the Crediting Period: 31/12/2046

Revision Frequency of Baseline

According with the methodology, baseline will be reviewed every 10 years.

PART 2: ESTIMATION OF ANNUAL UNPLANNED DEFORESTED AREA

Step 2.1 Analysis of Historic Deforestation

2.1.1 Data sources collection and calculation of historic deforestation rate

Satellite images used for the analysis and modeling of deforestation were Landsat 5 and Landsat 7 and includes 3 points in time: 2000, 2005 and 2008 with a resolution of 30x30 m. The used sources to get the Landsat images were National Institute for Space Research from Brazil (INPE) and USGS Global Visualization Viewer.

In the selection of the satellite images we compared quick looks and their %CC reported for each quadrant shown in both websites, to get images with less than 10% cloud cover over the desired areas.

After having done a search and purchase of images, a group of these ones was selected based on their characteristics that make them more appropriate for a visual interpretation of deforestation patterns and for the elaboration of the Mosaic. The best images available for each scene were chosen, which are:

Table 12: Images used for the analysis of deforestation in the Reference Period

Path-Row	2000	Image 2005	Image 2008
2-68	24/11/2000 (7TM)	10/08/2005 (5TM)	18/08/2008 (5TM)
3-68	17/08/1999 (5TM)	18/09/2005 (5TM) 17/08/2005 (5TM)	05/05/2008 (5TM)

A field assessment work for accuracy of the map has been done. The results show an accuracy of no less than 90% as requested by the methodology. The description of the process can be seen in 2.1.4.

2.1.2 Map of historic deforestation

The deforestation maps with paired data for periods 2000 -2005 and 2005-2008 were generated following the mapping procedure proposed by the Research Institute of the Peruvian Amazon (IIAP) and the Madre de Dios Regional Government. IIAP is the national entity in charge of producing maps for the ZEE of Madre de Dios, and their products are considered official for regional planning. This procedure consisted of:

1) Selection and acquisition of Satellite images (explained above).

2) The processing of the images met all recommendations given in the Sourcebook on REDD (GOFC-GOLD, 2009) and the Manual for elaboration of mosaics developed by the IIAP[88]. The summarized process is detailed below:

- Image conditioning

The acquired images were provided in compressed TIFF format. Decompression was done and exported to ERDAS IMAGINE matrix format (*. img) to then proceed to the union of spectral bands.

- Geo referencing

The geo-referencing locates the image according to a coordinate system. For the Image of the year 2000, the geo referencing was made using the IGN (National Geographic Institute) National Charter vector data (scale 1:100,000) as a reference.

For the other images the type of geo referencing was the Image to Image type and it consisted of using an image that has already a projection system, in this case the Mosaic of 2000 (2005 for the 2008 image). However, the IGN National Chart also served as a reference for validation of this geo referencing. The RMS (Root Mean Square) was minimal in all cases, complying with all the requirements for this step as explained in ERDAS field guide.

- Detection and removal of clouds and shadows

Satellite images with less than 10% cloud cover were selected; the adequate corrections were made with the construction of the mosaic on the next step. According to the Sourcebook on REDD (GOFC-GOLD, 2009), the preferred method for analysis on images with cloud cover is the visual interpretation, this is considered for step 3.

The cloud coverage for each scene per year is presented in the following table. This information was taken from the metadata shown by the image servers.

Table 13: Cloud Coverage in selected Landsat images

Scene Path-Row	Image 2000 CC%	Image 2005 CC%	Image 2008 CC%
p002r068	2.5%	0%	0%
p003r068	0%	0%* 2.5%**	0%

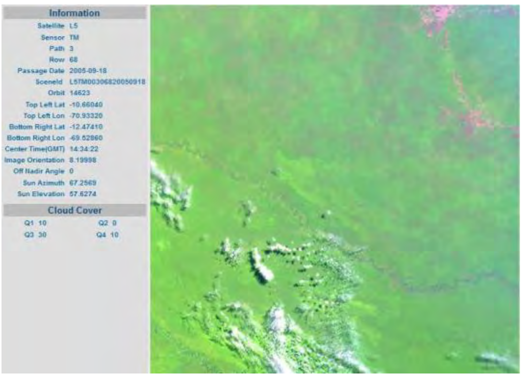
* Combined cc% for **quadrants A and C** (image 17/08/2005)
** Combined cc% for **quadrants B and D** (image 18/09/2005)

As can be seen, all the images have less than 10% of cloud coverage. For most cases, the selected images were already cloud free, but for scene 3-68 there, 2 images had to be used per each one.

For scene 3-68, image of 18/09/2005 was free of clouds in quadrants B and D, while image from 17/08/2005 was free in quadrants A and C. Therefore a mosaic for this scene was done by using the mentioned quadrants from both images, in order to get the lowest cloud coverage as possible. The quicklooks are presented next.

[88] IIAP, BIODAMAZ Peru - Finland. 2004. Manual for the elaboration of mosaics of Landsat TM satellite imagery for the Peruvian forest lowlands. Technical Document Nr. 03. Iquitos – Peru.

Image 2: Comparison of quadrants for scene 3-68 year 2005



18//09/2005

17/08/2005

- Radiometric enhancement

This step was performed with the software ERDAS IMAGINE v9.2. The radiometric enhancement was carried out on the digital values of the images to allow the presentation of a better visual appearance to the images.

- Mosaic construction

It consisted of the assemblage of all the scenes in order to cover the entire area. The individual images were selected taking into account the visual appearance of these as well as an order for splicing. Consideration was given to the date of the image, to allow the information in the overlapped area to be the most recent. However, if the most recent image had more cloud coverage, then the other image was preferred in the overlapping area.

3) Generation of vector data by visual interpretation of patterns of deforestation

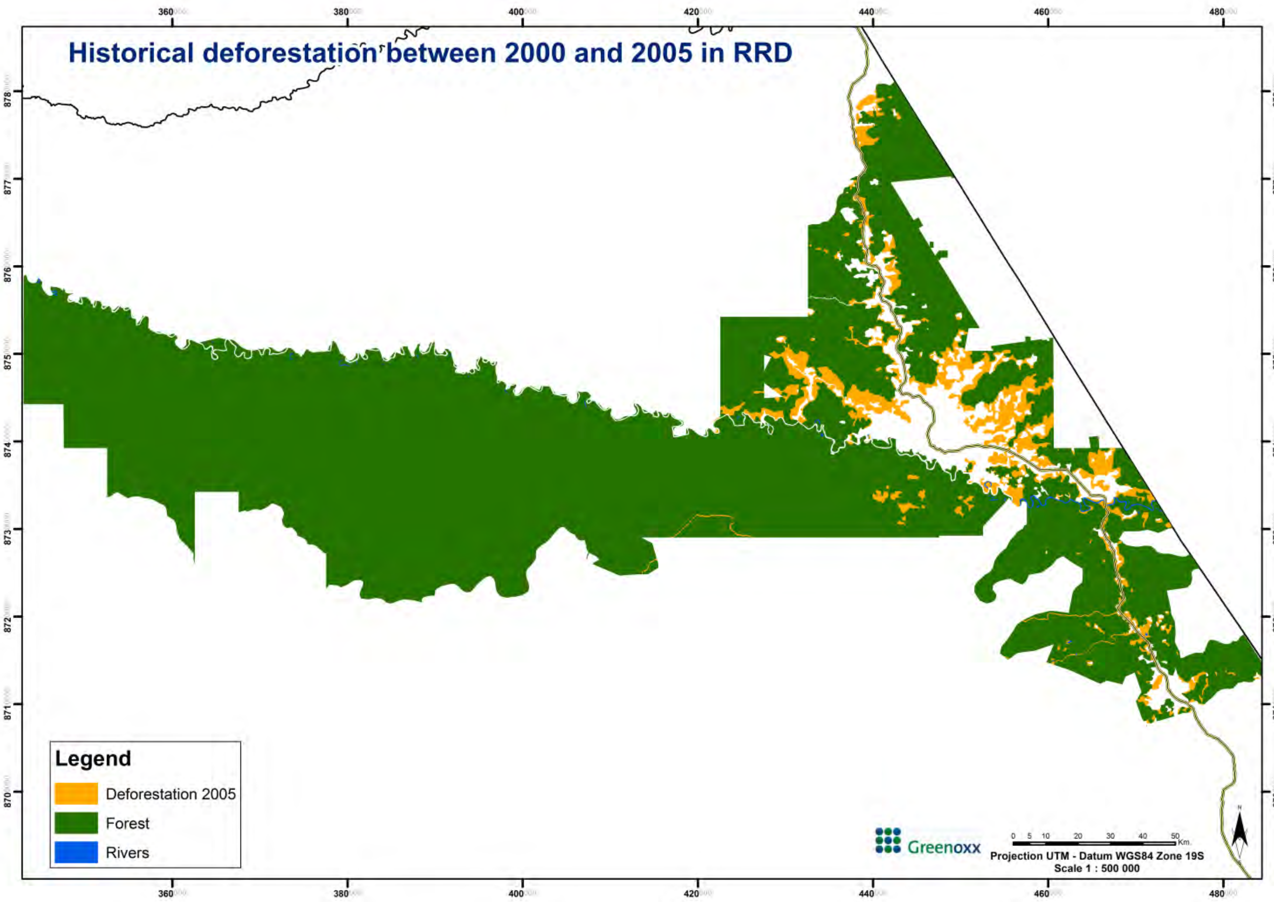
One of the main analysis methods for moderate resolution images is Visual Interpretation (Sourcebook on REDD GOFC-GOLD, 2009). According to this document, it is a simple and robust method but time consuming, and also requires that the image analysis is performed by an experienced interpreter. In our case, the work was done for all the years by IIAP, the national institution in charge of preparing the maps for ZEE and with a large experience with this kind of process in other Amazon Regions. This step consisted of interpretation, digitizing, editing and encoding of deforestation.

4) Map accuracy assessment

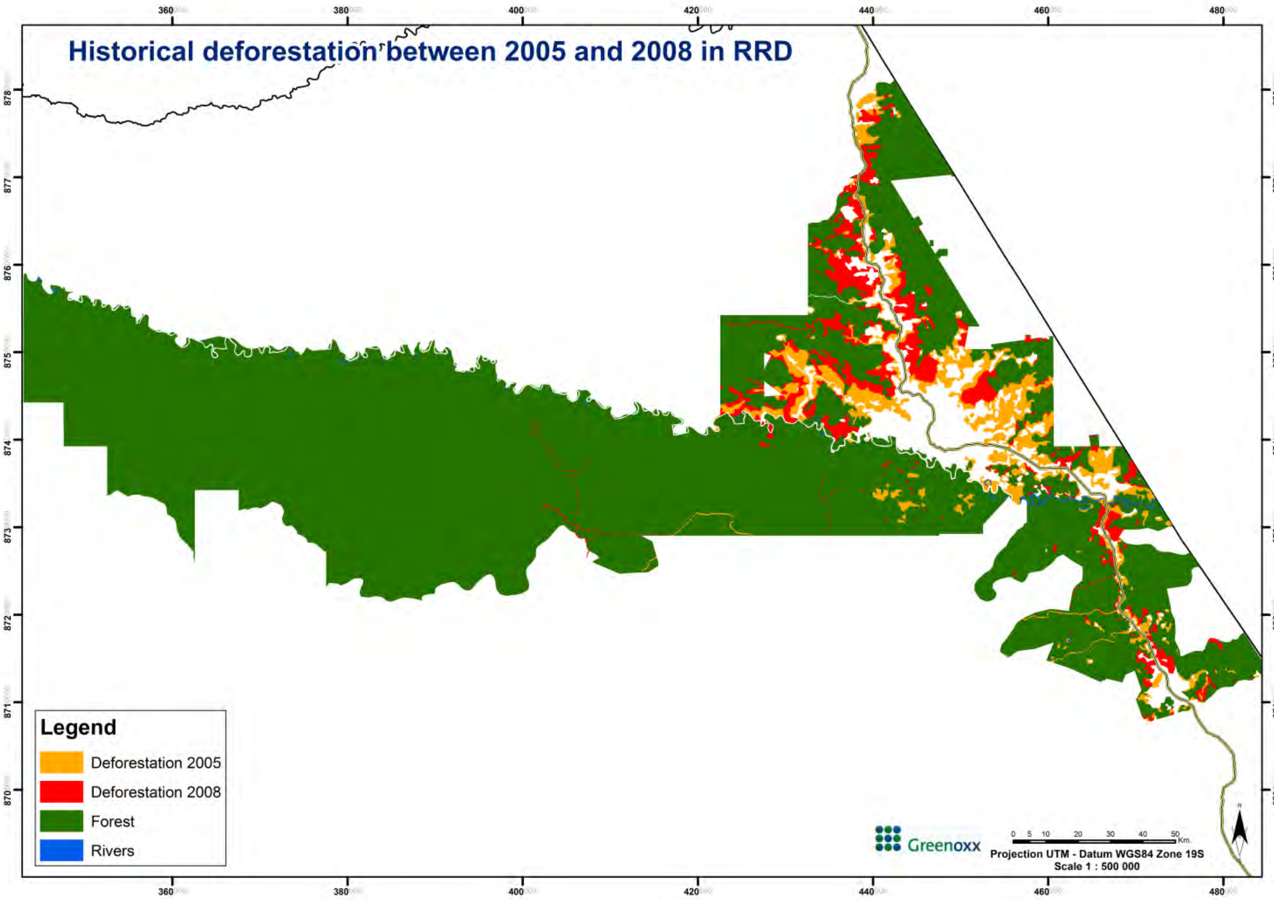
An accuracy assessment of maps was carried out in order to produce credible results of historical deforestation rate. For both classes: forest and non-forest, the minimum accuracy was 90%.

The outcome of this step is the paired maps showing the historical deforestation in RRD for the time periods 2000-2005 and 2005-2008. They can be seen in the following maps.

Map 10: Historic Deforestation in RRD between years 2000 and 2005



Map 11: Historic Deforestation in RRD between years 2005 and 2008



2.1.3 Historical Deforestation Calculation

The following charts show the forest and non-forest areas for each stratum of the Reference Region in the historic reference period, according to the previous analysis:

Table 14: Remaining Forest and Deforested Areas in the RRD

Year	Deforested	Remaining Forest
2000	-	299,740
2005	18,758	280,983
2008	35,199	264,542

2.1.4 Map Accuracy Assessment

An accuracy assessment of maps is required in order to produce credible results of historical deforestation rate. The minimum accuracy must be 90% for both classes: forest and non-forest.

In this case, BAM, hired the accuracy assessment for the 2008 year map as the most recent year.

The assessment of the digital interpretation was done using ground truthing data, according to the guidelines of methodology as described below:

a) Sampling Design

First, 6 large plots were established along Madre de Dios, distributed over transition zones (areas where deforestation was observed). These areas were selected in order to be an acid test for the work done. Areas clearly deforested and areas without any threat of deforestation do not represent any difficulty for the work of image processing.

These 6 plots are rectangles with a size of 5,000 hectares each, as recommended by Sourcebook. This makes up a total of 30,000 hectares of sampling area. GOFC-GOLD Sourcebook defines this method to join plots is a common practice known as cluster sampling, with the difference that the location of these rectangles have not been defined statistically but prioritizing transition areas (close the IOH). Each plot was divided in 200 squares (of 500 x 500 m) forming a grid of sub-plots. This grid searches to apply the selection method for choosing the sample points from each of the plots.

Then, from the grid, the sampling points were selected with the Systematic Non-Aligned Method proposed by Chuvieco (1996), which consists on searching randomly the first sampling point and, from it, determining the location of the other points at a systematically non-linear way. The excel function RANDOM was used.

This method allows introducing some randomness in the choice of the sample, while reducing the bias caused by frequency. Additionally, it guarantees a complete review of the whole area.

b) Sampling Size Determination

All statistical sampling has a sampling size according to the desired probability level or confidence level, the allowable error and the heterogeneity (standard deviation). For classified images, where variable is not quantitative but qualitative, a binomial distribution of the probability is recommended (Chuvieco, 2008), establishing the size of the sample with the following formula:

$$n = \frac{Z^2 pq}{E^2}$$

Where:

Z is the x value of standardized normal curve for a specific level of probability;
p is the expected percentage of success;
q is the expected percentage of error (q = 1 – p) and
E is the allowable level of error

Considering the success and failure percentage equivalent to 85% and 15% and an allowable level of error of 10% (for a 95% of confidence), the formula is established as below:

$$n = \frac{1.96^2 \times 85 \times 15}{10^2} = 48.98$$

It means that the minimum size required is 49 sampling points. In total, 55 plots were selected and distributed in a proportional way in the 6 areas, with 9 sampling points in 5 areas and 10 sampling points in the remaining one.

c) Data Collection

With the support of a GPS, the selected coordinates were located. The classes under assessment are Forest and Non-forest. Field work included the visit of 55 points and, if it was not feasible to reach one (because it was located in a private property or in an unsafe zone of illegal mining), they moved to the nearest feasible point, according to the grid selection of points. In any case, the point was GPS referenced and a visual recording of the status of the area was established. The field data was recorded in a simple handbook.

An excel sheet with the coordinates and the field results can be seen in Annex 3.

d) Results Analysis

With the list of field data and reference data, a squared matrix (m rows and m columns) called confusion matrix was built. Columns use to represent the reference classes (field information), while the rows represent the map classes. In this matrix, the diagonal represents the number of assessment points where both sources (map and field) agree, while the sides are errors of classification. The relationship between the right points and the total points means the global accuracy of map. The residues indicate field classes not included in map, while the residues in rows indicate map classes not verified in the field. In the following table, we show the confusion matrix for our project.

As recommended by GOFC-GOLD Sourcebook, user's accuracy formulae were used to determine the level of confidence for the map for both classes: forest and non-forest. In both cases, the percentage obtained was over the minimum requested by the methodology (90%).

Table 16: Confusion Matrix for the accuracy assessment

Predicted (Map) Classes	**Actual (Field) Classes 1**	**2**	∑	**Commission Errors %**
1	25	2	27	7.41
2	1	27	28	3.70
∑	26	29	**55**	
Omission Errors %	3.85	6.90		

Forest Accuracy	**96.43**	**%**
Deforestation Accuracy	**92.59**	**%**
Global Accuracy	94.55	%

As can be seen, the accuracy for both classes is higher than the minimum allowed (90%). Therefore no further correction is needed for the image. Also, the same accuracy level is assumed for the past images as they were elaborated following the same methodology.

Step 2.2 Annual unplanned deforestation areas estimation in RRD

The modeled annual area of deforestation in the historical reference period for RRD was calculated using the *Historical Average Annual Deforestation* approach, to determine the annual rate and an opportunity cost analysis to determine the location of future deforestation.

Therefore, to calculate the historical rate for RRD, the following equation was used:

$$A_{BSL,RRD,unplanned,t} = A_{RRD,unplanned,hrp} / T_{hrp} \quad (3)$$

Where:

$A_{BSL,RRD,unplanned,t}$	Projected area of unplanned baseline deforestation in the R*RD* in year *t*; ha
$A_{RRD,unplanned,hrp}$	Total area deforested during the historical reference period in the *RRD*; ha
T_{hrp}	Duration of the historical reference period in years; yr
t	1,2,3,… *t** year elapsed since the projected start of the REDD project activity

Table 17: Historic Deforestation Rate

$A_{RRD,unplanned,hrp}$ **Ha**	T_{hrp} **Yr**	$A_{BSL,RRD,unplanned,t}$ **ha**
35,198.62	8	**4,399,83**

Step 2.3 Annual unplanned deforested area estimated for the Project Area

Using the projected area of unplanned baseline deforestation in RRD, the area to be deforested in RRL was estimated. The latter was also stratified to get the rates per stratum, and the following formula was applied:

$$A_{BSL,\ RRL,\ unplanned,\ t} = A_{BSL,\ RRD,\ unplanned,\ t} * P_{RRL} \quad (4)$$

Where,

$A_{BSL, RRL, unplanned, t}$	Projected area of unplanned baseline deforestation in the reference region for location *RRL* in year *t*; ha
$A_{BSL, RRD, unplanned, t}$	Projected area of unplanned baseline deforestation in *RRD* in year *t*; ha
P_{RRL}	Ratio of forest area in *RRL* at the start of the baseline period to the total area of the *RRD*, dimensionless

Table 18: Ratio of forest area in RRL to the total area of RRD

RRD ha	Forest in RRL at 2008 ha	P_{RRL}
299,740.50	274,850.75	0.92

Table 19: Projected Areas of unplanned baseline Deforestation in RRL

$A_{BSL, RRD, unplanned, t}$ ha	P_{RRL}	$A_{BSL, RRL, unplanned, t}$	
		Ha	%
4,399.83	0.92	**4,034.48**	**2.44**

Given that the deforestation model works with rates in percentages rather than in areas, rate was transformed using a simple equation:

$$A_{BSL, RRL, unplanned, t}\ (\%) = \frac{A_{BSL, RRL, unplanned, t}\ (\text{ha}) \times 100}{\textit{Forest in RRL at 2008 (from Table 18)}}$$

In this way, the projected deforestation advances at a historical constant rate.

PART 3: LOCATION AND QUANTIFICATION OF UNPLANNED DEFORESTATION THREATS

Step 3.0 Location analysis

The type of deforestation in RRL is “frontier deforestation”, so location analysis is required.

Step 3.1 Preparation of data sets for spatial analysis

3.1.1 Spatial Models Requirement

According to the module, project proponents must identify the model/software that will be used to analyze where deforestation is most likely to happen in future periods. The model/software used must:

- Be peer-reviewed
- Be transparent (no “black box” calculations such as neural networks)
- Incorporate spatial datasets that have been documented to explain patterns of and are correlated with deforestation (both raster and vector)
- Be able to project location of future deforestation

The DINAMICA EGO tool (http://www.csr.ufmg.br/dinamica/) was used to determine the location of future deforestation. This software was developed by the Center of Remote Sensing from the Universidad Federal de Minas Gerais, leaded by internationally acknowledge scientist Britaldo Silveira Soares-Filho. The first version was used to model different scenarios of deforestation trend throughout the whole Amazon Basin, published in Nature magazine, Vol. 440|23 March 2006|doi:10.1038/nature04389 and has been used lately for many other institutions as Carbon Decisions International (Lucio Pedroni's consultancy company), among others. In that sense, we consider that the software has been largely peer-reviewed by recognized scientists and REDD experts worldwide. As can be read in the program guidelines, information of local experts can be introduced in substitution of pure statistical parameters, if considered.

Here is a list of other regional studies, mainly conducted in the Amazon basin and using DINAMICA EGO, confirming that it is peer-reviewed software used to model natural and social dynamics:

- Almeida, C.M. et al Modeling Urban Land Use Dynamics through Bayesian Probabilistic Methods in a Cellular Automaton Environment. INPE- UFMG.
- Soares-Filho, B. et al. DINAMICA – a stochastic cellular automata model designed to simulate the landscape dynamics in an Amazonian Colonization Frontier. ELSEVIER, Ecological Modeling 154 (2002) 217-235.
- Mas, J.F.; Flamenco, A. 2011. Modelación de los cambios de coberturas/uso del suelo en una región tropical de México. GEOTROPICO, 5(1), Artículo 1:1-24.
- Nunes, F. et al. Economic benefits of conservation: assessing the potential rents from Brazil nut concessions in Madre de Dios, Peru, to channel REDD+ investments. Foundation for Environmental Conservation 2012.

Also, as can be seen in many guidelines and YouTube videos (www.youtube.com/watch?v=D8L_CtFgDKA, www.youtube.com/watch?v=9JS_zDyIB2o, http://www.youtube.com/watch?v=fQwsRlloPzQ), detailed explanations of how it works are available and many trainings have been given to Peruvian (public and private) organizations to ensure that the software is adequately understood. In this way, it is clear enough how the software works and how different drivers and patterns affect the location of future deforestation and, for these reasons, we consider it meets transparency criterion.

For the project's case, the model created to project the deforestation in RRL, can be visualized as a diagram at the interface of the program. Thus every operation performed is known as well as its respective sub-result.

Regarding the inclusion of spatial datasets, model developed in DINAMICA has included different geographic layers in raster format, as distance to roads/rivers/deforested areas/markets and land tenure types (forestry concessions) among others. All of them have different responses to deforestation depending on their nature, and for that, shape the future deforestation. It is worth noting that the correlation between all this spatial datasets were also calculated, removing those highly correlated.

Software has been specifically designed to predict, based on historical and new circumstances, future cover category maps (forest / non forest, for our case). In that sense, we consider that DINAMICA EGO software meets with the 4 requirements mentioned above. More information can be found in their website or the studies mentioned above.

3.1.2 Preparation of spatial datasets

Existing digital layers that are officially used in the MDD Region were collected from different institutions (GOREMAD, ACCA, COFOPRI, etc.), trying to get at least 1 factor of each of the four classes presented in the module.

Table 20: Spatial Datasets collected for the project

Spatial Dataset	Source	Year
Forestry Concessions	Forestry and Wildlife General Direction (DGFFS)	2010
Land Use Capacity	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Protected Natural Areas	National System for Protected Natural Areas (SERNANP)	2009
Native Communities	Instituto del Bien Común (IBC)	2009
Quaternary Holocene	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Agricultural Parcels (PETT)	Regional Government of Madre de Dios (GOREMAD)	2009
Geology	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Productive Aptitude	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Vegetation	Peruvian Amazon Research Institute (IIAP) - Regional Government of	2009

	Madre de Dios (GOREMAD)	
Interoceanic Highway (IOH)	Regional Government of Madre de Dios (GOREMAD)	2009
Secondary Roads until 1999	Regional Government of Madre de Dios (GOREMAD)	2009
Secondary Roads until 2007	Asociación para la Conservación de la Cuenca Amazónica (ACCA)	2009
Hydrographic System	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Settlements	Regional Government of Madre de Dios (GOREMAD)	2009
Soil Classes	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Forest Classes	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Physiography	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009
Geo-morphology	Peruvian Amazon Research Institute (IIAP) - Regional Government of Madre de Dios (GOREMAD)	2009

The column Year refers to the year in which the data was obtained from the official sources, also listed. All of these sets were received in shape (vector) files and were adequate, in ArcGIS 10.0 with the tool ArcToolbox – Analysis tools – Extract – Clip, to match only areas located within the RRL. Finally they were converted to raster files automatically by the modeling software.

The data sets were created from GPS coordinates obtained by the respective institution (listed in Table 20) through field work are:

- Native Communities
- Settlements
- Forestry Concessions
- Secondary Roads until 2007
- Agricultural Plots (PETT)
- Interoceanic Highway (IOH)
- Secondary Roads until 1999
- Road Network from Maderacre & Maderyja

Many of these datasets are in constant actualization (PETT and concessions) because new concessions are granted or reshaped (through a process of re-measurement or re-delimitation given that there are some problems of overlapping), Therefore, the most actual ones were obtained from each source.

