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# Forest Carbon Partnership Facility (FCPF)

## READINESS PREPARATION PROPOSAL (R-PP)

# MADAGASCAR

**Date submitted: 2010**

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## Acronyms

| | |
|---|---|
| BOPR: | Operational Office for REDD Readiness |
| CAZ: | Ankeniheny Zahamena Corridor |
| CI: | Conservation International |
| CITES: | Convention on International Trade of Endangered Species |
| COAP: | Code of Protected Areas |
| CoFaV: | Fandriana Vondrozo Corridor |
| ComFor: | Forestry Commission |
| CTD: | Decentralized Territorial Collectivities |
| CT-REDD: | REDD Technical Committee |
| EIA: | Environmental Impact Assessment |
| EU: | European Union |
| FAO: | Food and Agriculture Organization |
| FCPF: | Forest Carbon Partnership Facility |
| GCF: | Contractual Management of State Forests |
| GeLoSe: | Secured Local Management |
| IEFN: | National Forest Ecological Inventory |
| INSTAT: | National Statistics Institute |
| IUCN: | International Union for Conservation of Nature |
| MAEP: | Ministry of Agriculture, Livestock, and Fisheries |
| MECIE: | Decree for Environmental Compliance of Investments |
| MEF: | Ministry of Environment and Forests |
| MEI: | Ministry of Economy and Industry |
| MEM: | Ministry of Energy and Mines |
| MINEAU: | Ministry of Waters |
| MNP: | Madagascar National Parks |
| MRFDAT: | Ministry of Land Tenure Reform and Regional Planning |
| MTPM: | Ministry of Public Works and Meteorology |
| NGO: | Non-governmental Organization |
| NPA: | New Protected Area |
| ONE: | National Environmental Office |
| PA: | Protected Area |
| PCPR: | REDD Readiness Coordination Platform |
| PRPSE: | Regional Environmental Planning, Monitoring and Evaluation Platform |
| REDD: | Reduced Emissions from Deforestation and forest Degradation |
| R-PP: | Readiness Preparation Proposal |
| SAPM: | System of Protected Areas of Madagascar |
| SESA: | Strategic Environmental and Social Assessment |
| SGFD: | Sustainable Forest Management Sites/KoloAla Sites |
| SRAT: | Regional Territorial Planning Framework |
| USAID: | United States Agency for International Development |
| WB: | World Bank |
| WCS: | World Conservation Society |

WWF: World Wide Fund for Nature

# GENERAL INFORMATION

## *Details of the National REDD Focal Point Submitting the R-PP*

| | |
|---|---|
| Name | |
| Organization | |
| Title | |
| Address | |
| Telephone | |
| Fax | |
| E-mail | |
| Website | |

## *R-PP Development Team*

(Authors and contributors)

| Name | Organization |
|---|---|
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## *Executive Summary*

Madagascar has implemented 3 environmental programs over 20 years. Significant efforts against deforestation have been developed.

However, about 0.5% of the 9 million hectares of forests is lost every year. The main causes of deforestation include expansion of agricultural lands (causing 80% of forest cover loss), production of energy charcoal, urban and infrastructure expansion at forest edges, illegal logging, and to a lesser extent, zebus grazing and penning in forests.

Under REDD Readiness, Madagascar has implemented 5 carbon sequestration and methodology testing projects since 2001, covering an area of 2,500,000 hectares for a potential carbon volume of 40 million tons.

Experiences of these projects were included in the draft Madagascar REDD+ strategy options, including mainly:

- Optimizing agricultural production systems,
- Slowing population growth in forest areas,
- Strengthening forest tenure security,
- Enhancing fire management,
- Increasing wood production through sustainable management and production,
- Reducing wood consumption, and
- Strengthening management structures both at community and administration levels.

Success of this strategic package also relies on its implementation framework. Therefore, Madagascar will:

- Develop a new institutional and regulatory framework to support the REDD+ strategy,
- Implement transparent and equitable governance for the carbon process,
- Carry out permanent consultation with all stakeholders throughout the process, and
- Implement a process to mitigate environmental and social impacts. This will be a participatory and iterative mechanism in order to define economically feasible mitigation measures in line with the World Bank safeguard procedures.

There is a lack of analysis of current historical trends to formulate a national reference scenario. Therefore, Madagascar will progress towards a projected reference scenario to take into account all future threats. However, an analysis of deforestation which is accurate and compliant with established international standards remains essential.

To establish a MRV system for the national REDD+ approach, Madagascar will improve its forest cover monitoring standards, as well as its knowledge on carbon storage capacity of various vegetation formations. Studies on forest cover changes should be performed and national capacity building will be accelerated.

The process will be supervised by a steering committee, established by governmental decree and including representatives of relevant sectors and regional actors. A professional and permanent implementing office and body will be created to stimulate and monitor activities planned in the R-PP.

The total cost of planned activities is estimated at **$US 9,967, 500.**

| Component | Cost (US$) |
|---|---|
| Component 1a: National Readiness Management Arrangements | 330,500 |
| Component 1b: Stakeholder Consultation and Participation | 1,257,000 |
| Component 2a: Assessment of Land Use, Forest Policy and Governance | 815,000 |
| Component 2b: Strategy Options | 815,000 |
| Component 2c: Implementation Framework | 630,000 |
| Component 2d: Strategic Environmental and Social Assessment | 705, 000 |
| Component 3: Reference Scenario | 1,325,000 |
| Component 4a: MRV | 4,090,000 |

***Important Note***

Throughout this R-PP, the term REDD means REDD+, as Madagascar will progress from a REDD to REDD+ approach.

## COMPONENT 1: ORGANIZE AND CONSULT

### *1a. National Readiness Management Arrangements*

**Overview**

Since 1990, the year the Environmental Charter was adopted, various structures have been established to lead strategic processes, including joint administration and financial partners committees, thematic committees, etc.

Existing cross-sectoral structures include:

- The CIME or Inter-Ministerial Committee for the Environment:

  This coordination structure was created in 1995 and included 8 governmental ministries. Its mission was to define strategies and political links between the various sectors. This structure has not been functional for four years. Given the current political situation, it seems difficult to revive it.

- The Platform on Climate Change:

  This structure was established in 2009 and has 24 members all from the administration in charge of the Environment. The platform was created by decree for internal coordination of all climate change issues, including REDD. This is a working structure. However, there is a lack of integration of actors from other sectors to ensure proper coordination of REDD readiness activities.

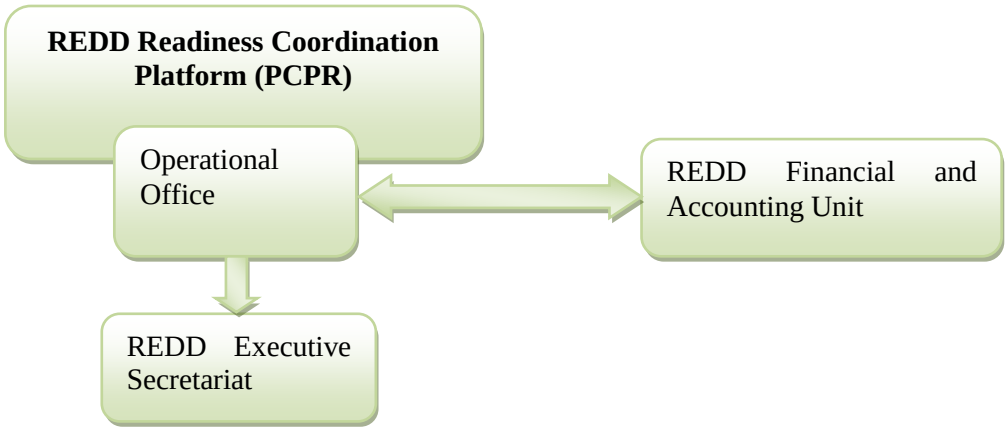
- The REDD Technical Committee:

  This structure was established over two years ago. It gathers the main REDD stakeholders at national level, including NGOs and projects implementing REDD pilot activities. CTREDD is currently an informal structure and is mainly in charge of coordinating and supervising REDD readiness. This committee provided support to the Forest Administration in developing the R-PIN and is in charge of supervising preparation of the R-PP. This structure needs to be expanded and formalized.

**Summary of the National REDD Readiness Management Arrangements**

The main objective of the national arrangement is to manage and coordinate REDD readiness activities. Such activities and interventions are mainly those planned in this R-PP. This arrangement is supposed to end in 2013 when actual REDD implementation starts. It is essential that the arrangement includes all stakeholders in developing and implementing the R-PP.

The proposed arrangement includes the following 4 elements, to be established by regulation:




**Summary**

- **Coordination Platform:** This platform will be responsible for coordinating the R-PP implementation activities. It will define the action plan and validate the main strategies and regulatory proposals. The platform will include representatives of the main REDD stakeholders in general and R-PP stakeholders in particular. The General Director in charge of Forests will chair the platform.
- **Operational Office:** The office will include individuals with the required capacities to supervise REDD readiness technical tasks. This office is established to speed technical and financial decision-making. It will define and manage activities to be implemented (studies, pilot activities, etc.) based on a plan approved by the Coordination Platform. The representative from the Ministry in charge of Forests will be the Coordinator of the Operational Office.
- **Executive Secretariat:** This will be a professional individual employed and hired for the entire REDD readiness phase, with a manager profile and qualifications in environment and forests.
- **Financial Management Unit:** Financial management will be performed by a professional, independent, and auditable entity.

**REDD Readiness Coordination Platform (PCPR)**

The PCPR will be the administrative body of the REDD readiness process. The structure:

- is created by inter-ministerial decree
- has a renewable duration of 3 years, from 2010 to 2013
- has 18 members:
  - 1 Chair: the General Director in charge of Forests,
  - 3 representatives of the Ministry in charge of Forests and Environment,
  - 1 representative of the Ministry in charge of Agriculture,
  - 1 representative of the Ministry in charge of Budget,
  - 1 representative of the Ministry in charge of Mines,
  - 1 representative of the Ministry in charge of Zoning,
  - 1 representative of the Ministry in charge of Energy,
  - 1 representative of the Ministry in charge of Transportation,
  - 1 representative of civil society, with a national dimension,
  - 1 representative of a private sector syndicate working in the forest sector,
  - 2 representatives of projects involved in REDD,
  - 2 representatives of NGOs or associations which had demonstrated their involvement in forest management and the REDD process implementation, and
  - 2 representatives of agencies and offices working in the environment and forest sectors.

The PCPR has the following main responsibilities:

- Definition of annual activities and budget for REDD readiness,
- Technical approval of activity decisions (strategies, regulation proposals) in the REDD process,
- Coordination of technical activity decisions and various sectoral and regional policies,
- Validation of hiring and reporting of the REDD Executive Secretary, and
- Development of communication strategies to the public and decision-makers,

The PCPR follows the following work arrangements:

- It normally meets every two months. Specific meetings can be arranged as needed, by invitation of its President.
- An implementing office (BECR) is established for operational management of the PCPR.

**Operational Office for REDD Readiness (BOPR)**

It includes individuals with technical capacities in management and in REDD. This office is in charge of operational and daily coordination of activities. It meets directly, or by rotating consultation. The BOPR has the following functions:

- Following decisions and commitments at activity level,
- Authorizing daily expense commitments, based on annual budget,
- Ensuring communication among members, to decision-makers and the general public,
- Representing the PCPR at the level of national authorities and in decision-making meetings, and
- Ensuring continuous communication to stakeholders and the general public.

**REDD Readiness Executive Secretary (SEPR)**

This professional is recruited through a call for interest and employed throughout the REDD readiness process. The Secretary's mission is to manage REDD readiness activities and preparation of work documents for the PCPR. His main mandates include:

- Preparation, organization, and operational coordination of activities to be financed under the PCPR,
- Direct execution of some REDD readiness activities,
- Monitoring and technical validation of all deliverables produced by implementing agencies or consultants,
- Preparation of all technical and financial reports for the PCPR and its Office,
- Representation of the PCPR in all technical meetings related to activities,
- Field communication actions, and
- Administrative tasks (human resources, management of premises etc.) for the entire structure.

The Secretary will have the following profile:

- Baccalaureate +5, Forestry or Agronomy Engineer with an additional management degree,
- 10 years of experience in the environmental and/or forest sector. Experience at regional level or with local communities appreciated,
- Very good technical knowledge of REDD and climate change processes,
- Good writing skills, and
- Good coordination capacities.

**REDD Financial and Accounting Unit (UFCR)**

This unit manages disbursements and accounting for REDD readiness. It ensures proper application of funding procedures. Therefore, it has the role of a funding management "desk". The unit will receive disbursement orders from the Office of the PCPR. It will be independently audited and the audit report will be made available to the public. The Administration and the donor will jointly select the unit. The donor will directly contact the selected entity.

The unit will have the main following features:

- A private or semi-private independent body, established under Malagasy law,
- Active in the environmental sector for at least 10 years,
- Private-type management. It has its own operational manuals validated by the donor and the PCPR,
- Already financially autonomous, and
- Auditable.

In addition, the UFCR:

- Reports on financial aspects (funds, budget) to the PCPR and to its donor and
- Reports on accounting aspects to its donor.

**Table 1a: Summary of National Readiness Management Arrangements Activities and Budget**

| Main activity | Sub-activity | Estimated Cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Making structures operational | Office renovation and equipment purchase for the Office and the Executive Secretary | 35,000 | 10,000 | 7,000 | | **52,000** |
| | Capacity-building for each structure (training, team-building) | 15,000 | 15,000 | | | **30,000** |
| | Operational costs for the Office and the Executive Secretary | 24,000 | 24,000 | 24,000 | 24,000 | **96,000** |
| | Periodic meetings (Platform, Office) and lobbying at decision-making level (government, financial partners) | 6,000 | 6,000 | 6,000 | 6,000 | **24,000** |
| Communication and awareness | At national level: for key themes and to present strategies | 12,500 | 15,000 | 12,000 | 20,000 | **59,500** |
| | At regional and communal levels | 17,000 | 20,000 | 15,000 | 17,000 | **69,000** |
| | **Total** | **109,500** | **90,000** | **64,000** | **67,000** | **330,500** |

## *1b. Stakeholder Consultation and Participation*

### Background

In Madagascar, public participation in environmental management is defined both in the Malagasy Constitution and in the Madagascar Environmental Charter.[1]

Consultation and participation of various stakeholders in developing management or planning tools at sectoral, regional, or national level have been common and inescapable practices in Madagascar for many years. For instance, development of the Malagasy Environmental Charter (1990) or definition of implementation components of the Environmental Program (2002) were largely based on consultation and participation of various sectoral departments, decentralized territorial collectivities (CTD), universities and research institutions, environmental non-governmental organizations (NGOs), political actors, and representatives of the civil society and the private sector as well as some of the country's technical and financial partners.

Furthermore, development and definition of forest, mining, and land tenure policies and the management code for protected areas and related plans and programs, followed similar processes both at national and regional level.

The regional forest zoning process includes consultation plans with all stakeholders (regional and local authorities, traditional authorities, forestry, environmental, and rural development NGOs and associations, decentralized technical services, local communities, and projects and programs in the region) on forest issues and stakes, at regional, district, commune and Fokontany levels.

Consultations take place through meetings, seminars, or workshops at local, regional, and national levels. Most of the time, direct discussions with populations in the field and broadcasted and televised debates complement these consultations. In the field, maps are used to encourage participation and support discussion, and field visits help ascertain actual situations. Beyond these usual practices, some management and planning tools in the environmental and forest sectors require by regulation and/ or recommend in guidelines to consult stakeholders. For example, for environmental impact assessments (EIA), Decree # 6830/2001 of June 28, 2001 sets the terms and procedures of public participation, while the MECIE[2] decree describes how public opinions are integrated in a decision-making process for a given investment project. For management transfer at the local level, detailed and complete information on the transfer must be communicated to local communities before the management transfer contract can be concluded. Designation procedures of a new protected area require public consultations at all levels before status and governance scheme for the new protected areas are defined and implemented.

Furthermore, formal, legal, and legitimate structures and mechanisms, or those implemented simply based on circumstances and initiatives, are being established in the forest and environmental sector. They either take the form of a participation and consultation platform, or a co-decision and co-management platform, to discuss and decide on forest issues and stakes. In general, such structures and mechanisms include, and rely on representatives of various stakeholders from the forest sector. Most of the time, they are established for and cover regional and local levels of forest areas. Specifically, the following structures and mechanisms can be mentioned:

- The Forestry Commissions (ComFor)[3], which can have either a deliberative authority to (i) determine if an area is a forest and (ii) make a decision on any dispute related to the subordination of a forest to the

[1] Environmental Charter, law # 90 033 of December 21, 1990 and its amendments

[2] Decree # 99-954 of December 15, 1999 modified by Decree # 2004-167 of February 03, 2004 on the environmental compliance of investments

[3] The Forestry Commission (ComFor) is a local forestry commission including a representative sample of stakeholders from the forest sector. On reforestation, ComFor implements the national reforestation policy at regional level through identification and delimitation of reserves for reforestation (RFR), by authorizing or denying land outside reserves for reforestation. The ComFor is comprised of the Head of the Region or a representative, the Head of the Regional

forestry regime; or a consultative authority to (a) make a recommendation on a request to subordinate forest to the forestry regime and (b) make a recommendation on issues related to the logging regime and the forest adjudication process, and

- The Planning and Monitoring and Evaluation Platforms (PRPSE)[4], the Multi-local Planning Committee (CMP)[5], the Ankeniheny-Zahamena Forest Corridor Platform (PlaCAZ)[6] and the Technical Committee at the regional level were set up for sustainable management and/or implementation of new protected areas. The latter structure was created to ensure participation of all actors at all levels in the establishment process of protected areas in Madagascar. The Regional Technical Committee[7] steered by the Forest Service provides strategic and technical support to various activities for sound natural resources management, including creation of new protected areas, regional forest zoning process, natural resources management transfer, and reforestation.

It should be noted that these structures also serve as mechanisms for conflict and dispute resolution among various stakeholders. A perfect example is the Mining-Forest Inter-ministerial Committee (CIMF) which was established to solve issues of overlapping mining plots and sensitive forest resources. With regards to conflict resolution at the level of local communities, "dinas"[8] were set to ensure good management of forest resources and solve potential disagreements.

## Summary of Consultations held during Development of the R-PP

The objective of consultations is to ensure participation in REDD initiatives of all stakeholders affected by deforestation and forest degradation issues in Madagascar, and to improve transparency of the decision-making process on REDD initiatives. Consultation contributes to increase stakeholders' awareness on deforestation and forest degradation and inform them about the REDD process.

Knowledge gaps, including on REDD, are addressed with relevant information/training. During consultations, all stakeholders have the opportunity to demonstrate their connections with forests and assert

Environmental, Waters and Forest District (Chef de la Circonscription Régionale de l'Environnement, des Eaux et Forêts), 3 representatives of the decentralized service of the Administration in charge of the Environment, Waters, and Forests, one representative respectively of the Finance Administration, the decentralized service of the Administration in charge of Domains and Topographical Services, the decentralized service of the Administration in charge of Decentralization and Territorial Planning, the decentralized service of the Administration in charge of Agriculture and Livestock, the decentralized service of the Administration in charge of Tourism, the relevant district(s), the relevant commune(s), the relevant and legally formed village association(s) and local community(ies), NGOs involved in local natural resources management, and representative logging groups. The ComFor is chaired by the Region Head or his/her representative (*cf. art. 4, 5, 6 of Decree # 2005-849*).

[4] PRPSE is a planning and monitoring and evaluation platform of all sectoral actors at the regional level. The PRPSE process is mainly based on dialogue between the Administration in charge of Forests and regional actors. The PRSPE process was established by regional decree.

[5] The Multi-local Planning Committee (CMP) was established by Decree # 047/99-DS/FAR/CAB/CMP of August, 26 1999. Its mission includes (i) the preservation of ecological functions of the forest corridor in the Fianarantsoa Faritany [Fandriana- Vonondrozo Corridor (CoFAV)] and (ii) the socio-economic promotion of the corridor in order to improve livelihoods of neighboring populations. The Committee includes various elected structures, public and traditional authorities, the civil society, the private sector, and development and environmental NGOs and associations.

[6] The Ankeniheny – Zahamena Forest Corridor Platform (PlaCAZ) gathers consultation structures from the six neighboring districts. The platform was created to coordinate activities and ensure consistency of the different management plans of the Development Regional Committees (CRD).

[7] The Regional Technical Committee play the following roles: (i) being the interface between the central direction in charge of the System of Protected Areas in Madagascar and regional actors involved in natural resources management; (ii) helping implementation of activities planned under the various steps of new protected areas designation; (iii) reconciling national and regional interests on one hand, and conservation and development complementarities on the other hand. The mission was to coordinate activities directly related to implementation of the SAPM and ensure that global direction in other sectors are consistent with the Durban Vision, through consultations with inter-sectoral commissions including Mining-Forests (CIMF).

[8] A "dina" is a type of social contract or pact set by common agreement within a community. It dictates rules and behaviors towards an object (here, forest resources) and defines sanctions in case of violation or infringement of the agreement. Dina is a true institution in the Malagasy rural world.

their opinions, concerns, and stakes on forests and the REDD process, to become full actors in the R-PP design and development and implementation of the REDD strategies.

Since the beginning of climate change and REDD initiatives, five REDD pilot projects[9] have been launched. Their objective is to develop funding mechanisms, including carbon trading, for sustainable site management. Therefore, consultations were held between the Forest Administration, ONE, and existing REDD pilot project developers. The main discussion points focused on carbon ownership rights and baselines. In the field, discussions are taking place between these pilot initiatives and populations living in their intervention areas. Workshops on deforestation and REDD have been held nationwide with collaboration of existing pilot projects, in addition to workshops organized with ministries and regional directors.

All of this concurred to the establishment of the REDD Technical Committee (CT REDD) and production of the R-PIN Madagascar. Once the R-PIN Madagascar was approved by the Forest Carbon Partnership Facility (FCPF), a series of workshops has been organized, specifically targeting experts and the REDD Technical Committee, with the objective of preparing the R-PP Madagascar. The workshops focused on:

- Spatial delimitation,
- Carbon inventory and quantification,
- Baseline and reference scenario,
- Revenue sharing,
- External validation,
- Institutional framework, and
- Monitoring of the R-PP.

