

REDUCTION OF DEFORESTATION AND DEGRADATION IN TAMBOPATA NATIONAL RESERVE AND BAHUAJA- SONENE NATIONAL PARK WITHIN THE AREA OF MADRE DE DIOS REGION – PERU: MONITORING REPORT



Document Prepared By Asociación para la Investigación y el Desarrollo Integral – AIDER

www.aider.com.pe

Project Title	Reduction of deforestation and degradation in Tambopata National Reserve and Bahuaja-Sonene National Park within the area of Madre de Dios region –Peru
Version	1.0
Report ID	01
Date of Issue	30-October-2012
Project ID	N/A
Monitoring Period	01-July-2010 to 30-June-2011
Prepared By	Asociación para la Investigación y el Desarrollo Integral - AIDER
Contact	Address: Av. Jorge Basadre 180 Oficina 6 – San Isidro. Lima, Perú Telephone: (51 1) 421 5835 Email : lima@aider.com.pe Website: www.aider.com.pe

Table of Contents

1 Project Details	
1.1 Summary Description of Project	3
1.2 Sectoral Scope and Project Type	3
1.3 Project Proponent	4
1.4 Other Entities Involved in the Project	4
1.5 Project Start Date	5
1.6 Project Crediting Period	5
1.7 Project Location	5
1.8 Title and Reference of Methodology	6
2 Implementation Status	
2.1 Implementation Status of the Project Activity	6
2.2 Project Description Deviations	7
2.3 Grouped Project	8
3 Data and Parameters	
3.1 Data and Parameters Available at Validation	9
3.2 Data and Parameters Monitored	10
3.3 Description of the Monitoring Plan	17
4 Quantification of GHG Emissions Reductions and Removals	
4.1 Baseline Emissions	26
4.2 Project Emissions	26
4.3 Leakage	26
4.4 Summary of GHG Emission Reductions and Removals	26
5 Additional Information	27

1 PROJECT DETAILS

1.1 Summary Description of Project

Madre de Dios is the Amazon region that registers the highest biodiversity levels in Peru. This region, altogether with the upper jungle of Cusco and Puno regions, represents the best conserved sector of peruvian Amazon jungle, having 30% of its surface under different protection categories under de National System of Protected Natural Areas –SINANPE, where is the Tambopata National Reserve (RNTAMB) and the Bahuaja-Sonene National Park (PNBS).

While historically Madre de Dios has had low deforestation levels, the significant upgrade in access due to construction of South Interoceanic Highway (adjacent to RNTAMB Buffer Zone) is increasing migration and, therefore, land use change and forest degradation.

The project is carried out in the area comprised of Tambopata National Reserve and the sector of Bahuaja-Sonene National Park located in Madre de Dios region, correspondent to the Partial Administration Contract of RNTAM and PNBS – in the area of Madre de Dios, signed between peruvian State and Association for Investigation and Integral Development – AIDER¹. The project purpose is to conserve the forest in both NPA against imminent progress of deforestation.

The project looks forward to reduce pressure of land use change in NPAs Buffer Zone trough promoting sustainable economic activities and establishing conservation agreements in the previously identified critical areas; both actions are oriented to consolidate a “barrier” against economic frontier advance (agricultural and mining). In like manner, it will be straightened the control and surveillance system of RNTAMB and PNBS, emphasizing in creation and operation of community surveillance committees with official recognition, as a strategy for local communities participation in NPAs management. Finally, it will be given technical support to the regional forestry and environmental authority and Natural Protected Areas National Service –SERNANP for forest and environmental governance in the Madre de Dios region, promoting State presence in NPAs and optimizing coordination and collaboration between authorities and local populations around NPA management.

1.2 Sectoral Scope and Project Type

Sectoral scope 14 – Agriculture, Forestry and Other Land Use

AFOLU project category: Reduced Emissions from Deforestation and Degradation (REDD)

Activity type: Avoiding Unplanned Deforestation and Degradation (AUDD)

Project activity type was defined according a decision tree located in the methodology used (REDD-MF, see 2.1). It is expected that forest land will be converted to non-forest at the “without-project” scenario, with the project area lacking legal authorization for a non-forest conversion.

Project is individual, not grouped.

¹ Given by Intendence Resolution N° 053-2008-INRENA-IANP

1.3 Project Proponent

Project proponent is shown in Table 1.

Table 1 Description and responsibilities of project proponent

Entity	Description	Roles/responsibilities
Asociación para la Investigación y Desarrollo Integral – AIDER Contact: Jaime Nalvarte Armas Address: Av. Jorge Basadre 180 Oficina 6 – San Isidro. Lima, Perú Telephone: (51 1) 421 5835 Email : lima@aider.com.pe	Peruvian NGO leadering topics of REDD y CDM projects, with more tan 20 years of experience in forestry projects, including forest management, reforestation and conservation of nature, working with enterprises, native communities and rural smallholders promoting eco-bussiness.	To execute RNTAMB and PNBS Partial administration Contract. To design, implement and monitor the project.

1.4 Other Entities Involved in the Project

The National Service of Natural Protected Areas (SERNANP) is in charge of conducting the management of the National System of Natural Protected Areas – SINANPE. The headquarters of Tambopata National Reserve and Bahuaja-Sonene National Park are part of this Service. It role is political support, following and supervision of assumed commitments, as a State entity responsible of NPA management.

National Service of Natural Protected Areas - SERNANP

Contact: Pedro Gamboa Moquillaza

Address: Calle Diecisiete nº 355 - Urb. El Palomar - San Isidro. Lima, Perú

Telephone: (51 1) 225-2803

E-mail: sernanp@sernanp.gob.pe

The Pontifical Catholic University of Peru – PUCP is an independent institution intended to give higher education, to promote investigation and extend its influence to community to contribute to national development. In 2008 AIDER and PUCP established an strategic alliance with the aim of executing the Operations Partial Administration Contract in the RNTAMB and the PNBS, same that is formalized may 8th 2009 through signing a collaboration agreement.

The PUCP complements AIDER efforts as an executor of Partial Administration Contract contributing with its high experience investigating in RNTAMB, through participation of its professionals in developing academic and investigation activities. Likewise, advises AIDER about managing the investigation component of the contract, specifically on promoting new investigations and better conditions for investigations. An example of this collective effort is the construction and operation of a 45-meters-height tower for continuous measurement of above-forest-CO₂, inside RNTAMB.

1.5 Project Start Date

Project start date: July 01, 2010

1.6 Project Crediting Period

Project crediting period: 20 years (July 01, 2010 – June 30, 2030).

First period of quantified GHG emission reductions: 10 years (July 01, 2010 – June 30, 2020).

1.7 Project Location

Name of project location: Tambopata National Reserve and Bahuaja-Sonene National Park – within Madre de Dios region.

The political location of project area is in Tambopata and Inambari districts, Tambopata province, Madre de Dios department and region, Republic of Peru. It occupies the south-eastern end of the department, reaching the international limit with Bolivian Republic. The map of the project area is shown in Figure 1.