It is worth noting that all the above mentioned files are constituted by polygons and/or points, whose areas and boundaries are officially used by the National and Regional Government when signing new concession contracts, planning infrastructure projects, doing zoning work, etc.

Most of these areas can be easily viewed at a nationwide scale in the websites of public institutions, like:
http://dgffs.minag.gob.pe/pdf/mapas_tematicos/Concesiones%20Maderables%20y%20No%20Maderables.pdf
http://www.sernanp.gob.pe/sernanp/bmapas.jsp

The maps coming from the Ecologic Economic Zoning, developed by IIAP-GOREMAD in 2009, are based in multiple datasets which were processed following IIAPs methodology, which can be seen in a diagram in Annex 4. These datasets are:

- Landsat 5 TM images (30 x 30 m of spatial resolution) with 7 bands: 3 from the visible spectrum and 3 from the infrared spectrum. Band 6 (from the thermal infrared spectrum) is sub-divided in 2 sub-bands and has a resolution of 120 m for sensor TM. This sensor is always recommended because it has been created specifically for natural resources research.
- National Chart (Scale 1:100000) compared with satellite information since 1979 and periodically updated. 45 charts were used to cover Madre de Dios Region developed in the world geodesic system of year 1984 (WCS84), prepared by the National Geographic Institute. Each chart includes level curves, land cover, rivers, lakes and islands and other relevant signals. Geometric correction (geo-referencing) was also done for each image. Relevant benchmarks (as bridges or settlements)

were geo-referenced and used to stabilize the images and keep the margin of error within ± 7-15 meters.
- RADAR images for topography and slope with panchromatic 100 meters band.
- Planimetric Maps (Scale 1:250000) to fill areas not covered by National Chart because of clouds.
- Political Map (Scale 1:1000000) Source: National Geographic Institute (IGN), 1983.
- Ecological Map (Scale 1:1000000) Source: National Office of Evaluation of Natural Resources (ONERN) - 1973, 1994.
- Climatic Map (Scale 1:1000000) Source: SENAMHI, 1988.
- Forest Map (Scale 1:1000000) Source: ONERN – 1995.

For a further review of the entire digital process, the work document *Digital Processing of Images and Modeling* from ZEE can be found in an annex of this module.

It should be mentioned that the same processing techniques used in Landsat images for ZEE were applied in the analysis of the historic deforestation of the RRD.

All Spatial Datasets collected, excepting Natural Protected Areas (ANP) because no ANP is located inside the RRL, were used to create the variables used in the modeling as shown below:

Table 21: Spatial variables per class used in the modeling process

Classes	Factors
Landscape	Productive Aptitude (1)
Accessibility	Distance to Secondary Roads (2)
Accessibility	Distance To Rivers (3)
Accessibility	Distance to Interoceanic Highway - IOH (4)
Anthropogenic	Distance to Deforested Areas (5)
Land Tenure	Forestry Concessions (6)

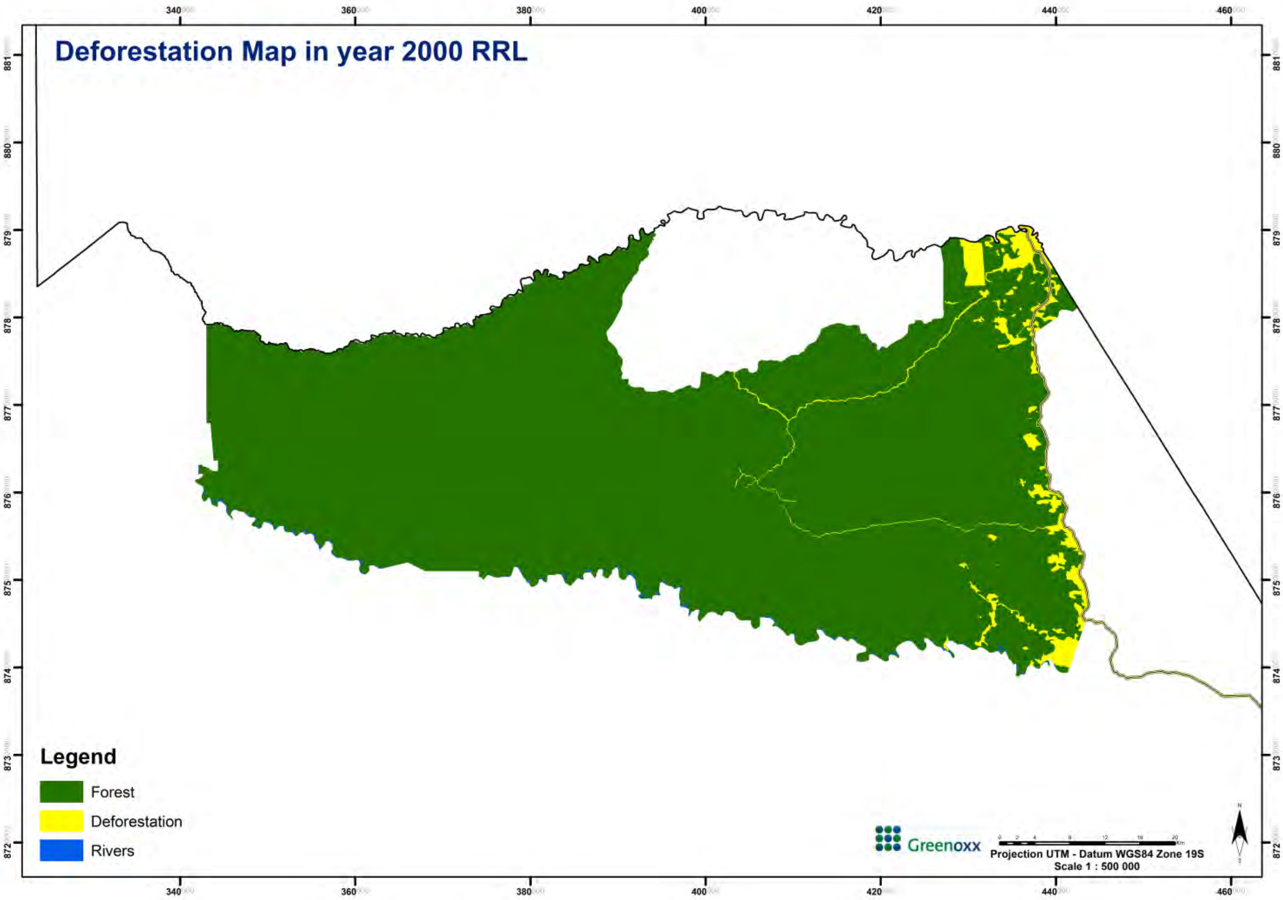
These spatial variables are classified by the type of data they represent. In that sense, the two categories of variables are:

- Categorical variables: landscape and land tenure factors.
- Continuous variables: accessibility and anthropogenic factors.

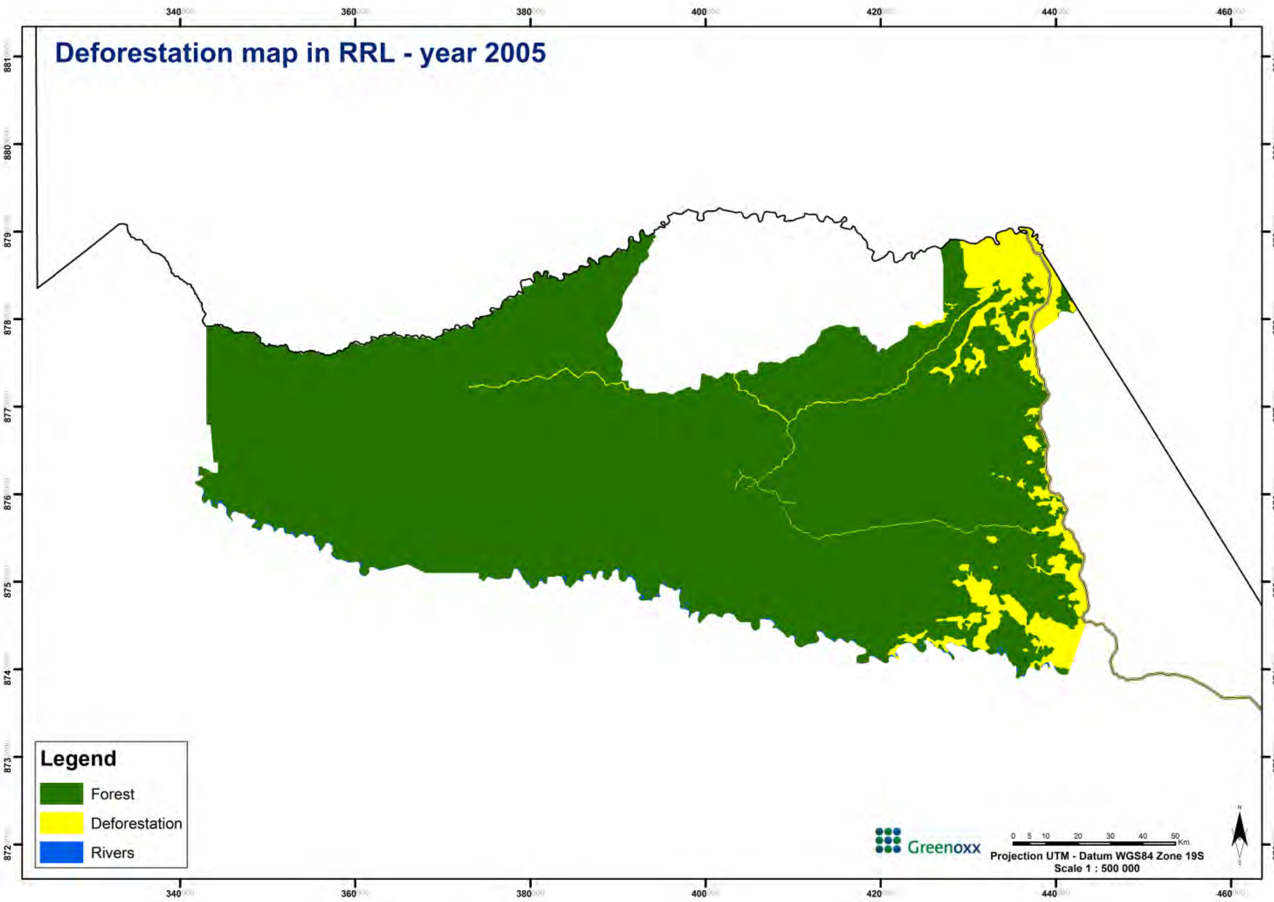
These files are converted in raster files as DINAMICA EGO only works with this type of data. All shape files were transformed to a raster matrix with ArcGIS version 9.3 (ESRI, 2008).

The forest/non-forest maps for RRL were made from the same mapped images used for RRD, given that a broader area than both regions was analyzed. The procedures for elaborating these maps were already explained in steps 2.1.1 to 2.1.4 of this module, and meet all the requirements listed in said steps. They are also in raster files.

Map 11. Deforestation Map in year 2000 RRL



Map 12. Deforestation Map in year 2005 RRL



The size of the raster files created must be equal to a raster matrix defined by the model based on the total area of RRL. This matrix has 2251 rows and 2606 columns, and each pixel has a resolution of 71 x 71 meters.

Table 22: Spatial properties for raster files

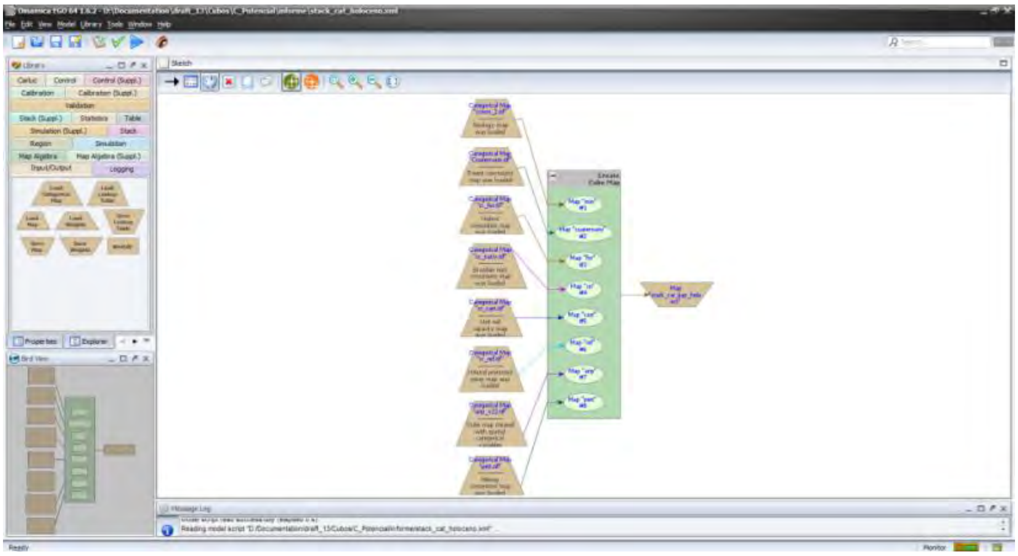
Columns	Rows	Spatial Reference	Extension			
			Upper	Left	Right	Lower
1437	726	WGS 1984 UTM Zone 19S	8790497	341713	443740	8738951

After the conversion of all the spatial variables to raster files, they are grouped in *Cubes* to create a processing unit. Specifically these cubes are multilayer maps that organize the spatial data to be entered in the modeling process. This operation is done in DINAMICA EGO. The two cubes created are:

- Cube for Categorical Variables.
- Cube for Continuous Variables (excepting the variables *Distance to Secondary Roads* and *Distance to Deforested Areas* which will be mentioned in step 3.3).

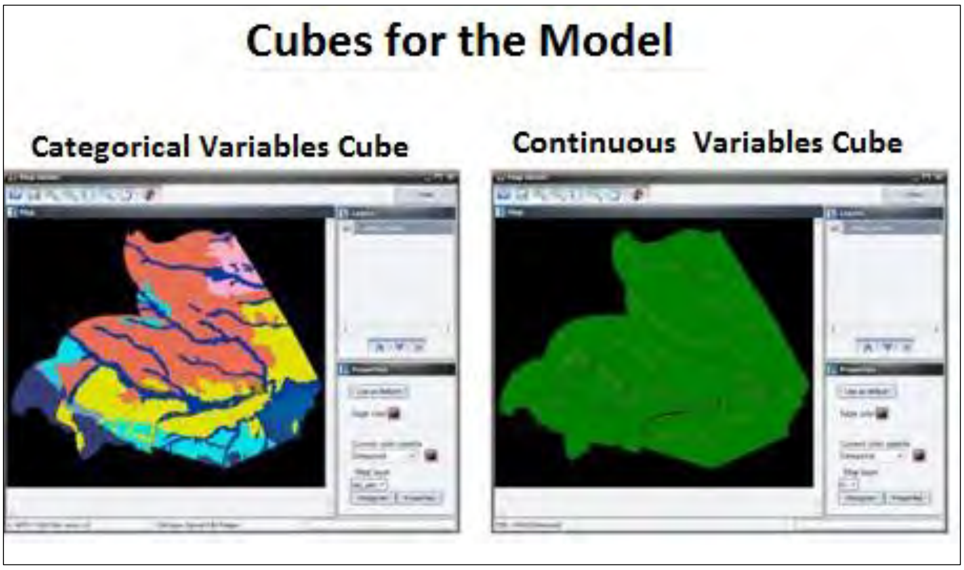
The process of cubes creation is graphed in the following example diagram:

Image 4. Cubes creation process



After this procedure, both cubes are ready to be part of the software as inputs for the analysis in the deforestation modeling.

Image 5. Cubes for the Model



Step 3.2 Preparation of Deforestation Risk Maps

The process of elaborating Risk Maps consists in two major steps: Calibrating the model and Modeling with the outputs from the calibration.

<u>Model Calibration</u>

Its main objective is to obtain results of the incidence that the variables gathered have over the deforestation process. Calibration consists in 2 sub-steps called **Calculation of Correlation** that could exist between variables and **Calculation of Weights of Evidence**. To do this, we worked with deforestation maps for year 2000 and 2005 that gave us a calibration period of 5 years.

a) Calculation of Correlation

As the modeling is based on the statistical method “Weights of Evidence”, whose condition is that no correlation exists between the factor maps, and given that some of them represent similar factors (e.g. Geology's Map and Holocene Quaternary's Map); a correlation analysis for all the factors (from 1 to 16 showed in Table 21 taken together) was done in DINAMICA EGO, using Cramer´s Test and Joint Information Uncertainty’s Test. The maximum acceptable values were 0.5 for each[89].

The result from this analysis is that the following factors are correlated (surpassed the maximum limit of 0.5 in either of the methods) and should not be used at the same time:

Table 23. Pair of factors correlated

First Variable	Second Variable	Crammer	Joint Information Uncertainty
static_var/fisio	static_var/geom	1.000	0.668
static_var/holo	static_var/soilcap	1.000	0.256
static_var/geol	static_var/holo	1.000	0.905
static_var/fisio	static_var/holo	0.998	0.203
static_var/geom	static_var/holo	0.998	0.367
static_var/fisio	static_var/soilcap	0.996	0.870
static_var/fisio	static_var/geol	0.992	0.240
static_var/geol	static_var/geom	0.992	0.427
static_var/geol	static_var/soilcap	0.982	0.298
static_var/holo	static_var/suelo	0.962	0.318
static_var/geom	static_var/soilcap	0.951	0.737
static_var/aprod	static_var/holo	0.940	0.178
static_var/fores	static_var/vege	0.905	0.811
static_var/aprod	static_var/soilcap	0.888	0.763
static_var/geol	static_var/suelo	0.867	0.367
static_var/fores	static_var/holo	0.854	0.187
static_var/fores	static_var/geol	0.850	0.220
static_var/aprod	static_var/geom	0.824	0.535
static_var/forcc	static_var2/pc	0.823	0.248
static_var/fisio	static_var/suelo	0.822	0.395
static_var/aprod	static_var/geol	0.800	0.208
static_var/forcc	static_var2/ios	0.770	0.210
static_var/holo	static_var/vege	0.768	0.176
static_var/aprod	static_var/fisio	0.753	0.697
static_var/soilcap	static_var/suelo	0.749	0.365
static_var/forcc	static_var/fores	0.746	0.220
static_var/fores	static_var/geom	0.738	0.445
static_var/geom	static_var/suelo	0.731	0.362
static_var/forcc	static_var/pett	0.719	0.505
static_var/forcc	static_var/vege	0.713	0.213
static_var/aprod	static_var/forcc	0.708	0.179

[89] Soares-Filho *et al*. empirically established thresholds of 0.45 for Cramer Test and of 0.35 for Joint Information Uncertainty’s Test, nevertheless Bonham-Carter (1994) mentioned by Almeida (2004) states that inferior values than 0.5 for both methods represent less association between variables than otherwise.

static_var/fores	static_var/soilcap	0.702	0.419
static_var/pett	static_var2/pc	0.677	0.161
static_var/pett	static_var2/ios	0.673	0.144
static_var/aprod	static_var/vege	0.668	0.523
distance/distance_to_1	static_var/forcc	0.662	0.149
static_var/fores	static_var/pett	0.661	0.156
static_var/aprod	static_var/fores	0.652	0.583
static_var/pett	static_var/vege	0.652	0.168
static_var/aprod	static_var/suelo	0.648	0.337
static_var/aprod	static_var/pett	0.637	0.124
distance/distance_to_1	static_var/pett	0.623	0.119
static_var/geol	static_var2/riv	0.603	0.076
static_var/fores	static_var/suelo	0.601	0.328
static_var/fisio	static_var/fores	0.598	0.399
static_var/forcc	static_var/suelo	0.576	0.211
static_var/geol	static_var/vege	0.573	0.205
static_var/geom	static_var/vege	0.554	0.409
static_var/soilcap	static_var/vege	0.547	0.382
static_var/pett	static_var/suelo	0.517	0.148
static_var/fisio	static_var/vege	0.505	0.354
static_var2/ios	static_var2/pc	0.210	0.504

With this information, 10 scenarios (simulations) were created that combined differently the factors mentioned above, being careful not to mix those correlated. For security, the same correlation analysis was remade for each scenario, to check the inexistence of any correlation.

Table 24: Scenarios tested

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Soil capacity	X		X							
Distance to settlements	X	X			X		X		X	
Distance to rivers	X	X	X	X	X	X	X	X	X	X
IOS			X	X		X		X		X
Distance to deforested areas	X	X	X	X	X	X	X	X	X	X
Distance to secondary roads	X	X	X	X	X	X	X	X	X	X
Holocene		X		X						
Productive Aptitude					X	X				
Non timber forest concessions (rubber)								X		
Physiography							X	X		
Geo-morphology									X	X

* The numbers in the table correspond to the given value to each factor in Table 21.

The correlation analysis confirmed that the drivers are not correlated, though there are Cramer values in some scenarios that are near the limit. It was also seen that all JIU values were less than 0.5 by far. For these reasons, we did develop a Risk Map for all the scenarios.

b) Calculation of weights of evidence

The approach of Weights of Evidence is the basis of the model for projecting deforestation. This technique allows mixing different patterns simultaneously in a unique equation for the calculation of probability of occurrence of transitions (Forest to Non-Forest) in the presence or under the simultaneous influence of the different variables.

For the Calculation of the Weights of Evidence, the Deforestation Maps of years 2000 and 2005 were used. As mentioned before, these maps are already in raster files and equal the model raster matrix.

The layers of Rivers, IOH and Secondary Roads were overlaid on each of the deforestation maps mentioned. The resulting maps are called Land Coverage Maps, and the values for the pixels of the rasters mentioned making the maps are:

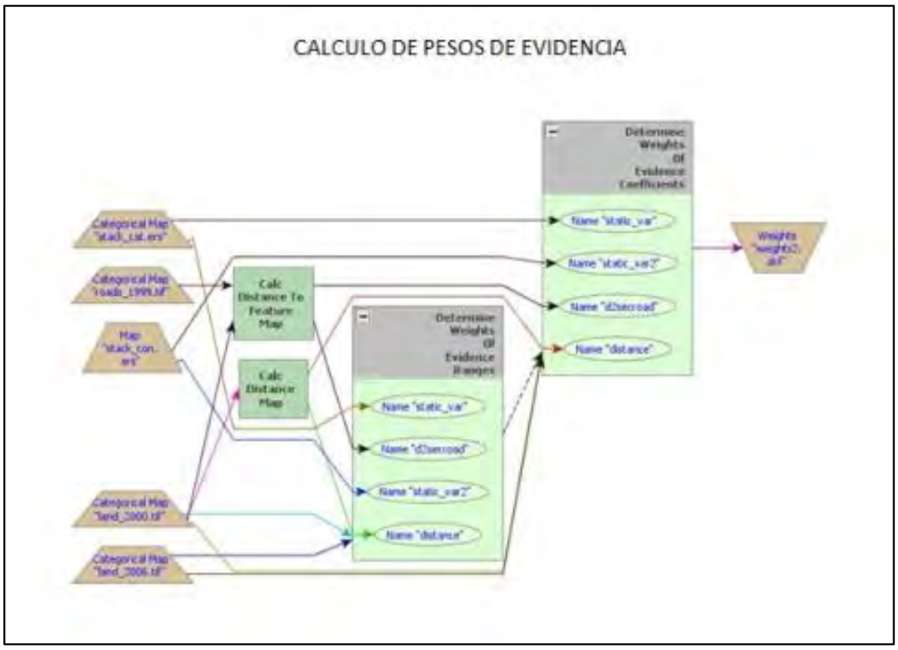
Table 26. Pixel Values for the Land Coverage Maps

Land Cover	Pixel Value
Forest	2
Deforestation	1
Secondary Roads	3
Interoceanic Highway	4
Rivers	5

A model in DINAMICA EGO was elaborated to create the weights of evidence. This model considers a final classification of the variables:

- Static Variables, represented by the variables inside the *Categorical Variable Cube* and *Continuous Variable Cube*.
- Dynamic Variables, represented by the *Distance to Deforested Areas* and the *Distance to Secondary Roads* (which were not included in the cubes).

Image 6. Weights of Evidence calculation



An example of the results obtained from this process is shown in Image 7. The guidelines of the software state that the project developer should use the values automatically generated by the model. Nevertheless, they can be changed if peer review exists or if experts' opinion is collected for the given weight of evidence value. For the project, no weight evidence value was changed.

Image 7. Graphic with a result of the Weights of Evidence

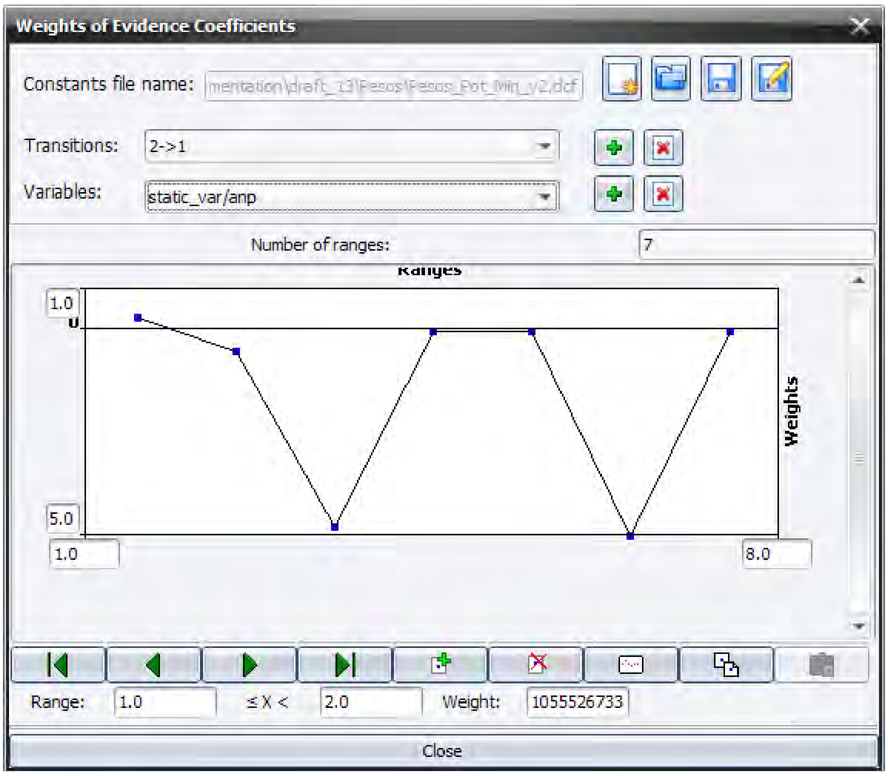


Table 27. Interpretation of the Weights of Evidence Values

Value	**Interpretation**
Negative value (-)	Range of the driver that rejects the transition (Forest to Non-forest)
Neutral value (0)	Range of the driver that is neutral
Positive value (+)	Range of the driver that attracts the transition (Forest to Non-forest)

The process for calculating the weights of evidence was repeated for each one of the scenarios (simulations), as they combine differently the variables used.