The R-PP development phase started with a consultation meeting between an extended REDD Technical Committee and two consulting firms selected to support CT REDD in formulating the R-PP Madagascar. CT REDD will be the leader during the preparation phase while the first consulting firm will be in charge of components 1 and 2 and the second firm of components 3 and 4, based on R-PP guidelines and standard template. During the meeting, the following aspects were presented and discussed:

- Overview and stakes/objectives of the R-PP preparation (by CT-REDD),
- Content and drafting process for the R-PP,
- Current status of analysis of strategic components of the R-PP including assessment of root causes of deforestation and degradation as well as possible strategy options, and
- Proposed timeline for consultation with various sectors and REDD stakeholders.

A series of consultations with stakeholders affected by deforestation and forest degradation was planned and subsequently held. Consultation sessions provided an ideal opportunity to put all consulted parties at the same level of information on climate change and REDD issues. Their active participation in the REDD process was also encourage. Key messages can be summarized as follows:

- REDD is a type of payment mechanism for environmental services, with the objective of compensating reduction of emissions from deforestation and forest degradation. It represents a great opportunity to address climate change and rural poverty and to support ecosystem services;
- The R-PP is a road map to get Madagascar ready for REDD. The R-PP has recommendations to define:
  - Strategy options to tackle degradation and deforestation,
  - A reference scenario for GHG emissions, and
  - A monitoring and verification system of outputs of implemented activities.

[9] They include the Makira Forest (run primarily by WCS), the 2 forest corridors projects CAZ and COFAV (run by CI) the FORECA project (primarily run by GTZ and the Swiss Intercooperation), and the Holistic Forest Conservation Program (PHCF primarily run by WWF and Good Planet).

- Given the nature and the complexity of root causes, addressing deforestation and forest degradation requires one or several inter-sectoral strategies.

Based on the above, main points discussed with the various actors affected by deforestation and forest degradation issues included:

- Goal and objectives of REDD,
- Root causes of deforestation,
- Existing or potential sectoral policies, plans, strategies, programs, and projects to address deforestation and forest degradation created by the sector,
- Strategy options to address deforestation and forest degradation,
- Useful documentation for the development of the Madagascar R-PP, and
- Identification of potential parties to participate in the REDD process.

In addition to general consultations, specific consultations were held with specialized entities on components 3 and 4. Main consultation points included identification and determination of (i) various existing data on forest cover assessment and deforestation analysis (stakeholders, outputs, methods, limits), (ii) studies performed in REDD pilot projects : methods, results, problems encountered, (iii) data gaps for the development of a reference scenario and implementation of a MRV system, (iv) existing and/or planned research or work, and (v) existing national capacities (consultant, institution) to participate in REDD preparation and implementation on training, the development of a reference scenario and MRV system implementation.

Issues raised by each entity during all consultations and responses are summarized in the Annex 1 Table and integrated in this R-PP. As for local populations and other forest sector players (NGOs, associations, private sector) who could not be consulted during this period due to several factors and constraints, it is important to mention that their concerns on and linkages with deforestation and forest degradation issues were noted when discussing with consulted parties who had similar consultations and subsequently analyzed these issues for the respective needs of their policy, plan, program, strategy, and present and/or future projects and interventions.

## Consultation and Participation Plan during REDD Readiness

Based on past consultation experience and results obtained so far from consultations on REDD and on the current state of the R-PP, the following points should be taken into account in the Consultation and Participation Plan:

- Expand consultations to regions, local authorities, traditional authorities and populations living in the predefined areas for REDD, and take the gender factor into consideration;
- Hold periodic consultations for sectors with a quasi-permanent interaction (Mining-Forests, Agriculture-Forests, Territorial Planning-Forests);
- Hold periodic consultations to report to all stakeholders and the general public on the progress of the initiated REDD process;
- The following stakeholders will be consulted given their future roles in preparing and implementing R-PP components:
    - The Forest Administration, in charge of ensuring sound and sustainable management of forest resources;
    - The sectoral administrations respectively in charge of Agriculture, Livestock, Mining, Territorial Planning and Decentralization, Energy and Public Works/Transportation;
    - Territorial administrations mainly regions and communes;

- Participation and consultation platforms/structures for co-management and co-decision-making in the sector;
- Administrations and platforms/structures close to REDD initiatives and "REDD forests" are mainly targeted;
- Specifically, the Ministry in charge of Finance for all issues related to carbon rights;
- Relevant nongovernmental organizations and private sector;
- Specialized bodies and institutions on the MRV system and reference scenarios;
- REDD project developers;
- Technical bodies established for R-PP development and implementation;
- Environmental units of ministries and affiliated agencies affected by REDD initiatives and projects; and
- Populations affected by REDD initiatives and projects.

- View the consultation process as a continuous and iterative process integrating all events occurring throughout the various R-PP steps;
- Use appropriate material and approaches to support consultations for each type of stakeholders, taking into account their respective constraints;
- Development and drafting of the Consultation and Participation Plan should not be dissociated with preparation and implementation of activities related to strategy options, the reference scenario, the MRV system, the SESA, and monitoring and evaluation, in order to optimize resources use.

In order to further strengthen knowledge and maintain stakeholders' ownership and participation in the REDD process, consultations will be supported with communication and information dissemination campaigns, using available media (newspapers, radio, television) at national, regional, and local levels. Information material on the REDD process, in a format understood by the general public, will be developed and distributed. Existing consultation structures within the forest and environmental sector, such as the Forestry Commissions, the Regional Planning and Monitoring and Evaluation Platforms (PRPSE), mayors' periodic meetings, projects, NGOs and associations involved in forestry and the environment, will contribute to awareness and information actions. Outreach sessions will be organized for populations limited by illiteracy and lack of access to modern communication media. Therefore, events such as fairs, puppet shows, and/or folkloric and traditional songs and dances (hira gasy, vako-drazana) will also contribute to awareness, communication and information dissemination. Workshops and seminars will be organized to build stakeholders' knowledge on REDD and implemented strategies. Events such as conferences and exhibits will also be held.

The same initiatives will be used to gather and address local populations' concerns and opinions on REDD strategies, as well as to solve potential conflicts. Therefore, populations are encouraged to send their grievances, including bones of contention, either to these structures and initiatives or directly to the nearest decentralized forest services. Within bounds of their respective roles and responsibilities, the addressees will first handle the relevant grievances, or if needed, will pass the grievances on to the relevant authorities able to handle them and make decisions. In other words, these structures are the first managers for the implementation framework and the management arrangement. Therefore, they will receive permanent guidelines, training, and capacity-building. In any case, grievances related to social and environmental impacts resulting from REDD strategies will be handled based on the SESA procedures outlined in Component 2d on social and environmental impacts.

To summarize, the Consultation and Participation Plan underlines information and awareness, technical exchanges and discussions, handling of grievances, conflict resolution, and communication and information dissemination on the R-PP.

The following table provides details on the Consultation and Participation Plan.

## Table of Detailed Consultation and Participation Plan

| *Consultation Theme* | *Targets / Contact* | *Period* | *Level* | *Consultation type / arrangements* |
|---|---|---|---|---|
| **REDD and R-PP processes** | | | | |
| Information and awareness on the ins and outs of the R-PP components and their content | - Relevant stakeholders<br>- Populations affected by REDD<br>- General public<br>- Administrations<br>- Structures involved in the R-PP<br>- REDD projects<br>- NGOs, civil society | Twice a year, yearly | - National<br>- Regional<br>- Local<br>- REDD areas<br>- Central | Workshops<br>Meetings<br>Media publication<br>Events (Fairs, exhibits, shows)<br>Field visits |
| Collection and processing of REDD-related complaints | - Relevant stakeholders<br>- Populations affected by REDD<br>- General public<br>- Administrations<br>- Structures involved in the R-PP<br>- REDD projects<br>- NGOs, civil society | Twice a year, yearly | - National<br>- Regional<br>- Local<br>- REDD areas<br>- Central | Workshops<br>Meetings<br>Field visits |
| Resolution of process-related conflicts | - Relevant stakeholders<br>- Populations affected by REDD<br>- Consultation and co-decision structures<br>- Inter-ministerial committees<br>- Decision-makers | Twice a year, yearly | National<br>Regional<br>Central | Workshops<br>Meetings<br>Field visits |
| Validation of main studies and strategy options | - Relevant stakeholders<br>- Populations affected by REDD<br>- Administrations<br>- Structures involved in the R-PP<br>- REDD projects<br>- NGOs, civil society | Year 1,2.3 | - National<br>- Regional<br>- Local<br>- REDD areas<br>- Central | Workshops<br>Meetings<br>Field visits |
| Final selection of strategy options and finalization of REDD strategies | - Relevant stakeholders<br>- Populations affected by REDD<br>- Administrations<br>- Structures involved in the R-PP<br>- REDD projects<br>- NGOs, civil society | Year 1,2,3 | - National<br>- Regional<br>- Local<br>- REDD areas<br>- Central | Workshops<br>Meetings<br>Field visits |
| Identification of training needs for implementation of REDD strategies | - Relevant stakeholders<br>- Populations affected by REDD<br>- Administrations<br>- Structures involved in the R-PP<br>- REDD projects<br>- NGOs, civil society | Year 1, 2, 3 | - National<br>- Regional<br>- Local<br>- REDD areas<br>- Central | Workshops<br>Meetings<br>Field visits |

| *Consultation Theme* | *Targets / Contact* | *Period* | *Level* | *Consultation type / arrangements* |
|---|---|---|---|---|
| Validation of REDD strategies | - Relevant stakeholders<br>- Populations affected by REDD<br>- Central administrations<br>- Relevant regional administrations<br>- Relevant local administrations<br>- Traditional authorities affected by the R-PP<br>- Decision-makers | Year 3 | National<br>Regional<br>Local<br>REDD areas | Workshops<br>Meetings<br>Field visits |
| Dissemination – Communication on the R-PP and REDD strategies | - Relevant stakeholders<br>- Populations affected by REDD<br>- Central administrations<br>- Relevant regional administrations<br>- Relevant local administrations<br>- Traditional authorities affected by the R-PP | Year 1, 2, 3, once a year | National<br>Regional<br>Local<br>REDD areas | Workshops<br>Meetings<br>Field visits<br>Events |
| **REDD preparation management arrangement** | | | | |
| Validation of management arrangement | - Stakeholders<br>- Central administrations | Year 1 | Central | Workshop |
| Communication | - Stakeholders<br>- Central administrations | Year 1,2, 3 | Central | Workshop |
| **Implementation framework** | | | | |
| Development and formulation of institutional framework and strategy measures for REDD implementation, including roles and responsibilities and relevant structures | - Relevant stakeholders<br>- Populations affected by REDD<br>- Central administrations<br>- Relevant regional administrations<br>- Relevant local administrations<br>- Traditional authorities affected by the R-PP<br>- REDD project developers<br>- Planned structures involved in REDD<br>- NGOs, civil society, private sector<br>- Decision-makers | Year 1,2, | National<br>Regional<br>Local<br>REDD areas | Workshops<br>Meetings<br>Field visits |
| Forest carbon ownership | - Relevant stakeholders<br>- Populations affected by REDD<br>- Central administrations<br>- Relevant regional administrations<br>- Relevant local administrations<br>- Traditional authorities affected by the R-PP<br>- REDD project developers<br>- Structures involved in REDD<br>- NGOs, civil society, private sector<br>- Decision-makers | Year 1, 2 | National<br>Regional<br>Local<br>REDD areas | Workshops<br>Meetings<br>Field visits |

| *Consultation Theme* | *Targets / Contact* | *Period* | *Level* | *Consultation type / arrangements* |
|---|---|---|---|---|
| Sharing of REDD-generated revenues | - Relevant stakeholders<br>- Populations affected by REDD<br>- Central administrations<br>- Relevant regional administrations<br>- Relevant local administrations<br>- Traditional authorities affected by the R-PP<br>- REDD project developers<br>- Structures involved in REDD<br>- NGOs, civil society, private sector<br>- Decision-makers | Year 1, 2 | National<br>Regional<br>Local<br>REDD areas | Workshops<br>Meetings<br>Field visits |
| Transactions based on emissions reductions including participation, national carbon registry, revenue distribution and carbon tax | - Relevant stakeholders<br>- Populations affected by REDD<br>- Central administrations<br>- Relevant regional administrations<br>- Relevant local administrations<br>- Traditional authorities affected by the R-PP<br>- REDD project developers<br>- Structures involved in REDD<br>- NGOs, civil society, private sector<br>- Decision-makers | Year 1, 2 | National<br>Regional<br>Local<br>REDD areas | Workshops<br>Meetings<br>Field visits |
| Validation of REDD implementation framework including institutional framework and "forest carbon governance" | - Relevant stakeholders<br>- Populations affected by REDD<br>- Central administrations<br>- Relevant regional administrations<br>- Relevant local administrations<br>- Traditional authorities affected by the R-PP<br>- REDD project developers<br>- Structures involved in REDD<br>- NGOs, civil society, private sector<br>- Decision-makers | Year 3 | National | Workshop |
| Development of legal and regulatory framework of other sectors based on REDD+ strategy | Other ministries and sectors | Year 1,2 | National and regional | Workshop |
| **Strategic Environmental and Social Assessment** | | | | |
| Formalization of SESA management and development framework for REDD (responsibility charter, SESA file supervision and evaluation arrangement, public participation process, integration of SESA process in the REDD+ strategy development process, schedule for regular | - MEF<br>- ONE<br>- Environmental units<br>- R-PP coordination platform | Before the launch of the SESA process but after capacity-building on SESA– Year 1 | Central | Specific consultation<br>Workshops |

| *Consultation Theme* | *Targets / Contact* | *Period* | *Level* | *Consultation type / arrangements* |
|---|---|---|---|---|
| meetings) | | | | |
| Social and environmental features potentially affected in a significant way | - Populations affected by REDD activities<br>- Local authorities and administrations<br>- Projects and initiatives active in the area (NGOs and civil society)<br>- Technical services | Development of REDD environmental and social baselines, Year 1 | - Pilot projects<br>- Future projects and initiatives | - Specific consultation of targets<br>- Site visits<br>- Work sessions |
| - Importance of environmental and social effects / impacts<br>- Reduction and mitigation measures<br>- Charter of responsibilities for implementation of measures | - Populations affected by REDD activities<br>- Local authorities and administrations<br>- Projects and initiatives active in the area (NGOs and civil society)<br>- Decentralized technical services | Analysis of the significance of environmental and social impacts and reduction and mitigation measures, Year 1, 2, and 3 | - Pilot projects<br>- Future projects and initiatives | - Specific consultations<br>- Site visits<br>- Work sessions |
| -Assessment of environmental and social opportunities and constraints<br>- Assessment of the level of environmental and social impacts<br>- Reduction and mitigation measures | - Decision-makers from sectoral ministries (Agriculture, Land Planning, Livestock, Public Works and Transportation, Finance, Mining)<br>- Decision-makers from the Ministry in charge of Forests<br>- Decision-makers from the Ministry in charge of the Environment<br>- Decision-makers from sectoral projects and programs related to REDD<br>- NGOs and civil society | Development and assessment of "strategy and sustainability options" Year 1, 2, and 3 | Central | Specific consultation with each sector:<br>Seven 1-day work sessions one day per sector) |
| Compliance of national legislation with World Bank operational procedures | - ONE<br>- Ministry in charge of the Environment<br>- Environmental units<br>- World Bank<br>-Other donors | Development of the environmental and social management framework for projects and initiatives under the REDD+ strategy Year 3 | Central | Specific consultation:<br>2-day work session |
| Selected options and reduction and mitigation measures<br>Required capacity-building | - Populations affected by REDD<br>- REDD Coordination Platform<br>- Decentralized services and environmental units.<br>- Decentralized authorities<br>- Civil societies (central and decentralized)<br>- NGOs (central and decentralized) | SESA process reporting – Year 3 | National | Specific consultation:<br>2-day work session |
| Progress of the SESA process | - Coordination Platform<br>-Stakeholders | Once every semester (Year 1, 2 and 3) | Central | Periodic consultation :<br>Five one-day sessions |
| **Development of reference scenario** | | | | |
| Explanatory data on deforestation: identification of variables which best explain deforestation and degradation | -REDD projects,<br>-Other projects tackling deforestation,<br>-Regional and local administration | Year 1 | Regional | Workshops |
| Model validation | -REDD projects | Year 2 | National | Workshop |

| *Consultation Theme* | *Targets / Contact* | *Period* | *Level* | *Consultation type / arrangements* |
|---|---|---|---|---|
| | -Other NGOs, administrations | | | |
| Simulation of policies | Central administration (Prime Minister's Office, MEF10, MRFDAT11, MAEP12, MTPM13, MEI14, MEM15…) | Year 2 | Central | Workshop |
| Presentation and validation of a demonstration draft of model | -REDD projects<br>-Other NGOs<br>-Central and regional administrations | Year 3 | National | Workshop |
| Presentation and validation of a demonstration draft of model | Central administration (Prime Minister's Office, MEF, MRFDAT, MAEP, MTPM, MEI, MEM…) | Year 3 | Central | Workshop |
| Presentation of final version of model and strategy report | REDD projects, other NGOs, central and regional administrations | Year 3 | Central | Workshop |
| **Development of MRV** | | | | |
| National basic and thematic mapping. Assessment of co-benefits | FTM, MRFDAT[16], MEEFT[17], MINEAU[18], MAEP[19], MTPM[20], MEI[21], Ministry of Transportation, MEM[22] | Year 1 | Central | Workshops,<br>Individual discussions |
| Definition of forest, extent of REDD mechanism and terms of move towards REDD+ | REDD projects<br>Other NGOs<br>Central administrations | Year 1 | Central | Workshop |
| Baseline data for REDD projects | REDD project developers | Twice a year, each year | Project | Workshop |
| Image classification methodology | Scientific committee | Year 1, 2, 3 | National | Workshop |

10 Ministry of Environment, Forests, and Tourism
11 Ministry of Land Tenure Reform and Regional Planning
12 Ministry of Agriculture, Livestock, and Fisheries
13Ministry of Public Works and Meteorology
14 Ministry of Economy and Industry
15 Ministry of Energy and Mines
16 Ministry of Land Tenure Reform and Regional Planning
17 Ministry of Environment, Forests, and Tourism
18 Ministry of Waters
19 Ministry of Agriculture, Livestock, and Fisheries
20 Ministry of Public Works and Meteorology
21 Ministry of Economy and Industry
22 Ministry of Energy and Mines

| Table 1b: Summary of Stakeholder Consultation and Participation Activities and Budget | | | | | | |
|---|---|---|---|---|---|---|
| **Main activity** | **Sub-activity** | **Estimated cost (in US$)** | | | | |
| | | **2010** | **2011** | **2012** | **2013** | **Total** |
| Consultations on REDD process and on the R-PP | Information – awareness (information material, contracts, events, outreach) | 50,000 | 50,000 | 50,000 | | **150.000** |
| | Collection/Processing of grievances on REDD (collection tools, training, resolution meetings/workshops) | 10,000 | 10,000 | 10,000 | | **30,000** |
| | Resolution of conflicts generated by the process (collection, conflict-resolution meetings/workshops) | 8,000 | 8,000 | 8,000 | | **24,000** |
| Consultations on main studies and strategy options | Validation of main studies (Regional workshops, national workshop) | 24, 000 | 24,000 | 24,000 | | **72,000** |
| | Final selection of strategy options and finalization of REDD strategies (fieldwork, regional workshops, national workshop) | 24,000 | 24,000 | 24,000 | | **72,000** |
| | Validation of REDD strategies (Fieldwork, regional workshops, national workshop) | | | 24,000 | | **24,000** |
| Dissemination/ communication on the R-PP and REDD strategies | Media communication and events | 8,000 | 8,000 | 8,000 | | **24,000** |
| | Field and regional dissemination/ communication (meetings, workshops, etc.) | 10,000 | 10,000 | 10,000 | | **30,000** |
| | National communication workshop | | | 8,000 | | **8,000** |
| Identification of training needs for REDD strategies | (for all consultations) | | | | | |
| Consultation on management arrangement | Validation workshop | 16,000 | | | | **16,000** |
| Consultation on implementation framework | Development / design of institutional framework and strategy measures for REDD implementation (stakeholders and other relevant structures meetings on roles and responsibilities, coordination procedures) | 24,000 | 24,000 | | | **48,000** |
| | Meetings / workshops with different sectors on legal and regulatory framework related to REDD strategies | 24,000 | 24,000 | | | **48,000** |
| | Forest carbon governance (Discussions at all levels on carbon ownership, hybrid system with projects, carbon taxes and government services, REDD revenue management and sharing, national carbon registry) | 20,000 | 80,000 | 40,000 | | **140,000** |
| | Validation of REDD implementation framework (validation workshop on: institutional framework and strategy measures and forest carbon governance including regulations) | | | 40,000 | | **40,000** |
| Consultation on environmental assessment | Formalization of development and management framework of REDD SESA (workshops on charter of responsibilities, supervision and evaluation arrangements of the SESA, public participation process) | 4,000 | | | | **4,000** |
| | Definition of environmental and social features (data collection in REDD areas, validation workshop of environmental and social features) | 2,000 | 2,000 | 2,000 | | **6,000** |

| Table 1b: Summary of Stakeholder Consultation and Participation Activities and Budget | | | | | | |
|---|---|---|---|---|---|---|
| **Main activity** | **Sub-activity** | **Estimated cost (in US$)** | | | | |
| | | **2010** | **2011** | **2012** | **2013** | **Total** |
| Consultation on environmental assessment | Analysis of the extent of environmental and social impacts and mitigation measures (data collection in REDD areas, validation workshop, meeting on development of the charter of responsibilities) | 2,000 | 2,000 | 6,000 | | **10,000** |
| | Analysis of strategy options and their durability ( discussion on opportunities and constraints of strategy options, impacts, related measures by sector, summary meeting on all relevant sectors) | 4,000 | 4,000 | 4,000 | | **12,000** |
| | Development of environmental and social management framework of REDD initiatives including a session on compliance of national legislation with World Bank procedures | | | 1,000 | | **1,000** |
| | Communication on the SESA process | | 2,000 | 2,000 | | **4,000** |
| | Status on REDD process (periodic meetings) | 2,000 | 2,000 | 2,000 | | **6,000** |
| Consultations on development of reference scenario | Production of explanatory data of deforestation and forest degradation (work sessions and workshops at all levels to identify the best explanatory data of deforestation and degradation and validation session) | 4,000 | | | | **4,000** |
| | Development of reference scenario (model validation) | | 2,000 | | | **2,000** |
| | Simulation of policies (work sessions with ministries to present the model and test policies) | | 4,000 | | | **4,000** |
| | Presentation and validation of demonstration draft of model (national level and central level) | | | 10,000 | | **10,000** |
| | Presentation of final version of model and a strategy report at central level | | | 2,000 | | **2,000** |
| Consultations on MRV development | Discussions on national basic and thematic mapping. Assessment of co-benefits (individual discussions, workshops) | 4,000 | | | | **4,000** |
| | Baseline data for REDD projects: periodic work sessions with REDD projects | 4,000 | | | | **4,000** |
| | Image classification methodology: periodic work sessions with scientific committee | 4,000 | 4,000 | 4,000 | | **12,000** |
| Contractors/ consultants for all consultations | International consultant (90 md) | 60,000 | 60,000 | 60,000 | | **180,000** |
| | National consultant (270 md) | 90,000 | 90,000 | 90,000 | | **270,000** |
| | **Total** | **398,000** | **435,000** | **424,000** | | **1,257,000** |

# COMPONENT 2: PREPARE THE REDD STRATEGY

## *2a. Assessment of Land Use, Forest Policy and Governance*

### Background

Based on the latest studies, the total surface of Malagasy forest resources is estimated at around 9,725,000 hectares in 2005.[23]Dense rainforests represent 47 % of this area, dense dry forests 29 %, spiny forests 18 %, and mangroves about 3 % while less than 3 % is covered by artificial forests, mainly eucalyptus and pine plantations. Area figures for natural forests are found in the study on forest cover done by USAID and Conservation International in 2007, while data on plantations come from the 1996 National Forestry Ecological Survey. About half of Madagascar's natural forests are in the eastern region and on the eastern ridge, forming a forest corridor from the northern Tsaratanana range to the Andohahela range in the South. The corridor is interrupted at many places, notably at Lake Alaotra in the Alaotra Mangoro Region. The other half of natural forests, mainly dense dry forests, spiny forests, and mangroves, is distributed more loosely in the northern, western, and southern parts of the country, with more significant forest ranges in the south-western and southernmost parts of the island. The main artificial forests are in the Moramanga region and around the city of Fianarantsoa for pine plantations and east of the Analamanga Region for eucalyptus. However, their surface is not sufficiently documented.