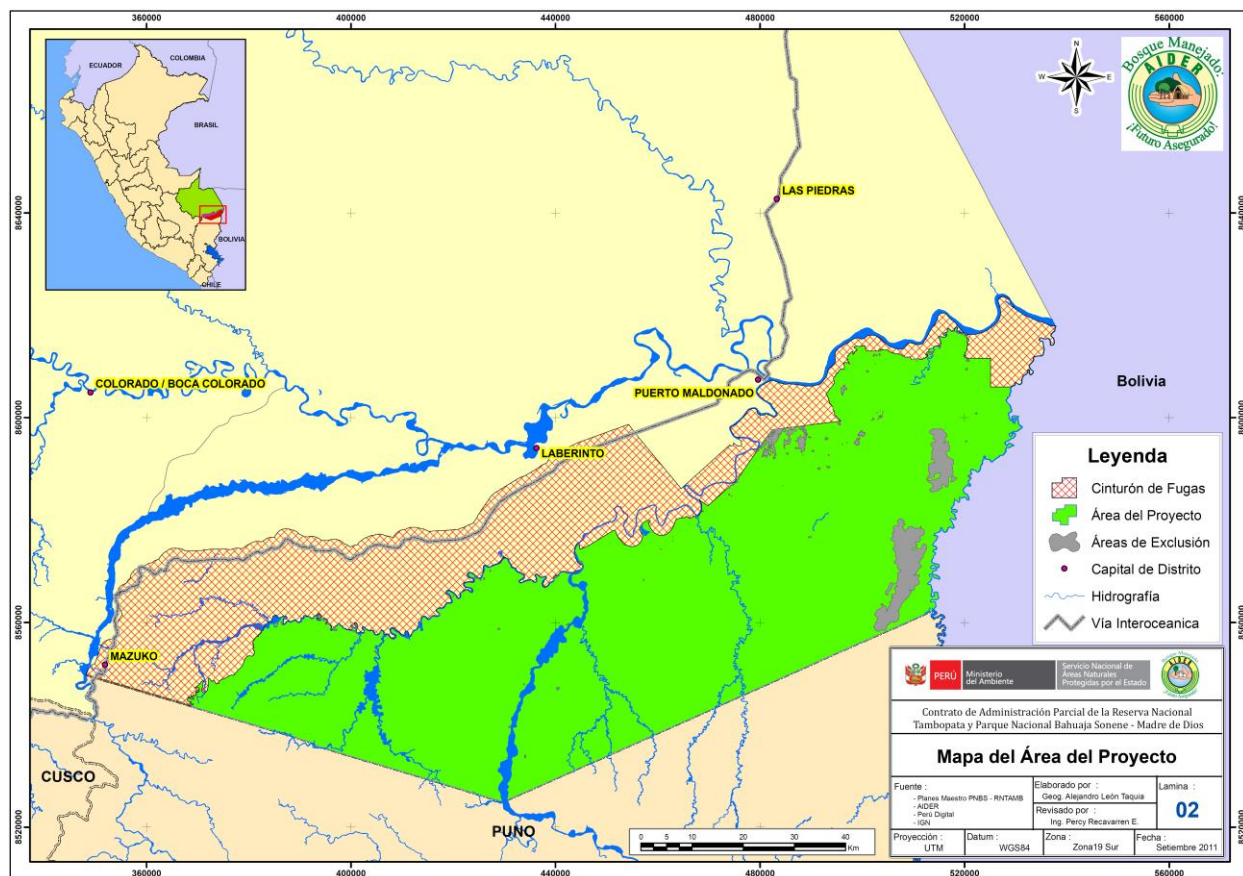


Figure 1 Map of the project area

1.8 Title and Reference of Methodology

Approved VCS Methodology VM0007, REDD Methodology Modules (REDD-MF) version 1.2, developed by Avoided Deforestation Partners. The modules used for monitoring are the next ones:

- Approved VCS Module VMD0015 “Methods for monitoring of greenhouse emissions and removals” (M-MON); although the PD was validated using module version 1.0, to perform monitoring in this period has been used version 2.0 approved in November 2011.
- Approved VCS Module VMD0010 “Estimation of emissions from activity shifting for avoided unplanned deforestation” (LK-ASU), version 1.0.
- Approved VCS Module VMD0013 “Estimation of greenhouse gas emissions from biomass burning” (E-BB), version 1.0.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Project implementation status: ongoing. The strategy to achieve emissions reduction presented in the Project Description had been consolidated in the management document *Strategy to Reduce Emissions from Deforestation and Forest Degradation in Tambopata National Reserve (RNTAMB) and Bahuaja-Sonene National Park (PNBS)- Madre de Dios area*. During the monitoring period, within the implementation of this management document, project activities have been initiated according to the timeline established in the Project Description: Productive Activities (Agroforestry, Palm trees management and conservation, Gold mining); Control and surveillance; and Forest governance. Annex I shows the list of activities developed during the monitoring period, with the respective supporting documentation.

For the **leakage monitoring** (to determine deforestation amount at the leakage belt that is effectively attributable to project activity), it will be implemented the community monitoring plan which has been prepared following criteria contained in the Project Design Document validated under the Climate, Community & Biodiversity Alliance (CCBA) standards; the community monitoring plan can be found in Annex II and is currently under planning, methodology evaluation and first stage of implementation. The estimated deforestation proportion caused by immigrant population, used for leakage estimates, will be estimated every 5 years based on available data at Statistics and Information Technology Institute – INEI.

Concerning to **Monitoring and management of non-permanence risk factors**, the next risk factors will be subject to monitoring:

- **Internal Risk**
 - Project management
 - It will be monitored every 5 years the risk of external encroachment to menace more than 50% of carbon stock over which previously have been emitted carbon credits.
 - As a part of AIDER annual staff evaluation, Institutional Monitoring will be in charge of maintaining a multidisciplinary team including people with all the necessary abilities to implement the project activities.

- Financial viability
 - o Project financial flux will be monitored at year 5, to verify if the break-even point was reached according to expected at the non-permanency risk evaluation.
- **External risk**
- Community engagement
 - o It is planned to consult the population at the project zone² through their most representative organizations: The RNTAMB management committee, the PNBS management committee, and organizations of harvested resources users; this will be done biannually.
 - o The enacting of community monitoring plan will allow to evaluate the net positive impact of the project over the population well-being.
- Political risk: The World Bank governance index will be annually monitored.
- **Natural risk**
- Fire: fires are annually monitored, using the procedure described in Annex XI; this action is part of the Integrated monitoring system that is being implemented within the Operations partial administration contract of RNTAMB and the PNBS- Madre de Dios area.
- Pests and disease: Information is compiled annually from Agricultural Regional Bureau.
- Extreme weather events: Information is compiled annually from Meteorology and Hydrology National Service – SENAMHI³

Non-permanency risk evaluation can be found in Annex III.

2.2 Project Description Deviations

Regarding monitoring plan contained in the PD, the next deviations occurred:

2.2.1 Discarding of Claslite software use to support delimitation of the area potentially impacted by degradation process

At present, Claslite version 2.2 has not been updated for non-governmental users; this prevented to use it to support degradation monitoring at the present period, because the software needs updates every three months from atmospheric database, which were not given by the software creator.

2.2.2 Monthly monitoring of hotspots

Monthly monitoring of hotspots was not performed because little information was available. The data source selected for this monitoring and indicated at Project Description, the University of Maryland in

² Delineated in CCB project design document, according to definition from CCB standards

³ http://www.senamhi.gob.pe/include_mapas/dat_esta_tipo.php?estaciones=000808

agreement with Conservation International Peru, was not available because the reports of hotspots in the Amazon region of Peru were not continuous.