It is worth noting that the Weights Evidence Method is a peer review procedure, used in the studies made on the Amazon Basing mentioned in sub-step 3.1.1

Modeling

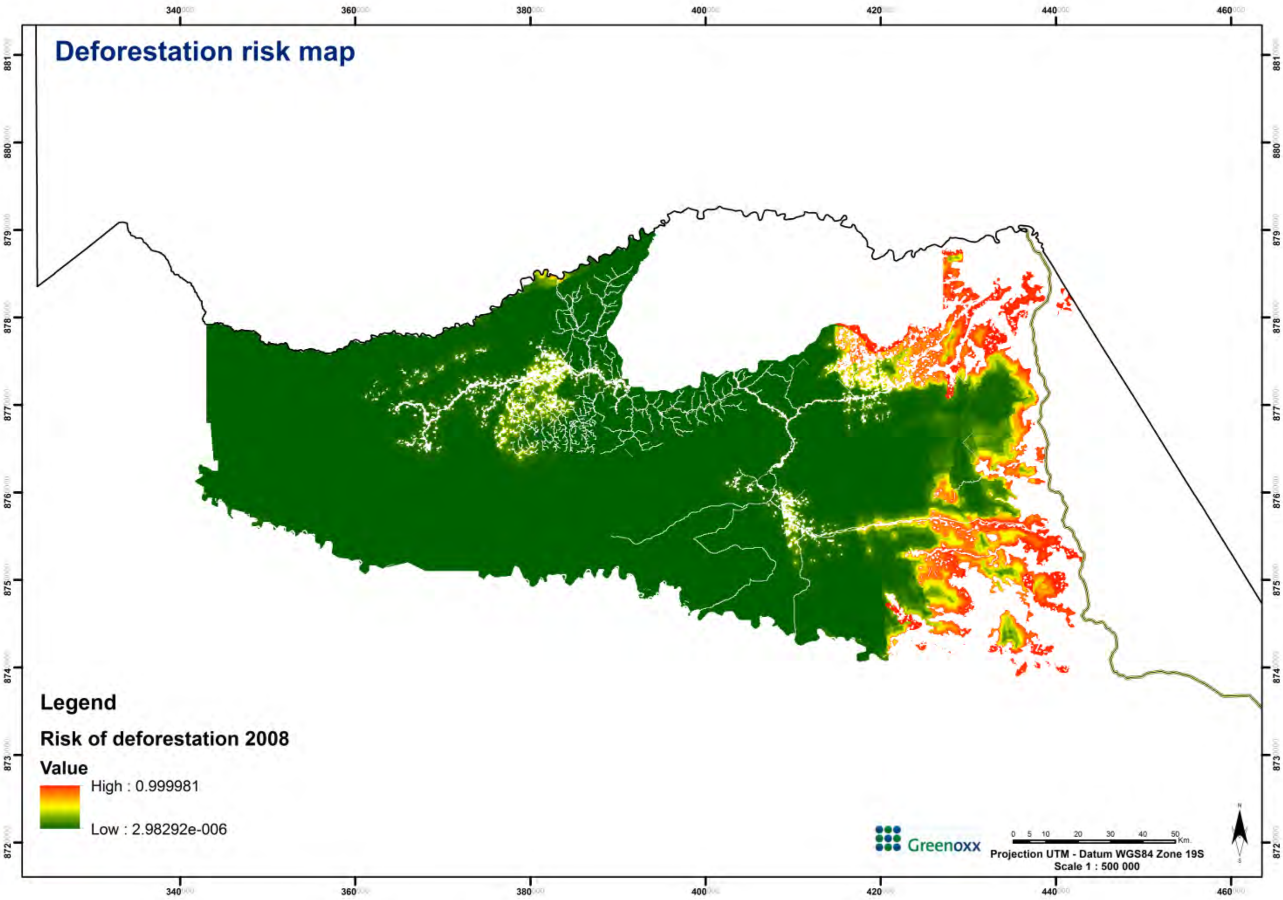
In order to generate the Risk Maps, the following data are entered into the Model of Deforestation:

- The results of the calibration process (weights of evidence for each scenario defined by the mix of variables selected based on the correlation results).
- The Historic Rates of Deforestation of the 3 Strata.
- The Categorical Variables Cube and the Continuous Variables Cube.
- Dynamic Variables
- Map of Deforestation of year 2005

The model is run and a Risk Map for each scenario (simulation) under test is obtained, for comparing them in next step, so that the most accurate one would be used for modeling the Baseline deforestation.

The Risk Maps were prepared to indicate the risk of deforestation, for each pixel location, in a numeric scale. In this case, the pixels take values from 0 (minimum risk) to 1 (maximum risk).

Map 13. Risk Map of Scenario 6



Step 3.3 Selection of the most accurate Deforestation Risk Map

This selection is achieved through the confirmation (validation) of the models of deforestation created, and by the subsequent comparison of those results.

From the Risk Maps created of each scenario, we elaborated Prediction Maps for the confirmation period (2005-2008). These Prediction Maps were overlapped to the map showing real deforestation in the confirmation period. This map is represented by the Real Deforestation Map of 2008 in RRL that was created following the same criteria used for the other Coverage Maps of year 2000 and 2005, with the only difference that the secondary roads map of year 2007 was used given that is the most actual one.

By comparing the predicted areas of each map versus the real deforestation seen in the Real Deforestation Map of 2008, the Figure of Merit (FOM) was calculated according to the following equation:

$$FOM = \frac{CORRECT}{CORRECT + Err_A + Err_B} \qquad (15)$$

Where:

CORRECT Area correct due to observed change predicted as change; ha
Err_A Area of error due to observed change predicted as persistence; ha
Err_B Area of error due to observed persistence predicted as changed; ha

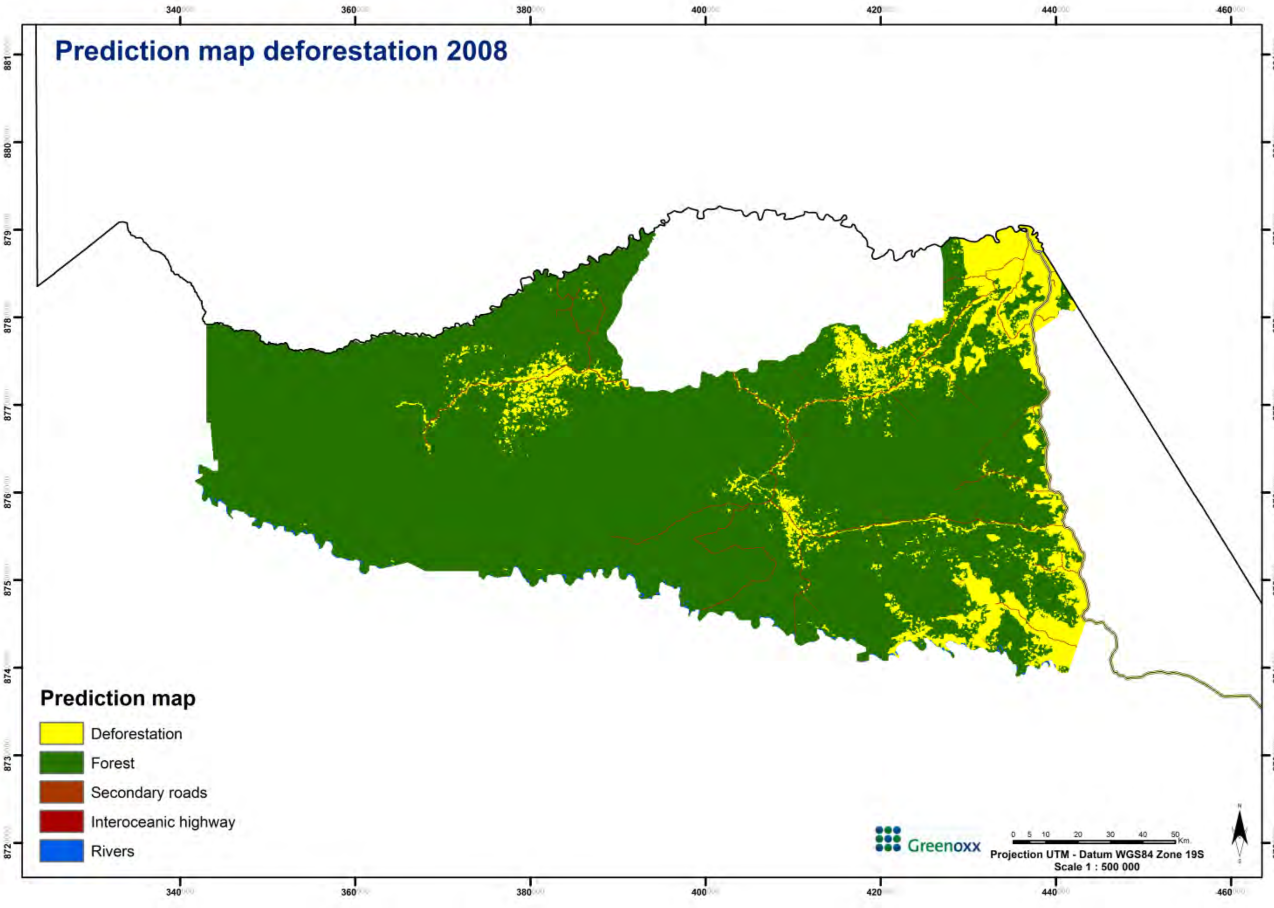
The results in Table 28 show that all the Prediction Maps have FOM values over 40%, which complies with the minimum limit of 40% for frontier deforestation. All the Prediction Maps as well as the Real Deforestation Map of 2008 in raster files are at disposition by request for further revision. The FOM calculations can be seen in the Excel file *Madre de Dios REDD Project Calculations.xlsx,* spreadsheet *FOM.*

Table 28. FOM values for the simulations (in pixels)

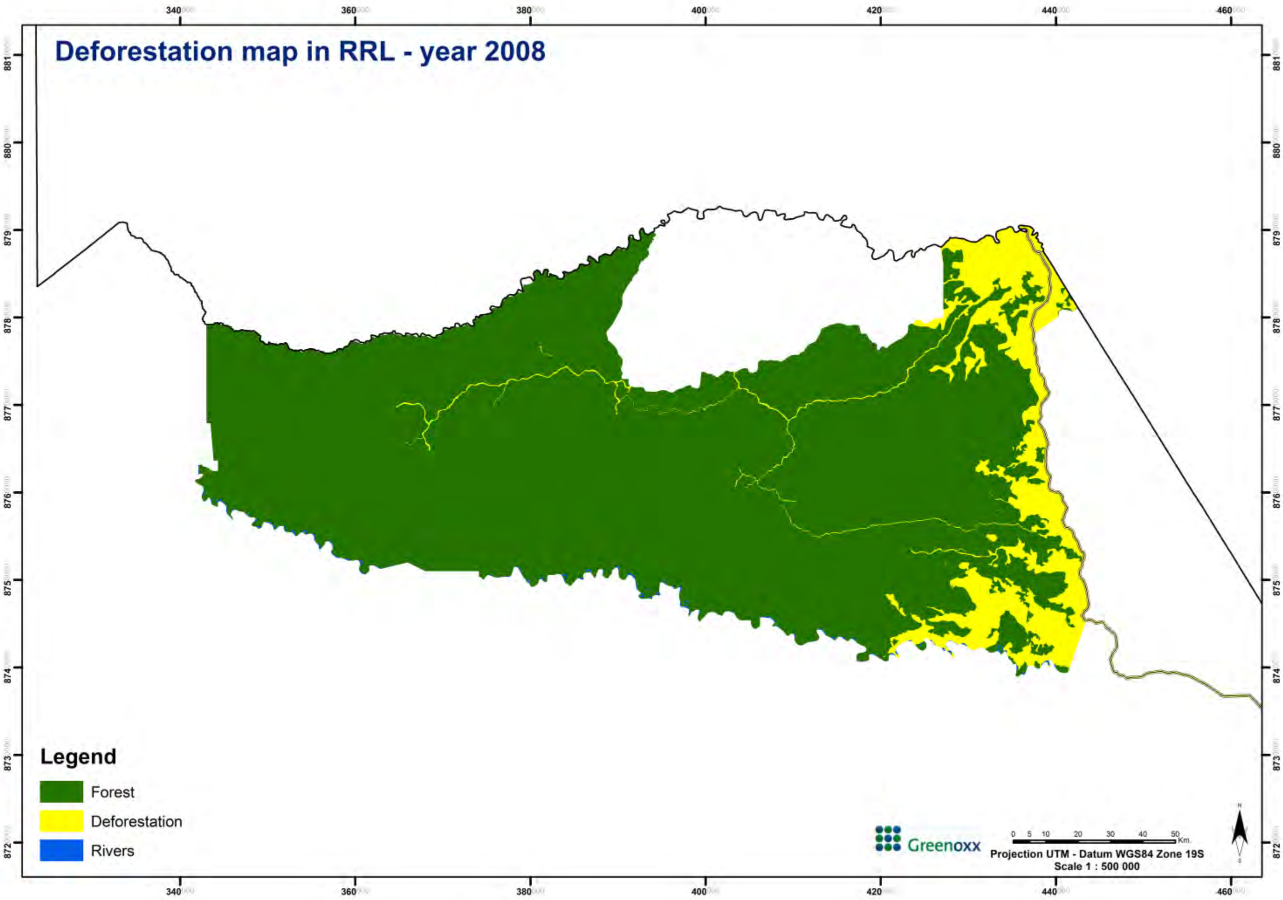
	Prediction Maps									
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Correct (ha)	41,032	41,328	41,001	41,500	42,852	43,056	41,175	40,871	41,217	41,000
Err_A (ha)	18,865	18,434	18,870	18,465	17,080	16,859	18,826	19,093	18,686	18,894
Err_B (ha)	24,845	24,379	24,934	24,395	22,874	22,609	24,644	24,940	24,464	24,606
FOM	0.4842	0.4912	0.4835	0.4919	0.5175	0.5217	0.4864	0.4814	0.4885	0.4852

As can be seen, the Scenario 6 has the highest uncorrelated FOM, with a similar number of drivers than other scenarios. These are the reasons why we have chosen the Prediction Map from Scenario 6.

Map 14. Prediction Map of Scenario 6 of projected deforestation until year 2008



Map 15. Real Deforestation Map in RRL until year 2008



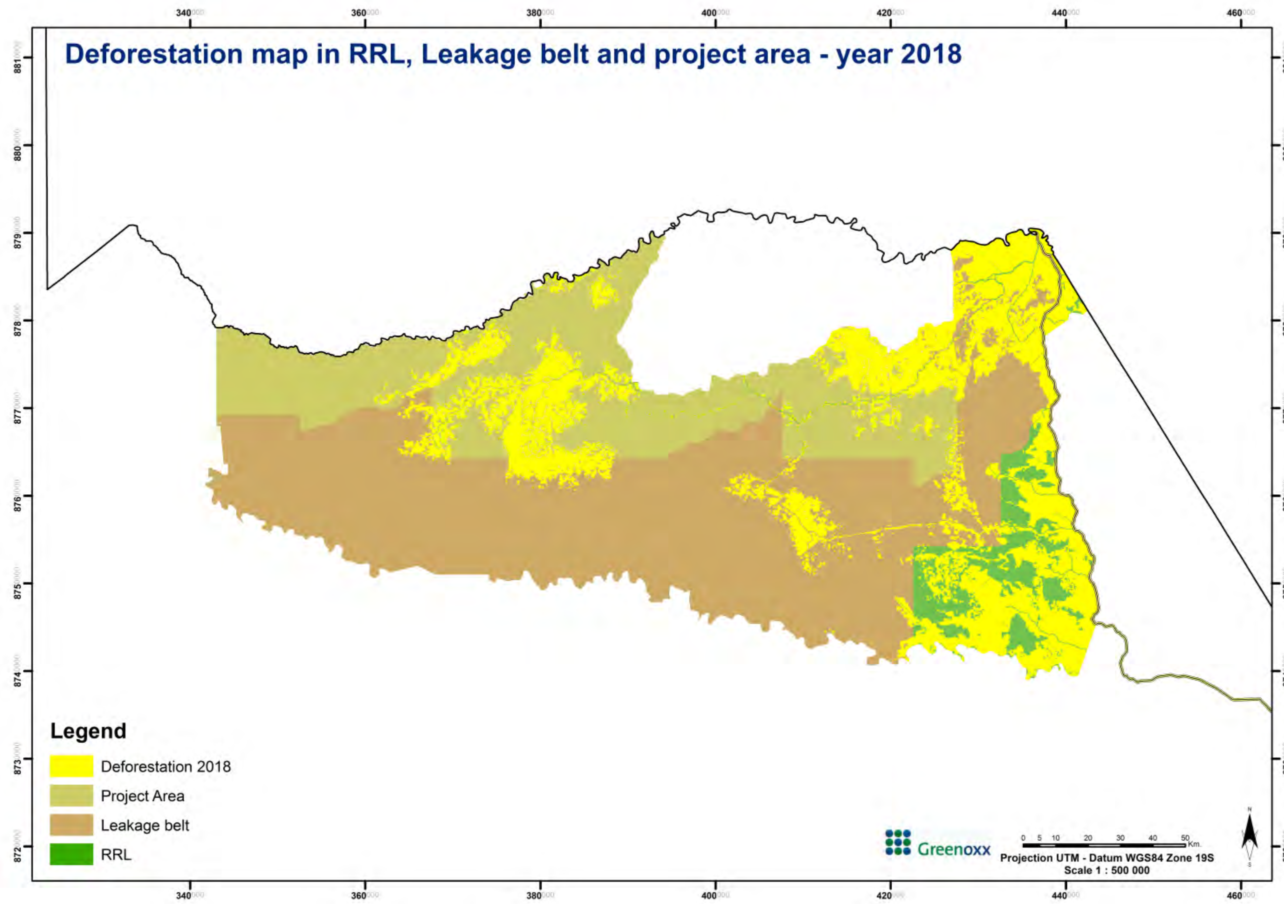
Step 3.4 Mapping of the locations of future deforestation

3.4.2 Where location analysis has been conducted

The model allocates land use change from forest to non-forest to pixels with the highest deforestation risk value, based on the deforestation Risk Map, as much as necessary to cover the amount of hectares to be deforested. A map of baseline deforestation for year 1 is generated by the software in raster file for the whole Reference Region.

This process is repeated yearly for the whole crediting period. With all this information a table of deforested area in the baseline scenario for the first baseline period and the whole crediting period for the Project Area and the Leakage Belt per forest strata can be extracted and produced.

Map 16. Projected Deforestation in the Reference Region, Project Area and Leakage Belt for the Baseline Period



The resulting areas to be deforested in the project boundaries PA and LB can be seen in the following tables:

Table 29. Projected areas of deforestation in Project Area

Annual areas deforested in each forest class within the Project Area									
Strata i			**Hilly forests**	**Terrace forests**	**Bamboos**	**Others**	**Tree swamps**		**SUM**
T	Year	Ha	ha	ha	ha	ha	ha	ha	Cumulative
1	2009		1,718.5	522.8	55.5	5.0			2,301.7
2	2010		3,212.1	1,348.5	263.6	6.6			4,830.8
3	2011		4,452.7	2,202.9	669.9	7.1			7,332.6
4	2012		5,561.2	2,807.8	1,177.1	7.6			9,553.7
5	2013		6,642.5	3,445.5	1,703.4	13.6			11,805.0
6	2014		7,858.4	3,916.9	2,129.3	13.6			13,918.2
7	2015		9,151.9	4,263.7	2,500.8	15.1			15,931.6
8	2016		10,463.1	4,592.4	2,843.1	20.2			17,918.7
9	2017		11,865.0	4,858.5	3,175.3	27.2			19,926.1
10	2018		13,347.6	5,164.0	3,441.0	30.2			21,982.8

Table 30. Projected areas of deforestation in Leakage Belt

Area deforested in each forest classes within the Leakage Belt									
Strata i		-	Hilly forests	Terrace forests	Bamboos	Others	Tree swamps	-	SUM
t	Year	ha	ha	ha	ha	ha	ha	ha	Cumulative
1	2009		1,324.27	283.81	1.01	117.46	3.53		1,730.07
2	2010		2,224.59	467.30	6.55	256.59	3.53		2,958.56
3	2011		2,999.40	701.20	70.57	406.30	3.53		4,181.01
4	2012		3,959.71	941.15	198.11	468.81	3.53		5,571.31
5	2013		4,746.61	1,230.00	376.06	554.51	8.07		6,915.24
6	2014		5,566.27	1,566.24	617.02	619.54	8.07		8,377.13
7	2015		6,468.61	1,903.99	829.24	697.67	8.07		9,907.58
8	2016		7,340.70	2,275.00	1,028.36	740.02	10.08		11,394.17
9	2017		8,284.38	2,634.43	1,198.75	775.81	10.08		12,903.45
10	2018		9,157.98	3,002.92	1,302.59	807.57	10.08		14,281.15

For the whole crediting period, the deforested area in the baseline scenario is 54,075.3 ha for the Project Area and 58,526.0 ha for the Leakage Belt.

PART 4: ESTIMATION OF CHANGES IN CARBON STOCKS AND GHG

Step 4.1 Stratification

Pre-Deforestation Strata (forest strata)

Stratification has been based on the original Forest Stratification developed by IIAP and Regional Government of Madre de Dios for the Ecological Economic Zoning. These strata have been grouped by similarity obtaining no more than 10 strata, according to GOFC-GOLD Sourcebook. The applicability criteria for using this pre-existing stratification and further detail can be found in X-STR module. The final Forest Strata for the Project Area is:

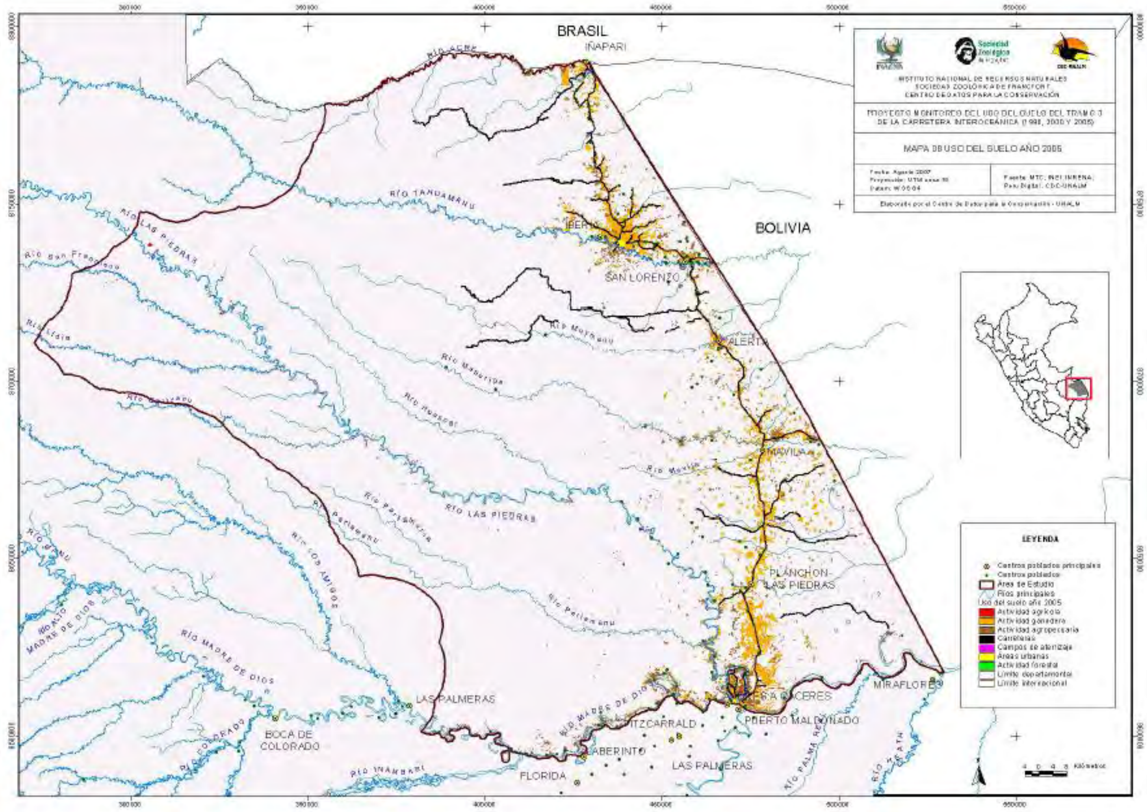
Table 31. Forest Strata in Madre de Dios REDD Project Area

i	STRATA	Code	Project Area
1	Hilly forests		79,290.19
2	Terrace forests		9,845.75
3	Others		130.59
4	Bamboos		8,550.87
5	Tree swamps		0.00
Total Area (ha)			**97,817.41**

Post-Deforestation Strata

To determine the post deforestation land uses, the results of the study made of the land use changes over the Stretch 3 of the IOH (CDC-SZF-INRENA, 2007)[90] have been analyzed. This study was carried out using the methodology developed by the same authors for the monitoring of the Peruvian south west Protected Natural Areas, and covers an area of 2’660,654 hectares, including the provinces of Tahuamanu and Tambopata. The period analyzed was 1990-2000-2005 and the images used for this purpose were Landsat (years 1990, 2000 and 2005) and additional CBERS images for year 2005.

Map 18. Land use Map, 2005. Monitoring Study



In the next chart, monitoring results are shown, being established the degree of land use change for those years (1990, 2000 and 2005). It must be mentioned that agriculture is focused on areas near roads and river sands. Farming was established by the study as the class combining agricultural activities and livestock, because the image could not determine if the areas were destined to crops or pastures, or in many cases, because they were both present in the area.