The overwhelming majority of natural forests belong to the State. Private property is limited, with rare exceptions for artificial forests, particularly eucalyptus plantations. Conservation of forest resources is based on three strategic axes: i) protection within the System of Protected Areas (SAPM); ii) sustainable management in the KoloAla areas; and iii) restoration of degraded forests and reforestation. These three pillars of forest resources conservation were institutionalized and spatialized by the Inter-ministerial Decree 18633 of October, 17 2008. Based on this national priority definition, about half of natural forests representing about 4,747,000 hectares are located in protection-designated areas, while the other half representing 4,687, 000 hectares of natural forests and 291,000 hectares of plantations are affected to sustainable production. This national vision was subsequently refined by the regional forest zoning including all stakeholders at regional level.

Timber forest resources are crucial for the majority of Malagasy people. About 80% of energy needs, particularly at the household level, are covered by firewood and charcoal. Furthermore, timber plays a significant role for construction and some precious woods are exported. Use of these timber resources is therefore an important source of revenue for rural populations. Recent studies estimate national wood consumption at an annual volume of 22 million $m^3$. About 80% of this volume, i.e. about 18 million $m^3$, is used as firewood or charcoal for household energy needs. The remaining 20% (about 4 million $m^3$) is used for construction and service, mainly at national level. Wood exports have some value, but cover insignificant quantities and are dominated at 80% by wood from pine plantations.[24]

As in many other tropical countries, deforestation is undoubtedly the core environmental issue in Madagascar. Recent studies (CI and USAID, 2007) estimate that about 50,000 hectares of natural dense forests were cleared annually between 2000 and 2005. The study observes a significant progress compared to the 1990-2000 timeframe where the annual deforestation rate was about 0.8%. The most affected areas are the dry dense forests in the southwestern part and the spiny forests in the southernmost part of the country. On the contrary, dense rainforests, particularly in the extreme North-East, have been less deforested, notably from 2000 to 2005. This discrepancy is further explained below.

[23] USAID and CI (2009): *Evolution de la couverture des forêts naturelles 1990 – 2000 – 2005, Madagascar*
[24] USAID/JariAla (2009): *Etude sur la production et la consommation en produits forestiers ligneux à Madagascar*

The extent of forest resources degradation is currently not well documented. In 1996, under EP1, the first National Forest Ecological Survey (IEFN0) provided the first base data on species composition and on structure and texture of the main forest ecosystems.

**Summary of the Causes of Deforestation and Analysis of Past Efforts**

Visible or direct causes of deforestation are processes or issues directly contributing to deforestation and degradation. The first studies show that direct causes of deforestation can be divided into the following three main categories:

- **Agriculture:** Agriculture has undoubtedly the most significant impact on deforestation. Expansion of agricultural lands with slash-and-burn agriculture, due to an increasing demand for subsistence and cash crops, is responsible for more than 80% of deforestation.
- **Energy:** In the energy sector, charcoal production is the main direct cause of deforestation. However, this is limited to some regions of the country, notably in the south-western part.
- **Infrastructure:** This sector includes direct causes related to expansion of infrastructures such as settlements (cities and villages), roads, mining and logging infrastructures, and public services infrastructures.

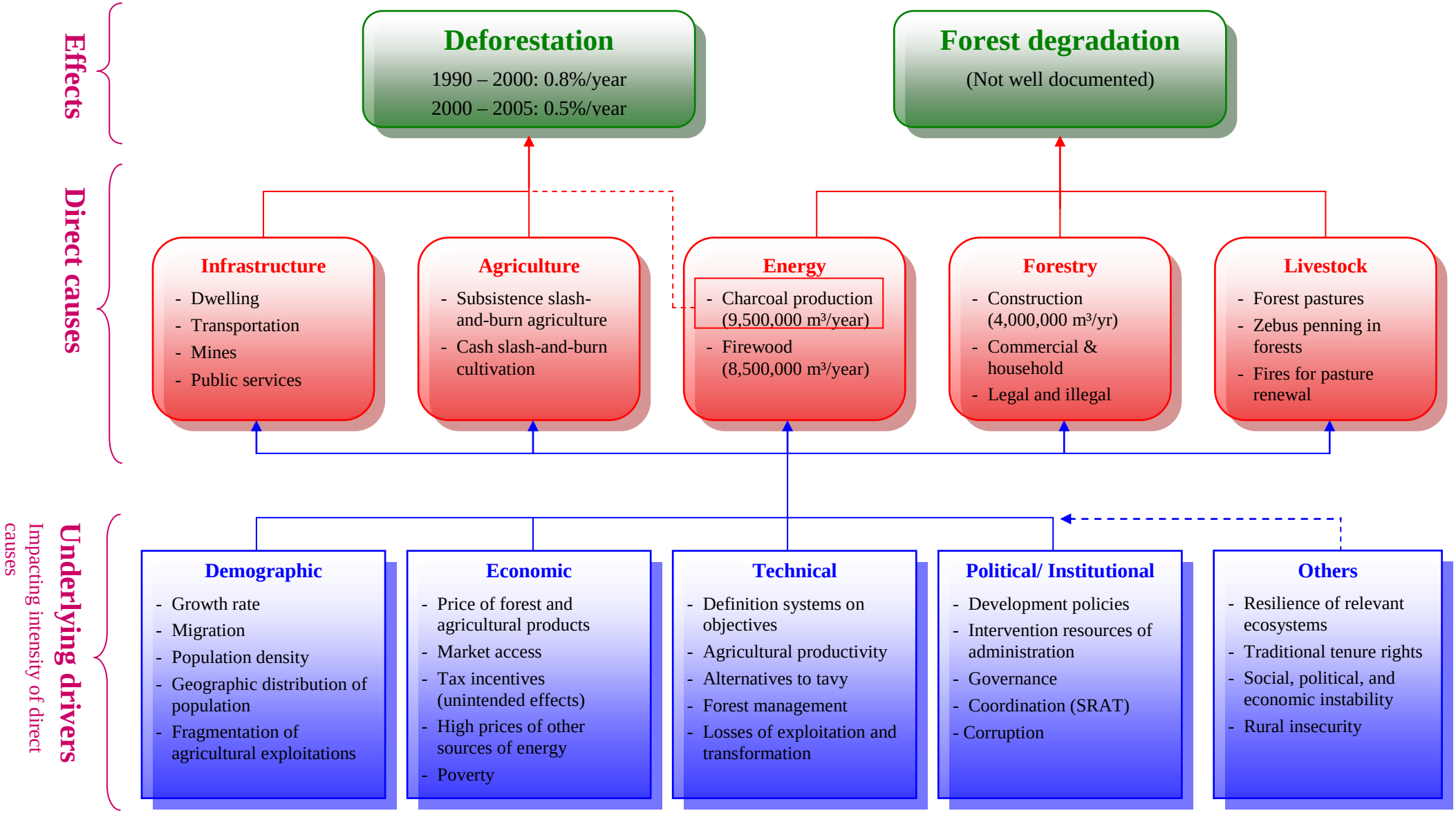
For direct causes of forest degradation, the three following areas have been highlighted:

- **Energy:** The energy sector accounts for over 80% of wood consumption. Wood is often exploited in a non-rational, unsustainable or even illegal way, contributing to the degradation of affected forests.
- **Forestry:** In the forestry sector, the main drivers of degradation of forest resources are mainly non-rational and unsustainable activities, including illegal logging.
- **Livestock:** Livestock directly contributes to forest degradation through penning and grazing in forest ecosystems. Furthermore, use of fires to renew pasture lands is the main obstacle to natural forest regeneration.

Direct causes and underlying drivers discussed below result from the first analyzes performed under the 2007 study on forest cover and from consultations during the R-PP preparation. A better knowledge on direct causes and underlying drivers is needed through specific studies in the following areas:

- **Interactions:** A better understanding of links between various causes and drivers and their impacts on intensity and spatial distribution of deforestation and degradation is needed.
- **Degradation:** Identify key drivers as well as priority areas affected by degradation with studies based on forest survey results at national level, among other data.
- **Significance and spatial distribution:** Further details on the impact of various causes and drivers, as well as their spatial distribution with a new analysis of deforestation.
- **Economic contributions:** Gain better understanding on the contributions of the forest sector to the national economy, in order to have better evidence against other land uses.

# Causes of deforestation and degradation in Madagascar



**Direct Causes and Underlying Drivers of Deforestation**

There are many direct causes and underlying drivers of deforestation but they are generally related to pressures from rural and urban populations and therefore to agriculture, energy supply and expansion of various infrastructures.

*Agriculture*

As in most tropical countries, agricultural production systems in Madagascar are strongly linked to forest clearing. Besides some more or less stable lowland cultivation (irrigated rice fields, truck farming, etc.), significant volumes of agricultural products are produced through slash-and-burn agriculture, i.e. the transformation of forest lands into agricultural lands. These shifting cultivation techniques are used both for subsistence crops (rainfed rice, cassava, etc.) and cash crops (maize, sugar cane, tobacco, etc.) and result in a total destruction of considerable areas of forests. For the great majority of rural Malagasy, the most efficient mean against poverty has always been to clear land, followed by slash-and-burn in forest. Extraction of forest products has always been viewed as a complementary activity, and is insufficient to ensure the survival of rural families. Therefore, forest areas are viewed more as a reserve of farmable, cultivated or pasture lands than a place for harvesting or commercial exploitation of wood and non timber products. Ecosystems and environmental services and functions are often eclipsed by immediate vital needs. Clearing for agriculture is considered to be the main direct cause of deforestation in Madagascar. It is estimated (World Bank 2003) to account for 80 to 95% of deforestation, depending on regions and on the resilience of affected forest ecosystems. In the western dry forests and particularly in the spiny southern forests where charcoal production has a more significant role, agriculture is less dominant. Predominant clearing of forest lands has been in practice for centuries, but current population increase and migratory trends considerably increase pressures on forests. Today, an actual race for clearing is noted in some regions (East). Deforestation resulting from this land tenure competition is beyond the framework of extensive cultivation. Indifference of officials at all levels gives free reins to this practice which benefits only the well-offs in neighboring villages.

The main factors impacting the level of agricultural sector impacts on forests include:

- **Population growth:** Rapid population growth is the main factor contributing to a significant increase of the demand for subsistence and cash crops. In order to increase production, farmers must expand their lands. As productivity of old clearings rapidly decreases, expansion almost always takes place on forest lands, involving new clearings. This trend is even more heightened with production of some unauthorized cash crops, including sugar cane for production of a local spirit, tobacco, and hemp. These crops are mainly cultivated in forests, sheltered from authorities.
- **Stagnation or reduction of agricultural productivity:** Increase of crops demand due to population growth, as explained above, could be in principle compensated by improving agricultural productivity by surface area. Unfortunately, stagnation or even reduction of agricultural productivity has been noted for several years under traditional agricultural systems. It should also be noted that efforts to improve productivity generally focused on relatively accessible areas, i.e. in areas rather far from main forest ranges. Faced with this situation, farmers have no other choice than to extend cultivated lands to improve their production. However, it should be noted that productivity increase does not necessarily result in a reduction of deforestation. As a matter of fact, in the absence of alternatives to agriculture, new households need to get some new lands regardless of productivity.
- **Insufficient promotion of old clearings:** Another answer to the increase in demand would be to better valorize old clearings. However, traditional management techniques of soil fertility do not allow for a permanent cultivation of clearings. Acceleration of agricultural rotations generally results in soil depletion and farmers have to quickly abandon cleared lands.
- **Tenure insecurity:** Two levels have to be considered in regards to the impacts of tenure insecurity on deforestation. First, tenure security of forests themselves is insufficient and generally not respected by local populations. Even in forest stands clearly belonging to the State (classified forests, forest reserves), land clearings for agriculture are frequent and cannot be controlled by relevant authorities. At the same time, tenure of agricultural lands is not well secured, which could result in insecurity for

farmers and prevent them from investing in more sustainable cultivation techniques. Customary tenure rights, under various forms, generally include a user right if it can be proved that previously unoccupied plots are continuously valorized. In this context, clearing and slash-and-burn cultivation usually result in some form of land appropriation by users.

- **Volatility of crop prices:** Evolution of cash crop prices can also indirectly affect deforestation. Thus, collapse in coffee prices on international markets forced many small farmers to abandon coffee trees and go back to slash-and-burn cash crops. Similarly, favorable international prices of maize resulted in an intensification of clearings in the southwestern part of the country. Finally, vanilla price degradation regularly pushes farmers to resume illegal logging of precious woods.
- **Rural insecurity:** Rural insecurity is generally related to extensive livestock rearing techniques and has an indirect impact on deforestation. This factor mainly prevents the use of some potentially interesting lands for agriculture. Thus, despite delimitation of large production ranges, rural insecurity in general, and in the mid-west in particular, combined with a migration policy devoid of support measures, resulted in rural exodus or migration to forest areas. Population pressure and fragmentation of lands due to inheritance led to more or less intensive internal migration waves at the expense of forests.

***Energy***

Energy supply strongly relies on timber forest resources. Wood is estimated (World Bank 2003) to cover about 80% of all energy needs. Firewood remains the main source of energy in rural areas, while it has been almost totally replaced by charcoal in urban centers. As a result, national wood consumption is largely dominated by energy uses. Among the 22 million $m^3$ consumed annually, 80% is used for energy, with about 42% for fire and 39% for charcoal production. Charcoal production is considered the second direct cause of forest clearing at national level, with uneven impacts throughout the country. The greatest impacts are noted in the western dry forests and in the southern spiny forests, particularly near major urban centers (Mahajanga, Morondava, Toliara, and Tolagnaro). Due to a slower growth, these forests are more sensitive to intensive logging for charcoal production. In the spiny forests of the Tulear region, charcoal kilns are weatherproofed with organic matter, frequently leading to total destruction of affected forests. On the contrary, in dense rainforests, charcoal production has much more impact on forest degradation than on clearings.

Various underlying drivers determine the level of impacts on deforestation of forest resources use for energy:

- **Inefficient carbonization techniques:** The wood sector is generally characterized by inefficient resource exploitation and transformation techniques. This failure is also noted for charcoal production where production rates (ratio of charcoal weight to weight of used wood) are rarely above 15%. This is mainly due to limited capacities of unprofessional charcoal producers but also to a lack of promotion of improved carbonization techniques. It is estimated that relatively modest efforts in capacity building and promotion of improved techniques could lead, in a relatively short term, to significant productivity increase (plus 100%), and reduce wood needs for charcoal production. A better use of charcoal waste would further enhance these results.
- **Energy-inefficient braziers:** As for production, charcoal use is also inefficient. Despite significant efforts by the PNEP and other projects, most households, particularly outside of the high plateaus, continue to use traditional high charcoal-consumption braziers. This is due to technical challenges (low quality of clay in coastal regions) but also to very limited purchasing power of target populations. However, these efforts should be pursued as improving efficiency of braziers would rapidly impact wood demand and therefore reduce energy sector contributions to deforestation and forest resources degradation.
- **Cost of alternative sources of energy:** It is obvious that clean alternative energies have not been developed to their full potential and fair value. Strengthening hydraulic (mini and micro stations), solar, wind, and biogas energy sources would reduce dependency on timber resources and non renewable energy sources. It should be noted that due to price differences (cooking with electricity is 5 to 10 times more expensive than cooking with charcoal), results would only be seen in the medium or long term.

***Infrastructure***

Mining infrastructure is currently the only type of infrastructure significantly contributing to deforestation. Madagascar has important mineral resources spread throughout the country. Many deposits have been identified including industrial minerals (graphite, chromium, quartz, mica, coal, ilmenite, nickel, cobalt, etc.), decorative stones (marble, celestite, corindon, ammonite, etc.), precious stones (ruby, sapphire, emerald, beryls, etc.), quarry, gold, and hydrocarbons. While in 2002, mining activities represented about 4% of the GDP, the government of Madagascar plans for a value of 30% in 2012 if all existing reserves are exploited. The Government launched several initiatives to expand the sector. Oil exploration is currently not a main source of deforestation as the emitted permits only cover research and pilot exploration activities.

The following underlying drivers determine the extent of the mining sector's impacts on deforestation:

- **Price of mining resources:** The higher the prices of mining resources, the greater the interest of operators to obtain them, regardless of impacts on forest resources.
- **Control of illegal activities and rushes:** Similarly to the energy and logging sectors, illegal mining activities directly contribute the most to deforestation and forest degradation. However, the mining administration seems to have very limited means to address these illegal activities and enforce existing laws. Management of rushes faces the same challenge. Efficient management would require more important resources.
- **Limited professionalism of actors:** Despite efforts to reform and streamline the sector, mining activities are mainly small-scale with a significant informal part, except for large and medium industrial operations (ilmenite extraction, Ambatovy project, coal, etc.). These small and medium-scale operations rarely comply with MECIE legal requirements (EIA) and are therefore difficult to monitor. It is important to professionalize these actors and include them in the MECIE procedures in order to limit their impacts on forest resources or ensure that sites are restored after exploration, if needed.
- **Lack of coordination with the forest sector:** Despite implementation of the Mining-Forest Inter-ministerial Committee, coordination between these two sectors is lacking to ensure sound management of mining operations. Given the frequent overlap of mining and forest resources (in 2008, about 10% of natural forest areas overlapped with mining permits, including 6% overlapping with new protected areas (NPA) under temporary protection status, 1% with priority areas within new protected areas, and 3% with SGFD sites for sustainable forestry production). This lack of coordination has adverse impacts on conflict resolution between the two sectors and can worsen deforestation related to mining operations.

**<u>Direct Causes and Underlying Drivers of Forest Degradation</u>**

Main causes of forest degradation are generally related to energy supply, forest resources management and promotion, and livestock.

***Energy***

As noted above, the energy sector in Madagascar strongly depends on timber forest products. In addition to charcoal needs in urban centers, rural populations consume an annual volume of over 9 million $m^3$ of firewood. In theory, production natural forests as well as existing plantations would sustainably meet these needs. Unfortunately, rural populations often gather and exploit firewood in a non rational and often illegal way, potentially leading to degradation of affected forest resources. However, dead wood is often collected for firewood which limits degradation impacts. Even though, impacts can be more significant if collection is concentrated in less resilient forests, particularly in the spiny forests of the extreme South of the island.

Several underlying drivers play a role on the severity of impacts of the energy sector on natural and artificial forest ecosystems:

- **Extraction and usage techniques:** As noted for charcoal, traditional wood exploitation and transformation techniques lead to significant losses of raw material. In the same way, use of firewood in traditional braziers has a very low efficiency and important quantities are needed. Actions at this level

would reduce needs and therefore negative impacts on forest resources in a relatively short term.

- **Lack of promotion of clean alternative energy sources:** Clean alternative energy sources, including hydraulic, solar, wind, and biogas, are not well promoted, contributing to a high dependency on wood energy. However, opportunities have not yet been well determined or spatially defined. Due to low prices of wood products on local and regional markets, other sources of energy are not competitive enough. Therefore, actions in this area would only impact forest degradation in the medium to long term.

***Forestry***

As in the energy and mining sectors, illegal forestry activities contribute the most to degradation of affected forest stands. Such illegal exploitation do not comply with long term forestry planning and are often non rational and unsustainable. Furthermore, they usually focus on a very limited number of species, leading to their removal. This trend is noted in all regions, but intensity and medium to long term impacts differ significantly. Eastern dense rainforests are generally more resilient to unsustainable logging and have a higher and more competitive value relative to other uses due to their relatively rapid growth. For the same reason, these forests have a greater regeneration potential, with an easier regeneration of stands after degradation or complete destruction. Finally, it should be noted that logging in such forests is generally more selective and focus on a limited number of species. Dense western dry forests and southern spiny forests have a much slower growth rate and are therefore more sensitive to such irrational activities. Harvesting, particularly for charcoal production, usually targets a larger number of species. Non-carbonized species are usually used to build kilns. Degraded or destroyed forests have a very low potential of regeneration. Degradation is mostly irreversible, all the more so because farmers frequently use fires to renew pastures and croplands.