Likewise, the available information, provided by INPE from Brazil through their web data base⁴, had errors at hotspot location; these errors were detected when info was contrasted between satellite imagery and field observations (an example of these errors can be seen on Figure 2, where hotspots are located in the middle of water bodies⁵). Therefore, using this data source was dismissed.

More trustable sources were sought, choosing data from National Aeronautics and Space Administration (NASA), which were available from user record in 2011. Nevertheless, monitoring of burned areas was performed according to specified in module E-BB.

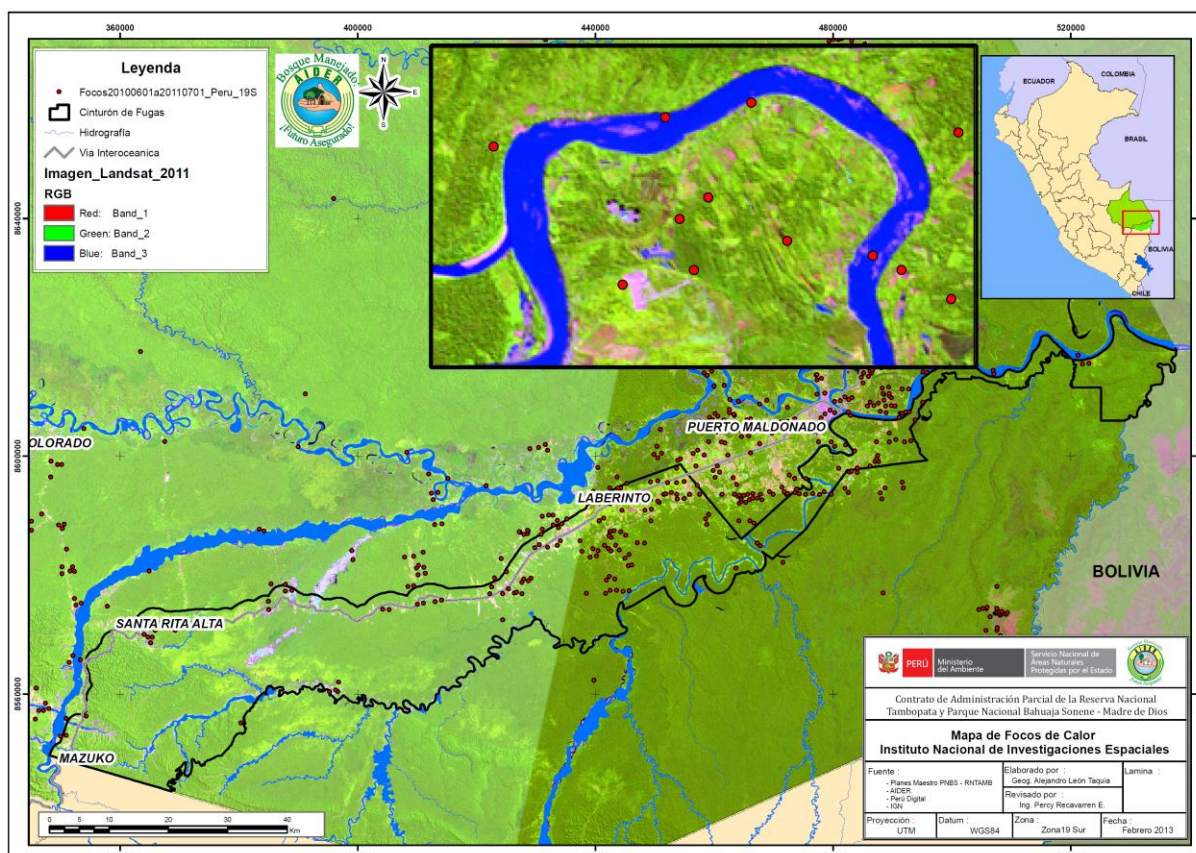


Figure 2 Errors in heat spots location at INPE-Brazil information

2.3 Grouped Project

Not applicable.

⁴ <http://www.dpi.inpe.br/proarco/bdqueimadas/>

⁵ Hotspots are attached in.shp format (Formato Vector Shapefile) from 01-06-2010 to 01-07-2011.

D:\PDD_SIG\Geodatabase_Shapefiles.mdb\INPE_Focos

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	Regional forest cover/ non-forest cover Benchmark Map
Data unit:	-
Description:	Map showing location of forest lands inside a reference region, the project area and the leakage belt at the beginning of crediting period.
Source of data:	Landsat 5 imagery. Points collected with GPS in the case of field verifying.
Value applied:	-
Purpose of the data:	To serve as a reference for the amount of forest cover and deforestation
Any comment:	-

Data Unit / Parameter:	<i>COMFi</i>
Data unit:	dimensionless
Description:	Combustion factor for stratum <i>i</i> (vegetation type)
Source of data:	Default values in Table 2.6 of IPCC, 2006 (Annex 2).
Value applied:	0,5
Purpose of the data:	Used to determine GHG emissions from biomass burning.
Any comment:	-

Data Unit / Parameter:	<i>G gi</i>
Data unit:	dimensionless
Description:	Combustion Emission factor for stratum <i>i</i> for gas <i>g</i> - source of data
Source of data:	Defaults can be found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5 (see Annex 2: emission factors for various types of burning for CH ₄ and N ₂ O).
Value applied:	6,80 para CH ₄ y 0,20 para N ₂ O en bosque tropical
Purpose of the data:	Used to determine GHG emissions from biomass burning.
Any comment:	-

Data Unit / Parameter:	<i>PROPIMM</i>
Data unit:	%
Description:	Estimated deforestation rate caused by immigrant agents.
Source of data:	INEI, 2007
Value applied:	18,65
Purpose of the data:	To determine area deforested by immigrant agents outside leakage belt and project area, under the project scenario.
Any comment:	-

3.2 Data and Parameters Monitored

Data Unit / Parameter:	Project forest cover monitoring map
Data unit:	-
Description:	Map showing the location of forest land within the project area at the end of each monitoring period. If within the project area any forest land is cleared, comparison with benchmark map must show the deforested areas at each monitoring event.
Source of data:	Landsat 5 imagery. Points collected with GPS in the case of field verifying.
Description of measurement methods and procedures to be applied:	Imagery interpretation by using software of geographical information system.
Frequency of monitoring/recording:	Annual
Value monitored:	541 608,40 ha
Monitoring equipment:	Computer (desktop/portable) with processor i7 and 6 GB of RAM memory. Softwares ENVI 4.8 and Arc GIS 9.3.1 GPS Garmin Navigator equipment
QA/QC procedures to be applied:	Map will be validated on field through a non-linear systematic sampling, and calculation of accuracy and errors of commission and omission through a confusion matrix. Minimum map accuracy will be 90 %, according to specified in M-MON module. Map creation is according the Standard Operational

	Procedure made for this aim, which is in the Annex X.
Calculation method:	We have as a reference the classified image from previous year, which is updated with new “non-forest” areas produced by the software and by the area knowledge of the remote sensing specialist; in this way, the forest area is defined for the present monitoring period. Map precision is calculated comparing it with field data.
Any comment:	