[90] CDC-UNALM, SZF, INRENA, 2007. Monitoreo del uso del Suelo entre Puerto Maldonado e Iñapari, correspondiente al tramo 3 de la carretera interoceánica para los años 1990,2000 y 2005. Lima, 45p. Available in http://www.ibcperu.org/doc/isis/11992.pdf

Table 32. Results of the monitoring of post-deforestation land uses in stretch 3 of IOH

	1990	2000	2005	Var. %
Forest	2,516,202	2,470,645	2,452,195	
Deforestation	56,795	102,197	120,783	
- Agriculture	949	3,587	4,074	**3.37%**
- Pastures (cattle ranching)	15,493	50,814	64,897	**53.73%**
- Farming	39,477	45,965	48,886	**40.47%**
- Infrastructure	876	1,831	2,926	**2.42%**

Source: CDC-SZF-INRENA, 2007. Own elaboration

The trend of land use change in the post-deforestation scenario, evaluated in the mentioned study in an area surrounding our project area, can let us infer that human activities are the cause of deforestation and that they are increasing permanently every year. Table shows that grazing is the activity with the fastest growth rate duplicating its participation as a deforestation driver from 27% in 1990 to 54% in 2005, while farming has reduced their explanatory power from 70% to only 40%, accumulated at 2005.

Data for year 1990 shows that Farming was the most common activity, followed by cattle ranching and agriculture. In year 2000, the three activities grew very much (more than three times for agriculture and cattle ranching). For year 2005, both activities kept the growth of their lands but not so rapidly as in the previous period.

It was decided to use the data for year 2005 as the most actual information available, and as it is accumulated deforestation, it represents the general trend of the whole deforestation in Madre de Dios. It is very clear that grazing is the most representative activity of the deforested areas, and is the only one that grows at a positive rate.

Its representativeness can be verified with data from production areas of main crops for year 2007 in Tahuamanu and Tambopata provinces. For this reason, it was considered valid to use the percentages of the presented monitoring study.

Table 33. Production Areas of main crops in Madre de Dios (2007)

Crops	area	%
Pastures	15,673.00	60.84
Hask rice	4,278.20	16.61
Yellow corn (hard)	4,149.02	16.11
Frijol grano seco	544.50	2.11
vegetable	88.52	0.34
cassava/ manioc	889.25	3.45
Others (sweat potato,waermelon, soy)	138.25	0.54
Total	**25,760.74**	**100**
Source: Agricultural Agency of Madre de Dios		

Then, the list of the final likely post-deforestation land-uses is presented following:

- Agriculture	:	3.37%	100.0 % for the agrarian strata (CO+ and CO-)
- Pastures (Cattle Ranching)	:	53.73%	
- Farming	:	40.47%	
- Infrastructure (*)	:	2.42%	
(*) Increase of urban areas, highways			

A. **Step 4.2 Estimation of carbon stocks and changes per stratum**

B. ***4.2.1 Carbon Stocks of the forest***

The equation used to calculate the carbon stocks in the forest strata is:

$$C_{BSL} = C_{AB\_tree,i} + C_{BB\_tree,i} + C_{AB\_non\text{-}tree,i} + C_{BB\_non\text{-}tree,i} + C_{DW,i} + C_{LI,i} + C_{SOC,i} \qquad (16)$$

Where:

C_{BSL}	Carbon stock in all carbon pools in forest stratum *i*; t CO_2-e ha^{-1}
$C_{AB\_tree,i}$	Carbon stock in aboveground tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{BB\_tree,i}$	Carbon stock in belowground tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{AB\_non\text{-}tree,i}$	Carbon stock in aboveground non-tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{BB\_non\text{-}tree,i}$	Carbon stock in belowground non-tree biomass in forest stratum *i*; t CO_2-e ha^{-1}
$C_{DW,i}$	Carbon stock in dead wood in stratum *i*; t CO_2-e ha^{-1}
$C_{LI,i}$	Carbon stock in litter in the forest stratum *i*; t CO_2-e ha^{-1}
$C_{SOC,i}$	Carbon stock in soil organic carbon in the forest stratum *i*; t CO_2-e ha^{-1}
i	1,2,3,…. *M* strata

As mentioned in T-SIG module, non-tree biomass, litter and dead wood are insignificant based on Carbon Inventories from Belgium Native Community. For this reason, these pools were conservatively omitted. Soil organic carbon was also omitted, therefore only above- and below-ground tree biomasses are being considered for the present project.

Carbon stocks for each stratum are presented in the following table:

Table 34. Carbon Stocks per forest strata

Name	***Above Ground*** t CO_2-e ha^{-1}	***Below Ground*** t CO_2-e ha^{-1}	$C_{BSL,i}$ t CO_2-e ha^{-1}
Hilly forests	407.34	97.76	505.10
Terrace forests	441.78	106.03	547.81
Others	--	--	--
Bamboos	487.48	117.00	604.48
Tree Swamps	438.24	105.18	543.42

4.2.2 Estimation of post-deforestation carbon stocks

The simple approach (Option 1) was used to estimate the post-deforestation carbon stocks. For this purpose, the following steps were undertaken:

The list of likely post-deforestation land uses is already given in step 4.1.

To establish the carbon stocks for each post-deforestation land use, information from several studies[91] made in the Peruvian Amazon was gathered and compared. The information provided in the Agricultural National Census of 2007 was also checked, and based on the cultivated area of each crop (table 33), it was established that the main crops of the region were Rice and Corn (preferred for having more carbon stock), and that the most common pasture was *Brachiaria decumbens.*

The following values were determined for each land use class:

Table 35. Carbon Stocks per post-deforestation strata

ID	**Name**	$C_{post,i}$ t CO_2-e ha^{-1}
DP	Deforestation for Pastures	18.63
DF	Deforestation for Farming	31.75
DI	Deforestation by Infrastructure	0.0
DA	Deforestation by Agriculture (Corn)	31.75
DM	Deforestation by Illegal Mining	0.0

Given that Farming carbon stock can´t be calculated directly because it is an activity that combines in different proportions agriculture and pastures, determined so by the CDC-SZF-INRENA, corn carbon stock was used as a proxy because it is the biggest stock when compared to pastures', having in this way a more conservative result and being consistent with option 1 of the methodology.

Step 4.3 Estimation of the sum of baseline carbon stock changes

Based on land use change from initial forest strata to final post-deforestation land uses, and considering the changes in respective stocks, we estimated the total change in carbon stocks for the reference period of the Project Area and Leakage Belt.

The equations used for that end are:

$$\Delta C_{TOT} = C_{BSL} - C_{post} - C_{wp} \quad (18)$$
$$C_{BSL} = \sum\sum ((C_{BSL,i)} * A_{unplanned,i,t}) \quad (19)$$
$$C_{post} = \sum\sum ((C_{post,i)} * A_{unplanned,i,t}) \quad (20)$$

Where:

ΔC_{TOT} Sum of the baseline carbon stock change in all pools up to time *t**; t CO_2-e
C_{BSL} Total forest carbon stock in areas deforested; t CO_2-e
C_{post} Total post-deforestation carbon stock in areas deforested; t CO_2-e
C_{wp} Total carbon stock in harvested wood products; t CO_2-e
$C_{BSL,i}$ Carbon stock in all carbon pools in the forest stratum *i*; t CO_2-e
$A_{unplanned,i,t}$ Area of unplanned deforestation in forest stratum *i* at time *t*; ha
$C_{post,i}$ Carbon stock in all carbon pools in the post-deforestation stratum *i*; t CO_2-e
$A_{unplanned,i,t}$ Area of unplanned deforestation in post-deforestation stratum *i* at time *t*; ha
t 1,2,3,… *t* years elapsed since the projected start of the REDD project activity
I 1,2,3, …. *M* strata

The cumulative results for Project Area are: at the end of crediting period (2046) is equal to 28,205,752 t CO_2; and equal to 11,650,712 t CO_2 for the first 10 years.
The cumulative results for Leakage Belt are: at the end of crediting period (2046) is equal to 29,914,834 t CO_2; and equal to 7,063,576 t CO_2 for the first 10 years.

The results for all the years in the baseline period are presented in the following tables for Project Area and Leakage Belt:

[91] Alegre, J. Arevalo, L. Ricse, A. Reservas de Carbono según el uso de la tierra en dos sitios de la Amazonia Peruana. Agroforestería para la Producción Animal en América Latina - II - Memorias de la Segunda Conferencia Electrónica (Agosto de 2000-Marzo de 2001) FAO.

Table 36. Total Forest Carbon stock in areas deforested in Project Area

Carbon stock changes in initial (pre-deforestation) forest classes in Project Area																**Total C stock change in initial forests**	
Strata i		**0**		**Hilly forests**		**Terrace forests**		**Bamboos**		**Others**		**Tree swamps**		**0**		Cumulative	Annual
T	Year	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
1	2009	-	-	1,718	867,997	523	286,370	55	33,519	5	-	-	-	-	-	1,187,886	1,187,886
2	2010	-	-	3,212	1,622,434	1,348	738,707	264	159,367	7	-	-	-	-	-	2,520,509	1,332,623
3	2011	-	-	4,453	2,249,053	2,203	1,206,786	670	404,969	7	-	-	-	-	-	3,860,807	1,340,298
4	2012	-	-	5,561	2,808,960	2,808	1,538,168	1,177	711,514	8	-	-	-	-	-	5,058,642	1,197,836
5	2013	-	-	6,643	3,355,119	3,446	1,887,501	1,703	1,029,638	14	-	-	-	-	-	6,272,258	1,213,615
6	2014	-	-	7,858	3,969,261	3,917	2,145,703	2,129	1,287,124	14	-	-	-	-	-	7,402,088	1,129,830
7	2015	-	-	9,152	4,622,614	4,264	2,335,696	2,501	1,511,700	15	-	-	-	-	-	8,470,010	1,067,922
8	2016	-	-	10,463	5,284,879	4,592	2,515,747	2,843	1,718,603	20	-	-	-	-	-	9,519,229	1,049,219
9	2017	-	-	11,865	5,992,975	4,859	2,661,556	3,175	1,919,411	27	-	-	-	-	-	10,573,942	1,054,713
10	2018	-	-	13,348	6,741,811	5,164	2,828,904	3,441	2,079,997	30	-	-	-	-	-	11,650,712	1,076,769

Table 37. Total post-deforestation carbon stock in areas deforested in Project Area

Carbon stock changes in final (post-deforestation) non forest classes in Project Area												Total C stock change in final post-deforestation classes	
Strata f		Deforestation for Pastures		Deforestation for Farming*		Deforestation for Agriculture (Corn)		Deforestation for Infrastructure				Cumulative	Annual
t	Year	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
1	2009	1,237	23,040	932	29,578	78	2,465	55	-	-	-	55,083	55,083
2	2010	2,596	48,356	1,955	62,078	163	5,173	116	-	-	-	115,608	60,524
3	2011	3,940	73,399	2,968	94,229	247	7,853	177	-	-	-	175,481	59,873
4	2012	5,133	95,632	3,867	122,771	322	10,231	230	-	-	-	228,634	53,153
5	2013	6,343	118,168	4,778	151,701	398	12,642	284	-	-	-	282,511	53,877
6	2014	7,478	139,320	5,633	178,857	469	14,905	335	-	-	-	333,083	50,572
7	2015	8,560	159,474	6,448	204,730	537	17,062	384	-	-	-	381,266	48,183
8	2016	9,628	179,366	7,252	230,266	604	19,190	432	-	-	-	428,821	47,556
9	2017	10,706	199,459	8,065	256,061	672	21,339	480	-	-	-	476,859	48,038
10	2018	11,811	220,047	8,897	282,491	741	23,542	530	-	-	-	526,080	49,220

Table 38. Sum of the baseline carbon stock change in all pools in Project Area

Classes		Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change in Project Area	
		cumulative	annual	cumulative	annual	annual	cumulative
t	Year	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e	tCO_2-e	tCO_2-e
1	2009	1,187,886	1,187,886	55,083	55,083	1,132,803	1,132,803
2	2010	2,520,509	1,332,623	115,608	60,524	1,272,098	2,404,901
3	2011	3,860,807	1,340,298	175,481	59,873	1,280,425	3,685,326
4	2012	5,058,642	1,197,836	228,634	53,153	1,144,682	4,830,009
5	2013	6,272,258	1,213,615	282,511	53,877	1,159,738	5,989,747
6	2014	7,402,088	1,129,830	333,083	50,572	1,079,258	7,069,005
7	2015	8,470,010	1,067,922	381,266	48,183	1,019,739	8,088,745
8	2016	9,519,229	1,049,219	428,821	47,556	1,001,663	9,090,408
9	2017	10,573,942	1,054,713	476,859	48,038	1,006,675	10,097,083
10	2018	11,650,712	1,076,769	526,080	49,220	1,027,549	11,124,632

Table 39. Total Forest Carbon stock in areas deforested in Leakage Belt

Carbon stock changes in initial (pre-deforestation) forest classes in Leakage Belt																**Total C stock change in initial forests**	
Strata i		**-**		**Hilly forests**		**Terrace forests**		**Bamboos**		**Others**		**Tree swamps**		**-**		Cumulative	Annual
T	Year	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
1	2009	0	0	1,324	668,885	284	155,474	1	609	117	0	4	1,918	0	0	826,886	826,886
2	2010	0	0	2,225	1,123,635	467	255,993	7	3,961	257	0	4	1,918	0	0	1,385,507	558,621
3	2011	0	0	2,999	1,514,985	701	384,128	71	42,660	406	0	4	1,918	0	0	1,943,691	558,184
4	2012	0	0	3,960	2,000,035	941	515,576	198	119,754	469	0	4	1,918	0	0	2,637,282	693,592
5	2013	0	0	4,747	2,397,496	1,230	673,812	376	227,319	555	0	8	4,383	0	0	3,303,009	665,727
6	2014	0	0	5,566	2,811,507	1,566	858,005	617	372,973	620	0	8	4,383	0	0	4,046,868	743,859
7	2015	0	0	6,469	3,267,275	1,904	1,043,027	829	501,259	698	0	8	4,383	0	0	4,815,945	769,076
8	2016	0	0	7,341	3,707,767	2,275	1,246,275	1,028	621,622	740	0	10	5,479	0	0	5,581,143	765,198
9	2017	0	0	8,284	4,184,414	2,634	1,443,172	1,199	724,617	776	0	10	5,479	0	0	6,357,681	776,538
10	2018	0	0	9,158	4,625,669	3,003	1,645,039	1,303	787,388	808	0	10	5,479	0	0	7,063,576	705,894

Table 40. Total post-deforestation carbon stock in areas deforested in Leakage Belt

Carbon stock changes in final (post-deforestation) non forest classes in Leakage Belt												Total C stock change in final post-deforestation classes	
Strata f		Deforestation for Pastures		Deforestation for Farming*		Deforestation for Agriculture (Corn)		Deforestation for Infrastructure				Cumulative	Annual
t	Year	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
1	2009	930	17,318	700	22,232	58	1,853	42	-	0	-	41,403	41,403
2	2010	1,590	29,615	1,197	38,019	100	3,168	71	-	0	-	70,803	29,400
3	2011	2,246	41,852	1,692	53,728	141	4,478	101	-	0	-	100,057	29,255
4	2012	2,993	55,769	2,255	71,595	188	5,966	134	-	0	-	133,330	33,272
5	2013	3,716	69,221	2,799	88,865	233	7,406	167	-	0	-	165,492	32,162
6	2014	4,501	83,855	3,391	107,651	283	8,971	202	-	0	-	200,477	34,985
7	2015	5,323	99,174	4,010	127,318	334	10,610	239	-	0	-	237,103	36,626
8	2016	6,122	114,055	4,612	146,422	384	12,202	275	-	0	-	272,679	35,576
9	2017	6,933	129,163	5,223	165,817	435	13,819	311	-	0	-	308,798	36,119
10	2018	7,673	142,954	5,780	183,521	482	15,294	344	-	0	-	341,769	32,970

Table 41. Sum of the baseline carbon stock change in all pools in Leakage Belt

Classes		Total C stock change in initial forests		Total C stock change in final post-deforestation classes		Total baseline carbon stock change in Leakage Belt	
		Cumulative	Annual	Cumulative	Annual	Annual	Cumulative
t	Year	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e	tCO_2-e	tCO_2-e
1	2009	826,886	826,886	41,403	41,403	785,483	785,483
2	2010	1,385,507	558,621	70,803	29,400	529,222	1,314,704
3	2011	1,943,691	558,184	100,057	29,255	528,929	1,843,633
4	2012	2,637,282	693,592	133,330	33,272	660,320	2,503,953
5	2013	3,303,009	665,727	165,492	32,162	633,564	3,137,517
6	2014	4,046,868	743,859	200,477	34,985	708,874	3,846,391
7	2015	4,815,945	769,076	237,103	36,626	732,451	4,578,842
8	2016	5,581,143	765,198	272,679	35,576	729,622	5,308,464
9	2017	6,357,681	776,538	308,798	36,119	740,419	6,048,883
10	2018	7,063,576	705,894	341,769	32,970	672,924	6,721,807

4.4 Estimation of the sum of baseline greenhouse gas emissions

The emissions of GHG as a consequence of deforestation activities within the project area in baseline, are determined according to module by the sum of CO_2 emissions of the combustion of fossil fuel by stratum each year, the greenhouse gas emissions different to CO_2 by biomass burnt by stratum per year and the direct emissions of N_2O by application of nitrogen within the project area.

$$GHG_{BSL,E} = \sum\sum (E_{FC,i,t} + E_{BiomassBurn,i,t} + N_2O_{direct\text{-}N,i,t}) \qquad (22)$$

Where:

$GHG_{BSL,E}$	Greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline; t CO_2-e
$E_{FC,i,t}$	CO_2 emission from fossil fuel combustion in stratum *i* in year *t*; t CO_2-e
$E_{BiomassBurn,i,t}$	Non- CO_2 emissions due to biomass burning as part of deforestation activities in stratum *I* in year *t*; t CO_2-e
$N_2O_{direct\text{-}N,i,t}$	Direct N_2O emissions as a result of nitrogen application on the alternative land use within the project boundary in stratum *i* in year *t*, t CO_2-e

Emissions of CO_2 by combustion of fossil fuel

The estimation of CO_2 by combustion of fossil fuel, according to module E-FFC is optional. However, its quantification is proposed if CO_2 emissions of combustion of fossil fuel with project are larger than the estimated emissions in baseline.

There is no information about the number of machinery, equipment, trucks, etc. that would be incorporated annually as a consequence of agriculture or farming activities during baseline (after deforestation) in the project area. In the other hand, there is strong evidence that these activities are carried in self-consumption/ small-scale way[92], which is supposed to minimally use fuel consuming' machinery. Therefore, it was decided not to measure the variable. This is a conservative approach. Likewise, the module indicates that fossil fuel is an optional source of emission.

Emissions of N_2O due to nitrogen application

No application of fertilizers is supposed in the post-deforestation activities given their traditional management.

Emissions of other GHG by biomass burning

The estimation of burnt biomass has been developed according to module E-BB, and has accounted for: conversion of forest land into non-forest land using fire and periodic burning of agriculture lands after harvest season.

In reference to the burning of forest biomass, it has been estimated that 55% of the deforested area is burnt in the field[93] for the development of any of the post-deforestation activities. In case of post-deforestation activities, it was defined that only agricultural lands would be burned in spite of the local knowing that pasture lands are also burned each year. This was established in order to be conservative.

The carbon stock emissions due burning are already included in the previous step and thus, they were not accounted in this step. The emissions of GHG are therefore represented by the liberation of CH_4 or N_2O.

The entire procedure is presented in E-BB module, and the results for GHG emissions in the baseline period for PA are 294,528 t CO_2-e, combining forest and agriculture burning.

[92] More details in REDD-MF module.
[93]Ministry of Environment, 2000. Map of deforestation in the Peruvian Amazon, Chapter 4.

Table 42. GHG Emissions (CH_4 and N_2O) due to forest burning in Project Area as part of deforestation activities

		GHG emissions due to biomass burning in forest strata as part of deforestation activities inside Project Area											
		Biomass Burnt per Forest Strata = Area (ha) x 0.55* x AG biomass (t/ha)**								**Total GHG Emissions**			
Strata i		**0**	**Hilly forests**	**Terrace forests**	**Bamboos**	**Others**	**Tree swamps**	**0**	**Total**	**CH_4**		**N_20**	
AG Biomass t/ha		**-**	**226.72**	**245.89**	**271.33**	**-**	**243.92**	**-**	Cumulative	Cumulative	Annual	Cumulative	Annual
T	Year	T	t	t	t	t	t	t	t	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e
1	2009	-	214,285	70,697	8,275	-	-	-	293,257	20,939	20,939	9,091	9,091
2	2010	-	400,535	182,367	39,343	-	-	-	622,245	44,428	23,490	19,289.61	10,199
3	2011	-	555,230	297,923	99,976	-	-	-	953,129	68,053	23,625	29,547	10,257
4	2012	-	693,456	379,732	175,653	-	-	-	1,248,842	89,167	21,114	38,714	9,167
5	2013	-	828,288	465,973	254,190	-	-	-	1,548,451	110,559	21,392	48,002	9,288
6	2014	-	979,903	529,716	317,756	-	-	-	1,827,375	130,475	19,915	56,649	8,647
7	2015	-	1,141,198	576,620	373,198	-	-	-	2,091,016	149,299	18,824	64,822	8,173
8	2016	-	1,304,694	621,070	424,277	-	-	-	2,350,040	167,793	18,494	72,851	8,030
9	2017	-	1,479,503	657,066	473,851	-	-	-	2,610,420	186,384	18,591	80,923	8,072
10	2018	-	1,664,371	698,380	513,495	-	-	-	2,876,245	205,364	18,980	89,164	8,241

Table 42. GHG emissions (CH_4 and N_2O) due to biomass burn in agriculture in Project Area

GHGs Emissions from Biomass Burning (from Agricultural wastes) in Project Area						
		Burnt Areas*	**CH_4**		**N_20**	
			Cumulative	Annual	Cumulative	Annual
T	Year	ha	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e
1	2009	77.6	58.89	58.89	22.54	22.54
2	2010	162.9	123.60	64.71	47.31	24.77
3	2011	247.3	187.62	64.01	71.80	24.50
4	2012	322.2	244.45	56.83	93.55	21.75
5	2013	398.2	302.05	57.60	115.60	22.05
6	2014	469.5	356.12	54.07	136.29	20.69
7	2015	537.4	407.64	51.52	156.01	19.72
8	2016	604.4	458.48	50.84	175.47	19.46
9	2017	672.1	509.84	51.36	195.12	19.66
10	2018	741.5	562.47	52.62	215.26	20.14

Step 4.5 Calculation of net emissions

The previous calculations are summarized with the following equations:

$$\Delta C_{BSL,unplanned} = \Delta C_{BSL,PA,unplanned} + GHG_{BSL,E} \quad (23)$$
$$\Delta C_{BSL,PA,unplanned} = \Delta C_{TOT,PA} \quad (24)$$
$$\Delta C_{BSL,LK,unplanned} = \Delta C_{TOT,LB} \quad (25)$$

Where:

$\Delta C_{BSL,unplanned}$ Net greenhouse gas emissions in the baseline from unplanned deforestation; t CO_2-e
$\Delta C_{BSL,PA,unplanned}$ Net CO_2 emissions in the baseline from unplanned deforestation in the project area; t CO_2-e
$\Delta C_{BSL,LK,unplanned}$ Net CO_2 emissions in the baseline from unplanned deforestation in the leakage belt ; t CO_2-e
$GHG_{BSL,E}$ Greenhouse gas emissions as a result of deforestation activities within the project boundary in the baseline; t CO_2-e
$\Delta C_{TOT,PA}$ Sum of the baseline carbon stock change in all pools up to time *t**in the project area, t CO_2-e
$\Delta C_{TOT,LB}$ Sum of the baseline carbon stock change in all pools up to time *t**in the leakage belt, t CO_2-e

The total net GHG emissions in the Project Area in the baseline from unplanned deforestation are 11,419,936.96 t CO_2-e (baseline period), and 27,626,600.19 t CO_2-e for the entire crediting period.

For Leakage Belt, the values found for $\Delta C_{BSL,LK,unplanned}$ will be used in LK-ASU module for subsequent calculations. As it is equal to $\Delta C_{TOT,LB}$ the results are already presented in Table 41.

The Final result for the emissions in Project Area can be seen in the next table:

Table 43. Total of Equivalent CO_2 in the Project Area

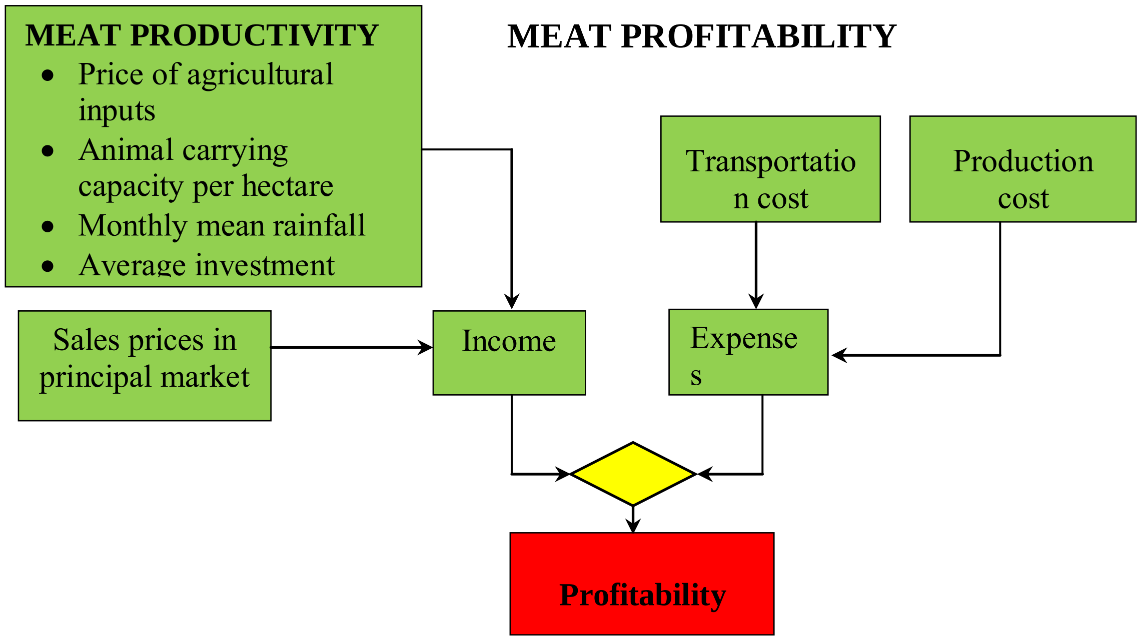
T	Year	Total Sum of carbon stock change in baseline (t CO_2) $\Delta C_{BSL,PA,unplanned}$	Greenhouse Gas Emissions in the Project Area in baseline (t CO_2 -e) $GHG_{BSL,E}$	Net GHG Emissions in the Baseline from Unplanned Deforestation Cumulative (t CO_2 -e) $\Delta C_{BSL,unplanned}$
1	2009	1,132,802.58	30,110.94	1,162,913.52
2	2010	2,404,900.87	63,888.84	2,468,789.71
3	2011	3,685,326.09	97,859.80	3,783,185.89
4	2012	4,830,008.58	128,219.42	4,958,227.99
5	2013	5,989,746.92	158,979.01	6,148,725.93
6	2014	7,069,005.23	187,615.63	7,256,620.86
7	2015	8,088,744.51	214,683.71	8,303,428.23
8	2016	9,090,407.74	241,278.05	9,331,685.79
9	2017	10,097,082.67	268,011.99	10,365,094.66
10	2018	11,124,631.69	295,305.26	11,419,936.96

It must be remained that future deforestation will be monitored permanently following the procedures described in M-MON module, which follows the technical parameters that have been used by IIAP during the preparation of historic reference period maps. These results will be compared with deforested areas in baseline scenario to calculate the real net emission reductions generated by the project.