The following underlying drivers aggravate negative impacts of these illegal activities or of other deforestation and forest degradation causes:

- **Lack of promotion of forest resources:** Forests are in permanent competition with other land uses, including agriculture and livestock. Currently, sustainable use of forest resources does not seem to provide enough tangible benefits, leading to transformation to croplands or pastures usually through burning (slash-and-burn). Recent experience highlighted the importance of creating tangible benefits of forest management to motivate all stakeholders, including for management transfer. Only economically viable management systems combined with long term supply of goods and services would allow sustainable use of forest resources to compete with destructive agricultural uses.
- **Lack of diversification of actors:** Despite an impressive number of management transfers (GELOSE and GCF) over the past years, the Forest Administration remains the main manager of forest resources. However, due to a lack of resources, management level of the Forest Administration is often inadequate. It is crucial to strengthen management transfer to professional actors from the private and civil sector (private actors, NGOs, associations) and to CTDs, as discussed under the forest administration reform. Management delegation requires standardization of procedures, strengthening of forest management standards, and capacity building for delegate managers.
- **Inadequate monitoring systems:** Efficient actions against illegal operations require monitoring systems to locate such operations and identify illegal products. However, existing monitoring systems make it extremely difficult to distinguish legal from illicit activities. Preliminary versions of modern systems for product tracking, contract management, and control are available but still have to be tested, refined and enforced with regulations before a potential widespread use. Recent experience with control and local taxation systems also showed that integrating local communities in monitoring can be very efficient.
- **Inefficient harvesting and transformation techniques:** As for fuel wood, harvesting and transformation of construction and service wood (including precious woods) generate significant losses. Less than 20% of standing raw wood is estimated to arrive on markets as semi-finished products

(boards, beams, etc.) while the remaining 80% is lost during the production process (in the most part, in forests during felling and first transformation). Therefore, meeting requirements for construction and service wood involved logging 5 or 6 times more wood with equivalent impacts on affected stands. One of the only short-term options to reduce forest degradation is to improve harvesting and transformation capacities at all levels.

- **Lack of incentives for reforestation and restoration:** Enforcing reforestation and restoration activities efficiently contributes to reduce degradation pressures on natural forests. Unfortunately, there is a lack of economic incentives for private sector investment, mainly due to low prices of forest products on local and regional markets. Therefore, developing tax incentives and technical support to promote reforestation would be very useful. However, creating new plantations would only have medium to long term impacts.

***Livestock***

For livestock, forest pasture is the main factor of forest resources degradation. This leads to livestock grazing and trampling on seedlings, directly disturbing stands and preventing normal regeneration. Extensive rearing techniques also include regular use of bushfires to renew pastures. Such practice can affect intact forest edges or even destroy degraded stands. Repeated fires also prevent natural regeneration of pastures and seriously hinder restoration and reforestation actions. Finally, livestock rearing is often linked to rural insecurity issues. As explained above, insecurity indirectly contributes to deforestation by preventing valorization of potentially interesting lands for crops, which would improve production without having to clear new lands.

**Cross-cutting drivers**

Some underlying drivers of deforestation and forest degradation cannot be related to any of the areas noted above. These cross-cutting drivers are mainly related to inter-sectoral coordination and cooperation including for planning, law enforcement, and countering illegal activities. Forest degradation and deforestation are partly the result of administrative weaknesses, enabling illegal actions such as encroachment on or irregular settlement in forests, forest permit emissions by unauthorized entities – emission of clearing permits by elected individuals is a blatant example-. Administrative weaknesses also contribute to the proliferation of illegal harvesting and exploitation of forest resources. All these factors lead to degradation and deforestation on virtually all forests type nationally.

Administrative weaknesses are due to a combination of several underlying drivers, among which the most frequently mentioned are the following:

- **Lack of resources and capacities:** Individual administrations have limited resources and capacities to develop and implement tools and procedures and also to enforce laws and regulations underlying their responsibilities, particularly on forest management.
- **Lack of inter-sectoral and inter-level coordination:** Despite efforts to standardize visions and strategies with relevant mechanisms, each sectoral administration settles for working on its individual objectives, without taking into account interrelations with or implications for other sectors. A perfect example is the non-compliance of the mining sector with land tenure regulations. Forest resources are always adversely impacted by this situation. Support tools for sectoral coordination and standardization, such as the Regional Territorial Planning Frameworks (SRAT) are still lacking. In this context and to apply decentralization policies and strategies, the lack of clarity on respective roles and responsibilities of the central level and the decentralized service within one sector on one hand, and between different sectors on the other hand, particularly on forest resources management further aggravates these coordination failures.
- **Governance weaknesses:** As noted above, the vast majority of forest resources, including all natural forests belongs to the State and is managed by the Forest Administration. This situation often leads to unilateral governance without an actual involvement of other stakeholders. It is also conducive to corruption with considerable impacts on implementation and efficiency of sustainable management measures and of law enforcement and control, indirectly contribution to deforestation and forest

degradation.

**Assessment of past efforts**

Development of efficient strategies against deforestation and forest degradation requires an assessment of past efforts, in addition to the identification of causes and underlying drivers. Lessons can be learnt from past experiences and promising approaches determined. As for the analysis of causes and underlying drivers, the following elements (see also the table in Annex 2) are the results of a preliminary assessment during the R-PP preparation and should be refined during the preparation phase of the Madagascar REDD+ strategy.

***Forest/Environment Sectors***

The three-phased environmental program has focused for 15 years on developing environmental reactions through enabling structures and tools (the MECIE decree, the Environmental Outlook Chart, management of small watersheds, the Durban vision complying with IUCN recommendations to grant protection status to 10% of a country's surface, etc.). Among the planned 6 million hectares of protected areas, about 5 million hectares have been created or are under creation. Protected areas status will change as the six categories of IUCN are adopted. Various stakeholders will be able to participate in management. The reform of the Forest Administration has the objective of applying the 1997 forestry policy to refocus on sovereign activities and allow other actors to participate in forest management. Retraining and replacement of aging technicians are planned. Implementation of an independent forestry control would improve efficiency of sovereign activities which underlie control of product flows by the Forest Administration to reduce the illegal portion of marketed products. On the other hand, adoption of a tracking system currently tested in three regions will facilitate future controls and identify sources of products on the market. This is a first step towards forestry certification which will open new markets for our operators while ensuring sustainable management of our forest resources. Management transfer is the selected tool to apply this new policy. Management transfers through GELOSE and GCF are examples of rural community participation. For other types of forest such as the new protected areas, management of certain categories can be transferred. Implementation of the application decrees of the new COAP and final approval of this legislation delay effective management of new protected areas. For forest concessions, the trend is to establish KoloAla sites with an adjudication system for sustainable resources management for the same duration as the rotation (30 to 60 years). On the latter point, the State could not provide all required resources to the Administration, leading to a crucial lack of permits and persistence of illegal activities throughout the sector.

***Mining Sector***

The most important mining resources in Madagascar are mostly under forest lands, leading to a permanent conflict between the two sectors. Furthermore, uncontrolled development of small and medium-scale mining operations have further adverse effects. Large mining operations are more or less controlled with application of the MECIE legislation. In order to mitigate conflicts, the Inter-Ministerial Mining/Forest Committee was created to handle on a case-by-case basis all overlap issues of mining plots and forests. There are several available tools. Some initiatives are also under way in the oil sector.

***Agriculture Sector***

Tavy for production of rice, the main staple in Madagascar has been identified as the main source of deforestation. SRI and SRA are two popularized systems to increase rice production first for self-sufficiency first then potentially for future exports. Popularization of both systems should be increased in forest areas for higher impacts. Agroforestry, agro-biological soil management (GSDM), and conservation agriculture (FAO) are mechanisms to manage soil fertility and efficiently fight erosion. Results are encouraging but their application needs to be accelerated and target outlying areas. Identification of large production basins outside of forests is a great initiative and would attract migration flows towards these basins in the future. Migration policies implemented in the Midwestern region were successful but rural insecurity is becoming an obstacle as new migrants are deterred by looters.

***Land Planning Sector***

Over 80% of court cases in Madagascar are related to land tenure. Capacity of the land tenure service to emit

new titles is largely below the level of requests. Tenure in forest areas remains unclear and customary rights often prevail. Initiated land planning reform through establishment of tenure offices and tenure legislation reforms starts to be successful but more efforts are still needed, particularly in forest areas. The development of a national land and habitat planning plan is participatory and multi-sectoral and will support all other planning frameworks in Madagascar. At the regional level, gradual implementation of the regional land planning framework, a variation of the SNAT, would reduce inter-sectoral conflicts. The SRAT should complement the existing regional forest zoning and both tools should support implementation of the local tenure plan.

**Table 2a: Summary of Assessment of Land Use, Forest Policy and Governance Activities and Budget (Follow-up Activities Needed)**

| Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Complementary studies on deforestation and forest resources degradation | Assess forest trends since IEFN 0 | 300, 000 | | | | **300,000** |
| | Assess deforestation trends for 2005 - 2010 | 450,000 | | | | **450,000** |
| | Weight and spatialize causes and drivers of deforestation and forest degradation | 30,000 | | | | **30,000** |
| | Evaluate interactions between the different causes and underlying drivers | 15,000 | | | | **15,000** |
| | Analyze economic contributions of the forest sector | 20,000 | | | | **20,000** |
| | **Total** | **815,000** | | | | **815,000** |

## *2b. REDD Strategy Options*

Generally, Madagascar has selected to implement a REDD+ strategy.

### Background

As shown under component 2a, environmental significance of deforestation and forest degradation was recognized decades ago, leading to development and implementation of many mitigation measures. Based on these experiences, a series of strategy options was identified to address the main causes and underlying drivers of deforestation and degradation. The strategy options presented below were selected and defined during various consultations and discussions held during preparation of this R-PP. They will support development of the final REDD+ strategy, to be implemented starting in 2013. To facilitate this task, strategic directions include studies and specific actions to produce complementary information during implementation of the R-PP, as well as information on costs and benefits, and political, social, and institutional feasibility of the various options.

Finalization of the national REDD+ strategy based on the strategy options below will be managed by the management structure presented under component 1a of this R-PP, including the REDD Coordination Platform as the decision-making entity, and the Operational Office as the implementing body. The specific task is to coordinate the different studies and assessments by national and/or international consultants and/or consulting firms in order to finalize the REDD+ strategy. This will require some consultations with the main stakeholders in forest resources management. Such consultations will apply the principles and methodologies set forth under Component 2b of this R-PP. Finally, it should be noted that governance and coordination aspects of REDD procedures are discussed under Component 2c of this R-PP.

### Summary of REDD Strategy Options

Strategy options should indicate directions to address causes and particularly underlying drivers of the level of deforestation and forest degradation identified under Component 2a of this R-PP. The options are structured around the underlying drivers described above and serve as a starting point for the development of the Madagascar REDD+ strategy, to be implemented starting in 2013. Strategy options for Madagascar include the following:

***Strategy Option 1: Optimize agricultural production systems***

The key underlying drivers of agricultural lands expansion through clearing include low productivity of traditional systems, forcing farmers to expand their lands to increase production, and the lack of valorization of old clearings. This strategy option aims at improving agricultural production systems as well as promotion of old clearings, especially in areas near forest ranges. In addition, better tenure security is required. Therefore, the two suggested approaches are the following:

**1a Improving agricultural production:** Develop approaches and incentives to enhance productivity of livestock and cultivation systems.

**1b Valorization of clearings:** Identify potential areas and promote settlement of migrating farmers, including with improvement of global and tenure security.

***Strategy Option 2: Reduce population growth in forest areas***

The extent of deforestation and forest degradation is directly impacted by population growth. Even a significant improvement in productivity would have little impact if populations in forest areas, and therefore needed croplands, continue to grow at the same rate. Therefore, this strategy option aims at integrating all aspects of population growth reduction in all agricultural and protection, sustainable management, and forest

resources restoration initiatives.

***Strategy Option 3: Enhance forest tenure security***

Forest lands suffer from a lack of tenure security and respect from local populations, seemingly leading to more intensive deforestation. This strategy option has the objective of improving forest tenure security, including through implementation of tenure systems in forest areas and their compliance with regional land use planning defined by the SRAT. This strategy complements tenure securing of areas surrounding forests, as specified under Strategy 1.

***Strategy Option 4: Reinforce fire management***

Vegetation fires, including for pasture renewal, degrade forest resources. Furthermore, they prevent natural regeneration of old clearings. This strategy option aims at reducing impacts of fires on forest resources through development and implementation of efficient fire management systems.

***Strategy Option 5: Increase wood production***

High demand in wood and non timber forest products causes significant stress on forest resources, particularly when demands are met through illegal and unsustainable exploitation. The main underlying factors include weak wood harvesting and transformation techniques, lack of incentives for reforestation at the private sector level, and often non rational and unprofessional management. The three proposed approaches include:

**5a Improve wood harvesting and transformation systems:** Develop and implement training tools on wood harvesting and transformation, with a special focus on charcoal production.

**5b Promote reforestation:** Develop incentives (technical, tax, etc.) to motivate the private sector's investment in reforestation and forest restoration.

**5c Enhance management of production forests:** Promote forest resources management transfer to new actors (CoBa, private sector, NGOs, etc.), develop and implement management monitoring systems and tools to professionalize and build capacities of delegate managers and to develop reliable data on growth and silvicultural requirements of main forest species.

***Strategy Option 6: Reduce wood consumption***

The energy sector strongly relies on fuel wood, contributing to pressures on forests. Key underlying drivers include inefficient wood use techniques as well as a lack of promotion of clean alternative sources of energy. This strategy option aims at reducing wood consumption through the following two approaches:

**6a Enhance efficiency of wood use techniques:** Develop and promote more energy-efficient wood use techniques, including for firewood.

**6b Promote clean alternative sources of energy:** Assess opportunities for clean alternative sources of energy (hydraulic, wind, solar, and biogas) and develop incentives.

***Strategy Option 7: Enhance management of the protected areas system (SAPM)***

Currently, the existing formal protected areas cover an area of about 2,000,000 hectares. About 4,000,000 hectares of new protected areas are being created. For these areas to be viable in the long run, management systems should be reinforced through an assessment of the various tested systems. The three proposed approaches are the following:

**7a Create and enhance income-generating activities:** Motivate stakeholders by creating and enhancing tangible benefits, assess past experiences of income generation (safeguard aspects will be discussed under the Strategic Environmental Assessment).

**7b Enforce legislation:** Develop and implement alternative structures to ensure better law enforcement for protected areas, especially for those for which management was transferred to private operators and non-governmental organizations.

**7c Reinforce management structures:** Support withdrawal of administration from protected areas management and subsequent management delegation to neighboring populations (management transfer) or to private operators, strengthen management capacities of these new players.

***Strategy Option 8: Enhance intervention means of administration***

Mining and forest administrations have limited means, both in terms of resources (equipment and human) and capacities, against illegal and non rational exploitations. This option aims at reducing deforestation and degradation with two approaches:

**8a Better law enforcement:** Review legal tools and reinforce monitoring and control systems, ensure independent control and funding through the Forestry Fund.

**8b Monitoring of small and medium-scale mining activities:** Develop tools to build capacities of small and medium-scale operators and reinforce monitoring systems.

**Finalization Process of the REDD+ Strategy**

Finalization of the Madagascar REDD+ strategy will be based on a series of assessments and evaluations to determine planned strategy options and to develop required tools and capacities for the implementation of the REDD+ national strategy starting in 2013. Measures will be implemented in 5 steps. The management structure for the preparation phase, suggested under Component 1a, will be in charge of coordination. These measures will clearly include consultations with various stakeholders in forest resources management (especially for Step 2) as detailed under Component 2b of this R-PP.

***Step 1: General evaluations and assessments***

Component 2a of this R-PP already outlines a number of general studies planned during the preparation phase. Following are some detailed information on these studies:

- **Assessment of forest cover trends 2005 – 2010:** Funded by USAID and Conservation International, a first monitoring study of forest cover trends was done in 2006/2007. This study showed a significant reduction of deforestation compared to the 1990-2000 period. However, to develop the baseline scenario this fact must be confirmed by refining data processing for the 2000-2005 timeframe and by processing data from 2010. New forest cover monitoring should include secondary and/or degraded forests as well as forest plantations, which were not included in the USAID/CI study. Methods and technical details of assessment of deforestation between 2005 and 2010 must comply with the monitoring and evaluation system proposed under Component 4 of this R-PP. Inclusion of a spatial analysis of deforestation is crucial in order to identify priority areas for application of deforestation reduction strategies.
- **Assessment of forest degradation:** Extent and spatial distribution of forest resources are relatively poorly documented. In 1993/94, the National Forest Ecological Survey provided valuable information on the status of the different Malagasy forest formations, which could also simplify the definition of a forest in Madagascar. Unfortunately, this national survey effort was never duplicated. A national monitoring survey is crucial to identify forest degradation trends. For deforestation assessment, technical and methodological details must be consistent with monitoring and evaluation methodologies suggested under Component 4 of this R-PP. Assessment of degradation must not only be quantitative, but also spatial, in order to identify priority areas for implementation of relevant strategy options. It is also recommended to combine surveys with deforestation analysis to reduce costs of field work.
- **Assessment of interactions between causes and underlying drivers:** Assessment of causes and underlying drivers of deforestation and forest degradation, as outlined under Component 2a of this R-

PP, must be refined in the quantitative assessments noted above. Studies will focus on interactions between various causes and underlying drivers to obtain a spatial delimitation of priority areas for the proposed deforestation and degradation mitigation activities.

- **Assessment of the economic contribution of the forest sector:** Forests are in permanent competition with other land uses. An underlying driver of deforestation lies in the low economic value affected to forests, leading many farmers to transform forests into croplands or rangelands. A more detailed assessment of the forest sector's contributions to the national economy would provide valuable evidence against deforestation. However, it should be noted that assessing the sector's economic contributions is a challenge given the significant role of informal and illegal activities and the inadequacy of archives of the relevant administration. Therefore, estimation methods based on demand for wood would be used rather than actual figures.

In addition to these studies related to Component 2a of the present R-PP, the following assessments should be held during this first step:

- **Assessment of potential impacts:** All strategy options and specific measures share the main objective of reducing deforestation and forest degradation. During preparation of the national REDD strategy, potential impacts should be assessed of the various proposed strategy options to reduce emissions due to deforestation and forest degradation, in order to identify priority areas for implementation of the corresponding strategy. This study should produce a spatial classification of planned strategy options, indicating which options have the greatest potential for reducing deforestation and degradation and the regions where their impacts would be the greatest.
- **Feasibility assessment:** Even if strategy options proposed in this R-PP are outcomes of a preliminary consultation with the main stakeholders, it is recommended to assess in greater detail the political and social feasibility for implementation. This assessment requires an analysis of the main risks for implementation, but also additional consultations with relevant actors, which should be held at the beginning of the preparation phase along with the other general studies indicated above. Feasibility assessment will also include an evaluation of existing capacities to implement proposed strategy options and develop capacity building measures at all levels.
- **Cost assessment:** Once the strategy options and intervention areas have been defined, detailed costs of implementation can be assessed. This assessment will include the following elements:
  - Investment costs: Investment costs are directly related to the financing of implemented activities under REDD strategies.
  - Opportunity costs: REDD strategies also aim at reducing use changes of forest lands. This reduction will create opportunity costs to be assessed.
  - Transaction costs:
- **Benefits assessment:** Potential benefits of implementation of the national REDD strategy are an essential element of the national REDD strategy assessment. Evaluation covers potential benefits related to carbon credits transactions, but will also include other benefits, from those related to the improvement of sustainable productivity of forest management systems to better wood transformation techniques (strategy option 5) or to the creation of alternative sources of revenues for protected areas management.

***Step 2: Selection of strategy options***

Once the assessments and general studies are completed, including all proposed strategy options, it is recommended to do a final selection of strategy options for the national REDD strategy. The selection process will include two main phases:

- First, results of general studies should be approved through a consultation process with the main actors. Consultations should be held at regional level to include local actors, including local communities and communes.
- Once validated, results will serve as a basis for final selection of strategy options for the national REDD strategy. The REDD Coordination Platform will be the main actor in this selection process.

***Step 3: Specific assessments and analyzes***

Once the selection phase is over, specific assessments and analyzes will only be performed for the selected strategy options in the final REDD strategy. It should be noted that all governance issues and coordination aspects among actors and different institutional levels (central, regional) will be handled at the level of the REDD strategy implementation framework (Component 2c of this R-PP). The main assessments to be performed, under the coordination of the operational Office include:

- **Assessment of past efforts:** As noted above, numerous efforts have been implemented in Madagascar to mitigate deforestation and forest degradation. Such efforts were successful as shown by recent analyzes of deforestation for the 1990-2000-2005 timeframe. Nevertheless, a detailed assessment of past efforts in light of the selected strategy options is required to identify the most effective techniques and approaches. Efforts to be implemented during the REDD readiness phase would be better focused and activities during REDD strategy implementation would be improved.
- **Leakage assessment:** Implementation of REDD strategies will reduce emissions due to deforestation and forest degradation, but there is a risk of a displacement of deforestation and degradation, which would reduce the effectiveness of the strategy. Risks are assessed for each selected strategy option and mitigation measures will be suggested.
- **Other specific studies:** other specific studies will be performed based on the selected strategy options. They will include additional data collection. The extent of analysis will be adapted based on the status of strategy formulation. It will include, but will not be restricted to:
- Assessment of impacts of programs in other sectors leading to deforestation or to degradation. Results will be prioritized and spatially defined,
- Feasibility analysis of restoration and mining rehabilitation techniques,
- Assessment of population growth and repartition based on distance to a forest type,
- Action/research on integrating forest zoning in a regional land planning framework (SRAT)

***Step 4: Finalization of the REDD+ strategy***

Results of all studies performed during the readiness phase will support finalization of the REDD+ national strategy. This process will be mainly led by the REDD Coordination Platform with support from an operational office. It will include a number of consultations with stakeholders at national and regional levels, as discussed in detail under Component 1b of this R-PP.