Data Unit / Parameter:	Leakage belt forest cover monitoring map
Data unit:	
Description:	Map showing the location of forest land within the leakage belt area at the end of each monitoring period.
Source of data:	Landsat 5 Imagery. Points collected with GPS in the case of field verifying.
Description of measurement methods and procedures to be applied:	Imagery interpretation by using software of geographical information system.
Frequency of monitoring/recording:	Annual
Value monitored:	192 160,94 ha
Monitoring equipment:	Computer (desktop/portable) with processor i7 and 6 GB of RAM memory. Softwares ENVI 4.8 and Arc GIS 9.3.1 GPS Garmin Navigator equipment
QA/QC procedures to be applied:	Map will be validated on field through a non-linear systematic sampling, and calculation of accuracy and errors of commission and omission through a confusion matrix. Minimum map accuracy will be 90 %, according to specified in M-MON module. Map creation is according the Standard Operational Procedure made for this aim, which is in the Annex X.
Calculation method:	We have as a reference the classified image from previous year, which is updated with new “non-forest” areas produced by the software and by the area knowledge of the remote sensing specialist; in

	this way, the forest area is defined for the present monitoring period. Map precision is calculated comparing it with field data.
Any comment:	

Data Unit / Parameter:	<i>Aburn,i,t</i>
Data unit:	Hectares
Description:	Sum of the burned areas within project area during monitoring period.
Source of data:	Landsat 5 Imagery. Points collected with GPS in the case of field verifying.
Description of measurement methods and procedures to be applied:	Imagery interpretation by using software of geographical information system.
Frequency of monitoring/recording:	Annual
Value monitored:	1216,14 ha
Monitoring equipment:	Computer (desktop/portable) with processor i7 and 8 GB of RAM memory. Softwares ENVI 4.8 and Arc GIS 9.3.1 GPS Garmin Navigator equipment
QA/QC procedures to be applied:	Burned areas map will be validated through a sampling of 10% from total analyzed area, observing that classes from office map correspond to field reality. Minimum map accuracy will be 90 %, according to specified in M-MON module. Map creation is according the Standard Operational Procedure made for this aim, which is in the Annex XI.
Calculation method:	Landsat 5 imagery was analyzed through characteristics of their spectral signatures, color gradation and shapes; afterwards, image training samples were extracted and maximum algorithm probability was applied to them, extracting the focus areas. Finally, a post-classification was made to be able to erase those pixels isolated in the area.
Any comment:	

Data Unit / Parameter:	<i>ADefPA_{i,t}</i>
Data unit:	Hectares
Description:	Deforested area registered for the project in stratum i during the monitoring period.
Source of data:	Landsat 5 Imagery
Description of measurement methods and procedures to be applied:	Imagery interpretation by using GIS software.
Frequency of monitoring/recording:	Annual
Value monitored:	11,74 ha
Monitoring equipment:	Computer (desktop/portable) with processor i7 and 6 GB of RAM memory. Software Arc GIS 9.3.1
QA/QC procedures to be applied:	Map of deforested areas will be validated on field through a non-linear systematic sampling, and calculation of accuracy and errors of commission and omission through a confusion matrix. Minimum map accuracy will be 90 %, according to specified in M-MON module. Map creation is according the Standard Operational Procedure made for this aim, which is in the Annex X.
Calculation method:	We have as a reference the classified image from previous year, which is updated with new “non-forest” areas produced by the software and by the area knowledge of the remote sensing specialist; in this way, the deforested area is defined for the present monitoring period. Map accuracy is calculated comparing it with field data.
Any comment:	

Data Unit / Parameter:	$A_{DefLB,i,t}$
Data unit:	Hectares
Description:	Deforested area registered for the leakage belt in stratum i during the monitoring period.
Source of data:	Landsat 5 Imagery
Description of measurement methods and procedures to be applied:	Imagery interpretation by using GIS software.
Frequency of monitoring/recording:	Annual
Value monitored:	5336,11 ha
Monitoring equipment:	Computer (desktop/portable) with processor i7 and 6 GB of RAM memory. Software Arc GIS 9.3.1
QA/QC procedures to be applied:	Map of deforested areas will be validated on field through a non-linear systematic sampling, and calculation of accuracy and errors of commission and omission through a confusion matrix. Minimum map accuracy will be 90 %, according to specified in M-MON module. Map creation is according the Standard Operational Procedure made for this aim, which is in the Annex X.
Calculation method:	We have as a reference the classified image from previous year, which is updated with new “non-forest” areas produced by the software and by the area knowledge of the remote sensing specialist; in this way, the deforested area is defined for the present monitoring period. Map accuracy is calculated comparing it with field data.
Any comment:	It was performed an ex – ante estimation of leakage belt deforested area in the project scenario, according to the procedures established in M-MON Module, resulting in a total of 756,13 ha

Data Unit / Parameter:	$A_{DegW,i}$
Data unit:	Hectares
Description:	Area potentially impacted by degradation processes in stratum i
Source of data:	RNTAMB and PNBS park rangers reports about illegal timber harvesting. Location map of physical components of project area.
Description of measurement methods and procedures to be applied:	Delimitation of the area potentially subject to forest degradation based on expert knowledge of park rangers (see participatory workshop memory, Annex XII).
Frequency of monitoring/recording:	Annual
Value monitored:	13 191,98 ha
Monitoring equipment:	Computer (desktop/portable) with processor i7 and 6 GB of RAM memory. Software Arc GIS 9.3.1
QA/QC procedures to be applied:	Participatory workshop carried out with park rangers to validate preliminary delimitation of the area potentially subject to forest degradation.
Calculation method:	Using UTM coordinates from points of interventions performed by park rangers during monitoring period and expert knowledge of the area and degradation activities, is determined the critical sectors area within project area.
Any comment:	-

Data Unit / Parameter:	AP_i
Data unit:	Hectares
Description:	Total area of degradation sample plots in stratum i
Source of data:	Field measurement
Description of measurement methods and procedures to be applied:	Systematically random sampling, covering at least 3 % of area potentially subject to degradation.
Frequency of monitoring/recording:	annual

Value monitored:	396,8 ha sampled by means of a total of 99200 m of 40 m wide- transects, distributed systematically in the area potentially subject to degradation.
Monitoring equipment:	Garmin GPS Navigator Equipment Computer (desktop/portable) with processor i7 and 6 GB of RAM memory. Software Arc GIS 9.3.1
QA/QC procedures to be applied:	Field data collection is carried out according to Standard Operational Procedure made for this aim, which can be found in Annex XII.
Calculation method:	Processing on desk the information collected on ground, using software of geographic information systems.
Any comment:	

Data Unit / Parameter:	$C_{DegW,i,t}$
Data unit:	t CO ₂ -e
Description:	Biomass carbon of trees cut and removed through degradation process in stratum i at the monitoring period.
Source of data:	Field measurement.
Description of measurement methods and procedures to be applied:	Field measurement according to procedure described in Module M-MON.
Frequency of monitoring/recording:	annual
Value monitored:	613,08 t CO ₂ -e
Monitoring equipment:	Tree calliper
QA/QC procedures to be applied:	Field data collection is carried out according to Standard Operational Procedure made for this aim, which can be found in Annex XII.
Calculation method:	Allometric equations used to calculate above-ground biomass (Brown, 1997, quoted by Pearson <i>et al.</i> , 2005) and below-ground (Source: Cairns <i>et al.</i> , 1997, quoted by IPCC, 2003).
Any comment:	

3.3 Description of the Monitoring Plan

The monitoring purpose is to obtain the necessary information that allows estimating the amount of avoided emissions during the crediting period, to evaluate effectiveness of project activities and collect all necessary data which allows ensuring project goals achievement of reducing emissions.