In addition, baseline will be reviewed at year 10, according with methodology requirements.

ANNEX 1. OPPORTUNITY COST STRATA DEFINITION

Field interviews were applied to rural families with corn crops and cattle ranching, requesting a large set of variables, including economic factors (productivity, area, sales, purchases, inputs, density, labor, investment and credit), climatic factors (rainfall, soil, relief) and spatial factors (as distance to roads, distance to rivers, distance to settlements and transportation costs). All these variables were econometrically analyzed to build the fittest equation of productivity for each product (meat and corn). In the case of meat, the sample has a confidence interval of 90% and margin of error of 10%. In the case of corn, families with different plot sizes from all the districts of Madre de Dios were randomly interviewed. Results and final variables selected are presented below:



Where,

$$Rent_{carne} = P_{carne} \times Y_{carne} - CP_{carne} - CT_{carne} \times Y_{carne}$$

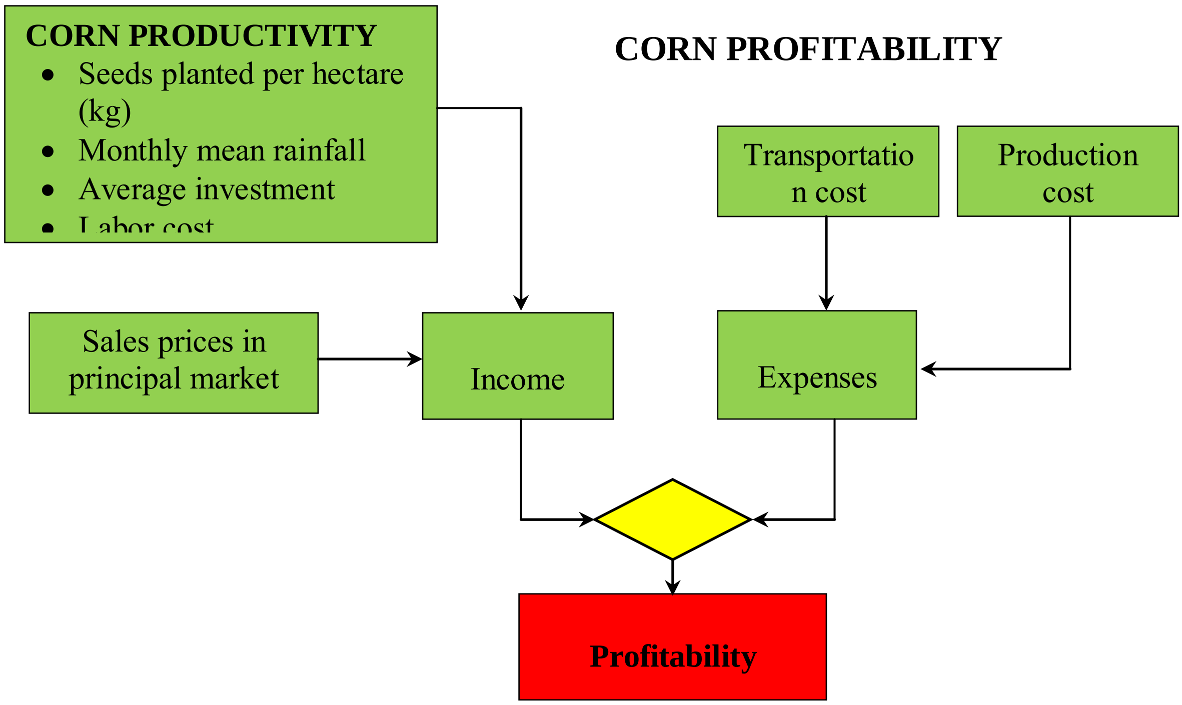
$$\ln Y_{carne} = \beta_0 + \beta_1(lg\ input_{carne}) + \beta_2(density_{carne}) + \beta_3(precip_{carne}) + \beta_4(lg\ invest_{carne}) + \beta_5\left(dist_{viasAfirm_i}\right) + \mu_i$$

Table 1: Inputs used for the calculation of Meat Profitability

Input	Value	Source
P_{carne}	4473 US$/ton	Aguilar (2007)
Y_{carne}	Equation yield Meat	Fleck et al (2010)
CP_{carne}	61 US$/ha	Field work CSF (2010)

Table 2: Inputs used for the calculation of Meat Productivity

Input	Description	Data Type	Source
lgninput_carne	Logarithm of the mean price of agricultural inputs (soles/ha)	Mean value 4.07	Field work CSF (2008)
Density_carne	Mean values animal carrying capacity (head/ha)	Mean value 1.456	Field work (2008)
Precip_carne	Monthly mean rainfall 1996-2001 (mm)	Spatial layer	CPTEC-INPE (2001)
lginvest_carne	Logarithm of the average values investment (soles/ha)	Mean value 6.20	Field work CSF (2008)
Dist_viasAfirm	Distance of roads (Km)	Spatial layer	ZEE GOREMAD (2008)



Where,

$Rent_{ma\,z} = P_{ma\,z} \times Y_{ma\,z} - CP_{ma\,z} - CT_{ma\,z} \times Y_{ma\,z}$
$Y_{ma\,z} = \beta_0 + \beta_1(seed_{ma\,z}) + \beta_2(precip_{ma\,z}) + \beta_3(income_{ma\,z}) + \beta_4(labor_{ma\,z}) + \beta_5(pH_{ma\,z}) + \mu_i$

Table 3: Inputs used for the calculation of Meat Profitability

Input	Value	Source
P_{maiz}	166 US$/ton	MINAG (2008)
Y_{maiz}	Equation yield	Fleck et al (2010)
CP_{maiz}	Average value per district	Field work CSF (2008)

Table 4: Inputs used for the calculation of Corn Productivity

Input	Description	Data Type	Source
$seed_{maiz}$	Value mean of the seed planted in Kg/ha at district level	Raster	Field work CSF (2008)
$precip_{maiz}$	Monthly mean rainfall 1996-2001 (mm)	Raster	CPTEC-INPE (2001)
$income_{maiz}$	Average value investment in soles at district level	Raster	Field work CSF (2008)
$Labor_{maiz}$	Average value labor cost in soles/ha at district level	Raster	Field work CSF (2008)
pH_{maiz}	pH Values	Raster	ISRIC (1998)

Once the two Profitability Maps are built in raster format, a comparison at a pixel level is made and the highest profitability between both products is selected, forming the Opportunity Cost Map. This is possible given that there is a value of meat's profitability and corn's profitability for each pixel.

$$\boldsymbol{CO = Rent_{max}\{Carne, Ma\,z\}}$$

Where,

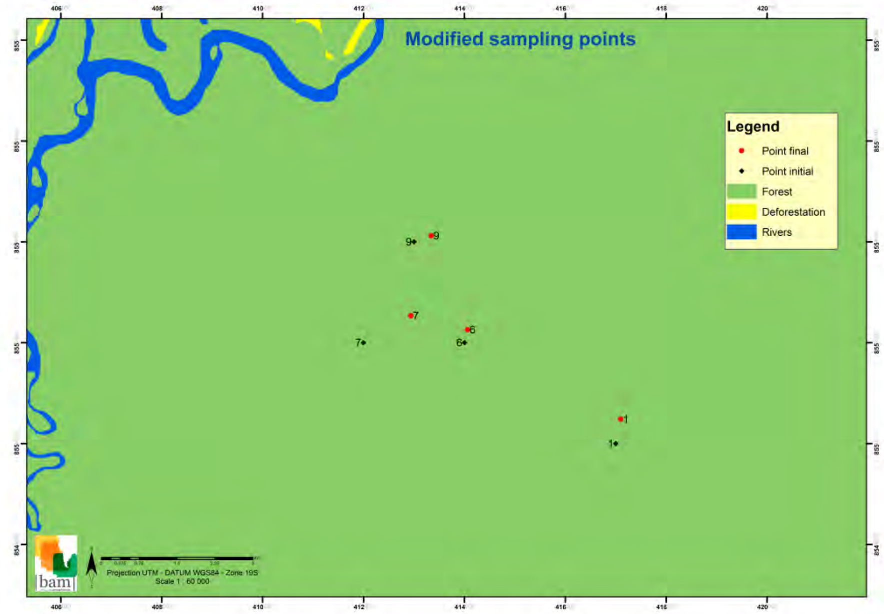
CO	Opportunity Cost
$Rent_{max}$	Maximum Profitability
Carne	Meat, referred to the profitability of meat
Maíz	Corn, referred to the profitability of corn

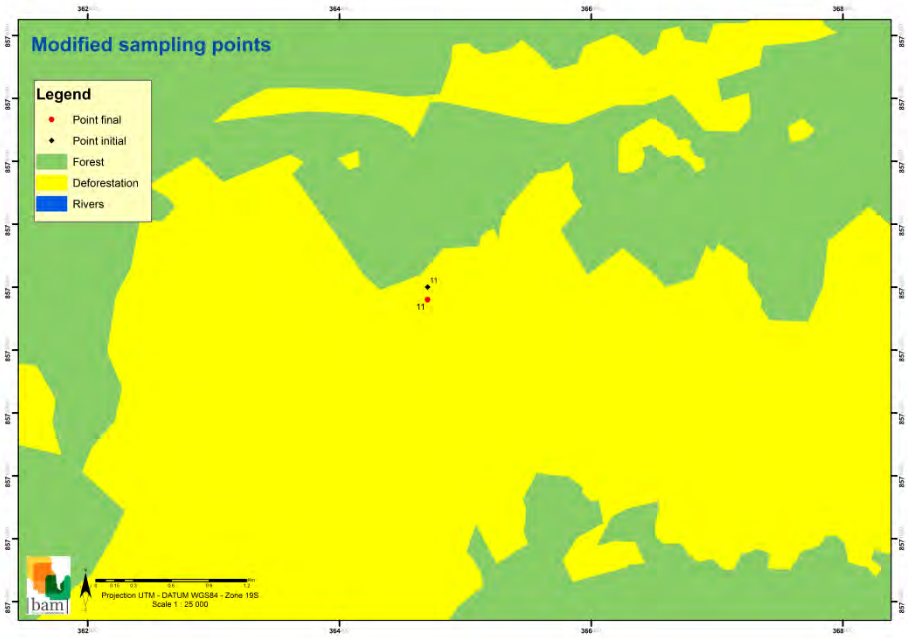
ANNEX 3: SAMPLE POINTS AND RESULTS FROM ACCURACY ASSESSMENT

Plot	N°	East	North	Map Data	Field Data
G1	1	417099	8550482	Forest	Forest
G1	2	418000	8550500	Forest	Forest
G1	3	411500	8551000	Forest	Forest
G1	4	416000	8552000	Forest	Forest
G1	5	419000	8552000	Forest	Forest
G1	6	414062	8552258	Forest	Forest
G1	7	412940	8552536	Forest	Forest
G1	8	412000	8553000	Forest	Forest
G1	9	413343	8554121	Forest	Forest
G2	10	361900	8569000	Deforested	Deforested
G2	11	365500	8570000	Forest	Forest
G2	12	358600	8570500	Deforested	Deforested
G2	13	361000	8570600	Forest	Forest
G2	14	360900	8570800	Forest	Forest
G2	15	367500	8571500	Deforested	Deforested
G2	16	360800	8571900	Forest	Forest
G2	17	364700	8572900	Deforested	Deforested
G2	18	367500	8573000	Forest	Forest
G3	19	400000	8571400	Forest	Forest
G3	20	399500	8573000	Forest	Forest
G3	21	398500	8571900	Forest	Forest
G3	22	401500	8573900	Forest	Forest
G3	23	397000	8574000	Deforested	Deforested
G3	24	403500	8574400	Deforested	Deforested
G3	25	397700	8574500	Forest	Forest
G3	26	404500	8574800	Deforested	Deforested
G3	27	396500	8574900	Deforested	Deforested
G3	28	403000	8575400	Forest	Forest
G4	29	465500	8595900	Forest	Forest
G4	30	468500	8596500	Deforested	Deforested
G4	31	469500	8597400	Deforested	Deforested
G4	32	472600	8597600	Deforested	Forest
G4	33	471000	8598400	Deforested	Deforested
G4	34	467000	8598900	Forest	Forest
G4	35	472000	8599000	Deforested	Forest
G4	36	471300	8599400	Deforested	Deforested
G4	37	466500	8599900	Deforested	Deforested
G5	38	490500	8650400	Forest	Deforested
G5	39	489500	8650900	Forest	Forest
G5	40	487000	8651900	Deforested	Deforested
G5	41	489000	8652400	Forest	Forest
G5	42	490000	8653400	Forest	Forest
G5	43	487500	8653700	Deforested	Deforested
G5	44	485500	8653900	Forest	Forest
G5	45	488500	8654400	Forest	Forest
G5	46	486000	8654900	Deforested	Deforested
G6	47	444200	8740200	Deforested	Deforested
G6	48	448100	8740800	Deforested	Deforested
G6	49	445400	8741800	Deforested	Deforested
G6	50	447200	8744600	Deforested	Deforested
G6	51	448300	8744900	Deforested	Deforested
G6	52	445000	8745700	Deforested	Deforested
G6	53	447800	8745700	Deforested	Deforested
G6	54	445700	8747400	Deforested	Deforested
G6	55	444200	8747600	Deforested	Deforested

GRID	N°	INITIAL EAST	INITIAL NORTH	FINAL EAST	FINAL NORTH	MAP DATA	FIELD DATA
G1	1	417000	8550000	417099	8550482	Forest	Forest
G1	6	414000	8552000	414062	8552258	Forest	Forest
G1	7	412000	8552000	412940	8552536	Forest	Forest
G1	9	413000	8554000	413343	8554121	Forest	Forest
G2	11	364700	8573000	364700	8572900	Deforested	Deforested

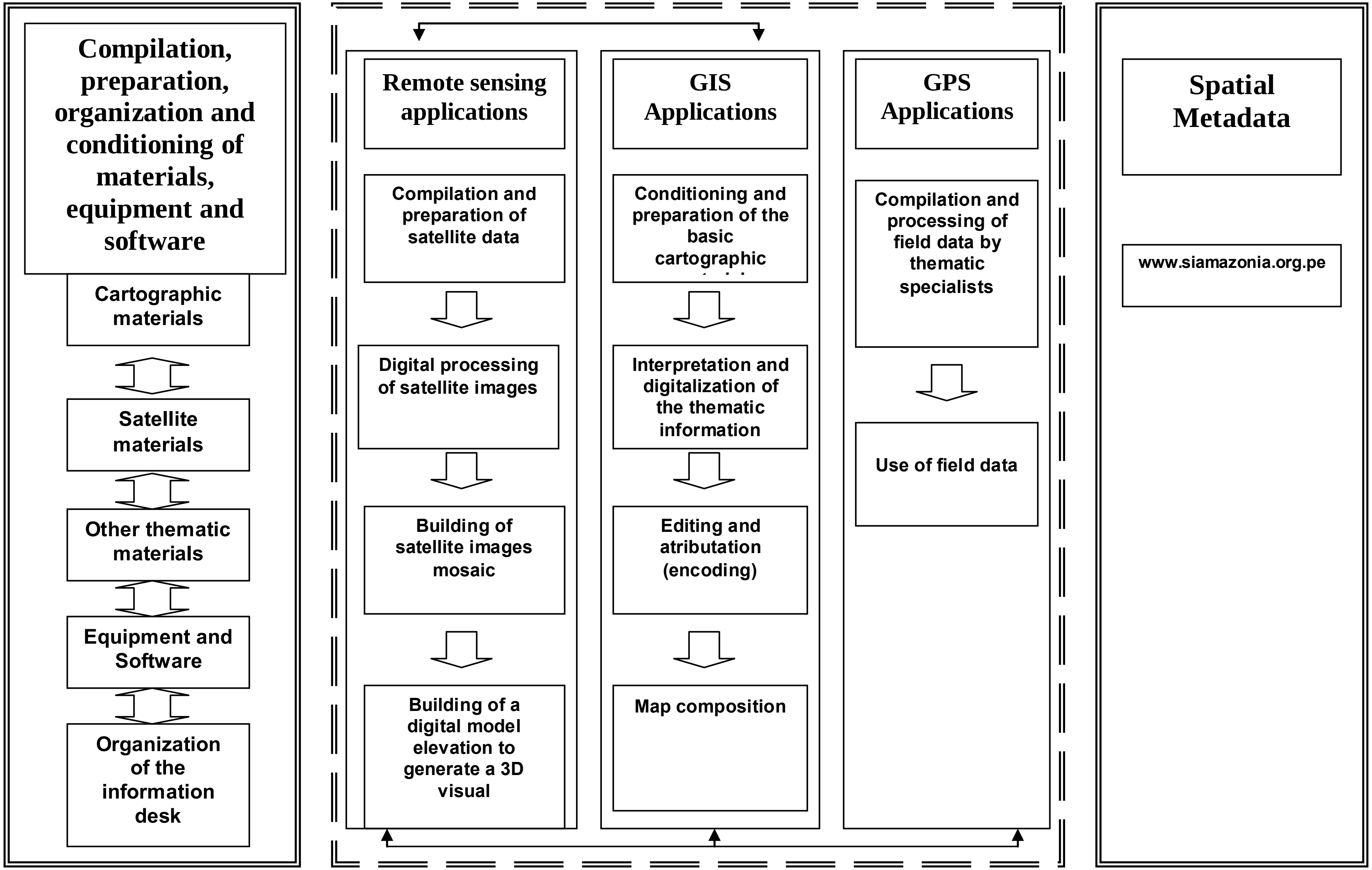
The points were modified because it was not possible to reach the established ones, selected in the cabinet stage, as they were inaccessible areas.





ANNEX 3. DIGITAL PROCESS OF IMAGES IN THE ZEE

Steps of the Methodology followed in the digital process of images –SIG-ZEE



Source: Digital Processing of Images and Modeling – ZEE

ANNEX 4. CRAMMER'S TEST FOR THE BASELINE' SCENARIO (N°6)

		Crammer			3	
First Variable	Second Variable	Chi^2	Crammer*	Contingency	Joint Entropy	Joint Information* Uncertainty
d2secroad/layer_0	distance/distance_to_1	473,527	0.254	0.661	3.514	0.179
d2secroad/layer_0	static_var/aprod	88,414	0.110	0.356	3.390	0.043
d2secroad/layer_0	static_var/shiri	10,394	0.131	0.129	1.764	0.013
d2secroad/layer_0	static_var2/ios	144,254	0.154	0.437	3.501	0.075
d2secroad/layer_0	static_var2/riv	40,200	0.086	0.249	2.419	0.028
distance/distance_to_1	static_var/aprod	404,439	0.226	0.631	3.675	0.145
distance/distance_to_1	static_var/shiri	25,373	0.204	0.200	2.252	0.019
distance/distance_to_1	static_var2/ios	552,239	0.187	0.689	3.690	0.215
distance/distance_to_1	static_var2/riv	122,185	0.149	0.408	2.827	0.084
static_var/aprod	static_var/shiri	21,510	0.188	0.185	1.864	0.016
static_var/aprod	static_var2/ios	485,903	0.248	0.666	3.407	0.179
static_var/aprod	static_var2/riv	358,521	0.256	0.608	2.449	0.083
static_var/shiri	static_var2/ios	94,209	0.393	0.366	2.011	0.040
static_var/shiri	static_var2/riv	8,457	0.118	0.117	0.862	0.013
static_var2/ios	static_var2/riv	70,092	0.113	0.321	2.673	0.042

ANNEX 6

MADRE DE DIOS AMAZON REDD PROJECT

"Estimation of emissions from activity shifting for avoided unplanned deforestation"

Prepared according to the Modular Methodology, Module VMD0010 v1 "LK-ASU", developed by Avoided Deforestation Partners and approved by VCS on December 2010.

I. APPLICABILITY CONDITIONS

- This module was employed as it is mandatory when using the BL-UP module, with all its conditions of applicability duly fulfilled.
- The activities subject to potential displacement are conversion of forest land to grazing lands and/or crop lands. In fewer cases the conversion in the leakage belt will go from forest to infrastructure.

The output parameter of this document is:

Parameter	SI Unit	Description
$\Delta C_{LK\text{-}AS,unplanned}$	T CO_2-e	Net greenhouse gas emissions due to activity shifting leakage for projects preventing unplanned deforestation

II. PROCEDURE

Different independent studies have established as the main deforestation drivers to the expansion of agrarian frontier by rural families, (local and newcomers), for subsistence crops and cattle ranching, local and migrants, as close as possible to local markets.

This baseline scenario that characterizes a large area of this department is not different in the Reference Region Area. With the recent paving of IOH, the accessibility to the forest areas have increased and consequently the profitability of agricultural and grazing activities and the migration rate have grown substantially. It must be remarked that Madre de Dios has the largest internal migration rate from the country so the problem has deepened.

The project has developed a plan to support the neighboring communities with the promotion of sustainable economic activities and, at the same time, to increase the access control to the forest by improving the surveillance system.

Nevertheless, leakage due to the avoided unplanned deforestation project is expected and was calculated following the steps established in the approved methodology.

2.1 STEP 1: Estimation of baseline carbon stock changes and greenhouse gas emissions in the Leakage Belt

The baseline for the leakage belt was constructed according to BL-UP module. The same criteria used to estimate the carbon stock changes in the Project Area were used in this step:

- The Forest Stratification is based on the Forest Map of the Madre de Dios ZEE, developed by the *Peruvian Amazon Research Institute* (IIAP) and the *Regional Government of Madre de Dios* (GOREMAD) in 2009. This stratification will remain the same for the entire baseline period.
- The post-deforestation land-uses were defined based on the analysis made by the study of land use monitoring, in 3 points in time of the Interoceanic Highway, stretch 3 (CDC-UNALM/SZF/INRENA, 2007). These land-use post-deforestation classes will also remain the same for the entire baseline period.
- The carbon stocks in pre- and post-deforestation classes are fixed for the entire baseline period.

The whole procedure can be seen in detail as well as the results for the entire project life, in the excel document: *Project Calculations v2.xlxs* and in the *BL-UP* document. The cumulative results for each year in the baseline are shown in Table 1.

Table 1: Total Carbon Stock Change in the Leakage Belt in Baseline

T	Year	Total carbon stock change in baseline (t CO_2-e) $\Delta C_{BSL,LK,unplanned}$
1	2009	785,482.63
2	2010	1,314,704.50
3	2011	1,843,633.29
4	2012	2,503,952.89
5	2013	3,137,517.21
6	2014	3,846,391.32
7	2015	4,578,841.91
8	2016	5,308,464.07
9	2017	6,048,883.19
10	2018	6,721,807.00

2.2 STEP 2: Estimation of the proportions of area deforested by immigrant and local deforestation agents in the baseline

The Project Area and Leakage Belt are located in the province of Tahuamanu (covering the District of Tahuamanu, Iberia and Iñapari).

In order to calculate the proportion of deforestation by immigration, the information provided in the National Census of 2007[94] has been considered, as showed in the following table.

[94] Data Consult System of Settlements and Disperse Population. National Census 2007: XI of Population and VI of Housing. INEI

Table 2. Population by Economic Activity and Residence Period in the Leakage Belt

Activity by group	Iñapari				
	≥ 5 year living in the district	< 5 year living in the district	**Total**	Residents	Migrants
Agriculture - cattle raising, hunting and forestry	175	118	293	26%	18%
Financial intermediate	2	1	3	0%	0%
Fishing	1	-	1	0%	0%
Construction	19	21	40	3%	3%
Manufacturing industries	25	20	45	4%	3%
Retail Trade	37	27	64	6%	4%
Wholesale trade	2	3	5	0%	0%
Transport, storage and communications	15	18	33	2%	3%
Hotels and restaurants	22	22	44	3%	3%
Teaching	11	13	24	2%	2%
Private households and domestic services	9	10	19	1%	1%
Pub. Admin. and defense	23	27	50	3%	4%
Other act. Com. Serv. and personal	8	7	15	1%	1%
Health and Social services	4	11	15	1%	2%
Sale, maintenance and repair of motor vehicle & motorcycle	4	4	8	1%	1%
Real state act., business and rents	2	8	10	0%	1%
Electricity supply, gas and water	-	1	1	0%	0%
Total	359	311	**670**	54%	46%

Source: National Census 2007. Compiled by author

Of all the activities the population carries out, only Agriculture and Livestock, presented under the same category in the table, are considered as a direct cause of deforestation. Taking the sum of both districts it results that 43.73% of the population is engaged in activities that cause deforestation, of which only 17.61% are migrants.

Table 3. Population Responsible of Deforestation by Residence Period in the area

IÑAPARI	% with more than 5 years in area	% with less than 5 years in area	Total Population %
Causing Deforestation (Agriculture, Livestock)	49%	38%	**44%**
Not Causing Deforestation	51%	62%	**56%**
TOTAL			**100%**

Source: In-house calculations

Moreover, land titling in agricultural parcels is easier given that the main requisite is to prove to have had the possession of the land for more than a year[95], and to have done an economic activity for the same period.

[95] For public lands. It must be more than 5 years in case of private lands.

Table 3: Proportion of Resident / Migrant Population that Deforests in the PA and LB

Iñapari Population	Deforester Migrants N°	Deforester Migrants %	**$PROP_{IMM}$**
670	118	18%	**0.18**
Iñapari Population	Deforester Residents N°	Deforester Residents %	**$PROP_{RES}$**
670	175	26%	**0.26**

Source: In-house calculations

2.3 STEP 3: Estimation of unplanned deforestation displaced from the Project Area to the Leakage Belt

According to the module, the estimated carbon stock changes and the GHG emitted in the Project Area should be multiplied by a factor less than 1, which represents the percentage of deforestation that would be displaced in the Leakage Belt. This factor has been obtained by analyzing the activities that cause deforestation within groups of people in the districts of Tahuamanu and Las Piedras, as mentioned above.