***Step 5: Tools and capacity building***

After the national REDD+ strategy is finalized, the REDD Coordination Platform and its operational office should finalize implementation of this strategy with the following activities:

- Based on assessment of existing capacities, a study needs to be done to identify capacity building requirements. Needs should include all stakeholders for strategy implementation in the previously-defined priority areas, i.e. relevant administrations but also other players, including non-governmental organizations and neighboring communities.
- Required tools to implement the REDD+ strategy should then be developed. Some of these tools, including those linked to capacity building of REDD management actors will be immediately implemented during the readiness phase. Other tools, for instance those aiming at improving management or wood use systems, will only be applied during implementation of the national REDD+ strategy.

| Table 2b: Summary of Strategy Activities and Budget | | | | | | |
|---|---|---|---|---|---|---|
| **Main activity** | **Sub-activity** | **Estimated cost (in US$)** | | | | |
| | | **2010** | **2011** | **2012** | **2013** | **Total** |
| Step 1: General studies and assessments | Assess potential efficiency of strategy options related to deforestation and degradation | 70, 000 | | | | **70,000** |
| | Assess political and social feasibility of the various proposed strategy options | 25,000 | 25,000 | | | **50,000** |
| | Assess implementation costs of selected strategy options | 30,000 | 30,000 | | | **60,000** |
| | Assess potential benefits of implementation of selected strategy options | 30,000 | 30,000 | | | **60,000** |
| Step 2: Selection of strategy options | Present and validate results of general studies | | 30,000 | | | **30,000** |
| | Select strategy options to be included in the national REDD strategy | | 15,000 | | | **15,000** |
| Step 3: Specific studies and assessments | Detailed analysis of past efforts against deforestation and degradation | | 50,000 | | | **50,000** |
| | Evaluation of potential leakage | | 45,000 | | | **45,000** |
| | Other specific studies related to selected strategy options | | 125,000 | | | **125,000** |
| Step 4: Finalization of the national REDD strategy | Compile results of specific studies and present to actors | | | 65,000 | | **65,000** |
| | Finalize the national REDD strategy | | | 45,000 | | **45,000** |
| Step 5: Tools and capacity building | Determine capacity building needs for actors | | | 15,000 | | **15,000** |
| | Develop required tools for capacity building and implementation of REDD strategy | | | 60,000 | | **60,000** |
| | Apply capacity building tools to actors implementing the REDD strategy | | | 110,000 | 100,000 | **210,000** |
| | **Total** | **155,000** | **265,000** | **395,000** | | **815,000** |

## *2c. REDD Implementation Framework*

### Background

Effective implementation of a REDD+ strategy in Madagascar will include several sectors and numerous actors involved in forest governance and land use. An institutional framework will be developed to coordinate policies and initiatives in various sectors and at different levels and also to execute some strategy options presented under Component 2b. This institutional framework will serve as a legal basis for good "forest carbon governance". The final preparation process for a REDD+ strategy under the national readiness management arrangement defined in Component 1b will define these institutional elements. In addition, institutional options will be assessed through consultations with all relevant actors (Component 1b) and specific studies performed while preparing the REDD+ strategy.

However, there are obvious essential principles for a future implementation framework, as well as some institutional components of this coordination and strategy options implementation framework. For forest carbon governance, key questions can be determined and there are some existing preliminary answers. The three aspects (principles, institutional framework, and carbon governance) are detailed below.

### REDD+ Implementation Framework

#### Key Principles for the Implementation Framework

The Madagascar REDD+ strategy will only succeed if stakeholders are confident that first, sufficient resources will be available to compensate required efforts and second, that the implementation framework has the capacity to ensure equitable benefit-sharing. This means that implementation costs of strategy options and opportunity costs for various actors in all relevant sectors will be taken into consideration. At the same time, benefit-sharing should be perceived as equitable by all actors.

An essential aspect is that potential REDD revenues will be created through a result-based mechanism, within or outside carbon markets. This implies that mitigation measures against deforestation and forest degradation are effectively implemented. Therefore, investments in all relevant sectors will be required to be able to generate such revenues. The revenues will then be used to create and support efficient and sustainable incentives in the various sectors. Thus, potential revenue-sharing mechanisms and allocation of initial investments in deforestation mitigation activities should be perceived as equitable and efficient by all stakeholders.

Both principles – efficiency and equity- will require transparent and regular assessment of efforts, of their costs, and of their effectiveness. Future payments and investments will be based on the results of this assessment.

#### Institutional framework and strategy measures

The institutional framework will be defined through the final REDD+ strategy preparation process (Components 1a and 1b) and an actual "REDD governance" will be implemented. This will include coordination of policies and initiatives in the forest, agriculture, and mining sectors as well as decentralization and land planning, combined with enhancement of efficiency, transparency, and equity of governance in each sector.

The following four strategy directions have been suggested and will be refined and completed during the REDD readiness phase:

- Determination of roles and responsibilities of various sectors in implementing the REDD+ strategy,

based on a charter of responsibilities among relevant sectors and key actors and between the central and decentralized levels (regional and local)

- Coordination and standardization among actors with development and implementation of coordination structures and procedures at the level of the Regional Land Planning Frameworks (SRAT).
- Revitalization of consultation and co-decision structures by strengthening forestry commissions and Regional Planning and Monitoring and Evaluation Platforms (PRPSE).
- Improvement of transparency and law enforcement. A future REDD strategy will have a higher probability of success if it is supported by a more global governance reform in all key sectors. This will be achieved with measures against corruption and improvement of budgetary transparency in relevant governmental sectors, but also with reinforcement of judicial and police enforcement systems for forest, tenure, mining, and other legislations.

Targeted studies and consultations will be performed under Components 1a and 1b to assess strategy options and add other directions if needed.

The institutional framework will also include a feedback system to capitalize results of the MRV system defined under Component 4 of this R-PP. Frequent and regular assessments of deforestation and forest degradation (spatialized and global events and trends) will help adapt planned interventions and reevaluate adopted REDD strategies. Thus, Madagascar's MRV system would not only be an accounting tool but would also inform and improve the strategy in a dynamic and flexible way.

**First Elements and Options for "Carbon Governance"**

A carbon governance framework will be established with consultations and policy decisions during the final preparation phase of the REDD+ strategy. The following questions will be included and some options are already obvious. A detailed work plan to address open questions will be developed by the Coordination Platform and the Operational Office. These structures' composition and responsibilities are presented in detail under Component 1a of this R-PP.

***Forest Carbon Ownership***

There is no clear legislation defining ownership rights for forest carbon in Madagascar, neither in the forest sector nor in other sectors (such as hydraulic or geothermal energy). The Madagascar REDD+ strategy will create this legal foundation which will be crucial to ensure transparent carbon credit transactions under REDD, but also to prevent conflicts among relevant actors and mitigate uncertainties for potential private or public investors. During the preparation phase of the REDD+ strategy, thorough legal assessment and consultations with stakeholders will be performed to establish the most appropriate legal framework for the national context and ensure compliance with existing international laws and conventions.

As starting point, current legislation helps establish some rights related to forest carbon ownership based on tenure rights and forest *usus fructus* rights.[25] However, this legal structure should be modified with a more specific legislation. Under standard law, fruits are received by the owner of the producing asset based on right of use. Therefore, reforestation and avoided deforestation should be distinguished as they produce different "fruits", i.e. "industrial fruits" (plantations) and "natural fruits" (avoided deforestation). REDD, which also includes forest management, restoration, and reforestation would cover very different "fruits" which will impact carbon ownership.

Currently and in the absence of a specific legislation, the national government (potentially represented by the Ministry of Forests and Environment) could be viewed as the owner of forest carbon from State forests (classified and domanial forests), the most important portion of forest carbon in Madagascar. On the other hand, carbon sequestered by trees planted on private lands would belong to respective land owners. However, tenure uncertainty prevails on the major part of Madagascar. Customary rights – as opposed to formal titles- are an example. Potential distinction between "title" and "certificate" should be clarified in regards to forest carbon rights. A more thorough assessment is required on the links between carbon rights

[25] Wemaere & Rajaonson (2006): *Note sur la nature juridique du carbone et les droits de propriété sur les crédits carbone. Proposition pour la rédaction d'un Protocole d'Accord* ; and Takacs (2009) : *Forest carbon. Law + property rights*

and forest product uses under various management regimes, including community forests, co-managed forests and forest concessions.

However, it is important to distinguish the legal and formal ownership aspect from the REDD revenue-sharing rights for revenues generated based on these legal rights. Stakeholders contributing to costs and investments to reduce emissions should be included in an equitable way in a REDD- revenue sharing system.

***Participation in Transactions based on Emissions Reductions***

The international climate regime would define if potential REDD credits could be emitted both to national governments and to sub-national initiatives and projects. On the other hand, the REDD national design should indicate who has the right to enter into carbon contracts and to participate in international transactions on emissions reductions.

As the national government is the potential owner of the majority of forest carbon in Madagascar, it is likely that any international transaction has to be authorized by the government. However, there are strong arguments in a favor of a national system which will allow sub-national activities to directly generate carbon revenues. This means that with authorization of the national government, sub-national projects or initiatives would generate and sell credits to international buyers. This type of transactions could be subject to a carbon tax in order to fund national measures or government services (below).

Another option would be to limit international transactions to the national government but to create a system to generate carbon credits at the sub-national level. In such a system, projects and other initiatives could contribute to reduce emissions due to deforestation at national level and can be compensated by selling these reductions to the government as credits or direct payments. The government would receive international REDD credits.[26]

One reason to consider such a hybrid system is the level of competence and experience of many non-governmental actors (NGOs, development agencies, etc.) in Madagascar. These actors are currently implementing REDD pilot projects and other deforestation mitigation activities. Another reason lies in the time needed to implement an effective national REDD+ strategy and to establish all required institutions and mechanisms. Madagascar will probably reach its REDD objectives more rapidly if sub-national projects and activities can start generating carbon revenues to reduce deforestation in hotspots.

***Carbon tax and elements of a hybrid system***

If sub-national projects or activities are allowed to generate and sell carbon credits, the national government could deduct a carbon tax. During development of the REDD+ strategy, the REDD Coordination Platform will assess how this carbon tax could help create synergies among targeted and localized project activities and governmental policies and measures. First and foremost, this tax could fund specific services provided by the national government to different REDD activities. For instance, assessment of forest cover trends and forest biomass (deforestation, reforestation, degradation, management, etc.) in intervention areas could be done by national institutions. A REDD national service could also provide some base information and tools, such as spatial data on carbon stocks, processed satellite imagery for the baseline scenario, and other key data such as population growth.

A coordinated hybrid approach requires registration of all carbon transactions in a national registry. This registry will prevent double accounting of emissions reductions (national and sub-national levels, project). In addition, standardized methods could be useful in implementing REDD projects, to develop national reference scenarios, models for leakages, and other tools useful to projects. This would contribute to more transparent and comparable generation of carbon credits by sub-national activities.

***Allocation and sharing of revenues generated by transactions***

Distribution of REDD revenues to various actors should be contribute to promotion of sustainable reduction of deforestation. In addition to distribution among governmental institutions and sectors, the REDD national strategy will review the best way to encourage nongovernmental actors in reducing deforestation through

[26] Another version of this option would be to allocate emission quotas to each province or region of Madagascar (the total would represent the emission reductions at national level). If a province/region reduces emissions due to deforestation below its quota limits, the province/region could sell the exceeding quotas to another requesting province/region (or to the government).

revenue sharing. Such actors include rural communities, REDD projects, the private sector (e.g. mining, logging, and agricultural companies), and NGOs. Creating real alternatives for poor local communities is especially important as their subsistence directly depends on deforestation activities.

Under a hybrid REDD system, sub-national activities could directly generate revenues from carbon credits sales and contribute to a tax to fund additional activities (above). Direct government compensation of these activities is also a possibility based on their relative contribution to the reduction of emissions from deforestation and forest degradation. To prevent inefficiencies, additionality, reference scenario, and leakage aspects should be evaluated for each allocation to compensate sub-national activities.

The "Coordination Platform" will examine whether existing structures could be used for revenue distribution based on performance. For instance, tools developed by the "Foundation for Protected areas and Biodiversity" to measure performance of protected areas (conservation effectiveness, financial management, etc.) could inform national or sectoral mechanisms.

***Management and REDD revenues "fund"***

Revenues created through effective implementation of the REDD+ strategy should be managed in a professional and transparent way. It should be assessed whether there are existing appropriate institutions in the country or if a new structure should be created. A bank or a commercial fund could potentially operate as "REDD Fund". Control of funds will evidently be done by the national institution created for revenue-sharing purposes.

***Transparency of the revenue-sharing process***

During preparation of the national REDD+ strategy, mechanisms will be developed to ensure that revenue-sharing is not only efficient but also transparent for all stakeholders. It is crucial that this process is verified and controlled by an external player (for instance, international auditors and REDD co-financing entities). The national coordination platform will also ensure that all stakeholders in Madagascar have access to information on generated revenues and their distribution and use. Stakeholders will also be involved in evaluating the efficiency of revenue-sharing.

| Table 2c: Summary of Implementation Framework Activities and Budget | | | | | | |
|---|---|---|---|---|---|---|
| **Main activity** | **Sub-activity** | **Estimated cost (in US$)** | | | | |
| | | **2010** | **2011** | **2012** | **2013** | **Total** |
| Institutional framework and strategy measures | Develop a charter of responsibilities for REDD implementation actors at national and sub-national levels | | 25,000 | | | **25,000** |
| | Develop coordination structures and procedures under SRATs | | 20,000 | 20,000 | | **40,000** |
| | Revitalize consultation and co-decision structures (ComFor and PRPSE) | | 20,000 | 10,000 | | **30,000** |
| | Assessment of required changes of regulatory framework in various sectors based on selected strategies | | 30,000 | 20,000 | | **50,000** |
| | Revision of regulations based on consultations outputs | | | 20,000 | 15,000 | **35,000** |
| Forest carbon governance | Review existing regulations and develop legal framework related to forest carbon ownership | 20,000 | 20,000 | | | **40,000** |
| | Develop a carbon tax system and define government services provided to potential sub-national projects and prepare this infrastructure | | 40,000 | 30,000 | 20,000 | **90,000** |
| | Establish a hybrid system to develop REDD projects in a national framework | | 20,000 | 10,000 | | **30,000** |
| | Develop and operate the national carbon registry | | | 150,000 | | **150,000** |
| | Develop and validate a transparent, efficient, and equitable revenue sharing and management for REDD | | 70,000 | 70,000 | | **140,000** |
| | **Total** | **60,000** | **300,000** | **10,000** | | **630,000** |

## *2d. Social and Environmental Impacts*

### Background

The Madagascar Constitution requests that every citizen protects the environment. The Malagasy government adopted in 1990 it Environmental Charter for sustainable natural resources management. The Charter repeats this principle of required environmental protection and defines the precautionary principle as the cornerstone of environmental management.

There are several existing implementation tools for environmental impacts assessment. Legal framework for environmental assessment is defined by the decree for environmental compliance of investments (or MECIE decree[27]) which requests that public or private investors perform an environmental impact assessment (EIA) when investments have a potential environmental impact, pursuant to the Environmental Charter. Since 2004, the National Environmental Office (ONE) is the delegate implementation entity and sole office for the MECIE. ONE supervises evaluation of EIAs, emission of environmental permits, and coordination of compliance of environmental management plans. The Ministry in charge of the Environment supervises ONE and controls implementation of the MECIE process. Other players are also involved in implementing the MECIE process: environmental units within ministerial departments, decentralized collectivities (regions and communes), populations affected by the project, environmental NGOs, and the civil society.

In addition, other legal tools are applied: bills on public participation and legislative and sectoral bills on environmental impacts assessments. Several guidelines and sectoral guides have been developed and applied to environmental impacts assessments including on logging, creation of protected areas, and mining exploitation. Decentralization of the EIA process has been initiated: monitoring of large projects is specifically performed by populations affected by the project and decentralized structures.

For strategic environmental assessments (SEA), MECIE specifies that an environmental impacts assessment is required for any plan, program or policy with potential impacts on natural habitat or on natural resources use, and/or on the quality of urban and/or human environment. However, as opposed to EIAs, implementation tools for SEAs are limited. Despite the lack of national references, a number of SEAs was performed in Madagascar with a global compliance with sustainable development and decision-making support. Such SEAs were requested by donors and/or voluntary initiated by various managers. A guide on SEAs has been available since 2008, in addition to capacity-building on SEA at multiple levels (central, regional). The guide was developed by capitalizing on about 15 past SEAs and international performance criteria.

### Management Framework of the Strategic Environmental and Social Assessment (SESA) of the REDD+ strategy

The SESA will identify and review all potential environmental and social impacts from the REDD strategy options as well as their implementation to ensure that decisions taken under the REDD+ strategy comply with sustainable development principles. The SESA will also assess mitigation measures against these impacts. The SESA should demonstrate that environmental and social factors were included in the decision-making process and highlight on one hand, how these conclusions influenced the final REDD strategy, and one the other hand that decision-makers and potentially affected individuals were duly consulted.

Development of the SESA will take into account international norms and practices, World Banks safeguard obligations, as well as the national framework on environmental protection (Environmental Charter, the MECIE decree, the forestry legislation and enacting regulations, sectoral regulations, and international conventions ratified by Madagascar) and the national framework on social aspects (such as the Ordinance #

[27] Decree # 99-954 of December 15, 1999 amended by Decree # 2004-167 of February 3, 2004 on environmental compliance of investments (MECIE)

62 023 of September 19, 1962 on expropriation due to general public interest and enacting regulations).

This environmental assessment will be initiated early in the decision-making process. It should be an integral part of the REDD strategy development process. The assessment will be iterative and participatory.

**Charter of responsibilities for the development of the REDD+ strategy SESA**

The main structures involved in SESA development include:

- **The Ministry in charge of Forests (MEF):**

  This structure will initiate (implementing agency) and coordinate the SESA. The MEF will receive support from the CT REDD and/or commissions at the REDD Coordination Platform level. It will finalize the terms of reference for the SESA. The MEF supervises consultants' activities during the development process. The structure should ensure integration of durability aspects and environmental and social stakes and concerns throughout the process. It should define the decision-making process during REDD+ strategy development in general, and SESA development in particular. It will also be responsible for communicating on the SESA and the REDD+ strategy.

- **The National Environmental Office (ONE):**

  As the sole implementation body for the MECIE, this entity ensures compliance and quality of the SESA process (respecting the established international requirements and standards). With this objective, the Technical Committee led by ONE and supported by the Ministry in charge of the Environment and the environmental units of sectoral departments affected by REDD, and/or other relevant entities should (i) validate the terms of reference and (ii) supervise the execution of the SESA . The Technical Committee is also in charge of an independent control of the SESA process to reinforce its equity and fairness. There is a similar committee for evaluation of a project EIA. Supervision activities will be integrated throughout the process (the technical committee will be associated during meetings, consultations, validation of ToRs, consultation plans, consultants' reports, etc.)

- **World Bank:**

  The SESA will be evaluated by the World Bank.

- **Consultants:**

  National consultants will receive support from an international consultant and will be the delegate executants for SESA development. These consultants will be directly supervised by the Ministry in charge of Forests (with support by the CT REDD or other structures). The consultants will also be in charge of capacity-building of various stakeholders affected by the SESA before the study starts.

- **Other actors:**

  A number of other actors will be involved in developing the SESA. They mainly include other ministerial departments, territorial and traditional authorities, forest-dependent populations, populations directly affected by the REDD+ strategy and activities, the civil society, academic representatives, and REDD-related nongovernmental organizations. These actors will be involved either in implementation-related (MEF) or independent control (ONE) technical committees, or in the public consultation and participation process.

**Public Participation and Consultation**

Madagascar has a well-defined regulatory framework [28] on public participation in an environmental impact assessment process for an investment project. A clear and transparent public participation process (in accordance with the World Bank O.P. 4.01 requirements) needs to be jointly defined (Ministry in charge of the Environment, ONE with the SESA instigator/ Ministry in charge of Forests, and the World Bank) for the SESA process. Steps for the process must include (i) an informative phase on the object of consultation and on the public consultation procedures themselves, (ii) a subsequent consultation phase *per se* to collect

[28] Decree # 6830/2001 of June 28, 2001 on arrangements and procedures for public participation in environmental assessment

opinions of the relevant public and, (iii) an integration phase of the outputs of public consultation in REDD-related environmental and social decisions. Consultation themes, tools, and targets will be defined under Component 1b of this R-PP.

**Capacity-building and training**

The main training subjects will be presented in Annex 2d of this R-PP.

**Terms of reference for the SESA**

Assessments will be performed by national consultants, with the support of an international consultant and in close cooperation with governmental and non-governmental institutions. The MEF will lead the process.

***Objectives of services***

- Establish relevant aspects of environmental and social situations and probable trends without the REDD+ strategy.
- Identify, describe, and assess potential environmental impacts (including social aspects) of the REDD+ strategy which should be integrated during preparation and implementation.
- Recommend realistic measures to manage and/or mitigate these impacts.
- Support the Ministry in charge of Forests to integrate these measures in the REDD+ strategy of the Government of Madagascar.

***Results***

- Concrete measures with clear institutional responsibilities to be integrated in the REDD+ strategy or in other REDD-related policies.
- A strategic environmental and social assessment report validated by ONE and the World Bank, including a non-technical summary.

***Range of services***

- Establish a work plan focusing on themes and areas which will be included in consultations with stakeholders or in specific assessments and actions (e.g. field visits). This work plans includes (i) a consultation plan for the strategic environmental assessment to be developed based on Component 1b of this R-PP and (ii) a capacity-building plan of various actors. This work plan will outline links between the SESA process and the REDD+ strategy development process as well as synergy in the implementation schedule of both processes.
- Establish a reference situation (in order to establish future changes by REDD) by describing environmental and social aspects affected by REDD (including future activities and projects), using the R-PP and other existing or future studies and assessments (especially past initiatives to address deforestation and degradation issues under Component 2b and the reference scenario of Component 3). This aims at providing all base data on current environmental quality and socio-economic status of the relevant areas before implementation of the REDD+ strategy. Present the probable trends without REDD and highlight social and environmental features of potential highly-impacted areas.
- Assess the legal and regulatory framework (social, forest, and environmental components including international conventions such as the CBD), institutional and environmental aspects and socioeconomic development policies in relation with root causes of deforestation and forest degradation or with REDD strategy options.
- A similar assessment of compliance of existing tools (legal, technical, and structural) for sustainable management of forests and the environment (including social aspects) with the World Bank safeguard procedures will be done. The main operational procedures related to REDD include O.P 4.01, O.P. 4.04, O.P. 4.10, O.P. 4.12, and O.P 4.36 respectively on environmental assessment, natural habitats and biodiversity, indigenous peoples, involuntary resettlement, and forests.
- Economic feasibility of implementation of these operational procedures will also be assessed by referring to existing projects and initiatives for which these procedures already apply.
- Initiate an identification and assessment of environmental and social opportunities and constraints.

Environmental and social resources and factors potentially affecting (in a positive or negative way) efficiency, effectiveness and durability of the REDD+ strategy should be identified, described, and assessed for each recommended alternative/ strategy option.