Monitoring activities include the use of remote sensors as well as in-situ inspections. The combination of both sources results in calculations and estimations required to know if the project is being developed in conformity with VCS-PD.

To perform the monitoring of areas under deforestation and forest degradation and the associated emissions, Module VCS VMD0015 “Methods for monitoring of greenhouse gas emissions and removals” (M-MON) will be used; likewise, the estimation of leakage due to activities shifting will be done according to Module VCS VMD0010 “Estimation of emissions from activity shifting for avoided unplanned deforestation” (LK-ASU). About estimation of non-CO2 GHG emitted from biomass burning, Module VCS VMD0013 “Estimation of greenhouse gas emissions from biomass burning” (E-BB) will be used.

It will be considered conservatively that the carbon stock in the above – and below-ground biomass remains constant, hence it will not be monitored. Furthermore, the secondary forest growth (carbon stock enhancement) will be omitted, in a conservative way, considering instead, the mosaic formed by agriculture/stock breeding and secondary forest as a single category; this is due to the complications that imply to differentiate between secondary forests and areas under agricultural management (for having similar visual and spectral characteristics) with the pixel value of the images that will be used. It is necessary to indicate that, in many occasions, forest regeneration is prevented (as is the case of areas affected by mining or those invaded by aggressive-competitors alien grass species).

Monitoring of land-use change, based on Landsat 5 images, will be conducted annually, involving all the changes in forest cover. Deforested area will be calculated (in hectares) within the project area and the leakage belt. Likewise, once generated the deforestation map, it will be validated through a systematic non-linear sampling on the field.

On the other hand, there will be an annual monitoring of the fire area that could affect the project activities, through the online information system provided by NASA, U.S.A.

The spatial information that can be provided by government entities will be actualized annually.

Monitoring will be performed by a professional Monitoring team, which will be located in the cities of Lima and Puerto Maldonado, coordinating with Tambopata National Reserve and Bahuaja-Sonene National Park headquarters. The Monitoring team reports to the AIDER Ecosystem Services Area Coordinator, based in Lima.

The Institutional Monitoring, Project Monitoring and Quality Assurance and Quality Control are entrusted to monitoring team located in Lima. Socio-environmental Monitoring is entrusted to monitoring team of Puerto Maldonado. The Emissions Monitoring tasks are shared between both headquarters.

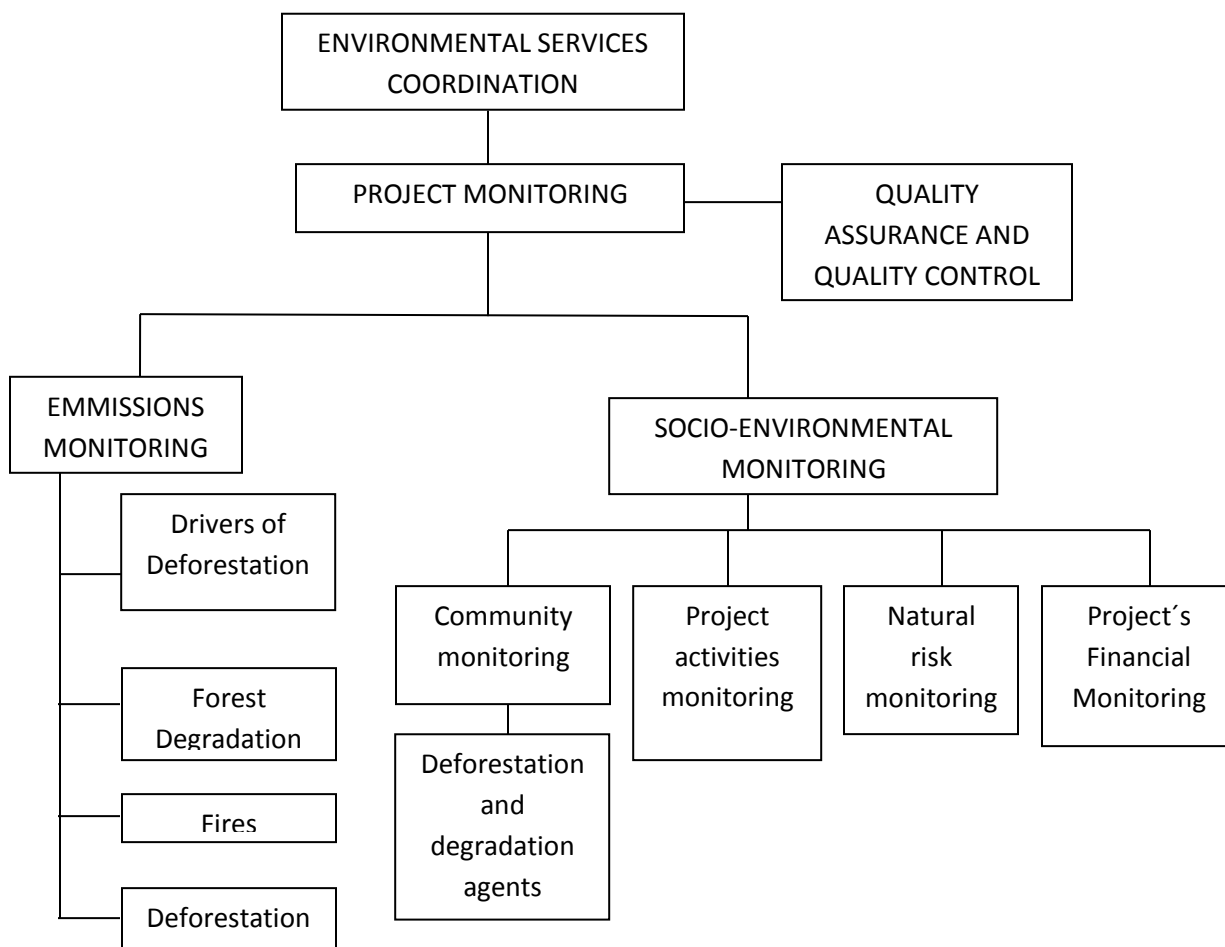


Figure 3 Monitoring Organizational Chart

The in-situ monitoring, run by the professional monitoring team in Madre de Dios, is supported by the expert knowledge from park rangers of the protected areas covered by the project area, whom receive additional training by means of additional training workshops to accomplish these tasks.

All the monitoring activities are being implemented using Standard Operational Procedures (SOPs) elaborated by the project team (see Annex X-XII). The staff will be permanently trained to assure the data quality.

The Quality Assurance and Quality Control team schedules audit visits to verify SOPs correct implementation; in the same way, it chooses random processes to verify the correct implementation of SOPs.

The monitoring data is stored and processed in Puerto Maldonado and Lima cities following the described procedure in Annex XIII.

- **Baseline revision**

The baseline scenario will be reviewed every 10 years. The deforestation rate for the reference region, project area and leakage belt will be updated, as well as the deforestation drivers; additionally, carbon stock information will be reviewed, evaluating 10% of surveyed plots on each stratum to determine the baseline scenario. Using this updated information, the deforestation model will be adapted in the baseline scenario for the project area and leakage belt, projecting again the deforested areas and the carbon emissions estimates in the baseline scenario for next period of time.

- **Monitoring of the actual changes in carbon stock and GHG emissions**

It will be performed using geographical software to process and interpret satellite imagery, complementing this with field data; the parameters subject to monitoring are found in section 3.2. Procedure is described next, as stipulated by module M-MON.