The following table shows how the population that causes deforestation is divided, and the proportion that will not change of activity after the implementation of the project activities.

Table 4: Percentage expected at the Interior of the Leakage Belt

<table>
<tr><th>Actors</th><th>Deforesters by Agriculture & Cattle Ranching %</th><th>Proportion not changed by Project Activity</th><th colspan="3">Expected Proportion of Inhabitants engaged in deforestation
%</th></tr>
<tr><td>Migrants</td><td>17.61</td><td>0.10</td><td>1.76</td><td>1.76</td><td rowspan="2">4.37</td></tr>
<tr><td>Residents</td><td>26.12</td><td>0.10</td><td>2.61</td><td>2.61</td></tr>
</table>

As can be seen above, 26.12% of deforestation in the project area will be carried out by residents and 17.61% by migrants.

With the farmers, whose activity is often of subsistence and from which they obtain a low revenue, the REDD Project aims to work and conduct surveillance, monitoring and training activities for the implementation of sustainable activities. This is why it is estimated that 10% (worst scenario) of such population will not change their line of business and will maintain the deforestation activity while 90% could revert to alternative sustainable economic activities promoted by the project. Therefore, with these data, it is estimated that the population that will cause deforestation and will migrate to the Leakage Belt will be **4.37%.**

The total emissions in the PA in the baseline would be equal to 11’419,936.96 t CO_2 in 2018 and 27’626,600.19 t CO_2 by 2046. When multiplied by 0.0437 (factor determined as the displacement of areas to the Leakage Belt) these amounts result in 499,409.18 and 1’208,148.34 t CO_2 respectively of emissions by deforestation displacement from the Project Area to the Leakage Belt. The results for the baseline period can be seen in Table 5.

The ex-post results will be calculated for each monitoring period.

Table 5. Net Cumulative carbon stock change emissions due to unplanned deforestation displaced from the PA to LB.

T	Year	Net GHG Emissions in the Baseline in PA (t CO_2-e) $\Delta C_{BSL,unplanned}$	Net CO_2 emissions due to leakage from PA to LB (t CO_2-e) $\Delta C_{LK\text{-}ASU\text{-}LB}$
1	2009	1,162,913.52	50,855.77
2	2010	2,468,789.71	107,963.49
3	2011	3,783,185.89	165,443.80
4	2012	4,958,227.99	216,829.97
5	2013	6,148,725.93	268,892.04
6	2014	7,256,620.86	317,341.78
7	2015	8,303,428.23	363,120.07
8	2016	9,331,685.79	408,087.15
9	2017	10,365,094.66	453,279.51
10	2018	11,419,936.96	499,409.18

2.4 STEP 4: Estimation of unplanned deforestation displaced from the Project Area to outside the Leakage Belt

a) Definition of AVFOR

Once the deforestation displacement to the leakage belt area is determined, it was also estimated the displacement to areas outside the leakage belt. To that end it has been defined the total area of forest available nationwide (TOTFOR), which has been equal to the total area of forest in the country as there is no information of the forest area in buffers around roads and rivers. The forest in protected areas (PROTFOR) and forest under management (MANFOR) were excluded.

Table 6. Forest Area divided by availability in the country

Category	Ha	Source
TOTFOR	70,180,130.40	PROCLIM, 2000
PROTFOR	16,452,255.72	Forest Bureau of the Ministry of Agriculture
MANFOR	8,586,493.55	DGFFS - Ministry of Agriculture

Then, the AVFOR is estimated with the following formula:

AVFOR = TOTFOR – PROTFOR – MANFOR
AVFOR = 70´180,130.4 - 16´452,255.72 ha - 8´586,493.55)
AVFOR = 45'141,381.13

b) Definition of $PROP_{LB}$

The forest area as a proportion of the total available national forest area is given by:

$PROP_{LB}$ = LBFOR / AVFOR

The LBFOR area was defined as the total forest area in the LB minus the areas under active management, represented by Forest Timber Concessions (153,289.32 ha).

$PROP_{LB}$ = (159,018.02 - (153,289.32)) / 45´141,381.13
$PROP_{LB}$ = 0.00013

c) Definition of $PROP_{CS}$

According to the methodology, the stratification of AVFOR by carbon stock has to be made. There are studies of carbon stock nationwide, in different stratum or types of forests. However, such studies have not been homogenized to date. At a country level, there is an ongoing work. For this step, the data established for Peru in the Second Communication on Climate Change[96] was used to derive the country average carbon stock: the emissions by land use change in natural forests for period 1990 – 2000 (56,827 Gg CO_2 equivalent) divided by the deforested areas on the same period (149,631.76 has). The resulting carbon stock for available forest outside LB is 379.779 t CO_2/ha

The average of the carbon stock in the Leakage Belt has been determined based on the average carbon stock by stratum, and the representation of each in the Leakage Belt (LB) (weighted average), being equal to 518.69 t CO_2

$PROP_{CS} = C_{OLB} / C_{LB}$
$PROP_{CS}$ = 379.779 t CO_2/ha / 518.69 t CO_2/ha
$PROP_{CS}$ = 0.73

d) Definition of LK_{PROP}

The proportional leakage for areas with immigrating populations is:

$LK_{PROP} = PRO_{IMM} * (1 - PROP_{LB}) * PROP_{CS}$
LK_{PROP} = 0.18 * (1 - 0.00013) * 0.73
LK_{PROP} = 0.13178 = 13.178%

[96] http://www.minam.gob.pe/dmdocuments/SCNCC-MINAM.pdf (pag 72).

e) Estimation of leakage outside the LB, as a proportion of baseline deforestation

Finally, the leakage caused by deforestation actors that will be displaced outside the Leakage Belt is equal to:

$$\Delta C_{LK\text{-}ASU,OLB} = (\Delta C_{LK\text{-}ASU,OLB} - \Delta C_{P,LB}) * LK_{PROP}$$

The results for the baseline period are presented in Table 7.

The value of $\Delta C_{P,LB}$ was calculated ex-ante according to the M-MON module, more details of the procedure can be seen in *Project Calculations v2.xlxs* or M-MON module.

Table 7. Net cumulative CO_2 emissions due to unplanned deforestation displaced outside LB

T	Year	Total carbon stock change in baseline in LB (t CO_2-e) $\Delta C_{BSL,LK,unplanned}$	Net CO_2 emissions within the LB in project case (t CO_2-e) $\Delta C_{P,LB}$	Net CO_2 emissions due to displaced unplanned deforestation outside LB $\Delta C_{LK\text{-}ASU,OLB}$
1	2009	785,482.63	504,044.20	37,087.07
2	2010	1,314,704.50	843,645.87	62,074.62
3	2011	1,843,633.29	1,183,059.48	87,048.33
4	2012	2,503,952.89	1,606,786.57	118,225.74
5	2013	3,137,517.21	2,013,344.80	148,139.89
6	2014	3,846,391.32	2,468,229.31	181,609.84
7	2015	4,578,841.91	2,938,242.86	216,192.96
8	2016	5,308,464.07	3,406,441.40	250,642.54
9	2017	6,048,883.19	3,881,568.34	285,601.91
10	2018	6,721,807.00	4,313,383.55	317,374.44

For the ex-post calculations, the sub-steps *f* and *g* of the module will be followed and the results presented for each monitoring period.

2.5 STEP 5: Emissions from leakage prevention activities

Following activities have been considered by the project to prevent the occurrence of leakage:

- Agroforestry and Silvopasture training to families from Iñapari and Belgica Indigenous Community.
- Training in alternative sustainable economic activities as ecotourism, rubber management, fish farming, etc., to promote the adequate management of non-timber resources in the reference region

In both cases, the trainers will come from the same region. Therefore the GHG emissions from leakage prevention activities are set to zero.

$GHG_{LK,E} = 0$

2.6 STEP 6: Estimation of total leakage due to the displacement of unplanned deforestation

The total GHG emissions due to leakage are finally calculated with the following equation.

$$\Delta C_{LK\text{-}AS,unplanned} = \Delta C_{LK\text{-}ASU\text{-}LB} + \Delta C_{LK\text{-}ASU,OLB} + GHG_{LK,E}$$

Table 8. Total leakage due to the displacement of unplanned deforestation

T	Year	$\Delta C_{LK\text{-}ASU\text{-}LB}$	$\Delta C_{LK\text{-}ASU,OLB}$	$GHG_{LK,E}$	Total Leakage due to displacement of unplanned deforestation (t CO_2-e) $\Delta C_{LK\text{-}AS,unplanned}$
1	2009	50,855.77	37,087.07	-	87,942.84
2	2010	107,963.49	62,074.62	-	170,038.11
3	2011	165,443.80	87,048.33	-	252,492.13
4	2012	216,829.97	118,225.74	-	335,055.71
5	2013	268,892.04	148,139.89	-	417,031.94
6	2014	317,341.78	181,609.84	-	498,951.62
7	2015	363,120.07	216,192.96	-	579,313.03
8	2016	408,087.15	250,642.54	-	658,729.70
9	2017	453,279.51	285,601.91	-	738,881.42
10	2018	499,409.18	317,374.44	-	816,783.62

ANNEX 7

MADRE DE DIOS AMAZON REDD PROJECT

"Estimation of carbon stocks in the above- and belowground biomass in live tree and non-tree pools"

Madre de Dios
Amazon REDD Project

I. APPLICABILITY CONDITIONS

This module is being used to determine carbon stocks in aboveground- and belowground tree biomass in the baseline case. It will also be employed in the estimation of ex-post change in carbon stocks in above- and below tree biomass.

- Above ground tree biomass pool has been accounted.
- Above ground non-tree biomass pool has been excluded as it was not significant in previous results of regional inventories[97].
- Below ground tree biomass is being accounted as it is significant.

The parameters produced within this module are:

Parameter	SI Unit	Description
$C_{AB\_tree,\,i}$	t CO_2-e ha^{-1}	Carbon stock in aboveground tree biomass in stratum i
$C_{BB\_tree,\,i}$	t CO_2-e ha^{-1}	Carbon stock in belowground tree biomass in stratum i

II. PROCEDURE

The initial stocks were measured at a continuous way since 2004, complying with the period of ±5 years of the project start date.

These stocks are considered valid and will be used in the entire baseline period, and will be re-estimated for baseline renewal. If re-measured stocks are within the 90% confidence interval of the t=0 estimate, then the latter shall be re-employed, if not, the new estimates will be used.

Part 1: Aboveground Tree Biomass ($C_{AB\_tree,i}$)

There are two options for sampling aboveground tree biomass. For the proposed project, option 1 is being employed: *Fixed Area Plots with Allometric Equations*. Results are based in field measurements.

Step 1:

Number of Plots

To achieve an acceptable accuracy, the carbon inventory of the Project has been performed in accordance with the provisions of X-UNC Module. The number of plots was calculated using the Winrock Sampling Calculator, which considers a security margin of 15% of total parcels.

In order to have a more adjusted value of the coefficient of variation of each stratum, necessary to estimate the number of plots, we used the results of the following regional inventories: Native Community of Belgica, and Bahuaja Sonene National Park. These are comparable data as they were recently taken in similar strata.

[97] The inventory mentioned is the one made in Native Community of Belgica. The stratification used in this inventory is based in the Forest Map of the ZEE of Madre de Dios (2009).

The summary of them calculations can be seen in tables below:

REQUIRED ERROR AND CONFIDENCE LEVEL		
e - level of error (%)	15.0%	
Error level (decimal)	0.15	
Z(1-a) - Confidence level	95.0%	
Sample statistic Z(1-a)	1.96	
Total project area size	97,686.81	hectares

SIZE AND VARIANCE OF EACH STRATA						
Stratum	Stratum Name	Area (ha)	Mean C/ha (tonnes)	Standard Deviation (tonnes C/ha)	Plot size (ha)	Coefficient of Variation
stratum 1	Terrace Forests	9,845.75	405.63	189.57	0.5	47%
stratum 2	Bamboos	8,550.87	470.31	161.95	0.5	34%
stratum 3	Hilly Forests	79,290.19	395.13	165.55	0.5	42%

NUMBER OF PLOTS TO BE USED			
Stratum	Stratum Name	Plot Quantity	Rounded Plot Quantity
Total Sample Size		29.58	**35**
stratum 1	Terrace Forests	3.37	**4**
stratum 2	Bamboos	2.50	**3**
stratum 3	Hilly Forests	23.71	**28**
TOTAL NUMBER OF PLOTS			**35**

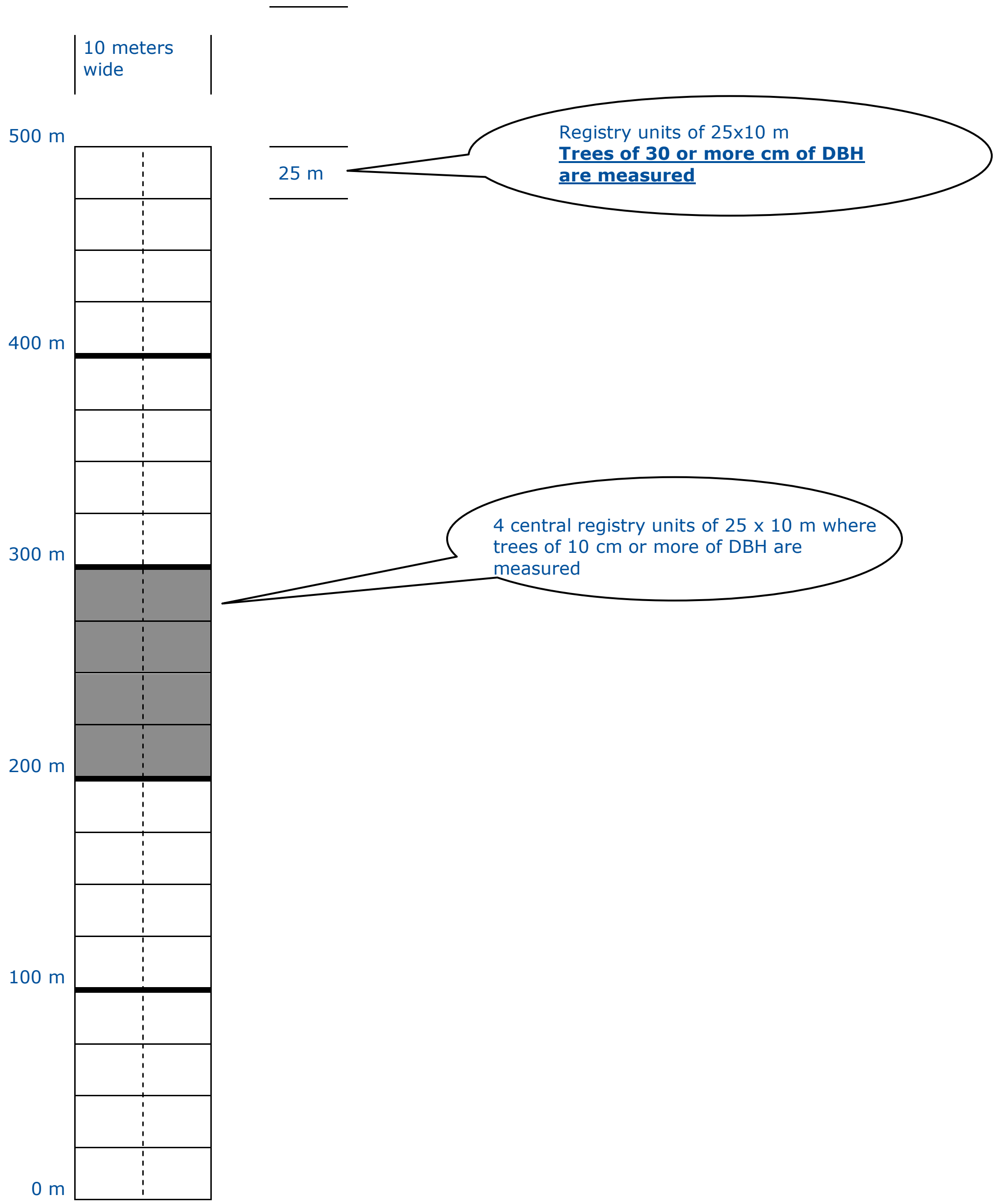
According to the results, there should be 30 plots as minimum but 142 were actually sampled, having less uncertainty. They were distributed as follows:

Table 4. Final Number of Plots for the Madre de Dios REDD Project.

STRATA	N° PLOTS
Terrace Forests	7
Bamboos	9
Hilly Forests	125

SIZE OF PLOTS

In relation with the sample units shape, previous studies have demonstrated that the rectangular, strip type, sample unit shape is the most efficient, for the evaluation of high variability tropical forests as those of Maderacre and Maderyja concessions. Therefore, the sample units will be rectangular of 10 meters wide and 500 meters long and will be divided in 20 registry units of 25 x 10 meters. In the next page, a figure showing the shape of the sample units is enclosed.



PARAMETERS TO BE MEASURED

In each sample unit the following parameters are evaluated:

- In trees of 30 cm or more of DBH: specie (common and scientific names), DBH (diameter at breast height), HF (tree trunk height), TH (total height) and Q (external quality of the tree trunk).
- In the 4 central registry units, all the trees of 10 cm or more of DBH are evaluated.

Some other aspects are also evaluated: physiographic, rippling level, topography, slopes, land use, types of vegetation, rivers and streams (drainage regime), past harvesting activities, exploitation rates and its impacts, fauna (general observations).

The infield data is registered in specially designed forms.

Step 2:

TREES SPECIES EQUATION

For the calculation of biomass of tree species, the allometric equation *Biomass-Diameter Regression (Model II)* proposed in Chavé et al (2005)[98] for *Moist Forest*[99] was applied. This equation was validated by the author using datasets from previous studies in several tropical countries.

$$\mathbf{B = \rho * exp(-1.499 + 2.148 * Ln\ (DBH) + 0.207 * (Ln\ (DBH))\ \hat{}2 - 0.0281 * (Ln\ (DBH))\ \hat{}3)} \text{ in Kg (dry)}$$

Where,
P = Density by species (gr/cm3)
DBH = Diameter at breast height, (cm)

PALM TREES EQUATION

There are few studies to develop allometric equations for palm trees, and in this specific case, equations for 4 of the 17 species present in the project area were found in revised literature: Euterpe precatoria (Huasaí), Attalea phalerata (Shapaja), Bactris gasipaes (Pijuayo) and Mauritia flexuosa (Aguaje). The first one is the most common palm tree in the project area, while the 2 last ones are the less abundant, having each only 1 individual between all the 58 parcels.

A trial calculation of biomass using the equations of Shapaja and Huasaí was performed, and the results showed that more conservative values were obtained from the former. On this grounds, and given the additional advantage of having a wider range of heights (1-30m compared to 1-11m permitted in Shapaja's equation), it was considered better to employ the allometric equations of Huasaí in all palm trees.

$$\mathbf{B = 6.666 + 12.826\ xH^{0.5}\ x\ LN\ (H)} \quad \text{in Kg (dry)}$$

Where,
H = Palm tree height (m)

This allometric equation was developed by Delaney et al., 1999 and quoted in the Sourcebook for Land Use, Land-Use Change and Forestry Projects (2005) and in the Chapter 4 of IPCC Good Practice Guidance for LULUCF.

PACAL (BAMBOOS)

Due to the difficulty of sampling areas with abundant presence of Pacas, it was decided to use the value of biomass per individual, taken from studies conducted in natural pacales of the Colombian Amazonia and described in Cruz, H. 2009. This value is equal to:

$$\mathbf{B = 47.022} \quad \text{kg/individual (dry)}$$

[98] Chave, J; Andalo, C; et al. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecologia 145: 87–99
[99] The forest in Madre de Dios can be considered as *Moist Forest* accordingly with the author classification of forest.

The only parameter required to obtain the total biomass is the number of individuals per plot.

Step 3:

The Biomass of each individual was estimated using the appropriate equation, and then was multiplied by the Carbon Fraction to convert it into Carbon Stock (t C). The CF used is equal to 0.49 t C/t d.m. which is the value for Tropical and Sub Tropical Forests taken from IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.3

It is worth noting that these values were not carried to hectares yet.

Table 5. Carbon Stock in Aboveground Tree Biomass per Plot

CONC.	UM	Total
Ma	1	9.11
	2	12.37
	3	4.11
	4	11.45
	5	5.63
	6	6.99
	7	10.26
	8	6.01
	9	7.16
	10	12.09
	11	5.29
	12	10.03
	13	10.71
	14	9.92
	15	10.00
	16	10.52
	17	9.53
	18	5.73
	19	4.16
	20	5.44
	21	9.92
	22	7.65
	23	6.90
	24	6.64
	25	5.23
	26	3.79
	27	10.29
	28	3.77
	29	5.69
	30	8.18
	31	4.70
	32	5.02
	33	3.74
	34	3.16
	35	6.62
	36	13.88
	37	12.72

	38	10.77
	39	8.63
	40	9.94
	41	9.05
	42	8.24
	43	5.09
	44	7.21
	45	7.88
	46	10.13
	47	4.52
	48	6.07
	49	5.92
	50	7.91
	51	6.65
	52	6.08
	53	6.99
	54	7.95
	55	7.01
	56	5.84
	57	5.12
	58	7.19
	59	4.48
	60	6.03
	61	3.52
	62	3.64
	63	6.00
	64	4.27
	65	6.31
	66	12.61
My	1	6.88
	2	8.93
	3	12.46
	4	8.12
	5	4.46
	6	6.77
	7	4.29
	8	6.44
	9	3.23
	10	2.59
	11	4.14
	12	4.01
	13	4.56
	14	s.d.
	15	5.26
	16	13.82
	17	3.96
	18	4.66
	19	6.74
	20	1.50
	21	5.66

	22	5.53
	23	9.28
	24	5.66
	25	7.44
	26	2.68
	27	5.75
	28	4.23
	29	3.24
	30	10.54
	31	5.81
	32	5.88
	33	3.03
	34	9.70
	35	3.85
	36	7.71
	37	8.39
	38	6.05
	39	8.88
	40	4.33
	41	13.33
	42	5.28
	43	2.18
	44	6.73
	45	7.38
	46	5.08
	47	1.27
	48	4.26
	49	4.76
	50	3.72
	51	5.45
	52	4.44
	53	7.48
	54	2.56
	55	3.64
	56	6.96
	57	6.65
	58	3.53
	59	6.40
	60	8.88
	61	6.83
	62	7.16
	63	8.96
	64	5.36
	65	5.73
	66	2.58
	67	2.88
	68	6.49
	69	5.62
	70	5.77
	71	2.19

	72	7.63
	73	7.15
	74	4.66
	75	5.04
	76	9.99

Step 4:

A unit size of 0.5 ha allows a detailed and efficient characterization of the floristic composition and dispersion of the species, above all the characterization of the most important species because of their abundance.

And then, they were multiplied by 44/12 to convert the values into Carbon Dioxide Equivalents (t CO_2-e/ha). Results can be seen in the following table:

Table 6: Stock of Carbon Dioxide Equivalents per Plot

Code	Plot	T CO2/ha
Ma	1	393.24
Ma	2	501.94
Ma	3	345.62
Ma	4	335.31
Ma	5	464.82
Ma	6	403.73
Ma	7	421.22
Ma	8	438.00
Ma	9	365.84
Ma	10	312.87
Ma	11	274.59
Ma	12	308.92
Ma	13	314.05
Ma	14	780.50
Ma	15	470.87
Ma	16	453.26
Ma	17	s.d.
Ma	18	454.30
Ma	19	430.09
Ma	20	1,123.79
Ma	22	263.86
Ma	23	362.38
Ma	24	374.94
Ma	25	464.46
Ma	26	652.92
Ma	27	603.14
Ma	28	373.88
Ma	29	237.32

Ma	30	358.43
Ma	31	367.77
Ma	32	462.76
Ma	33	399.62
Ma	34	347.76
Ma	35	246.34
Ma	36	534.17
Ma	37	327.72
Ma	38	289.93
Ma	39	294.58
Ma	40	257.41
Ma	41	494.99
Ma	42	587.66
Ma	43	274.25
Ma	44	332.68
Ma	45	396.62
Ma	46	339.52
Ma	47	240.47
Ma	48	661.08
Ma	49	687.16
Ma	50	516.84
Ma	51	551.28
Ma	52	853.46
Ma	53	541.05
Ma	54	249.88
Ma	55	404.21
Ma	56	378.15
Ma	57	404.90
Ma	58	517.98
Ma	59	343.90
Ma	60	505.28
Ma	61	293.43
Ma	62	306.28
Ma	63	370.55
Ma	64	s.d.
Ma	65	221.42
Ma	66	287.26
My	1	559.04
My	2	397.47
My	8	529.34
My	17	597.34
My	18	523.94
My	19	411.50
My	20	414.36
My	21	264.32
My	24	615.52
My	25	294.79

My	26	389.72
My	27	362.26
My	28	175.08
My	29	388.96
My	31	276.19
My	32	140.09
My	33	244.67
My	34	284.05
My	35	477.87
My	36	323.55
My	37	847.93
My	38	391.14
My	39	215.67
My	40	440.47
My	41	425.66
My	42	234.03
My	43	377.76
My	44	755.88
My	45	242.12
My	46	363.15
My	47	392.90
My	48	303.77
My	49	467.77
My	50	492.18
My	51	487.69
My	52	482.00
My	53	671.16
My	54	328.95
My	55	199.06
My	56	828.61
My	57	289.38
My	58	273.80
My	59	316.72
My	60	518.62
My	61	389.29
My	62	290.86
My	63	478.05
My	64	256.08
My	65	385.28
My	66	344.91
My	67	388.69
My	68	122.30
My	69	298.60
My	70	233.03
My	71	483.00
My	72	794.99
My	73	540.61

My	74	615.73
My	75	243.75
My	76	233.26

Finally, the Mean Aboveground Carbon Stock per Stratum was estimated, and is presented below:

Table 7. Mean Aboveground Carbon Stock per Stratum

STRATUM	CARBON STOCK ($t\ CO_2$-e/ha)
Terrace Forests	441.78
Bamboos	487.48
Hilly Forests	407.34

Part 2: Belowground Tree Biomass ($C_{BB\_tree,i}$)

The mean carbon stock in belowground tree biomass was estimated based in field measurements of the previous calculated aboveground biomass.
Like for Aboveground biomass, here are two options for estimate the Carbon Stocks; and for the proposed project, *Option 1* was used.

Step 1:

The belowground carbon stocks of each tree were obtained by multiplying the results of *Part 1, Step 3* with the Root to Root Ratio, equal to 0.24. This value is for Tropical Rainforest with aboveground biomass higher than 125 t/ha, and was taken from the CP-AB Module[100].