- Identify and evaluate significant effects and potential environmental and social risks from REDD+ implementation for each identified option/alternative (including both positive and negative secondary effects; short, medium and long-run impacts, and permanent and temporary impacts). Significant impacts should integrate interests and concerns of stakeholders, socioeconomic consequences (specifically for forest-dependent peoples, indigenous peoples, and vulnerable and minority populations), and implications for sustainable development. This assessment would also cover REDD management and/or implementation structures (including execution and monitoring of reduction and mitigation measures identified in the SESA).
- Assess the extent of social and environmental impacts while considering potential cumulative effects, inter-sectoral aspects of the REDD initiative, and the environmental or institutional capacity to react to direct or indirect impacts of this initiative. In addition, assess the compatibility with land uses of each suggested activity and initiative under REDD.
- Consultants will specify the methodology for assessing potential impacts/effects and will integrate the World Bank procedures. Projects under the REDD+ strategy which have important and significant impacts on deforestation and degradation as well as on population displacement will not be considered.
- Analyze the environmental and social management framework of the REDD+ strategy in order to define the environmental and social evaluation assessment process for REDD initiatives, projects and future activities. This process should (i) integrate both the Malagasy legislation, specifically the MECIE and environmental, social and forest aspects, and the World Bank safeguard policies, (ii) recommend a classification of required and applicable environmental assessment types for each strategy project/activity, and (iii) identify charters of responsibilities for the different stakeholders to make the environmental assessment process effective. Consultants would potentially make environmental recommendations for some types of specific projects/activities under the REDD+ strategy. They will also outline the implementation process of the safeguard policies (while taking into account economic feasibility).
- Suggest planned measures to prevent, reduce, and compensate as much as possible any significant adverse effect on environmental and social aspects. Measures should be realistic and economically efficient and will cover REDD coordination and implementation as well as implementation of each planned initiative, project, or activity under REDD. Develop an implementation plan for these measures as well as a description of planned monitoring measures and indicators. Measures should comply with the national legislation and defined in accordance with World Bank procedures.
- Conclusions and recommendations – This part summarizes main environmental and social issues, constraints (policy, institutional, etc.), challenges, and main recommendations. Draft a statement summarizing the rationale behind the selection of all planned options, activities, and measures (including prevention and mitigation measures noted above) and describing the evaluation process including any difficulty. This part should also highlight how the SESA impacted or not the final REDD strategy. Outline necessary institutional capacity-building actions.

**Table 2d: Summary of Social and Environmental Impact Activities and Budget**

| Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Establishment and implementation of the SESA management and development framework for REDD | Supervision of SESA activities by the MEF and information dissemination on the SESA (progress, tools, etc.) | 20,000 | 20,000 | 20,000 | | **60,000** |
| | Supervision of the SESA process by ONE and CTE and assessment of the SESA file | 60,000 | 60,000 | 60,000 | | **180,000** |
| SESA capacity-building | Capacity-building of decision-makers (tool development and implementation) | 40,000 | 20,000 | 20,000 | | **80,000** |
| | Capacity-building of other actors (tool development and implementation) | 40,000 | 50,000 | 50,000 | | **140,000** |
| SESA development | Establishment of baseline environmental situation for REDD | 40,000 | | | | **40,000** |
| | Assessment of legal, institutional, and development policy framework | 20,000 | | | | **20,000** |
| | Public consultation | (See Component 1b) | | | | |
| | Assessment of the level of environmental and social impacts – Evaluation of environmental and social opportunities and constraints | 30,000 | 30,000 | 30,000 | | **90,000** |
| | Development of environmental and social frameworks for projects and activities under the REDD+ strategy | | | 35,000 | | **35,000** |
| | Development of reduction and mitigation measures | | 30,000 | 30,000 | | **60,000** |
| **Total** | | **250,000** | **210,000** | **245,000** | | **705,000** |

# COMPONENT 3: DEVELOP A REFERENCE SCENARIO

## Background

To date, the only comparable figures on forest cover trends for a recent period are found in the MEF/CI/USAID report and FAO studies. Both estimates show a decrease of the annual deforested area between 2000 and 2005 compared to the 1990-2000 timeframe. However, this decrease does not reflect a continuous trend towards a gradual deforestation reduction. Several factors corroborated to produce this result. The main assumption is the efficiency of the national environmental policy during the 2000-2005 period (EP2, development of protected areas[29], the Durban Vision, environmental awareness, management transfers, etc.).

However, mobilized resources for environmental policies are currently less important than those available between 2000 and 2005. A number of potential pressures have been identified. Deforestation could possibly increase in the medium run due to the development of agribusiness (including biofuels), mining, and infrastructure to support the two planned pillars of the Malagasy economy.[30] Other existing pressures may be aggravated, including increase of population density and impoverishment leading to enhanced dependency on natural resources.

Therefore, it seems useful to eventually develop a projected reference scenario to take these future threats into account. Main projected activities are therefore defined here to develop this national reference scenario which will allow consideration of these potential pressures and help the national administration in steering its land planning strategy. [31]

## Proposed Approach to Develop a Reference Scenario

**Evolution of deforestation drivers**

A number of drivers suggest that deforestation might increase in the future (it should be noted that deforestation does not seem to be limited by biophysical factors as the *Terrestrial Carbon Group* indicated that 76% of remaining forests in Madagascar are threatened in the long term):

- Increase of population density by 2.8% annually (INSTAT projections), for a population living in rural areas at 82%, practicing slash-and-burn techniques (tavy), and for which energy consumption needs are covered at 80% by firewood and charcoal;
- A strategy direction for the agriculture sector lies in supporting agribusiness development (including biofuels). Legally, development of large exploitations should be done in non forested and non cultivated areas. ONE requires that such investment projects perform an environmental impact assessment. However, experience has shown that administration has not always been consulted and that ONE recommendations are not always respected (knowing that ONE does not always have the resources to control compliance with recommendations from the impact assessments);
- Another national strategy orientation is to develop mining exploitation.[32] Some mining permits are located in forest areas (10% of the surface of protected areas might be affected by mining permits even if exploitation has not started). Mining development might indirectly lead to deforestation through development of infrastructure and opening access to some remote areas.

[29] In protected areas, annual deforestation rate went from 0.18% to 0.12% from 1990-2000 to 2000-2005 (Jariala estimate).

[30] These elements are the pillars of the Madagascar Action Plan (2007).

[31] Reference scenario means here the most accurate estimated future emissions compared to business-as-usual emissions, in order to contribute to national decision-making and to measure the most realistic emissions reductions.

32 Oil exploration should have relatively minor impacts on forest cover, as oil-rich areas are located in the lowly forested western part of the country.

- To support development of these sectors (considered as crucial for the economy) improvement and expansion of the infrastructure network are also planned. Some of the planned infrastructure would cross forested areas, causing higher pressure on forests (see Figure 1).

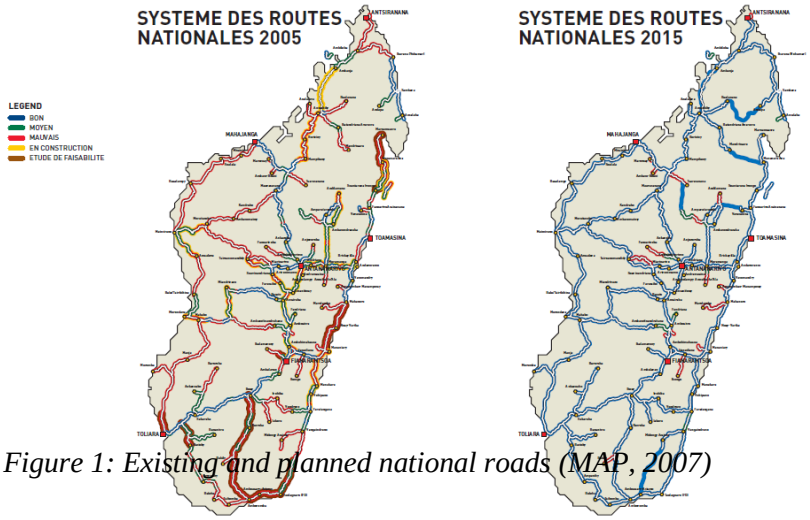



*Figure 1: Existing and planned national roads (MAP, 2007)*

- Madagascar might also be impacted by international factors: higher oil prices might increase pressure to collect firewood and charcoal; increase of crop prices (especially rice) might make cultivation profitable in areas where it is not currently the case. In addition, evolution of meat consumption in emerging countries, as well as international policies to promote biofuels, are factors that might increase pressure on forests at the global level, particularly in countries lacking the necessary resources to protect their forests.
- Climate change impacts are already observed in the south and southwestern parts of the country. These impacts make cultivation more difficult in dryer areas and increase pressure on forests in these areas (it is already observed that during drought periods, the population shifts to charcoal production or to small-scale mining exploitation, often in forested areas). In addition, migrations are observed from the South to the North and the East.

**Essential elements of the Planned Reference Scenario in Madagascar**

- Madagascar is a centralized country[33], and therefore national strategies are those impacting the entire country, particularly for environmental management. As a consequence, it would not be relevant to define sub-national reference scenarios to obtain funds. It is however expected that the national level reference scenario will have regional outputs.
- Due to potential pressures mentioned above, Madagascar is opting for a projected approach. However a spatialized historical approach is the first step to develop a reference scenario, while waiting for enough reliable data and clearer guidelines from the UNFCCC. The projected approach will be based on data generated by the MRV system, but the historical approach will use low-resolution data in order to produce faster results to contribute to the national strategy.
- Two existing REDD projects in Madagascar have a merely methodological purpose to inform discussions at national level (FORECA and PHCF). They will contribute to identification of data with the greatest impacts on deforestation volume as well as potential nationally-appropriate modeling tools. In other projects (Makira, CAZ, and COFAV), reference scenarii have also been developed and contributed to identification of variables with the greatest impacts on locating deforestation. They also helped test the Land Change Modeler tool to estimate location of future deforestation. To maximize synergies, exchanges among project developers will be maintained throughout the development of historical and projected reference scenarii.

33 The currently implemented decentralization system provides that regions will implement national policies, including environmental policies, but will not enact their own environmental legislation.

- Initially, the reference scenario will focus on deforestation and forest regrowth.[34]It can be made more sophisticated as data on forest degradation become available, if an activity is deemed to have sufficient mitigation potential to justify potentially significant monitoring costs. Therefore, it is not an emissions reference scenario, but a reference scenario (implying emissions and removals).

**Planned activities to develop the reference scenario**

***Activity 1: Definition of roles and responsibilities***

The reference scenario has the purpose of serving as a land planning tool for the forest sector as well as for other sectors. Responsibility for its development will be supervised by the REDD Readiness Coordination Platform. When the scenario becomes a decision-making tool, outputs will eventually be used by the Prime Minister's Office and/or the Ministry of Land Planning.

**Activity 1.1**: Creation of a technical group for reference scenarii. This will include members of projects involved in reference scenarii development, as well as national institutions involved in collection of explained data (ONE, ESSA Forêt, FTM, etc.) or explanatory data (INSTAT, FOFIFA, Ministry of Economy, etc.). This technical group will regularly meet at the initiative of the PCPR. In addition to methodological exchanges, the group will be responsible for suggesting general organization and distribution of responsibilities for this activity to the Platform, and recommending potential service providers for the various steps: collection of explained data, collection of explanatory data, development of the historical scenario, and development of the projected scenario.

**Activity 1.2:** Formalization of the role of the institution steering this technical group, in cooperation with the BOPR and the Executive Secretary. ESSA Forêt seems to be the most appropriate institution due to the role of the FORECA project for local baselines.

**Activity 1.3:** Hiring of an economist researcher familiar with land use changes modeling. This expert will first support collection of data and thoughts on the most appropriate modeling approach. He will then steer development of the historical scenario and build a research team for the development of the projected scenario.

***Activity 2: Historical deforestation estimates***

For both the historical and project scenario development, past land use changes (in terms of affected areas and locations) are the first required information.

**Activity 2.1:** Selection of forest definition and range of the REDD mechanism (Activity 3 of the MRV system).

**Activity 2.2:** Monitoring of national forest trends with low resolution satellite data such as SPOT Vegetation / MODIS. This activity has the objective of rapidly (finalization at the end of year 1) producing a series of deforestation maps based on analysis of SPOT Vegetation/MODIS decade synthesis. Calibration and quality control of maps will be done with available forest cartographic data (Jariala, Kew Garden, ONE). Initially, such maps will inform the historical reference scenario and provide decision-making elements to support the national REDD+ strategy. A first approximation of the reference scenario in terms of deforested area will be enough (based on deforestation proxies during Phase 2 of the REDD mechanism).

**Activity 2.3:** Fine estimate of past emissions/ removals based on thematic mapping (Activity 5.3 of the MRV component) and carbon estimates (from Activity 6.5 of the MRV component).

34 The Ministry of Energy strongly promotes development of plantations for energy aiming at reducing pressures on natural forests due to wood collection. Including plantations and monitoring their trends would be useful under the REDD mechanism.

***Activity 3: Collection of deforestation explanatory data (quantity and location)***

Explanatory data will be required to develop a projected model and by extension the historical model.

**Activity 3.1:** Identification of variables with the greatest impacts on deforestation and degradation. Variables will be identified based on feedback from REDD project developers as well as from projects tackling deforestation in general and regional and local administrations. To locate deforestation, CI and WCS have already identified the most appropriate explanatory variables to adjust their models: population density, distance to roads, distance to waterways, distance to villages, slope, altitude, and distance to protected areas. It might be necessary to test other data which might impact location of deforestation in the southern and southwestern areas not included in these projects (the map of main forest formations types itself will probably be an explanatory variable). For deforestation extent, an existing thesis work at the ESSA Forêt shows that data on market access (channel organization, price), population growth, and agricultural production (yield) could be crucial factors.

**Activity 3.2**: Inventory of available data (both past and future) will help define past and future trends for variables identified in 3.1. Identification for all data will include dates, collection methodology, aggregation levels and institutions where the data are available. Data will be researched in priority at INSTAT, the Ministry of Economy, ONE, FOFIFA and other institutions where relevant data might be available. Inventory will initially list data. Data will eventually be integrated in the national database (developed from Activities 9.2 and 9.3 of the MRV component).

**Activity 3.3:** Capacity-building of existing collection entities (INSTAT, ONE, FOFIFA, others, etc.) to maximize synergies among institutions, enhance their collection methods and gather new indicators (biophysical and socioeconomic). Following Activity 3.3, a collection procedure will be established to gather additional data (identified as crucial in 3.1 and not available in 3.2), and to regularly update selected indicators. This procedure must be robust (replicability), cheap, and reliable. Discussions on the planned model type will inform the procedure (Activity 5.1).

**Activity 3.4:** Data collection on new biophysical and socioeconomic indicators required to develop the historical and projected reference scenarii. Location data will be initially gathered to inform the spatialized historical scenario.

***Activity 4: Development of a spatialized historical scenario***

The spatialized historical scenario can be developed with Land Change Modeler, a tool developed by IDRISI -, which estimates location of future deforestation (it will focus on deforestation). LCM is a dynamic tool, which means that it can take into account evolution of applied parameters as explanatory variables (e.g.: new road construction, creation of new protected areas, etc.). This initial historical modeling exercise can inform the national REDD+ strategy by:

- Quantifying and prioritizing significance of past spatial causes of deforestation;
- Analyzing effectiveness of some past policies (policies on protected areas, development areas of land tenure offices, management transfer areas, infrastructure development, etc.);
- Identifying deforestation hotspots;
- Testing the impacts on location of a number of planned national policies (new conservation areas, new infrastructure, elimination of insecurity in certain areas, etc.).

**Activity 4.1:** Software purchase and related capacity-building. All capacities of the tool have not been used under the Makira, CAZ, and COFAV projects. The team in charge of developing the historical model will be provided training on the tool. The team will include the economist identified in 1.3 and experts who have already used the tool in projects, in order to maximize synergies between project and national levels.

**Activity 4.2:** Selection of appropriate historical approach and reference period. The choice will depend on estimates of past forest cover trends and assumptions of future trends of deforestation drivers. Continuation of the historical trend could be done in different ways: by projecting the average deforestation rate of the reference period, or by pursuing an observed linear trend during the reference period (decreasing or increasing).

**Activity 4.3:** Adjustment and statistical validation of the model. Model predictions will be compared with

actual facts. The model with the best prediction capacity will be selected. The team in charge of developing the national model will include one or more experts who have already used this approach at project level.

**Activity 4.4:** Validation of the model by the PCPR, as well as by regional stakeholders approached during the identification phase of deforestation explanatory variables.

**Activity 4.5:** Simulation of policies in partnership with various ministries. The model and its capacities will be presented to various ministries. During this presentation, policies to be tested will be defined by representatives of ministries and a report on impacts will be submitted to the Administration.

***Activity 5: Development of a projected and spatialized reference scenario, a steering tool at national level***

A projected model will go further than the historical model in terms of decision-making as it allows an estimation of impacts of national policies, both on deforestation location and extent (e.g. price and agricultural subsidies variations, introduction of new technologies, etc.). Potential options for testing include evolution of production costs or sales price, agricultural yield improvement, subsidies, etc... Testing will include deforestation and afforestation/reforestation. A sufficient number of forest classes should be included to eventually integrate degradation.

**Activity 5.1:** Selection of model type and development of detailed terms of reference to design the model. The model type will depend on complexity of the deforestation process, expected results, and potential need to couple extent and location predictions. Analysis of scientific literature and developed economic models at national level in Madagascar or in other countries will help identify potentialities of various approaches. Terms of reference will specify the type of economic approach (statistical, stochastic, optimization, simulation), the corresponding model type (for instance for an optimization model, it could be general or partial equilibrium), processes to be reflected by the model (based on analysis of deforestation drivers but also on the scope of the mechanism), and list of available data and data being collected and their features. The economist expert identified under Activity 1.3 will be in charge of this analysis in cooperation with the Forestry Administration. Terms of reference will help select the desired profiles for Activity 5.2.

**Activity 5.2:** Implementation of a partnership with an international research institution. PhD candidates and post-doctoral fellows will be placed in the institution in Year 1 to be mobilized as early as Year 3 or 4 to develop the projected model. An expert from the institution will be approached from Year 3 to Year 5 to support the development of the model with regular missions and remote support.

**Activity 5.3:** Creation of a research team at ESSA Forêt to develop the projected model, under the supervision of the economist identified in 1.3.

**Activity 5.4:** Presentation and validation of a first demonstration draft of the model. The draft will be submitted to national stakeholders at a technical workshop, in order to validate assumptions and include potential improvements. Capacities of the model will also be presented to various administration sectors, which will be requested to formulate national land planning policies to be tested by the model.

**Activity 5.5:** Presentation of a final version of the model and a strategy report outlining impacts on forest cover of various national strategy options. Effectiveness can be compared to implementation costs of the strategy option, to inform the national REDD+ strategy.

**Activity 5.6**: External validation of the model. This validation is required to ensure credibility of model use as potential basis for negotiation.

***Activity 6: Use and readjustment of projected reference scenario***

**Activity 6.1:** Implementation of a step-by-step procedure to readjust the model (model calibration and validation based on new data and integration of new explanatory variables). The national research team will be responsible for regular adjustment of the model (approximately every 5 year) based on the national database, and for publishing regular strategy reports for national steering. The team will work in cooperation with the institution steering the national land planning strategy to provide useful results for

decision-making. The team will however remain independent.

**Activity 7: Methodological approach with projects**

REDD projects will be included in discussions on national approach (collected data and model type) through participation to the technical group in charge of the reference scenario. The applied methodology for the development of the reference scenario at national and project level can differ as reflected processes are not the same. However, the national model can serve as first approximation to estimate avoided emissions during the project identification stage.

**Activity 7.1:** Provision of biophysical and socioeconomic data to projects at the national database level for adjustment of their reference scenarii. Data will be provided along with guidelines specifying the conditions under which other data sources can be used by projects (for instance when the national level provides data which are too aggregated to be relevant at local level). Guidelines will emphasize the conservative aspect of business-as-usual estimates at project level as the sum of project reference scenarii throughout the country should be inferior to the national reference scenario.

**Table 3: Summary of Reference Scenario Activities and Budget**

| Main Activity | Sub-activity | Estimated cost (in US$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
| Activity 1 : Definition of roles and responsibilities | Creation of a technical group on reference scenarii | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | **50,000** |
| | Recruitment of an economist researcher | 15,000 | 15,000 | 25,000 | 25,000 | 25,000 | **105,000** |
| Activity 2: Estimation of historical deforestation | Selection of forest definition and scope of mechanism | See Component 4a | | | | | **-** |
| | Monitoring of national forest trends using low-resolution satellite data | 35,000 | | | | | **35,000** |
| | Fine estimation of past emissions/removals | See Component 4a | | | | | **-** |
| Activity 3: Collection of explanatory data for deforestation | Identification of best explanatory variables for deforestation and degradation | 55,000 | | | | | **55,000** |
| | Inventory of available data | 10,000 | | | | | **10,000** |
| | Capacity-building of existing collection entities | 60,000 | 60,000 | | | | **120,000** |
| | Data collection on new biophysical and socioeconomic indicators | | 80,000 | 80,000 | | | **160,000** |
| Activity 4: Development of a spatialized historical reference scenario | Software purchase and capacity-building for use | 10,000 | | | | | **10,000** |
| | Selection of adequate historical approach and reference period | 5,000 | | | | | **5,000** |
| | Adjustment and statistical validation of model | 20,000 | 20,000 | | | | **40.000** |
| | Model validation | | 15,000 | | | | **15,000** |
| | Simulation of policies in partnership with the various ministries | | 20,000 | | | | **20,000** |

| Table 3: Summary of Reference Scenario Activities and Budget | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Main Activity** | **Sub-activity** | **Estimated cost (in US$)** | | | | | |
| | | **2010** | **2011** | **2012** | **2013** | **2014** | **Total** |
| Activity 5: Development of a spatialized and projected reference scenario, a steering tool at national level | Establishment of a partnership with an international research institution | 50,000 | 50,000 | 110,000 | 110,000 | 110,000 | **430,000** |
| | Establishment of a research team within ESSA Forêt | | | 75,000 | 75,000 | 75,000 | **225,000** |
| | Presentation and validation of a demonstration model draft | | | | 20,000 | | **20,000** |
| | Presentation of final model version and strategy report | | | | | 15,000 | **15,000** |
| | External validation of model | | | | | 10,000 | **10,000** |
| Activity 6: Use and readjustment of projected reference scenario | Implementation of step-by-step procedure to readjust model | | | | | | |
| Activity 7: Methodological articulation with projects | Provision of biophysical and socioeconomic data to projects at national database level | See Component 4a | | | | | |
| | **Total** | **270,000** | **270,000** | **300,000** | **240,000** | **245,000** | **1,325,000** |

# COMPONENT 4: DESIGN A MONITORING SYSTEM

## *4a. Emissions and Removals*

### Proposed approach for the design of a monitoring system for emissions and removals

**Essential elements of the planned monitoring system in Madagascar**

- Component 4a has two planned phases: i) design and testing of monitoring system; ii) implementation of monitoring system and long-term improvement.
- Quality and accuracy efforts will ensure a continuous balance in measuring estimated land uses and land use changes and biomass/carbon stock estimates.
- Due to the lack of base information to develop the MRV system in Madagascar, potential long-term development is considered. This will improve accuracy of measures and enhance national capacity building and development of quality information.
- In this perspective, the first steps described below will refer to deforestation monitoring. Other parameters (degradation, sustainable forest management, carbon stocks increase, etc.) to maximize a REDD+ approach will be integrated as capacities of national experts and monitoring resources are enhanced (see 3.3).
- Reduction of measure uncertainties by building national capacities in recommended technical procedures on spatial data (geometric adjustment, radiometric adjustment, proper use of image classification and change analysis systems, etc.), forest surveys, estimation of uncertainty level throughout the data collection and analysis chain.