STEP 1. Selection and analyses of sources of land-use and land-cover (LU/LC) change data

The full procedure can be found in Annex IV.

At the end of monitoring period:

- Forest Cover Maps for the project area and leakage belt were developed (see Annex VII and VIII).
- "Forest" and "non-forest" categories area were obtained within project area and leakage belt.

Table 2 Forest and non-forest area within project area and leakage belt

Category	Forest (ha)	Non-forest (ha)
Project area	541 608,40	11,74
Leakage belt	192 160,94	71 605,10

- Remaining forest area was updated at the Reference region, giving a total of 5 089 464,31 ha.

The detailed results can be found in Annex IV.

STEP 2. Interpretation and analysis

2.1 Monitoring deforestation

Monitoring of deforestation is performed according the procedure described in Annex IV. Estimates of emissions from deforestation can be found in Annex IX.

2.2 Monitoring forest degradation

2.2.1 Degradation through extraction of trees for illegal timber

Monitoring of degradation is performed according to the procedure described in Annex IV.

2.2.2 Monitoring degradation due to selective logging of forest management areas possessing a FSC certificate

It does not apply, due to the absence of FSC forest management areas within the project area, since these operations are incompatible with the objectives of the Natural Protected Areas that conform the Project Area, according to the Project Description.

2.3 Monitoring areas undergoing natural disturbance

- Legal basis

In Peru there is a system for natural disasters management. Law N° 29664 creates the Disaster Risk National System (SINAGERD). Article 9 of this law mentions that the National Institute for Civil Defense (INDECI) is integral part of that system. The same law mentions, in Article 13, INDECI functions to develop, coordinate and facilitate the formulation and implementation of the Disaster Risk Management National Plan.

In the Regulation of the Organization and Functions of the National Institute for Civil Defense – INDECI, SUPREME DECREE N° 059-2001-PCM, is stipulated in its formation the creation and functioning of the statistics and telematics office inside INDECI. Article 9 of that regulation sets out this office functions highlighting in paragraphs b) To make timely and reliable statistic report, c) To centralize and publish statistics related with disasters mitigation and prevention, g) To develop and maintain INDECI's web page and intranet network actualized.

- Data compilation

Taking into account this legal basis, we visited INDECI⁶ web page to obtain information.

⁶ <http://sinpad.indeci.gob.pe/sinpadweb/>

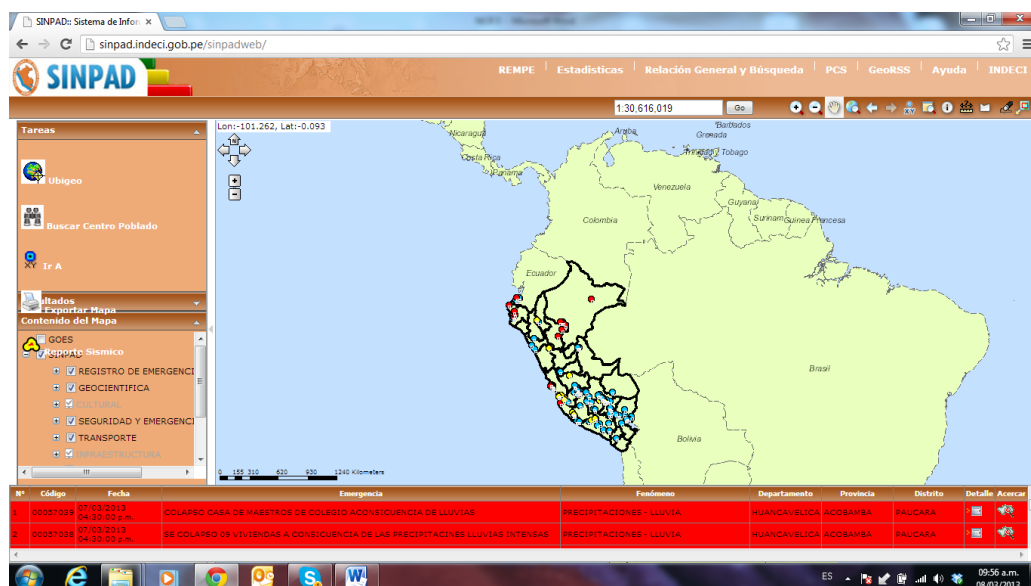


Figure 4 Web page of the National Information System for Response and Rehabilitation – SINPAD

From this web was downloaded the occurrence of events (natural or human-induced) on each district of Madre de Dios department, for the period from 2003 to 2012; this data was gathered by each Emergency Operations Centre COE (that works to a municipality level) and systemized in the National Information System for Response and Rehabilitation - SINPAD

From this database was selected information for districts in which is located the project area: Tambopata and Inambari districts, for the monitoring period from July 1st 2010 to June 30th 2011.