Step 2:

The mean belowground tree biomass carbon stock for each stratum was estimated by dividing the results from the previous step with the sub-plot area (as in *Part 1, Step 4*), and then multiplying by 44/12, which is the ratio of molecular weight of CO_2 to carbon.

The results can be seen in table below:

[100] In this module a modified Table 4.4 of the AFOLU Guidelines (IPCC 2006) is presented.

Table 8: Stock of Carbon Dioxide Equivalents per Plot in belowground tree biomass

Code	Plot	T CO2/ha
Ma	1	94.38
Ma	2	120.47
Ma	3	82.95
Ma	4	80.47
Ma	5	111.56
Ma	6	96.90
Ma	7	101.09
Ma	8	105.12
Ma	9	87.80
Ma	10	75.09
Ma	11	65.90
Ma	12	74.14
Ma	13	75.37
Ma	14	187.32
Ma	15	113.01
Ma	16	108.78
Ma	17	s.d.
Ma	18	109.03
Ma	19	103.22
Ma	20	269.71
Ma	22	63.33
Ma	23	86.97
Ma	24	89.99
Ma	25	111.47
Ma	26	156.70
Ma	27	144.75
Ma	28	89.73
Ma	29	56.96
Ma	30	86.02
Ma	31	88.26
Ma	32	111.06
Ma	33	95.91
Ma	34	83.46
Ma	35	59.12
Ma	36	128.20
Ma	37	78.65

Ma	38	69.58
Ma	39	70.70
Ma	40	61.78
Ma	41	118.80
Ma	42	141.04
Ma	43	65.82
Ma	44	79.84
Ma	45	95.19
Ma	46	81.48
Ma	47	57.71
Ma	48	158.66
Ma	49	164.92
Ma	50	124.04
Ma	51	132.31
Ma	52	204.83
Ma	53	129.85
Ma	54	59.97
Ma	55	97.01
Ma	56	90.76
Ma	57	97.18
Ma	58	124.32
Ma	59	82.54
Ma	60	121.27
Ma	61	70.42
Ma	62	73.51
Ma	63	88.93
Ma	64	s.d.
Ma	65	53.14
Ma	66	68.94
My	1	134.17
My	2	95.39
My	8	127.04
My	17	143.36
My	18	125.75
My	19	98.76
My	20	99.45
My	21	63.44
My	24	147.72

My	25	70.75
My	26	93.53
My	27	86.94
My	28	42.02
My	29	93.35
My	31	66.29
My	32	33.62
My	33	58.72
My	34	68.17
My	35	114.69
My	36	77.65
My	37	203.50
My	38	93.87
My	39	51.76
My	40	105.71
My	41	102.16
My	42	56.17
My	43	90.66
My	44	181.41
My	45	58.11
My	46	87.16
My	47	94.30
My	48	72.90
My	49	112.26
My	50	118.12
My	51	117.05
My	52	115.68
My	53	161.08
My	54	78.95
My	55	47.77
My	56	198.87
My	57	69.45
My	58	65.71
My	59	76.01
My	60	124.47
My	61	93.43
My	62	69.81
My	63	114.73

My	64	61.46
My	65	92.47
My	66	82.78
My	67	93.29
My	68	29.35
My	69	71.66
My	70	55.93
My	71	115.92
My	72	190.80
My	73	129.75
My	74	147.78
My	75	58.50
My	76	55.98

Finally, the results were averaged by Stratum, obtaining the following results:

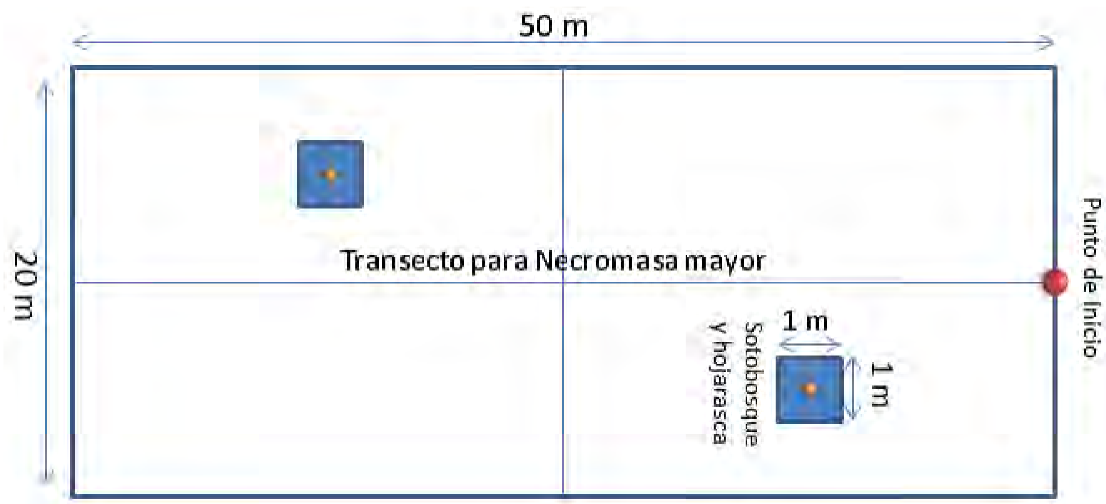
Table 9. Mean Belowground Carbon Stock per Stratum

STRATUM	CARBON STOCK (t CO_2-e/ha) in belowground tree biomass
Terrace Forests	106.03
Bamboos	117.00
Hilly Forests	97.76

Part 3: Aboveground non-tree biomass ($C_{AB\_nontree,i}$)

As explained before, other regional inventories were revised. From them, the one with non-tree vegetation data was Belgica's Native Community Inventory conducted by FONAM.

To estimate the non-tree vegetation biomass, they used the *Sampling Frame Method* (Option 1), and established 2 square sub-parcels of 1m^2 per plot of aboveground tree biomass.



Source: Protocol Para el Inventario de Stocks De Carbono en Proyecto REDD “Bélgica” (FONAM).

Every tree individual with DHB lower than 10 cm as well as shrub individuals were collected and weighted in field (fresh weight). Then a sub-sample of each sample was weighted, labeled and subsequently analyzed in the laboratory, where they were oven-dry. The resulting dry weights of the sub-samples were used to estimate the *wet to dry ratio*, employed in the estimation of dry biomass per sub-parcel. Finally, the values were carried to hectares.

With the results obtained in this inventory, we have tested the significance of each pool, and concluded that the Non-Tree Aboveground Biomass is not significant. This process can be seen in the *Tool for testing significance of GHG emissions in REDD project activities* document. It should be mentioned that Belgica´s inventory data are comparable as they used a similar stratification.

Based on this outcome, it is supposed that similar results would be obtained if non-tree vegetation was sampled in the project area plots; and therefore it was concluded not to include non-tree vegetation in the inventory of the project. Consequently, *Part 3* and *Part 4* have not developed in this document.

Nevertheless, during baseline renewal this non-tree biomass pool will be accounted following the specifications set out in the CP-AB module.

Part 4: Belowground non-tree biomass ($C_{BB\_nontree,i}$)

Not undertaken as explained in *Part 3*.

ANNEX 8

MADRE DE DIOS AMAZON REDD PROJECT

"Estimation of greenhouse gases coming from burnt biomass"

Preparation developed as from the Modular Methodology - Module E-BB developed by Avoided Deforestation Partners, approved by VCS.

I: APPLICABILITY CONDITIONS

According to the Framework REDD-MF this module is mandatory. Also the applicability of this module states that, if fire is used to clear land, emissions shall be accounted. Moreover this procedure will be conducted in the future if fires occur ex-post to accurately account GHG emissions.

In the Baseline, the use of fire to clear areas to establish crops or pastures is very common. Another source of GHG emissions is the burning of crop residues, practiced every year by farmers.

For the ex-ante calculation of GHG emissions in the with-project case, it was considered the projected areas to be deforested inside Leakage Belt, as it is expected that the deforestation agents use the same steps to clear land.

The CO_2 emissions from biomass burning won't be estimated because they are already accounted through stock change.

II: PROCEDURE

2.1 METHODOLOGY

Greenhouse gas emissions (GHG) coming from biomass burning are estimated using the following formulas proposed in E-BB module:

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

Where:

$E_{BiomassBurn,t}$	GHG emissions due to biomass burning as part of deforestation activities in stratum *i* in year *t*; tCO_2-e for each GHG (CH_4, N_2O)
$A_{burn,i,t}$	Area burnt for stratum *i* at time *t*; ha
$B_{i,t}$	Average aboveground biomass stock before burning in stratum *i*, time *t*; tonnes d. m. ha^{-1}
$COMF_i$	Combustion factor for stratum *i*; dimensionless
$G_{g,i}$	Emission factor for stratum *i* for gas *g*; kg t^{-1} dry matter burnt
GWP_g	Global warming potential for gas *g*;
g	1,2,3….. G greenhouse gases
i	1, 2, 3 … *M* strata
t	1, 2, 3, … *t** years elapsed since the start of the REDD Project activity

The factors used and their source in this formula are:

Table 1. Factors for the estimation of CH_4 and N_2O emissions from biomass burning of forest Strata

	Emission of CH_4		**Emission of N_2O**	
FC	**FE** Kg / t burnt d.m.	**PGC**	**FE** kg / t burnt d.m.	**PGC**
0.5	**6.8**	**21**	**0.2**	**310**

* Combustion Factor for Primary Tropical Moist Forest according to Table 2.6 of Module E-BB.
** Emissions Factor for Tropical Forest as per section III and Annex 2 of Module E-BB, Table 2.5 of the IPCC, 2006.
*** PGC default values for CH_4 and N_2O from IPCC SAR.

The average aboveground biomass stock before burning for a particular stratum in particular is calculated with the following formula:

$$B_{i,t} = (C_{AB\_tree,i,t} + C_{DWi,t} + C_{LI,i,t})*12/44*(1/CF) \quad (2)$$

Where:

$B_{i,t}$	Average aboveground biomass stock before burning in stratum *i*, time *t*; tonnes d. m. ha^{-1}
$C_{AB\_tree,i,t}$	Mean aboveground biomass carbon in stratum *i*, at time *t*; t CO_2-e ha^{-1} (estimated using CP-AB)
$C_{DWi,t}$	Carbon stock in dead wood for stratum *i,* at time *t*, t CO_2-e ha^{-1}
$C_{LI,I,t}$	Mean carbon stock in litter for stratum *i*, at time *t*; t CO_2-e ha^{-1}
12/44	Inverse ratio of molecular weight of $CO_2$to carbon, t CO_2-e t C^{-1}
CF	Carbon fraction of biomass; t C t^{-1}d.m.
i	1, 2, 3 …*M* strata
t	1, 2, 3, …*t** years elapsed since start of the REDD Project activity

For Madre de Dios Amazon REDD Project were not considered carbon stock of biomass stored in dead wood nor in litter because they were not significant carbon pools according to the results of the forestry inventory made in Native Community of Belgica. For this reason, carbon stocks from these two pools were not used in equation 2.

The Carbon Fraction used for tree biomass is 0.49 t C / t d.m. according to IPCC 2006 INV GLs AFOLU Chapter 4, Table 4.3 (for Tropical Forest). The Carbon Fraction for agricultural biomass is the default value of 0.47 t C / t d.m from the same source.

2.2 ESTIMATIONS IN BASELINE

2.2.1 Conversion of Forest Land to Non-Forest Land using Fire

It has been organized in two parts to manage all data simultaneously. All calculations can be seen in detail in excel document: *REDD Project Calculations v2.xlsx*, spreadsheet *5.2*.

Estimation of burnt Biomass in Forest Strata during deforestation ($B_{i,t}$)

First, it was prepared a chart that contained the amount of deforested hectares by stratum in one specific year. Such values were multiplied by 0.55 as it is estimated that 55%[101] of deforested biomass is burnt (proportion considered moderate given the observed field conditions, where biomass burnt can even reach 100% in the deforested areas). Then, the value obtained (annual burnt areas in the project area) is multiplied by the existing biomass by stratum which has been previously taken from t CO_2 per hectare to tons of biomass per hectares, to obtain the values of burnt biomass by stratum per year (expressed in tons per year). Finally, the values of burnt biomass by stratum per year are added to obtain the total value of burnt areas of primary forest per year in the project area:

$$\text{AG biomass (t/ha)} = \text{AG Carbon Stock (t } CO_2\text{/ha)} * 12/44 * (0.49)^{-1}$$
$$\text{Biomass (t)} = A_{burn,i,t} \text{ (ha)} \times 0.55 \times \text{AG biomass (t/ha)}$$

The result from this step is presented in table 2.

[101] Deforestation Map of the Peruvian Amazon, 2000. MINAM.

Table 2: Cumulative Biomass Burnt in the Project Area in baseline

		GHG emissions due to biomass burning in forest strata as part of deforestation activities inside Project Area											
Biomass Burnt per Forest Strata = Area (ha) x 0.55*** x AG biomass (t/ha)										Total GHG Emissions			
Strata i		0	Hilly Forests	Terrace Forests	Bamboo	Other	Tree swamps	0	Total	CH_4		N_20	
AG Biomass t/ha			226,72	245,89	271,33		243,92	-	Cumulative	Cumulative	Annual	Cumulative	Annual
T	Year	t	t	t	t	t	t	t	t	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e
1	2009	-	214.285	70.697	8.275	-	-	-	293.257	20.939	20.939	9.091	9.091
2	2010	-	400.535	182.367	39.343	-	-	-	622.245	44.428	23.490	19.289,61	10.199
3	2011	-	555.230	297.923	99.976	-	-	-	953.129	68.053	23.625	29.547	10.257
4	2012	-	693.456	379.732	175.653	-	-	-	1.248.842	89.167	21.114	38.714	9.167
5	2013	-	828.288	465.973	254.190	-	-	-	1.548.451	110.559	21.392	48.002	9.288
6	2014	-	979.903	529.716	317.756	-	-	-	1.827.375	130.475	19.915	56.649	8.647
7	2015	-	1.141.198	576.620	373.198	-	-	-	2.091.016	149.299	18.824	64.822	8.173
8	2016	-	1.304.694	621.070	424.277	-	-	-	2.350.040	167.793	18.494	72.851	8.030
9	2017	-	1.479.503	657.066	473.851	-	-	-	2.610.420	186.384	18.591	80.923	8.072
10	2018	-	1.664.371	698.380	513.495	-	-	-	2.876.245	205.364	18.980	89.164	8.241

Estimation of the Amount of Emissions of CH_4 and N_20

The resulting sum of burnt biomass is then multiplied by the respective factors, to get the emissions of CH_4 and N_20:

Biomass (t) x FC x FE (Kg/ t d. m.) x PCG / 1000

Table 3. GHG emissions from biomass burning in Forest Strata in the Project Area in baseline

Total GHG Emissions			
CH_4		N_20	
Cumulative t CO_2-e	Annual t CO_2-e	Cumulative t CO_2-e	Annual t CO_2-e
20.939	20.939	9.091	9.091
44.428	23.490	19.289,61	10.199
68.053	23.625	29.547	10.257
89.167	21.114	38.714	9.167
110.559	21.392	48.002	9.288
130.475	19.915	56.649	8.647
149.299	18.824	64.822	8.173
167.793	18.494	72.851	8.030
186.384	18.591	80.923	8.072
205.364	18.980	89.164	8.241

2.2.2 Periodical Burning of Agricultural Land after deforestation

Estimation of burnt areas in Agriculture Land

According to the analysis made to the post-deforestation land-uses[102], it is known that 3% from deforested areas are destined to Agriculture (mainly Corn). Agriculture performs annual burns, although it is supposed that the same practice is performed in Pasture lands, given the traditional management of pastures. Moreover the “Farming” activity, being defined as the mixture of agriculture and pastures, logically carries out burning of biomass. As the latter activities account for the biggest percentages of post-deforested areas, Agriculture is then the only activity considered here, in order to be conservative with the estimations of emissions.

The areas of Agriculture that are burnt, which area the same as the ones deforested for said activity based on the total deforested areas projected in the Project Area, can be seen in Table 4.

[102] For more details, review Step 4.2.2 of BL-UP.

Table 4: Cumulative areas of post-deforestation land-uses in the Project Area in baseline

		Area of post-deforestation classes established on deforested areas within the Project Area					
	Strata f	Deforestation for Pastures	Deforestation for Farming*	Deforestation for Agriculture (Corn)	Deforestation for Infrastructure	Deforestation for Illegal Mining	Total
	% historic	53,73%	40,47%	3,37%	2,41%	0,00%	Cumulative
T	Year	ha	ha	ha	ha	ha	ha
1	2009	1.236,7	931,6	77,6	55,5	-	2.301,7
2	2010	2.595,6	1.955,2	162,9	116,4	-	4.830,8
3	2011	3.939,8	2.967,8	247,3	176,7	-	7.332,6
4	2012	5.133,2	3.866,8	322,2	230,2	-	9.553,7
5	2013	6.342,9	4.778,0	398,2	284,4	-	11.805,0
6	2014	7.478,3	5.633,3	469,5	335,3	-	13.918,2
7	2015	8.560,1	6.448,2	537,4	383,8	-	15.931,6
8	2016	9.627,8	7.252,5	604,4	431,7	-	17.918,7
9	2017	10.706,3	8.064,9	672,1	480,1	-	19.926,1
10	2018	11.811,4	8.897,4	741,5	529,6	-	21.982,8

Estimation of the Amount of Emissions of CH_4 and N_20

The AG Carbon Stock of Corn, 28.8[103] t CO_2/ha, had to be converted to tonnes of biomass, and then multiplied by the factors of Table 5.

These factors, corresponding to Agricultural Residues, were taken from **Tables 2.5 and 2.6 of IPCC 2006** presented as annexes of the E-BB module.

103 Taken from Alegre, J. Arevalo, L. Ricse, A. Reservas de Carbono según el uso de la tierra en dos sitios de la Amazonia Peruana. Agroforestería para la Producción Animal en América Latina - II - Memorias de la Segunda Conferencia Electrónica (Agosto de 2000-Marzo de 2001). FAO

Table 5. Factors for the estimation of CH_4 and N_2O emissions from biomass burning of Agricultural Residues

Biomass before burning (T/ha)	Combustion Factor (Table 2.6 IPCC)	Emission Factor Kg / T Dry matter burnt (Table 2.5 IPCC)	Total GHG T/ha/Year		PCG	**Total t CO_2-e / ha**
16.7	0.8	2.7	0.03612	**CH_4**	21	**0.76**
		0.07	0.00094	**N_2O**	310	**0.29**

The above result in t CO_2-e / ha was multiplied by each of the accumulated burnt areas per year, and are showed in the following table:

Table 6. GHG emissions from biomass burning in post-deforestation land-uses in the Project Area in baseline

GHGs Emissions from Biomass Burning (from Agricultural wastes) in Project Area						
		Burnt Areas*	**CH_4**		**N_20**	
			Cumulative	Annual	Cumulative	Annual
T	Year	ha	t CO_2-e	t CO_2-e	t CO_2-e	t CO_2-e
1	2009	77,6	58,89	58,89	22,54	22,54
2	2010	162,9	123,60	64,71	47,31	24,77
3	2011	247,3	187,62	64,01	71,80	24,50
4	2012	322,2	244,45	56,83	93,55	21,75
5	2013	398,2	302,05	57,60	115,60	22,05
6	2014	469,5	356,12	54,07	136,29	20,69
7	2015	537,4	407,64	51,52	156,01	19,72
8	2016	604,4	458,48	50,84	175,47	19,46
9	2017	672,1	509,84	51,36	195,12	19,66
10	2018	741,5	562,47	52,62	215,26	20,14

The total GHG Emissions from biomass burning in the Project Area in Baseline are:

Table 7. Accumulated Greenhouse Gas Emissions in the Project Area in baseline

Greenhouse Gas Emissions in the Project Area in baseline ($t\ CO_2$ -e) $GHG_{BSL,E}$	**Net GHG Emissions in the Baseline from Unplanned Deforestation Cumulative ($t\ CO_2$ -e)** $\Delta C_{BSL,unplanned}$
30.110,94	1.162.913,52
63.888,84	2.468.789,71
97.859,80	3.783.185,89
128.219,42	4.958.227,99
158.979,01	6.148.725,93
187.615,63	7.256.620,86
214.683,71	8.303.428,23
241.278,05	9.331.685,79
268.011,99	10.365.094,66
295.305,26	11.419.936,96

2.3 EX-ANTE ESTIMATIONS IN THE WITH-PROJECT CASE

The estimated emissions in the with-project case only include the ones produced by biomass burning in the Leakage Belt, as a mean of land clearance. This data is to be considered in the M-MON module, to monitor project emissions.
No deforestation or degradation, and therefore emissions from biomass burning, are considered inside the Project Area in the with-project case, because of the expected results of the proposed activities.
The calculations in this step are based in the projected areas to be deforested in the LB in the with-project scenario, made according to the specifications for ex-ante $A_{DefLB,I,u,t}$ found in M-MON (*Data and Parameters Monitored for Verification*).

The same procedure and considerations as in step 2.2.1 of the present document were followed, and the total biomass burnt in the Leakage Belt can be seen in Table 8.

Table 8. Biomass Burnt per Forest Strata in the Leakage Belt in the With-Project Case

		GHG emissions due to biomass burning in forest strata as part of deforestation activities inside Leakage Belt in the with-project case							
		Biomass Burnt per Forest Strata = Area (ha) x 0.55*** x AG biomass (t/ha)							
Strata i		0	Hilly forests	Terrace forests	Bamboos	Others	Tree swamps	0	Total
AG Biomass t/ha			226.72	245.89	271.33		243.92		Cumulative
T	Year	t	t	t	t	t	t	t	t
1	2009	-	105,964	24,630	97	-	304	-	130,994
2	2010	-	178,004	40,554	628	-	304	-	219,490
3	2011	-	240,001	60,853	6,758	-	304	-	307,916
4	2012	-	316,842	81,677	18,971	-	304	-	417,794
5	2013	-	379,807	106,744	36,011	-	694	-	523,257
6	2014	-	445,394	135,924	59,086	-	694	-	641,098
7	2015	-	517,596	165,235	79,409	-	694	-	762,934
8	2016	-	587,378	197,433	98,476	-	868	-	884,156
9	2017	-	662,888	228,625	114,793	-	868	-	1,007,173
10	2018	-	732,791	260,604	124,737	-	868	-	1,119,000

Finally, after multiplying the factors in Table 1, the following results are obtained.

Table 9. Total GHG Emissions in the Leakage Belt in the With-Project Case due to biomass burning

Total GHG Emissions				
CH_4		N_20		Total
Cumulative	Annual	Cumulative	Annual	Cumulative
t CO2-e	t CO2-e	t CO2-e	t CO2-e	t CO2-e
9,353	9,353	4,061	4,061	**13,414**
15,672	6,319	6,804	2,743	**22,476**
21,985	6,314	9,545	2,741	**31,531**
29,830	7,845	12,952	3,406	**42,782**
37,361	7,530	16,221	3,269	**53,582**
45,774	8,414	19,874	3,653	**65,648**
54,473	8,699	23,651	3,777	**78,124**
63,129	8,655	27,409	3,758	**90,538**
71,912	8,783	31,222	3,814	**103,135**
79,897	7,984	34,689	3,467	**114,586**

ANNEX 9

MADRE DE DIOS AMAZON REDD PROJECT

"Estimation of Uncertainty for REDD Project activity"

Elaboration according to the Modular Methodology, Module VMD0017 v1 "X-UNC", developed by Avoided Deforestation Partners, approved by VCS on December 03, 2010.

I. APPLICABILITY

- The uncertainty of the rate of deforestation coming from a regression equation was estimated as described in this module.
- The uncertainty for degradation was considered zero given that official data[104] is used to estimate emissions from biomass burning of forest strata as part of deforestation activities; and given that a very conservative assumption that only agricultural areas would be burnt annually in the post-deforestation classes was used. Neither N_2O from nitrogen application nor emissions from fossil fuel combustion were included in the degradation estimates.
- A precision target of a 95% confidence interval equal or less than 15% of the recorded value has been used to determinate the number of plots.
- This tool would be used in the ex-post estimations of uncertainty during project activity.

II. BASELINE UNCERTAINTY

PART 1. UNCERTAINTY IN BASELINE ESTIMATES

Step 1: Estimation of the Uncertainty in the deforestation and degradation rate

Uncertainty of the deforestation rates used in all RRD Strata are considered zero as they use historic rates calculated from a long term average.

Therefore, equation 1 is not applicable.

Step 2: Estimation of uncertainty of emissions and removals in the project area

The relevant parameters considered in the baseline estimation of uncertainty of emissions and removals were Above-ground (AG) and Below-ground (BG) Biomass Carbon Pools.

The parameters not considered are presented next:
- Pools: Dead-wood, Litter, Soil organic, Wood products.
- Sources: Fossil fuel combustion and N_2O emissions from nitrogen application.

These parameters were not included in the calculation; reasons are explained in detail in Module VM0007 REDD-MF.

The emissions from fossil fuel combustion are not simply calculated, but since a very conservative value (55% of deforested mass is burned, according to the Ministry of Environment of Peru) is being used, the uncertainty is set as zero.

a) Estimation of Percentage Uncertainty in the carbon stocks per stratum, in the baseline case ($U_{BSL,SS,i}$). As mentioned before, the AG and BG biomass carbon pools per stratum were the only ones included, and the following criteria were taken in consideration:
   - The information from the stratified Carbon Inventory made for the Madre de Dios Amazon REDD Project was used. The number of parcels and the estimated AG and BG carbon stock of each

[104] 55% of the deforested biomass is burnt, according to the *"Deforestation Map of the Peruvian Amazon – 2000"*. (MINAM, 2010).

stratum were calculated following the procedure designed in the CP-AB module (based on field measurement data).

- The uncertainty resulting from calculations to estimate aboveground biomass, based on measured tree variables (DBH, specific density), is already included in the biomass equation itself. Chave et al (2005) states that the set of equations (without height), including the one for Moist Forest used in CP-AB, overestimates biomass in 0-5%. Nevertheless, a correction factor *CF* was applied to these regressions in order to offset this error[105], and therefore it won't be included in our uncertainty estimation.
- The *t- test* is performed with a 95% confidence interval.

The results of Carbon Stocks (from the AG and BG pool) of all plots were arranged in an excel sheet and the Standard Error of the Media and the T-value (for the 95% confidence interval) were calculated with the following equations:

Standard Error of the Mean (SE) = Standard Deviation (SD) / √(N)

T-value$_{95\%\ CI}$= INV.T (1 - (100 – 95)/200, N-1) … (excel formula)

Where:
N = number of plots
95%CI = T-value$_{95\%\ CI}$ * SE

Each uncertainty for carbon stocks per stratum was then expressed as the 95% confidence interval as a percentage of the mean, using the formula from GOFC-GOLD Sourcebook 2008 (page 94).

$$U_{BSL,SS,i} = \frac{95\%\ CI * 100}{Mean}$$

It is assumed that the estimated uncertainties are valid for each stratum.