**System design and implementation**

***Activity 1: Defined distribution of roles and responsibilities***

**Activity 1.1:** Identification and hiring of a coordinator for the design phase of the MRV system. The coordinator will be under the responsibility of the REDD Readiness Coordination Platform and will allocate 100% of his/her time to coordinate development of a MRV system. The coordinator will be hired for a minimum duration of 3 years.

**Activity 1.2:** Formalization of the institution and the direction in charge of the "design" and "implementation" phases of the MRV system. ONE is currently the most relevant institution for this role. Organization arrangements are suggested in annexes (4.2 and 4.3). These arrangements are the result of consultation with stakeholders and synthesis of consultation workshops.

**Activity 1.3:** Identification of national and international teams to be created for the "design" phase of the MRV system (Annex 4.2). Specification of roles for each institution : definition of specifications and requirements, identification of methodologies, satellite data acquisition, pre-processing of satellite data (geographic, radiometric, etc.), stratification by forest type, stratification by land-use trend, interpretation of satellite data, forest survey, data control (field, THR), calculation of results, reporting, database

maintenance, etc.

**Activity 1.4:** Identification of national and international teams to be created for the "implementation" phase of the MRV system. This step will follow the "design" phase of the MRV system after evaluating relevance of outputs. A preliminary arrangement is attached (Annex 4.3).

**Activity1.5:** Identification of local experiences on participatory environmental monitoring at national level, and evaluation of feasibility of their application for REDD.

***Activity 2: Accurate identification of co-benefits of developing a national MRV system***

Madagascar crucially needs updated, robust, and formal cartographic information for development purposes (agricultural statistics, land use trends, degradation of arable lands, state of watersheds, management of natural risks, updated topographical maps, updated transportation network data, etc.). Current data produced by the FTM result from aerial photographs from 1949. Public and private actors and NGOs need these updated data to adapt their activities to the national reality. To date, the greatest efforts have focused on forests (USAID JariAla Project, Critical Ecosystem Partnership Fund Project) at the expense of other land use types. A more thorough cartographic map including all land use types would obviously help many governmental programs (national land management scheme, regional land management scheme, local tenure plan, etc.). In addition, a multi-use product would mobilize more funds to collect better-resolution satellite data and allow FTM to update national topographical maps. Such a product would enhance recognition of the MRV system at national level.

**Activity 2.1:** Launching of a short study to identify: i) precise national needs for thematic and topographical cartographic information; ii) criteria to be measured (classification type, scale, technical features, etc.); and iii) the most effective methodology to meet those needs. This study will be supervised by the Coordinator and should submit its results within two months after the beginning date. The expected output is a summary report on national data needs, identifying cartographic products to meet these needs (CORINE Land Cover, etc.).

**Activity 3: Forest definition, scope of the REDD mechanism and move towards REDD+**

Definition of forest and scope of the REDD mechanism are two intrinsically interlinked notions. A current definition of forest in Madagascar exists under the Kyoto Protocol (cover density > 30%, height > 5m, and surface > 1ha), but there is no consensus on this definition and REDD pilot projects use different definitions relevant to the context of their projects. The Programme Germano-Malgache pour l'Environnement has started an initiative to consider identification of new criteria for a new forest definition under REDD but this initiative still needs to be reinforced.

**Activity 3.1:** Identification and characterization of intermediary formations (between the two definition extremes). Formations can be identified based on available height data in the IEFN0 and completed by cover density analyzes (crown sizes combined with various heights). Location and surface will be specified.

**Activity 3.2:** Analysis of the implications of the different forest definitions. Analysis should be done on the impacts of several definitions (extreme and intermediary) on eligible areas for avoided deforestation/degradation and afforestation/reforestation (for instance, according to Zomer et al, 2006[35], depending on the selected definition, the eligible surface for forest CDM in Madagascar would be between 83,971km² and 246,241 km²), eligible activities (minimal project size, height of plantations, inclusion of agroforestry, etc.), monitoring costs (land-use change types, minimal detection areas, available capacities, etc.), and the corresponding mitigation potential (current emissions/removals and potential emissions reductions or removals increases). A technical document will specify the forest detection pattern based on applied satellite data and the corresponding degree of uncertainty. This analysis

[35] Robert J. Zomer, Antonio Trabucco, Louis V. Verchot, Bart Muys, 2006. Land Area Eligible for Afforestation and Reforestation within the Clean Development Mechanism: A Global Analysis of the Impact of Forest Definition. Mitig Adapt Strateg Glob Change (2008) 13:219–239

will also specify REDD activities to be monitored in Madagascar.

**Activity 3.3:** Establish a qualitative progress schedule for the MRV system. The schedule will indicate gradual integration phases of REDD activities (degradation, sustainable forest management, etc.) based on technological improvement of the MRV system (geographic quality, field control, accuracy of measures, available satellite data, use of remote-sensing data, etc.). Priority will initially be given to deforestation measurement and to afforestation/reforestation.

**Activity 3.4:** Validation with a national workshop of proposed options for forest definition, national scope of the REDD mechanism, and steps towards REDD+.

***Activity 4: Training and capacity-building***

There is a highly uneven knowledge in Madagascar and particularly in institutional structures on REDD negotiation at the UNFCCC level and on the main IPCC technical documents on GHG inventories for the AFOLU sector, for several reasons : i) recent institutional changes related to governmental change, leading to a turnover of people in charge of climate change and REDD; ii) recent involvement of public institutions under the initiative of the CT REDD ; therefore, the people in charge had very little time to get updated and ; iii) lack of experience in GHG inventories and limited participation in implementing a REDD mechanism.

**Activity 4.1:** General capacity-building for the Coordinator and ONE staff during the design phase of the MRV system. Capacity-building will mainly focus on monitoring international negotiations on REDD. GES inventory procedures for the AFOLU sector, and managing uncertainties and reporting.

**Activity 4.2:** Capacity-building in GHG/REDD inventories for technical teams belonging to the MRV system "design phase" and "implementation phase" teams (local consulting firms, public institutions, etc.). Training will specifically focus on the following areas: IPCC guidelines, report format for inventories, REDD activities, carbon measurement unit, use of IPCC tables, national communication, etc.).

**Activity 4.3:** Capacity-building in GIS/remote sensing for technical teams belonging to the MRV system "design phase" and "implementation phase" teams on the following areas: geodetics, geographic corrections, radiometric adjustments, image classification (visual, segmentation, classification, etc.), estimation of uncertainties, management of cartographic projects, etc.).

***Activity 5: Activity data: methodology definition and tool selection***

**Activity 5.1:** Based on report conclusions of Activity 2.1, on the use of national cartographic data and production of a multi-user cartographic information, the REDD Platform will produce a methodological report with the support of national/international experts in GHG/REDD inventories. The report will specifically describe the identified technical method to produce a base cartography and an updated thematic cartography, focusing on the following procedures:

- Development steps for an ortho-mosaic;
- Geodetics, acquisition of tie-points, geometric corrections of the ortho-mosaic, quality control of geometric corrections;
- Radiometric correction step for the ortho-mosaic;
- Methods of cloud removal;
- Classification procedure of the ortho-mosaic. A wall-to-wall approach will be preferred as cartography is for multiple uses. Based on training of local experts in automatic image processing, a move towards this approach at national level is logical. However, due to the lack of estimates of uncertainty level in national projects (Jariala/CEPF), reliability of this method in Madagascar and implementation potential at national level (radiometric processing) cannot be asserted. Therefore, it is important to estimate the relevance of this method based on outputs of pilot projects and by initiating preliminary studies with the support of an experienced laboratory. Uncertainty associated to the detection of main land-use categories will help determine the most relevant approach (supervised classification, visual, hybrid method, etc.);

- Quality control and uncertainty estimation procedures;
- Result calculation procedures; and
- Data storage and database management procedures (subsequent corrections of data during cover updates, etc.).

**Activity 5.2:** Production of national base cartography based on report of Activity 5.1. Base cartography will be initially developed to support development of the thematic cartography. The most important data needed to develop thematic cartography include:

- Accurate cartographic baseline;
- Formal tie-points throughout the country; and
- A reliable digital altitude model.

**Activity 5.3:** Production of the thematic cartography based on report of Activity 5.1. Thematic cartography will be produced for the most recent 2009/2010 period and for at least three historical dates in order to rapidly get data on land-use trends for the entire country.

**Activity 5.4:** Support to the detection of forest types identified under Activity 6.3. With support from the scientific committee and international experts, this activity has the objective of summarizing available reports and testing the use of optical satellite and remote-sensing data to detect forest types in Madagascar. This activity should reduce the uncertainty level of detection of the main forest types for which carbon stocks are considered to be homogenous. Lessons learned from pilot projects will also be integrated for this activity.

**Activity 5.5:** Using the multi-date thematic cartography and results of Activity 5.4, information required for monitoring forest cover trends (stratified by forest type) will be produced. Calculation of conversion matrices of land use.

**Activity 5.6:** Evaluation step of outputs of the MRV system design phase, developed in Activity 5.5. Assessment reports on quality of the forest cover monitoring system and recommended improvement for the planned system. From this activity, a methodology report will outline the final forest cover monitoring system. This system could apply a point-sampling approach, stratified based on information on land use trends from the thematic cartography (high-pressure areas, medium-pressure areas, etc.). This approach would reduce production costs and enhance detection and monitoring efforts in complex forest types (causes of classification errors) and in areas where land-use trends are important.

**Activity 5.7:** Launching of MRV system implementation based on the methodology document of Activity 5.6 and with the organization defined in Activity 1.4.

***Activity 6: Carbon density/Emissions Factors (EF): methodology definition and tool selection***

Determining emission factors both for the reference scenario and for monitoring "project" scenarii is a priority. Variable results of pilot projects in terms of carbon rate/hectare (carbon density) highlight the urgent need to improve knowledge on this parameter which can cause important errors in the MRV process at any scale. Available existing sources in Madagascar should be completed to reliably estimate the carbon rate/hectare for all types of wooded area.

**Activity 6.1:** General approach. When activity data are available, information on emission factors for various types of forest cover help build a reference scenario and monitor a project scenario. If there are enough emission factors available for various levels of cover degradation, monitoring can be accurate enough by limiting the number of permanent plots for field monitoring which are costly to set up and to monitor over to long term. Once the emission factors are determined, monitoring can be simplified :

- By monitoring activity data
- By placing some forest trend monitoring plots in "strategic" areas: intact forest, gradually degraded forest, regrowth area, etc.

**Activity 6.2:** Valorization of existing data. If existing data at national level (1996 survey) are not enough to determine emission factors, they still can be valorized:

- With a preliminary estimation of the emission factors with relevant allometric equations (local)
- Using the data, calculating variation coefficients to adjust the scope of the new data collection campaign.

Field data collection could also be simplified for "tree" biomass by valorizing existing data. CIRAD is expected to publish an Atlas of trees of Madagascar with information on wood density of the main Malagasy tree species.

**Activity 6.3:** Typology. Development of a unique type classification of forested areas in Madagascar is a priority. Emission factors are determined for each "forest type" and activity data will be related to this stratification. Type classification could be based on the relatively detailed stratification done under IEFN0. "Degradation level" (e.g. intact dense rainforest/degraded forest/ highly degraded forest) should be taken into account. Using a land-use change matrix (e.g. from an intact to a degraded forest) would help apply these emission factors to determine stock variations without having to redo field measurements, even for degradation. Artificial stands should also be included. Typology could be divided into "sub-types" for small-scale projects. Type classification should be agreed by consensus by state institutions, REDD project operators, and scientific entities (ESSA-Forêt, FOFIFA).

**Activity 6.4:** Methodology choices. In addition to type classification, stakeholders should also agree on methodology choices to develop and monitor emission factors:

- Selection of included carbon pools (with a focus on dead wood); this selection can vary based on forest type;
- Features of the inventory system (plot size and shape, permanent or temporary);
- Choice between a systematic or a stratified inventory;
- Calculation methods for different pools;
- Integration method of pilot projects data /standardization of practices.

Selection will be made within a multi-stakeholder working group.

**Activity 6.5:** Research program. Improving general calculation methods is a priority with the development of local allometric equations [36] and reliable calculation methods for non-tree pools. These aspects should be covered by a support research program led by a Malagasy institution such as ESSA-Forêt or FOFIFA and continuously inform the carbon monitoring program. This research project could also include long-term monitoring of forest trends in intact areas and monitoring of degradation in threatened areas using permanent plots and a "carbon stock" approach. Analysis of aboveground biomass/underground biomass ratio and measurement of soil carbon storage for different forest types could also improve accuracy of monitoring. In cooperation with ONE, it could be possible to request the contribution of large projects (mining, infrastructure, etc.), whose activities require forest clearing, in order to include destroyed trees to develop national allometric equations.

**Activity 6.6:** Emission factors of slash-and-burn. Slash-and-burn practices cause immediate atmospheric emissions of CO2, as well as other greenhouse gases (CH4, NOx, CO, and N2O), in variable quantities based on combustion efficiency. The remaining biomass (5 to 10% or even more) is transformed into stable charcoal for about a hundred years. In addition, part of the cleared vegetation could be left decaying on site. Analysis of characteristics of slash-and-burn in Madagascar will help better understand their actual impacts in terms of GHG emissions/hectare and to more accurately estimate emission factors. This aspect should be included in the research program.

**Activity 6.7:** Initiate a study to improve knowledge of carbon stocks outside of forest lands (agricultural lands, savannas, etc.). In order to enhance the MRV system, post-conversion carbon stocks per hectare should be locally estimated with studies combining literature and field measures for savannas, savanna woodlands, and rice fields. Results would provide conversion factors of forest lands to other land uses and improve accuracy of REDD and GHG inventories.

*These actions might help the MRV monitoring system to reach a TIER 2-3 precision level.*

[36] Initially, an interesting option would be to develop an equation by main identified forest type, rather than by species.

***Activity 7: National spatial database: Data accuracy and comparison***

This database will ensure geographic quality of data and therefore optimize computed outputs (image superposition, reduction of errors during trend analysis, same data sources, etc.).

**Activity 7.1:** Feasibility study to establish a national spatial database (BDSN) to host cartographic and satellite data required for the REDD MRV system: satellite data, topographical data, MNT, etc. This study will define technical features of the database, the public body supervising management and maintenance, BDSN creation and maintenance costs, technological needs for data warehouse and processing, data distribution rules, quality control, etc.

**Activity 7.2:** BDSN creation and beginning of spatial data acquisition following production activities. The public entity identified for BDSN management and maintenance will be in charge of this activity.

**Activity 7.3:** Training and/or capacity-building of teams from the public entity identified to host the BDSN. Training would mainly focus at management techniques for the spatial database, control and monitoring of acquired data, management of data referencing, data extraction and distribution, use of identified software for management, etc.

**Activity 7.4:** Based on the feasibility report of Activity 6.1, purchase of required equipment (hardware/software) and training of teams on equipment maintenance.

**Activity 7.5:** Long-term activity to start after creation of the BDSN: i) organization of long-term data acquisition (available data, relationship with suppliers and/or donors, acquisition program of satellite data providers, etc.); ii) long-term data management and maintenance and; iii) data distribution to REDD actors.

***Activity 8: MRV data storage: transparency and validation***

**Activity8.1:** Implementation of a data storage system as warehouse for data used under the MRV system, in order to facilitate control and validation of regular inventories in Madagascar: activity reports, expert reports, field measurement, forest survey reports, dendrometric data, experts arguments, etc.

***Activity 9: Articulation with Malagasy REDD pilot projects***

Risks of non-compliance of pilot projects results with the national inventory should be quickly anticipated. A parallel progression should take place to standardize criteria, methodologies and base data used by REDD pilot projects and the national MRV system.

**Activity 9.1:** Organization of regular workshops during the design phase of the MRV system. These workshops aim at increasing information exchanges between the team supervising the national MRV system development and technical teams from REDD pilot projects. Exchanges should focus on: clarification of applied criteria and definition (forest characterization, REDD activities, forest typology, etc.), pooling field control data, pooling forest inventory data, applied dendrometric data, developed allometric equations, failures and successes, etc.

**Activity 9.2:** Creation of a database for REDD projects. This database will be hosted by ONE and aims at gathering all social (statistics by region, indicators, population growth rates, migrations, etc), environmental (indicators, statistics, etc.), forest (allometric equations, wood density by species, expansion factors, biomass /C02 ratio, etc.), and thematic (thematic maps not included in the BDSN) information that should be shared between REDD project developers and the government. This database should be created during the first year of the MRV system development.

**Activity 9.3:** Database maintenance, provision of hardware/software, coordination of a network of contributors (universities, international research labs working in Madagascar, forest specialists, etc.) and information distribution to existing REDD projects and project developers. Information dissemination

could be done using a numeric document accessible on the ONE portal or by distributing a DVD to project developers.

***Activity 10: Regional and international approach***

**Activity 10.1:** Promote technical connection with Reunion Island. Development of a satellite reception station on Reunion Island (SEAS) opens significant prospects to : i) improve availability of satellite data on Madagascar; ii) offer privileged information access opportunities from the SEAS station through cooperation, research and development agreements with Reunion Island, Reunion Island University and IRD; and iii) develop technical cooperation based on training and technology transfer for preliminary processing of satellite data (geo-referencing, mosaic building, advanced radiometric processing, image segmentation, etc.) and data processing.

**Activity 10.2:** Develop technical cooperation with CNES and IRD, including establishment of a very-high resolution cartographic baseline. Cooperation would promote development of high quality cartographic data and capacity-building of FTM thanks to technical support from CNES, IGN Espace, and IRD. Financial and human resources are required to support connection among institutions, promote development of main cooperation lines (travel of representatives, organization of exchange workshops, preparation of image request reports, etc.), and handle all administrative tasks to carry out activities.

**Table 4a: Summary of Monitoring Activities and Budget (MRV)**

| Main activity | Sub-activity | Estimated cost (in US$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
| Activity 1: Distribution of roles and responsibilities | Recruitment of a Coordinator, MRV development | 80,000 | 80,000 | 80,000 | | | **240,000** |
| | Formalization of institutions in charge of the MRV system | | | | | | - |
| | Identification of teams for the design phase | | | | | | - |
| | Identification of teams for the implementation phase | | | | | | - |
| Activity 2: Identification of co-benefits of a national MRV development | Accurate analysis of co-benefits | 30,000 | | | | | **30,000** |
| Activity 3: Definition of forest and scope of REDD mechanism | Identification and characterization of intermediary formations | 20,000 | | | | | **20,000** |
| | Analysis of impacts of various forest definitions | 10,000 | | | | | **10,000** |
| | Establish a qualitative advancement schedule for the MRV system | 10,000 | | | | | **10,000** |

**Table 4a: Summary of Monitoring Activities and Budget (MRV)**

| Main activity | Sub-activity | Estimated cost (in US$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
| Activity 4: Training and capacity-building | General training for Coordinator and ONE | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | **100,000** |
| | Specific training on GHG/REDD inventories | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | **100,000** |
| | Specific training on GIS/Remote-sensing | 35,000 | 35,000 | 35,000 | 35,000 | 35,000 | **175,000** |
| Activity 5: Activity data: Methodology definition and tool selection | Methodology reports from report conclusions of Activity 2.1 | 25,000 | | | | | **25,000** |
| | Production of base cartography | 800,000 | 300,000 | 300,000 | | | **1,400,000** |
| | Production of thematic cartography | | 300,000 | 150,000 | 150,000 | | **600,000** |
| | Support to identification of forest typologies | | 20,000 | 20,000 | | | **40,000** |
| | Analysis of thematic data for historical forest cover monitoring | | | 10,000 | | | **10,000** |
| | Assessment step of results from the design phase of the MRV system | | | | 25,000 | | **25,000** |
| | Implementation of the MRV system | | | | | | - |
| Activity 6: Carbon density and emission factors : methodology definition and tool selection | Status of forest carbon stocks estimation | 20,000 | | | | | **20,000** |
| | Creation of a working group and decision on typology and methodology options | 20,000 | | | | | **20,000** |
| | Development of a monitoring plan and a research program by the working group | | | | | | - |
| | Training, capacity-building | 60,000 | 60,000 | 60,000 | | | **180,000** |
| | Data collection and analysis | | 100,000 | 100,000 | 100,000 | | **300,000** |
| | Implementation of the research program | 85,000 | 85,000 | 85,000 | | | **255,000** |
| | Implementation of the research program | | 40,000 | 40,000 | 40,000 | 40,000 | **160,000** |
| Activity 7: National spatial database :data accuracy and comparison | Feasibility study for a national spatial database | 25,000 | | | | | **25,000** |
| | Creation of a national spatial database | | 50,000 | | | | **50,000** |
| | Training and capacity building of spatial database management | | 20,000 | | | | **20,000** |
| | Equipment purchase | | 60,000 | | | | **60,000** |
| | Organization of acquisition, long-term management program | | | | | | - |

| Table 4a: Summary of Monitoring Activities and Budget (MRV) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Main activity** | **Sub-activity** | **Estimated cost (in US$)** | | | | | |
| | | **2010** | **2011** | **2012** | **2013** | **2014** | **Total** |
| Activity 8 : MRV data storage : transparency and validation | Establishment of an inventory data storage system | | 45,000 | | | | **45,000** |
| Activity 9: Articulation with other Malagasy REDD pilot projects | Exchange workshops between REDD pilot projects and national MRV development team | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | **50,000** |
| | Creation of a database for REDD projects, coordination and database maintenance | 15,000 | | | | | **15,000** |
| | Database maintenance, information dissemination, network coordination | | 10,000 | 10,000 | 10,000 | 10,000 | **40,000** |
| Activity 10: Regional and international approach | Connection with Reunion Island (SEAS) | 25,000 | 20,000 | 20,000 | | | |
| | Connection with CNES and IGN Espace | | | | | | - |
| | **Total** | **1,310,000** | **1,275,000** | **960,000** | **410,000** | **135,000** | **4,090,000** |

## *4b. Other Benefits and Impacts*

**Proposed approach for designing a monitoring system for other benefits and impacts**

Other benefits and impacts of the monitoring system are multi-sectoral by nature and should be considered more loosely than the REDD monitoring system itself. The Coordination Platform (PCPR) will have a greater responsibility in ensuring information sharing among different sectors and relevant entities.