- Data mapping

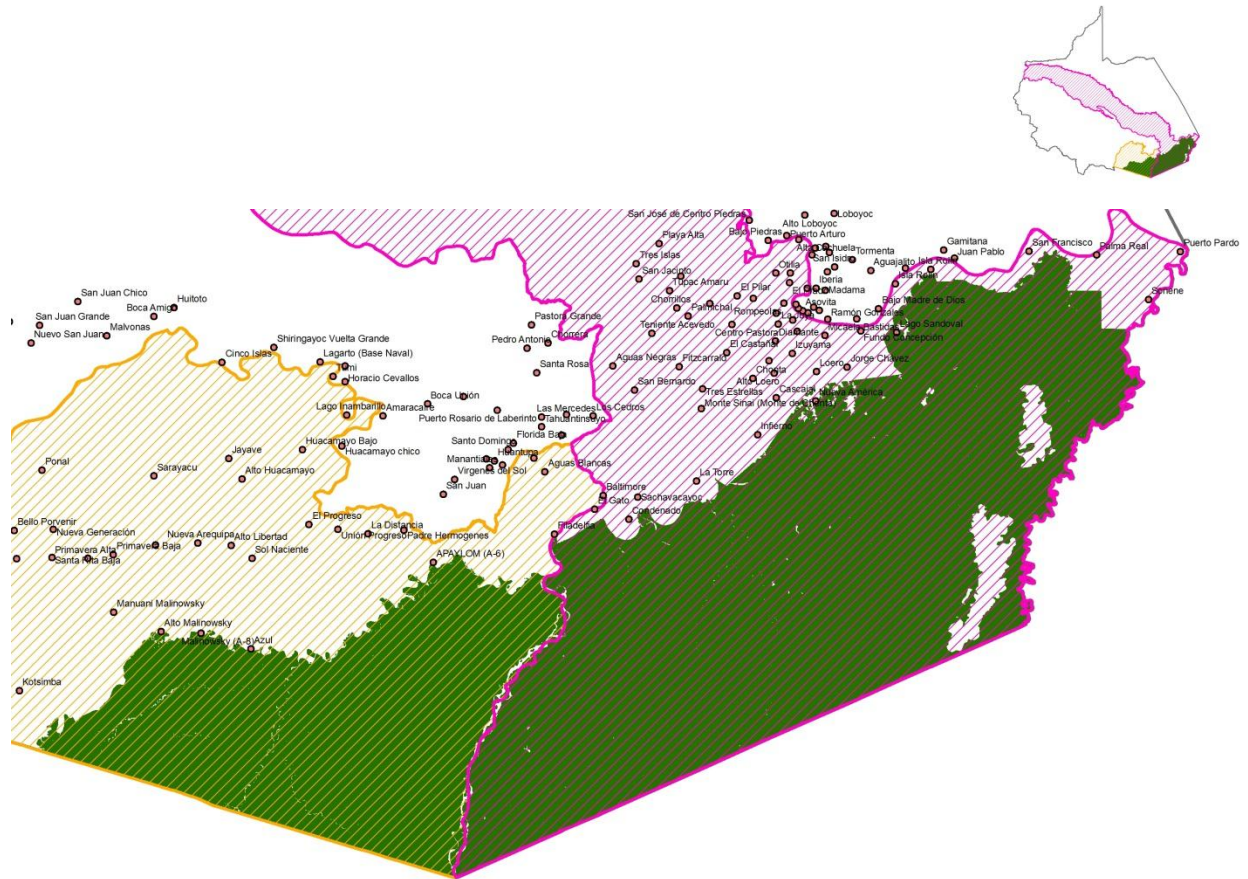


Figure 5 Limit of districts involved in project area

Table 3 Incidents data / Occurrences report for period from July 1st 2010 to June 30th 2011.

Date	District	Cod Dpto	Cod Prov	Cod Dist	Code	Emergency	Reference location
01/07/2010	Tambopata	17	1701	170101	00039073	Fire at Prado Community	El Prado
28/07/2010	Tambopata	17	1701	170101	00039366	House fire in shanty town Los Cedros, Santiago alley Lt. 1	PEM
04/08/2010	Tambopata	17	1701	170101	00039416	House fire in Pueblo viejo, Circunvalación av.	PEM
01/12/2010	Tambopata	17	1701	170101	00041370	Dengue and malaria affect Madre de dios department	Doesn't determine
24/01/2011	Tambopata	17	1701	170101	00042065	House flooding caused by rainfall	Doesn't determine
22/04/2011	Tambopata	17	1701	170101	00044316	Houses fire at Dos de mayo av. with central Arequipa	PEM
23/04/2011	Tambopata	17	1701	170101	00044367	01 house fire at Infierno 1 village	Infierno
18/06/2011	Tambopata	17	1701	170101	00046049	01 rustic wooden house fire at community	Doesn't determine
10/02/2011	Inambari	17	1701	170102	00042405	Flooding caused by Inambari river overflow, Mazuko area	Mazuko