For the Belowground pool, the carbon stocks are calculated by multiplying the AG carbon stock by 0.24, which is the Root-to-shoot ratio for Tropical Rainforest. Therefore, as it is a fixed proportion, the parameters used to calculate the uncertainty can also be estimated by multiplying the AG parameter by said proportion. This was applied to calculate SD and the Mean for BTI and P strata, as can be seen in Table 1.

The results for $U_{BSL,SS,i}$ of each carbon pool per strata can be seen in Table 1 and 2.

b) Estimation of the Percentage Uncertainty in the combined carbon stocks and GHG sources in the baseline case per stratum ($Uncertainty_{BSL,SS,i}$)

After the percentage uncertainty of the carbon pools per strata were calculated, the following formula was used in order to combine them:

Uncertainty should be expressed as the 95% confidence interval as a percentage of the mean.

$$Uncertainty_{BSL,SS,i} = \frac{\sqrt{(U_{BSL,SS1,i} * E_{BSL,SS1,i})^2 + (U_{BSL,SS2,i} * E_{BSL,SS2,i})^2 + \cdots + (U_{BSL,SSn,i} * E_{BSL,SSn,i})^2}}{E_{BSL,SS1,i} + E_{BSL,SS2,i} + \cdots + E_{BSL,SSn,i}} \quad (2)$$

Where:

[105] Chave et al. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecologia 145: 87–99.

$Uncertainty_{BSL,SS}$	Total uncertainty in the combined carbon stock and greenhouse gas sources in the baseline case; %
$U_{BSL,SS,i}$	Percentage uncertainty (expressed as 95%confidence interval as a percentage of the mean where appropriate) for carbon stocks and greenhouse gas sources in the baseline case in stratum *i* (1,2…n represent different carbon pools and/or GHG sources); %
$E_{BSL,SS,i}$	Carbon stock or GHG sources (e.g. trees, down dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in stratum *i* (1,2 … n represent different carbon pools and/or GHG sources) in the baseline case; t co_2-e

The results can be seen in Table 4.

Table 1. Percentage Uncertainty in the AG Biomass Carbon Pool per Strata

ABOVEGROUND

Confidence Level 95 %

Stratum	Stratum Number	Stratum size (ha)	Number of Plots (N)	Mean	Mean Standard Error (SE)	T. Dist.	95% Half width	$U_{BSL,SS,i}$
Terrace Forests	1	9,845.75	37	441.78	56.58	2.03	114.75	25.97
Bamboo	4	8,550.87	9	487.48	56.26	2.31	129.73	26.61
Hilly forests	5	79,290.19	130	407.34	14.00	1.98	27.69	6.80
Swamp trees	7	-	41	438.24	27.63	2.02	55.85	12.74
Total		97,686.81	217					

Table 2. Percentage Uncertainty in the BG Biomass Carbon Pool per Strata

BELOWGROUND

Confidence Level 95 %

Stratum	Stratum Number	Stratum size (ha)	Number of Plots (N)	Mean	Mean Standard Error (SE)	T. Dist.	95% Half width	$U_{BSL,SS,i}$
Terrace Forests	1	9,845.75	37	106.0	13.58	2.0	27.5	26.0
Bamboo	4	8,550.87	9	117.0	13.5	2.3	31.1	26.6
Hilly forests	5	79,290.19	130	97.8	3.4	2.0	6.6	6.8
Swamp trees	7	-	41	105.2	6.6	2.0	13.4	12.7
Total		97,686.81	217					

Table 3. Total Uncertainty in the combined carbon stock in the baseline

	Carbon Pools									
	Above-ground				Below-ground					
Stratum	$U_{BSL,SS,i}$	Mean t CO_2/ha	Stratum Area (Ai)	$E_{BSL,SS,i}$	$U_{BSL,SS,i}$	Mean t CO_2/ha	Stratum Area (Ai)	$E_{BSL,SS,i}$	**Uncertainty** $_{BSL,SS,i}$	$E_{BSL,SS,i}$
Terrace Forests	26.0	441.8	9,845.75	4,349,698	26.0	106.0	9,845.75	1,043,927	21.5	5,393,625.2
Bamboo	26.6	487.5	8,550.87	4,168,390	26.6	117.0	8,550.87	1,000,414	22.1	5,168,803.3
Hilly forests	6.8	407.3	79,290.19	32,297,763	6.8	97.8	79,290.19	7,751,463	5.6	40,049,226.3
Swamp trees	12.7	438.2	-	-	12.7	105.2	-	-		-

Step 3: Uncertainty in Baseline

The Uncertainty across combined data is estimated with:

$$Uncertainty_{BSL,SS,i} = \frac{\sqrt{(Uncertainty_{BSL,SSi\,1} * E_{BSL,i1})^2 + (Uncertainty_{BSL,SSi2} * E_{BSL,i2})^2 + \cdots + (Uncertainty_{BSL,SSM} * E_{BSL,iM})^2}}{E_{BSL,i1} + E_{BSL,i2} + \cdots + E_{BSL,iM}}$$

(3)

Where:

Uncertainty$_{BSL,SS}$ Total uncertainty in the combined carbon stock and greenhouse gas sources in the baseline case; %

Uncertainty$_{BSL,SS,i}$ Percentage uncertainty in the combined carbon stocks and greenhouse gas sources in stratum *i* in the baseline case; %

$E_{BSL,SS,i}$ Sum of combined Carbon stock and GHG sources (e.g. trees, down dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in stratum *i* (1,2 … n represent different carbon pools and/or GHG sources) multiplied by the area stratum *i* (A_i) in the baseline case; t co_2-e *i* *1,2,3 …M* strata

$\boldsymbol{Uncertainty_{BSL,SS}}$ **= 5.501%**

Incorporating rate Uncertainty:

$$Uncertainty_{BSL,SS,i} = \sqrt{Uncertainty_{BSL,RATE}^{\ 2} + Uncertainty_{BSL,SS}^{\ 2}} \quad (4)$$

Where:

$Uncertainty_{BSL}$ Uncertainty in baseline scenario in stratum *i*, %

$Uncertainty_{BSL,RATE}$ Percentage uncertainty in the rate of deforestation for areas through time; %

$Uncertainty_{BSL}$ = √ ((0)^2+(5.50)^2)

$\boldsymbol{Uncertainty_{BSL}}$ **= 5.501%**

6.1 PART 2. UNCERTAINTY EX-POST IN THE WITH PROJECT SCENARIO

The total uncertainty in project scenario is estimated considering that the carbon stocks from each stratum are the same in both baseline and project scenarios. Also, the ex-ante percentage uncertainty in the with-project carbon stocks is equal to the calculated baseline uncertainty, as stated in the X-UNC module.

The same procedures as in step 2 were followed, and therefore we have:

Table 5. Ex- ante Percentage Uncertainty in the with-project case

Stratum	Uncertainty $_{P,i}$	$E_{P,i}$
Terrace Forests	21.54	5,393,625.21
Bamboo	22.07	5,168,803.28
Hilly forests	5.64	40,049,226.25
Swamp trees		-

Uncertainty $_{P}$	**5.501**

The uncertainty in project scenario is estimated with:

$$Uncertainty_P = \frac{\sqrt{(Uncertainty_{Pi\,1} * E_{P,i\,1})^2 + (Uncertainty_{Pi\,2} * E_{P,i\,2})^2 + \cdots + (Uncertainty_{P,iM} * E_{P,i\,M})^2}}{E_{P,1i} + E_{P,i\,2} + \cdots + E_{P,i\,M}} \quad (6)$$

Where:

$Uncertainty_{,P}$	Total Uncertainty in project scenario; %
$U_{P,SS,i}$	Uncertainty in baseline project in stratum *i*; %
$E_{P,SS,i}$	Sum of combined Carbon stock and GHG sources (e.g. trees, down dead wood, soil organic carbon, emission from fertilizer addition, emission from biomass burning etc.) in stratum *i* (1,2 … n represent different carbon pools and/or GHG sources) multiplied by the area stratum *i* (A_i) in the baseline case; t co_2-e
i	*1,2,3 …M* strata

As the same carbon stocks and uncertainties are being used in the ex-ante calculation, an equal result for the uncertainty in the with-project case is obtained:

Uncertainty $_{P}$ **= 5.501%**

6.2 PART 3. TOTAL ERROR IN REDD PROJECT ACTIVITY

The uncertainties from leakage were not estimated, as suggested in the module. When combining the baseline and with-project case uncertainties with the following equation, we obtain:

$$C_{REDD\_ERROR} = \sqrt{Uncertainty_{BSL}{}^2 + Uncertainty_P{}^2} \qquad (7)$$

Where:

C_{REDD_ERROR}	Total uncertainty for REDD project activity; %
$Uncertainty_{BSL}$	Total uncertainty in baseline scenario, %
$Uncertainty_P$	Total uncertainty in the With-project; %

$C_{REDD\text{- }ERROR}$ = √((5.50)^2+(5.50)^2)

$C_{REDD\text{- }ERROR}$ = 7.779 %

6.3 PART 4. IMPLICATIONS FOR PROJECT ACCOUNTING

The allowable uncertainty (15%) is not being surpassed, thus no deduction is needed.

$$Adjusted\_C_{REDD,t} = C_{REDD,t} * (100\% - C_{REDD_{ERROR}} + 15\%) \qquad (8)$$

Where:

$Adjusted\_C_{REDD,t}$	Cumulative total net GHG emissions reductions at time *t* adjusted to account for uncertainty; t CO_2-e
$C_{REDD,t}$	Cumulative total net GHG emissions reductions at time *t* ; t CO_2-e

C_{REDD_ERROR} Total uncertainty for REDD project activity; %

Therefore,

$$\boldsymbol{Adjusted\_C_{REDD,t} = C_{REDD,t}}$$

More details of the whole procedure can be seen in *X-UNC.xlsx*

REFERENCES AND DOCUMENTATION

1. ALEGRE, J.; LAPEYRE, T. y AREVALO, L. 2004. Determination of the carbon reserves in the aerial biomass, in different systems of land use in San Martín, Peru. Ecología Aplicada. Lima, Peru.

2. Influence area of the south Inter Oceanic Highway in Madre de Dios, Peru. Ellectronic Bulletin Observatorio del Fuego Nº 1. 2008. 3 p.

3. ASNER, 2009. Evaluation of carbon in tropical forests: an integration of satellite and aerial maps. Departament of Global Ecology, Carnegie Insitution for Science. 19 p.

4. ASNER, 2009. Tropical forest carbon assessment: integrating satellite and airborne mapping approaches. Department of Global Ecology, Carnegie Institution for Science. Environmental Research Letters. 11 p.

5. Biophisical aspects of the Maderacre SAC forestry concession, Province of Iñapari, Region of Madre de Dios, Peru. 2008. 5 p.

6. BAKER, T. 2009. Climate change and the importance of tropical forests. Workshop on statistic analysis to support the design of carbon inventories. Iquitos. 15-17th May, 2009.

7. BARRIO, Javier. 2005. Rapid evaluation of wildlife within the Maderacre and Maderyja concessions. 36 p.

8. BARRIOS, G. 2008. Strategy for the implementation and evaluation of permanent plots with the objective of monitoring in the Maderacre and Maderyja forestry concessions. WWF – Program Office Peru.

9. BASTIENNE, J. 2001. Guide for the formulation of carbon forestry projects. Austral University of Chile. Chile.

10. BID, Tahuamanu Municipality; 2008. Urban development strategy of the city of Iñapari – Project 001-PE-1001. Pág. 121.

11. BONAN, G. B. 2008. Forests and Climate Change: Forcings, Feedbacks and the Climate Benefits of Forests. Science, 13 June 2008: Vol. 320. Nº 5882, pp. 1444 – 1449.

12. BONIFAZ, José Luis; Urrunaga, Roberto. 2009. Economic benefits of the Inter Oceanic Highway. Investigation Center of the Pacific University. Lima. 1st Edition.

13. Britaldo Soares-Filho, Gustavo Coutinho Cerqueira, Cássio Lopes Pennachin. "DINAMICA - a stochastic celular autómata model designed to simulate the landscape dynamics in an Amazonian colonization frontier" en Ecological Modeling 154 (2002).

14. BROWN, S.; SATHAYE, J.; CANNEL, M. y KAUPP, P. 1996. Citado por Kanninen, M. Carbon sequester in the forest: the role of forests in the carbon global cycle. Mitigation of carbon emissions to the atmosphere by forest management. Commonwealth Forestry Review Magazine. Nº 75.

15. CANCHANYA, Fernando. Identification of High Value of Conservation Forests in the Maderacre and Maderyja forestry concessions. 21 p.

16. CAPELLA, J. 2008. Work document 281108. Consultation on the most probable land use scenarios in absence of the Project. SPDA.

17. CDC, UNALM, INRENA, 2007. Monitoring of land use between Puerto Maldonado and Iñapari, corresponding to stage 3 of the Inter Oceanic Highway for the years 1990, 2000 and 2005. Pg. 45.

18. "Population and Household Census, 2007". National Institute of Statistics and Informatic (INEI), Peru, 2007.

19. "Community with and without project scenarios". Maderacre and Maderyja technical staff, 2009.

20. CONDORI YAJAHUANCA, Edith. 2006. Implementation of Diagnostic Sampling in Maderacre and Maderyja concessions. Technical Report. 34 p.

21. D. CALLO-CONCHA, L. Krishnamurthy, J. Alegre, 2001. Quantification of the carbon sequestered by various SAF'S and witnesses, in three ecological floors in the Peruvian Amazon. Pg. 23.

22. DYKSTRA, D. 2006. Reduced Impact Logging: Converting the results of investigation in field practices. International Symposium "Possibilities of Sustainable Forest Management in Tropical America". Indonesia. Boliva.

23. Monitoring system and company evalution of Maderacre SAC. 2006. 27 p.

24. KROLL, N. 2009. Current scenario of the biodiversity in the area of the Maderacre and Maderyja concessions and surroundings. Technical document. 20 p.

25. "Estimation in carbon stock changes in the baseline and GHG emissions for the unplanned deforestation of the Madre de Dios Amazon REDD Project", Technical area of Bosques Amazónicos, application of the BL-UP Module of the REDD Methodology Modules approved by the VCS, March 2011.

26. "Estimation of the emissions caused by the displacement of unplanned deforestation for the Madre de Dios Amazon REDD Project", Technical area of Bosques Amazónicos, application the LK-ASU Module of the REDD Methodology Modules approved by the VCS, March 2011.

27. "Estimation the carbon reserves contained in wood products in the long term", Technical area of Bosques Amazónicos, application the CP-W Module of the REDD Methodology Modules approved by the VCS, March 2011.

28. "Estimation of Carbon Stocked in the Biomass of the Forestry Concessions of Maderacre and Maderyja, Madre de Dios, Peru". AIDER NGO, 2009.

29. FAO. 2009. Situtation of forests 2009. Rome. ftp://ftp.fao.org/docrep/fao/011/i0350s.pdf.

30. FERNANDEZ Felipe; Morales, Lourdes, 2009. Diagnosis of the impact integrated to the Inter Oceanic Highway Sura in the region of Madre de Dios, pg. 40.

31. GARAY, Miluzka y PEÑA, Freddy. 2006. Evaluation report for the Certification of Sustainable Forest in the Maderera Río Acre SAC in Madre de Dios, Peru. 27 p.

32. GARAY, Miluzka y PEÑA, Freddy. 2006. Evaluation report for the Certification of Sustainable Forest in the Maderera Río Yaverija SAC in Madre de Dios, Peru. 26 p.

33. Goodacre et al. 1993. A statistical analysis of the spatial association of seismicity with drainage patterns and magnetic anomalies in western Quebec. 21 p.

34. GOREMAD & IIAP. 2008. Ecological - Economic zonification proposal for the Madre de Dios Department.

35. Hamilton, K., Sjardin, M., Shapiro, A. and Marcello, T. 2009. State of Voluntary Carbon Markets 2009. Ecosystem Marketplace & New Carbon Finance. 107 p.

36. HUERTA, P. 2009. Elaboration of deforestation maps for the Madre de Dios region, employing the processing and classification of digital images of the Landsat 5 satellite, years 1999, 2004 y 2008. CI, WWF, SFM, MINAM, GOREMAD, CONIDA, ACCA. 1st report. 75 p.

37. IIAP (a), 2009. Map of climate types in the department of Madre de Dios. Ecological – Economic zonification of Madre de Dios. IIAP, GOREMAD.

38. IIAP (b), 2009. Descriptive memory of soils and major land use capacity maps in the department of Madre de Dios. Ecological – Economic zonification of Madre de Dios. IIAP, GOREMAD. 151 p.

39. IIAP (c), 2009. Descriptive memory of the phisiography map of the Department of Madre de Dios. Ecological – Economic zonification of Madre de Dios. IIAP, GOREMAD. 30 p.

40. IIAP (e), 2009. Descriptive memory of the forestry map of the department of Madre de Dios. Ecological – Economic zonification of Madre de Dios. IIAP, GOREMAD. 52 p.

41. "Inclusion of the genus component and the Belgium Native Community in the implementation of the REDD Project". 2009. Technical document. 8 p.

42. INEI, 2010. National Census 2007: XI of Population and VI of Households. Data consultation system for Populated Centers and Disseminated Population.

43. INEI, 2010. Department indicators Peru 2006-2009. Pg. 508.

44. "Total emission report in the Madre de Dios Amazon REDD Project", Technical Area Bosques Amazónicos, application the REDD-MF Module of the REDD Methodology Modules approved by the VCS, March 2011.

45. Report for the Certification of Forest Management in Maderera Río Acre SAC in Madre de Dios, Peru. Smartwood, 2006.

46. Report for the Certification of Forest Management in Maderera Río Yaveryja SAC in Madre de Dios, Peru. Smartwood, 2006.

47. IPCC 2007. Fourth Evaluation Report. Climate Change 2007: Scientific physical basis. Quoted by Friends of the Earth International. 2008. Forests in a changing climate. Edition 115. Holland. http://www.ipcc.ch/ipccreports/ar4/wg1/ar4-wg1-chapter7.pdf.

48. IPCC, 2006. Agriculture, forestry and other land use (AFOLU) – Volumen 4. http://www.ipcc.ch/meetings/session25/doc4a4b/vol4.pdf

49. IPCC, 2005. Capture and storage of carbon dioxide. Intergovernmental group of experts on climate change. 66 p.

50. IPCC. 1995. Climate Change. Quoted by Kanninen, M. Carbon sequestration in the forest: the role of forests in the global carbon cycle. The Science of Climate Change. Cambridge University Press. England.

51. IDESAM FUNDACAO. A.S; CD. 2009. Methodology for Estimating Reductions of Greenhouse Gases Emissions from Frontier Deforestation. RED-NM-002 / Version 01 January.

52. KOMETTER, Roberto. Environmental Impact Evaluation. Maderacre Forestry Concession SAC. 19 p.

53. KOMETTER, Roberto. Planification of the exploratory evaluation of the forest in the Maderacre and Maderyja concessions. 17 p.

54. KOMETTER MOGROVEJO, Roberto. 2006. Forestry management general plan for Maderacre SAC concession. 57 p.

55. KOMETTER MOGROVEJO, Roberto. 2006. Forestry management general plan for Maderyja SAC concession 50 p.

56. KROLL KOHEL, Nelson. 2007. Annual Operative Plan (POA) for forestry concessions with wood production. 37 p.

57. KROLL, N. 2009. Effect of climate change on the Madre de Dios Amazon REDD Project. Technical document. 5 p.

58. KROLL, N. 2009. Potential impact of the implementation of the “Madre de Dios Amazon REDD Project” on biodiversity. Technical document. 30 p.

59. LAPEYRE, Tatiana; Alegre, Julio y Arévalo, Luis. 2004. Determination of carbon reserves in aerial biomass in different systems of land use in San Martín. Peru. In: Applied Ecology. Jan/Dec 2004, vol 3, n 1-2, p 35-44 ISSN1726-2216.

60. LEON, A. 2009. Interpretation of deforested areas with Landsat images for the reference región of the Maderacre and Maderyja concessions. AIDER. Madre de Dios. Peru.

61. Manual of functions of the management operations. Maderyja SAC Concession. 2008. 17 p.

62. Basic First Aid Manual. Maderacre SAC Forestry Concession. 2005. 54 p.

63. MELGAREJO LIZAMA, Oscar y KROLL KOHEL, Nelson. Forestry Management Operations Manual. Maderacre SAC. 55 p.

64. Methodology for Estimating Reductions of Greenhouse Gases Emissions from Frontier Deforestation. RED-NM-002/Version 01, January, 19th 2009.

65. Mitigation of possible negative impacts of the Madre de Dios Amazon REDD Project. 2009. Report elaborated by the technical teams of the Maderacre and Maderyja concessions.

66. Oliveira et al. 2007. Land-Use Allocation Protects the Peruvian Amazon. Science 31 August 2007: Vol. 317. Nº 5842, pp. 1233 – 1236.

67. Pearson, T., Walker, S. and Brown, S. 2005. Sourcebook for Land Use, Land-Use Change and Forestry Projects. 64 p.

68. Peñuelas et al. 2009. Phenology Feedbacks on Climate Change. Science 15 May 2009: Vol. 324. Nº 5929, pp. 887 – 888.

69. Phillips et al. 2009. Drought Sensitivity of the Amazon Rainforest. Science 6 March 2009: Vol. 323. Nº 5919, pp. 1344 – 1347.

70. Integral monitoring plan. Maderacre SAC Forestry Concession. 2009. 8 p.

71. Community Relationship Plan between Maderacre and its social surrounding. 2008. 57 p.

72. Community Relationship Plan. Maderyja SAC Concession. 2008. 33 p.

73. "Potential impacts of the implementation of the REDD Project on the community". Technical Document. 2009. 16 p.

74. PROCLIM – INRENA, 2005. GHG Inventory for the Agriculture sector and Land use change. Pg. 170.

75. Protocol for acting towards the constructive transformation of conflicts. Maderacre SAC Concession. Work Document. 5 p.

76. Protocol for the resolution of conflicts. Maderyja SAC Concession. (Conflict and colaboration in forestry management). 2008. 6 p.

77. QUIROZ, Y. 2008. Modelling of the land use/cover changes with DINAMICA software. Center for Investigation in Environmental Geography. Autonomous University of Mexico. México.

78. Recavarren Estares, Percy; Torres Padilla, Jorge; Sánchez Santiváñez, Marioldy. 2007. "Identification of the potentiality of carbon sequestration projects in the areas of influence of the South Inter Oceanic Highway", Final Report, AIDER NGO, June 2007.

79. Recavarren Estares, Percy "Estimation of the Carbon Flow in a Scenario without the Madre de Dios Amazon REDD Project within the Maderacre and Maderyja concessions". Aider NGO, 2009.

80. Recavarren, P. and Delgado, M. "Estimation of the Carbon Flow in the Maderacre and Maderyja concession in the framework of the Madre de Dios Amazon REDD Project", AIDER NGO, 2009.

81. Recavarren, P. et al. 2009. Estimation of the carbon stocked in the biomass of the forest of the Tambopata National Reserve and the National Park Bahuaja Sonene Madre de Dios sector. Partial Administration Contract AIDER. Madre de Dios, Peru.

82. Recavarren, P. 2009. Estimation of the carbon flows of the concessions Maderacre and Maderyja for the Madre de Dios Amazon REDD Project, Madre de Dios. AIDER NGO. 22 p.

83. Recavarren, P., Sánchez, C., Torres, J. and León, A. 2009. Estimation of the rate and modeling of the deforestation in the Maderacre and Maderyja forestry concessions. AIDER NGO. 24 p.

84. Recavarren, P. and Delgado, M. 2009. Estimation of carbon stocked in the aerial biomass of the forest in the leakage belt of the Maderacre and Maderyja concessions, Madre de Dios, Peru. AIDER NGO. 6 p.

85. Regulation of Forest Management Practices in the Workers Operations, Clients and/or Contractors within the Maderacre SAC Forestry Concession. 2007. 19 p.

86. Regulation of Industrial Security within the Maderacre SAC Forestry Concession. 42 p.

87. RUSSO, R. 2002. Forests as carbon sinks and carbon deposits. Earth University. Conference presented during the international workshop “Economic Valuation of the Natural Capital”. Costa Rica.

88. 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

89. SIMAMAZONIA, 2010. Modelling Conservation in the Amazon Basin. http://www.csr.ufmg.br/simamazonia/apresenta/NATURE04389.pdf

90. SIMAMAZONIA, 2010. Supplementary information to Amazon “Conservation Scenarios”. http://www.csr.ufmg.br/simamazonia/apresenta/suppl.pdf

91. Soares Filho et al. Simulating the spatial patterns of change through the use of the Dinamica model. Cartography Departament, Remote Sensoring Center, University of Minas Gerais. 8 p.

92. Stakeholder Comments Report. Soc. Claudia Canchaya, 2011.

93. Summary of the ecological and silvicultural characteristics of the species to be managed within the Maderacre forestry concession. 17 p.

94. The forest carbon offsetting survey 2009. Ecosecurities in partnership with Conservation International, The Climate, Community and Biodiversity Alliance and ClimateBiz. 33 p.

95. “The Stakeholder Community”. Maderacre and Maderyja technical staff, 2009.

96. Torres, Jorge; Recavarren, P. y Sánchez, C. “Leakage – Madre de Dios Amazon REDD Project”. 2009. AIDER NGO.

97. UE, WWF, CESVI, IBIS, 2006. Life plan of the Belgium Native Community. Indigenous Forestry Project. Pg. 42.

98. UNDP: "Human Development Report, Peru 2005. Make competitiveness and opportunity for everybody", developed by Socio-environmental Management Team, Walsh Peru, S.A., 2005.

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

100. VCS AFOLU Non-Permanence Risk Tool, Version 3, Procedural Document, 8 March 2011, v3.0.

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

102. VCS Methodology Element VM0007 REDD Methodology Modules, Version 1.0, Sectoral Scope 14, developed by Avoided Deforestation Partners, approved on 03 Dec 2010.

103. VCS Program Guide, Version 3, Requirements Document, 8 March 2011, v3.0.

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

105. Winrock International. 2006. Carbon Storage in the Los Amigos Conservation Concession, Madre de Dios, Peru. 31 p.

106. YQUISE, Anthony; Pocomucha, Vicente; Vargas, Ytauclerh. Carbon stores in different land use systems within the José Crespo y Castillo District – Huánuco – Peru. Pg. 49