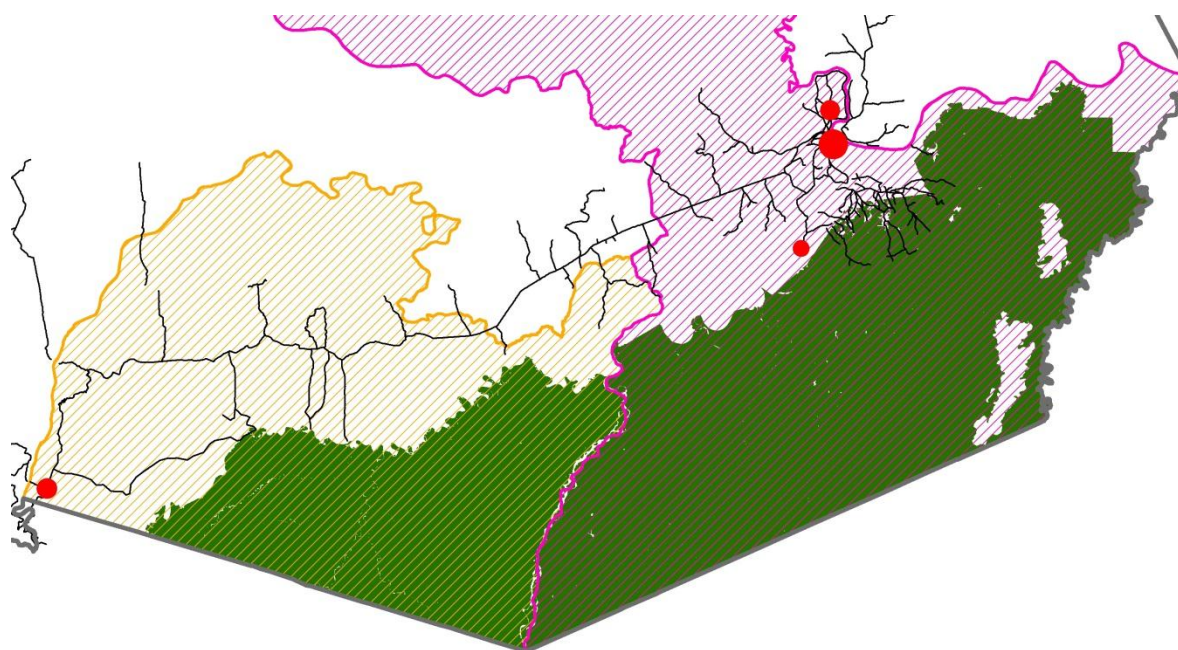


Figure 6 Map of incidents at Tambopata e Inambari districts

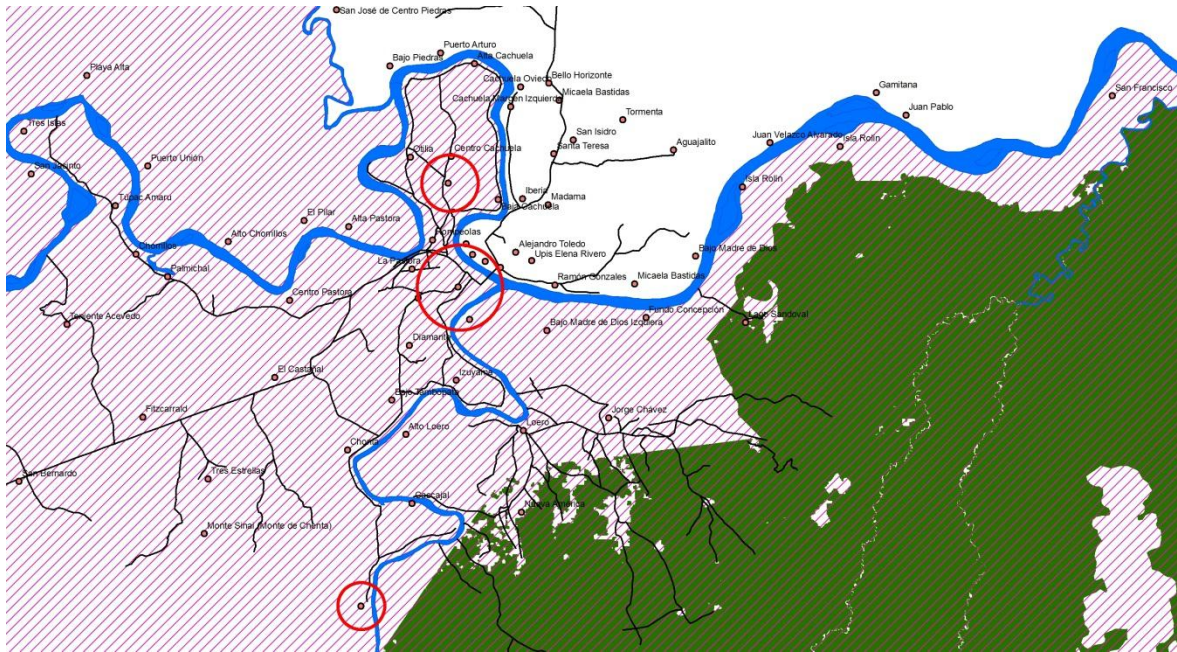


Figure 7 Map of incidents at Tambopata district

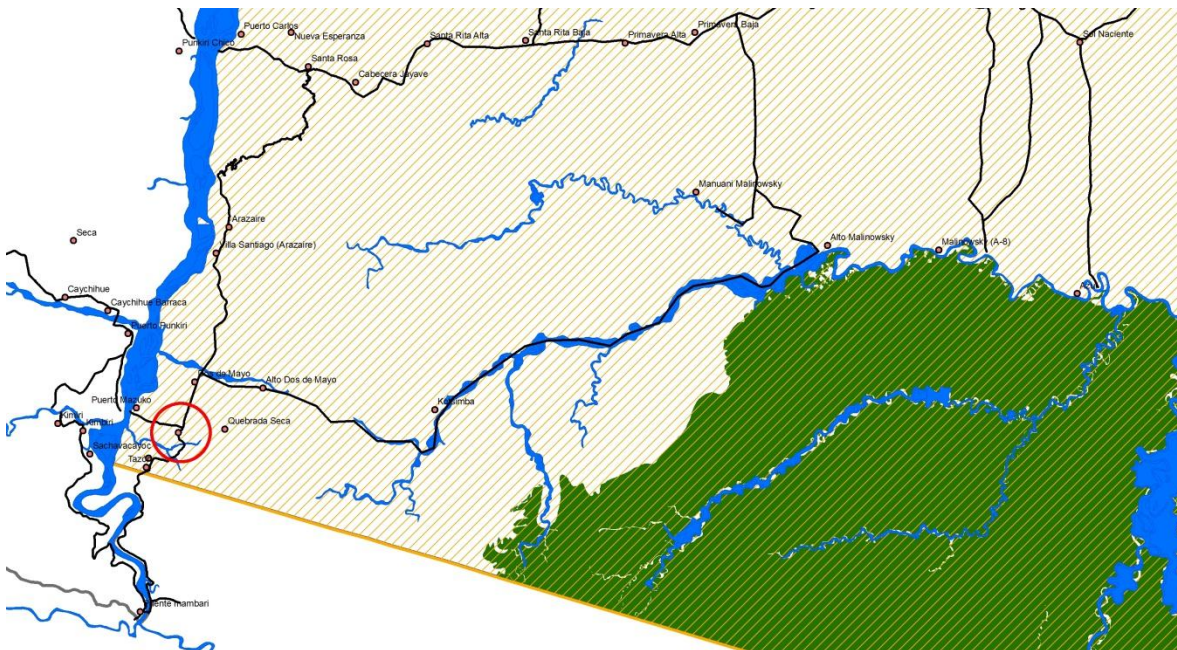


Figure 8 Map of incidents at Inambari district

According to data obtained from this official information source, inside the project area natural disturbances have not taken place, as tectonic activity (earthquake, landslide, volcano), pests, diseases that could result on a carbon stock degradation. As specified in module M-MON, any fire emissions were estimated using E-BB module (see item 2.5 *Monitoring project emissions*).

2.4 Monitoring areas under carbon stock enhancement

Carbon stock enhancement due to forest re-growth has been omitted in a conservative way as specified on the Project description.

2.5 Monitoring Project emissions ⁷

The areas burned during monitoring period have been delineated, in order to calculate resulting emissions produced by fires, according to procedure indicated in module E-BB; burned areas mapping procedure can be found in Annex V.

- **Monitoring of changes in carbon stock and GHG emissions caused by leakage**

Relevant parameters for monitoring of leakage caused by activities shifting are found in section 3.2. Deforested areas at leakage belt are being monitored, trying, as much as possible, to cross information from ground- truth data with information of social monitoring at the different populations (according to Climate, Community & Biodiversity standards), to confirm that leakages are, effectively, attributable to the project activity.

- **Monitoring of measures to avoid deforestation and reduce risk of leakage**

The implementation of the *Strategy to Reduce Emissions from Deforestation and Forest Degradation in Tambopata National Reserve (RNTAMB) and Bahuaja-Sonene National Park (PNBS)- Madre de Dios area* is annually monitored; in this management document the project activities described on section 1.8 of PD have been developed, through measurement of its targets and indicators and supported by information obtained in community monitoring.

Emissions that could result from project activities are considered insignificant, due to the selected technology level (see section 1.7 of PD) and the selected emissions sources (see section 2.3 of PD).

- **Estimation of net ex-post changes in carbon stocks and GHG emissions**

The estimation of net ex-post changes in carbon stocks will be conducted according methodology REDD-MF. Procedure is developed in Annex IX.

⁷ In the monitoring plan contained in the validated Project Description, there is included item 2.2.2 Monitoring of degradation caused by fire, according M-MON module version 1.0. For the present monitoring report, developed according version 2.0 of mentioned module, emissions caused by fires are mentioned on item 2.5 Project emissions; burned areas have been estimated according Annex V procedure, and resulting emissions according Annex IX.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Net emissions at the baseline scenario during the monitoring period 2010-2011 are equal to 195 385,7 tCO₂-e, according to estimates presented on the Project Description.

4.2 Project Emissions

Emissions produced by project activity have been considered insignificant, according to justification given in section 2.3 of the Project Description and to the evaluation of the fire emissions significance (see spreadsheet – Project Emissions.xls).

4.3 Leakage

Emissions produced from leakage have been considered equal to zero, according to methodology procedure.

4.4 Summary of GHG Emission Reductions and Removals

Table 4 Total net reductions of GHG emissions during monitoring period

Net emissions at the baseline scenario; t CO ₂ -e ΔC_{BSL}	Net GHG emissions within project area in the project scenario; tCO ₂ -e ΔC_P	Net GHG emissions due to leakage; t CO ₂ -e ΔC_{LK}	Total net GHG emissions reductions (tCO ₂ -e) $C_{REDD,t}$
195,385.73	4,589.52	0	190,796.20

The number of Voluntary Carbon Units (VCUs) is shown at Table 5; to do this calculation, the 13% was subtracted from the net GHG annual emissions, which is the buffer for non-permanence risk, calculated according to AFOLU Non-Permanence Risk Tool (VCS Version 3); tool development and buffer calculation is found in Annex III.

Table 5 Voluntary Carbon Units

Net GHG emission reductions (tCO ₂ -e)	AFOLU pooled buffer account (13 %)	Voluntary Carbon Units
190,796.20	24,804	165,992.20

5 ADDITIONAL INFORMATION

Annex I – List of project activities
Annex II – Community Monitoring Plan
Annex III - VCS Non-Permanence Risk Report
Annex IV – Deforestation Monitoring Report
Annex V – Burned Areas Report
Annex VI – Degradation Monitoring
Annex VII – Map of Project Area Monitoring 2010-2011
Annex VIII – Map of Leakage Belt Monitoring 2010-2011
Annex IX – Calculation of Emissions Reductions
Annex X - SOP Deforestation Monitoring
Annex XI - SOP Fires Monitoring
Annex XII - SOP Forest Degradation Monitoring
Annex XIII - SOP Information Storage
Annex XIV – Integral Biological Monitoring Report
Annex XV- Map of Forest/Non forest Cover July 2010
Spreadsheet – REDD Project Emissions.xls