The principle is that REDD stakeholders identify needed data and indicators for REDD monitoring in a general sense and communicate these data and indicators to entities in charge of collection. The data and indicators produced will then be integrated in the REDD database (see 9.2 in 4a) and made available to all. Some data have already been identified, but accurate lists and features will largely be determined by additional studies during the first years of implementation of the readiness process. Following indications will only be provisional.

Similarly, it is extremely difficult to precisely define implementation arrangements for this component now. Such arrangements depend on institutions and REDD governance scheme identified during the preparation phase, and more generally on national policy, strategy and sectoral priorities, as well as on responsibility-sharing among different ministries and technical entities. These points still need to be confirmed.

**Data to be included**

***Required data to operate the model underlying the national scenario***

Applied data for local models: population density, distance to roads, distance to waterways, distance to villages, slope, altitude, and distance to protected areas.

Data to be used for the national level reference scenario: market access (channel organizations, price), population growth, and agricultural production (yield) data.

New data to be included to operate the model underlying the national reference scenario, identified under model readjustment procedures.

***Governance data related to REDD implementation***

Establishment of REDD-specific governance bodies, and clear designation of implementation agencies and financial management arrangements.

Operation indicators for these institutions (meeting minutes, meeting attendance list of various members, recommendations or resolutions, work plans and activity reports, communication actions, etc.).

Indicators on development of REDD-specific legal tools and institutional arrangements, with first and foremost, clarification of forest carbon ownership and trading terms.

Indicators on REDD+ strategy implementation, including by integrating the REDD approach in strategy documents for relevant sectors ( including Agriculture, Mining, Land Planning, Decentralization, etc.) and including REDD recommendations in national and regional land planning documents. Implementation of the REDD+ strategy also includes transparent and regular evaluation of efforts done by different national partners involved in REDD, related costs, and efficiency (see 2c).

Indicators on national level governance, including good institutional operations and law and regulation enforcement.

Financial indicators (support commitment by donors or partner institutions, effective disbursement, REDD-

specific accounting) from the national registry or its preliminary components.

Indicators on implementation of the consultation (including at regional level and for some target areas) and communication plan, with actual holding of meetings and workshops, proposal development, registration and recognition procedures.

***Data related to social and environmental impacts monitoring***

Actual impacts should be assessed at national or target area level (depending on the final strategy approach) based on socioeconomic and environmental health indicators.

Involvement of local communities in field monitoring of ecological parameters is being developed in Madagascar, particularly by NGOs such as the Durrell Wildlife Preservation Trust. A strategic line during preparation period will be to evaluate already produced results in this area (based on REDD needs) and to develop and test community field monitoring methods specific to REDD.

The most important data are those on deforestation and forest degradation. They will be produced by the MRV system.

Links between social and financial impacts should be established. This includes revenues actually generated by the REDD approach and their repartition and distribution channels, including to local actors.

Impacts in terms of livelihood improvements for local actors should be confirmed, ideally in a totally independent way (unrelated to the various actors of the national REDD).

Generally, outputs from the strategic environmental assessment (see 2d) will determine relevant data and applicable collection procedures.

**Implementation and operation**

See part 9.2 of Component 4a: the database will be hosted by ONE and will gather all relevant data for REDD stakeholders.

Information access and dissemination will be done by posting information online on an internet portal.

*Currently, activities related to Component 4b are not precise enough to be budgeted. Furthermore, they will mainly be covered under other components or by executing entities. Therefore, there is no budget associated with Component 4b.*

## COMPONENT 5: SCHEDULE AND BUDGET

### Total Budget for R-PP Implementation

The total budget is estimated at **$US 9,967,500**, with the following repartition:

| Component | Estimated cost (in US$) |
|---|---|
| Component 1a: National Readiness Management Arrangements | 330,500 |
| Component 1b: Stakeholder Consultation and Participation | 1,257,000 |
| Component 2a: Assessment of Land Use, Forest Policy, and Governance | 815,000 |
| Component 2b: Strategy Options | 815 000 |
| Component 2c: Implementation Framework | 630,000 |
| Component 2d: Strategic Environmental and Social Assessment | 705,000 |
| Component 3: Reference Scenario | 1,325,000 |
| Component 4a: Monitoring Activities | 4,090,000 |
| Total | 9,967,500 |

## Detailed Budget by Component

### Component 1a: National Readiness Management Arrangements

| Component 1a Main activity | Sub-activity | Estimated Cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Making structures operational | Office renovation and equipment purchase for the Office and the Executive Secretary | 35,000 | 10,000 | 7,000 | | **52,000** |
| | Capacity-building for each structure (training, team-building) | 15,000 | 15,000 | | | **30,000** |
| | Operational costs for the Office and the Executive Secretary | 24,000 | 24,000 | 24,000 | 24,000 | **96,000** |
| | Periodic meetings (Platform, Office) and lobbying at decision-making level (government, financial partners) | 6,000 | 6,000 | 6,000 | 6,000 | **24,000** |
| Communication and awareness | At national level: for key themes and to present strategies | 12,500 | 15,000 | 12,000 | 20,000 | **59,500** |
| | At regional and communal levels | 17,000 | 20,000 | 15,000 | 17,000 | **69,000** |
| | **Total 1a** | **109,500** | **90,000** | **64,000** | **67,000** | **330,500** |

**Component 1b: Stakeholder Consultation and Participation**

| Component 1b Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Consultations on REDD process and on the R-PP | Information – awareness (information material, contracts, events, outreach) | 50,000 | 50,000 | 50,000 | | **150.000** |
| | Collection/Processing of grievances on REDD (collection tools, training, resolution meetings/workshops) | 10,000 | 10,000 | 10,000 | | **30,000** |
| | Resolution of conflicts generated by the process (collection, conflict-resolution meetings/workshops) | 8,000 | 8,000 | 8,000 | | **24,000** |
| Consultations on main studies and strategy options | Validation of main studies (Regional workshops, national workshop) | 24, 000 | 24,000 | 24,000 | | **72,000** |
| | Final selection of strategy options and finalization of REDD strategies (fieldwork, regional workshops, national workshop) | 24,000 | 24,000 | 24,000 | | **72,000** |
| | Validation of REDD strategies (Fieldwork, regional workshops, national workshop) | | | 24,000 | | **24,000** |
| Dissemination/ communication on the R-PP and REDD strategies | Media communication and events | 8,000 | 8,000 | 8,000 | | **24,000** |
| | Field and regional dissemination/ communication (meetings, workshops, etc.) | 10,000 | 10,000 | 10,000 | | **30,000** |
| | National communication workshop | | | 8,000 | | **8,000** |
| Identification training needs for REDD strategies | (for all consultations) | | | | | |
| Consultation on management arrangement | Validation workshop | 16,000 | | | | **16,000** |
| Consultation on implementation framework | Development / design of institutional framework and strategy measures for REDD implementation (stakeholders and other relevant structures meetings on roles and responsibilities, coordination procedures) | 24,000 | 24,000 | | | **48,000** |
| | Meetings / workshops with different sectors on legal and regulatory framework related to REDD strategies | 24,000 | 24,000 | | | **48,000** |
| | Forest carbon governance (Discussions at all levels on carbon ownership, hybrid system with projects, carbon taxes and government services, REDD revenue management and sharing, national carbon registry) | 20,000 | 80,000 | 40,000 | | **140,000** |
| | Validation of REDD implementation framework (validation workshop on: institutional framework and strategy measures and forest carbon governance including texts) | | | 40,000 | | **40,000** |
| Consultation on environmental assessment | Formalization of development and management framework of the REDD SESA (workshops on charter of responsibilities, supervision and | 4,000 | | | | **4,000** |

| Component 1b Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Consultation on environmental assessment | evaluation arrangements of SESA, public participation process) | | | | | |
| | Definition of environmental and social features (data collection in REDD areas, validation workshop of environmental and social features) | 2,000 | 2,000 | 2,000 | | **6,000** |
| | Analysis of the extent of environmental and social impacts and mitigation measures (data collection in REDD areas, validation workshop, meeting on development of charter of responsibilities) | 2,000 | 2,000 | 6,000 | | **10,000** |
| | Analysis of strategy options and their durability ( discussion on opportunities and constraints of strategy options, impacts, related measures by sector, summary meeting on all relevant sectors) | 4,000 | 4,000 | 4,000 | | **12,000** |
| | Development of environmental and social management framework of REDD initiatives including a session on compliance of national legislation with World Bank procedures | | | 1,000 | | **1,000** |
| | Communication on the SESA process | | 2,000 | 2,000 | | **4,000** |
| | Status on REDD process (periodic meetings) | 2,000 | 2,000 | 2,000 | | **6,000** |
| Consultations on development of reference scenario | Production of explanatory data on deforestation and forest degradation (work sessions and workshops at all levels to identify the best explanatory data on deforestation and degradation and validation session) | 4,000 | | | | **4,000** |
| | Development of reference scenario (model validation) | | 2,000 | | | **2,000** |
| | Simulation of policies (work sessions with ministries to present the model and test policies) | | 4,000 | | | **4,000** |
| | Presentation and validation of demonstration draft of model (national level and central level) | | | 10,000 | | **10,000** |
| | Presentation of final version of model and a strategy report at central level | | | 2,000 | | **2,000** |
| Consultations on MRV development | Discussions on national basic and thematic mapping. Assessment of co-benefits (individual discussions, workshops) | 4,000 | | | | **4,000** |
| | Baseline data for REDD projects: periodic work sessions with REDD projects | 4,000 | | | | **4,000** |
| | Image classification methodology: periodic work sessions with scientific committee | 4,000 | 4,000 | 4,000 | | **12,000** |
| Contractors/ | International consultant (90 md) | 60,000 | 60,000 | 60,000 | | **180,000** |

| Component 1b Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| consultants for all consultations | National consultant (270 md) | 90,000 | 90,000 | 90,000 | | **270,000** |
| | **Total 1b** | **398,000** | **435,000** | **424,000** | | **1,257,000** |

**Component 2a: Assessment of Land Use, Forest Policy, and Governance**

| Component 2a Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Complementary studies on deforestation and forest resources degradation | Assess forest trends since IEFN 0 | 300, 000 | | | | **300,000** |
| | Assess deforestation trends for 2005 - 2010 | 450,000 | | | | **450,000** |
| | Weight and spatialize causes and drivers of deforestation and forest degradation | 30,000 | | | | **30,000** |
| | Evaluate interactions between the different causes and underlying drivers | 15,000 | | | | **15,000** |
| | Analyze economic contributions of the forest sector | 20,000 | | | | **20,000** |
| | **Total 2a** | **815,000** | | | | **815,000** |

**Component 2b: Activities Related to Strategy Options**

| Component 2b Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Step 1: General studies and assessments | Assess potential efficiency of strategy options related to deforestation and degradation | 70, 000 | | | | **70,000** |
| | Assess political and social feasibility of the various proposed strategy options | 25,000 | 25,000 | | | **50,000** |
| | Assess implementation costs of selected strategy options | 30,000 | 30,000 | | | **60,000** |
| | Assess potential benefits of implementation of selected strategy options | 30,000 | 30,000 | | | **60,000** |
| Step 2: Selection of strategy options | Present and validate results of general studies | | 30,000 | | | **30,000** |
| | Select strategy options to be included in the national REDD strategy | | 15,000 | | | **15,000** |
| Step 3: Specific studies and assessments | Detailed analysis of past efforts against deforestation and degradation | | 50,000 | | | **50,000** |
| | Evaluation of potential leakage | | 45,000 | | | **45,000** |
| | Other specific studies related to selected strategy options | | 125,000 | | | **125,000** |
| Step 4: Finalization of the national REDD strategy | Compile results of specific studies and present to actors | | | 65,000 | | **65,000** |
| | Finalize the national REDD strategy | | | 45,000 | | **45,000** |
| Step 5: Tools and capacity building | Determine capacity building needs for actors | | | 15,000 | | **15,000** |
| | Develop required tools for capacity building and implementation of REDD strategy | | | 60,000 | | **60,000** |
| | Apply capacity building tools to actors implementing the REDD strategy | | | 110,000 | 100,000 | **210,000** |
| | **Total 2b** | **155,000** | **265,000** | **395,000** | | **815,000** |

**Component 2c: Implementation Framework Activities**

| Component 2c Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Institutional framework and strategy measures | Develop a charter of responsibilities for REDD implementation actors at national and sub-national levels | | 25,000 | | | **25,000** |
| | Develop coordination structures and procedures under SRATs | | 20,000 | 20,000 | | **40,000** |
| | Revitalize consultation and co-decision structures (ComFor and PRPSE) | | 20,000 | 10,000 | | **30,000** |
| | Assessment of required changes of regulatory framework in various sectors based on selected strategies | | 30,000 | 20,000 | | **50,000** |
| | Revision of regulations based on consultations outputs | | | 20,000 | 15,000 | **35,000** |
| Forest carbon governance | Review existing regulations and develop legal framework related to forest carbon ownership | 20,000 | 20,000 | | | **40,000** |
| | Develop a carbon tax system and define government services provided to potential sub-national projects and prepare this infrastructure | | 40,000 | 30,000 | 20,000 | **90,000** |
| | Establish a hybrid system to develop REDD projects in a national framework | | 20,000 | 10,000 | | **30,000** |
| | Develop and operate the national carbon registry | | | 150,000 | | **150,000** |
| | Develop and validate a transparent, efficient, and equitable revenue sharing and management for REDD | | 70,000 | 70,000 | | **140,000** |
| | **Total 2c** | **60,000** | **300,000** | **10,000** | | **630,000** |

**Component 2d: Social and Environmental Impacts Assessment Activities**

| Component 2d Main activity | Sub-activity | Estimated cost (in US$) | | | | |
|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | Total |
| Establishment and implementation of the SESA management and development framework for REDD | Supervision of SESA activities by the MEF and information dissemination on the SESA (progress, tools, etc.) | 20,000 | 20,000 | 20,000 | | **60,000** |
| | Supervision of the SESA process by ONE and CTE and assessment of the SESA file | 60,000 | 60,000 | 60,000 | | **180,000** |
| SESA capacity-building | Capacity-building of decision-makers (tool development and implementation) | 40,000 | 20,000 | 20,000 | | **80,000** |
| | Capacity-building of other actors (tool development and implementation) | 40,000 | 50,000 | 50,000 | | **140,000** |
| SESA development | Establishment of baseline environmental situation for REDD | 40,000 | | | | **40,000** |
| | Assessment of legal, institutional, and development policy framework | 20,000 | | | | **20,000** |
| | Public consultation | (See Component 1b) | | | | |
| | Assessment of the level of environmental and social impacts – Evaluation of environmental and social opportunities and constraints | 30,000 | 30,000 | 30,000 | | **90,000** |
| | Development of environmental and social frameworks for projects and activities under the REDD+ strategy | | | 35,000 | | **35,000** |
| | Development of reduction and mitigation measures | | 30,000 | 30,000 | | **60,000** |
| **Total 2d** | | **250,000** | **210,000** | **245,000** | | **705,000** |

**Component 3: Develop a Reference Scenario**

| Component 3 Main Activity | Sub-activity | Estimated cost (in US$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
| Activity 1 : Definition of roles and responsibilities | Creation of a technical group on reference scenarii | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | **50,000** |
| | Recruitment of an economist researcher | 15,000 | 15,000 | 25,000 | 25,000 | 25,000 | **105,000** |
| Activity 2: Estimation of historical deforestation | Selection of forest definition and scope of mechanism | See Component 4a | | | | | **-** |
| | Monitoring of national forest trends using low-resolution satellite data | 35,000 | | | | | **35,000** |
| | Fine estimation of past emissions/removals | See Component 4a | | | | | **-** |
| Activity 3: Collection of explanatory data for deforestation | Identification of best explanatory variables of deforestation and degradation | 55,000 | | | | | **55,000** |
| | Inventory of available data | 10,000 | | | | | **10,000** |
| | Capacity-building of existing collection entities | 60,000 | 60,000 | | | | **120,000** |
| | Data collection on new biophysical and socioeconomic indicators | | 80,000 | 80,000 | | | **160,000** |
| Activity 4: Development of a spatialized historical reference scenario | Software purchase and capacity-building for use | 10,000 | | | | | **10,000** |
| | Selection of adequate historical approach and reference period | 5,000 | | | | | **5,000** |
| | Adjustment and statistical validation of model | 20,000 | 20,000 | | | | **40.000** |
| | Model validation | | 15,000 | | | | **15,000** |
| | Simulation of policies in partnership with the various ministries | | 20,000 | | | | **20,000** |
| Activity 5: Development of a spatialized and projected reference scenario, a steering tool at national level | Establishment of a partnership with an international research institution | 50,000 | 50,000 | 110,000 | 110,000 | 110,000 | **430,000** |
| | Establishment of a research team within ESSA Forêt | | | 75,000 | 75,000 | 75,000 | **225,000** |
| | Presentation and validation of a demonstration model draft | | | | 20,000 | | **20,000** |
| | Presentation of final model version and strategy report | | | | | 15,000 | **15,000** |
| | External validation of model | | | | | 10,000 | **10,000** |
| Activity 6: Use and readjustment of projected reference scenario | Implementation of step-by-step procedure to readjust model | | | | | | |
| Activity 7: Methodological articulation with | Provision of biophysical and socioeconomic data to projects at national database | See Component 4a | | | | | |

| Component 3 Main Activity | Sub-activity | Estimated cost (in US$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
| projects | level | | | | | | |
| | **Total 3** | **270,000** | **270,000** | **300,000** | **240,000** | **245,000** | **1,325,000** |

**Component 4: MRV**

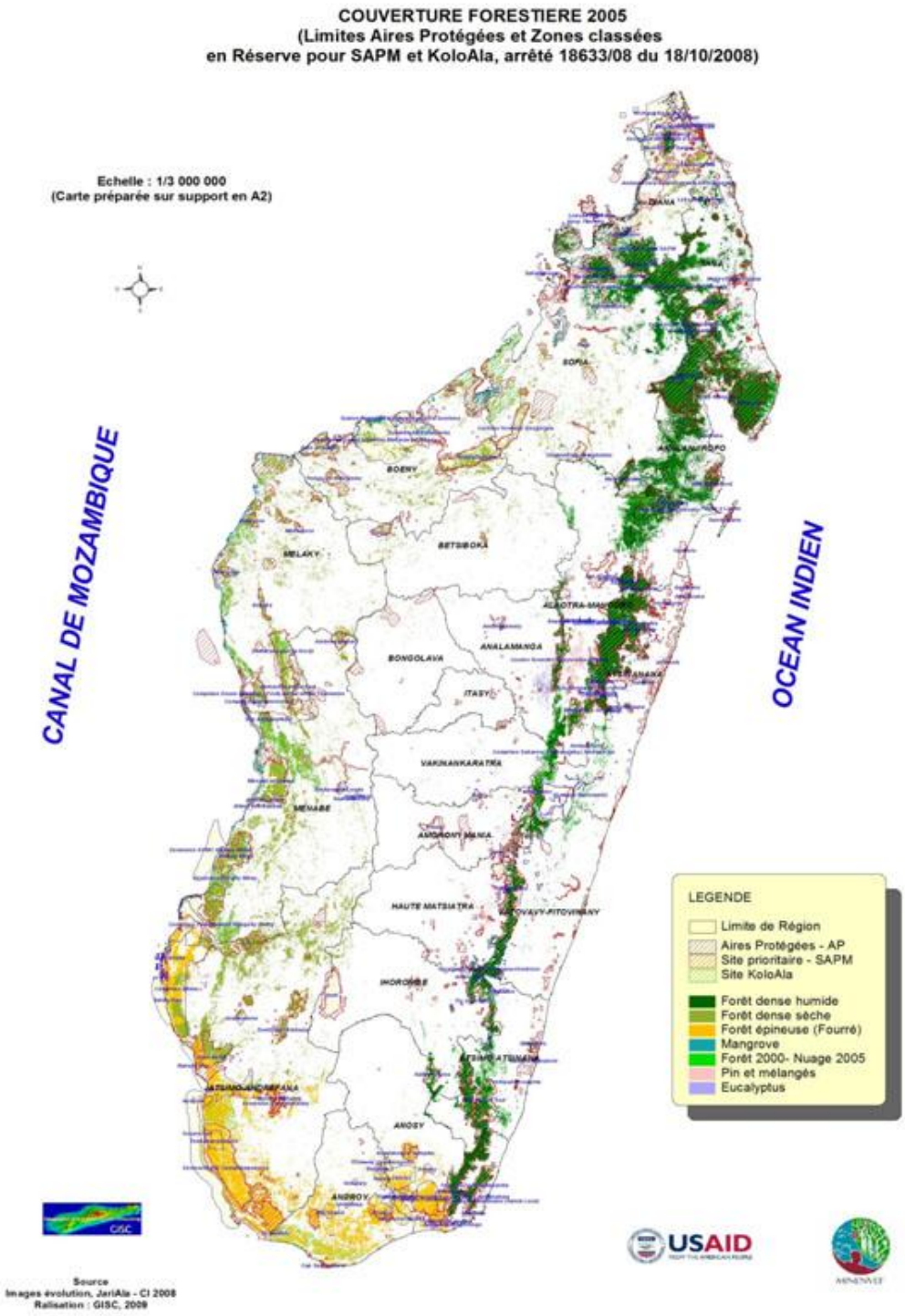
| Component 4<br>Main activity | Sub-activity | Estimated cost (in US$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
| Activity 1: Distribution of roles and responsibilities | Recruitment of a Coordinator, MRV development | 80,000 | 80,000 | 80,000 | | | **240,000** |
| | Formalization of institutions in charge of the MRV system | | | | | | **-** |
| | Identification of teams for the design phase | | | | | | **-** |
| | Identification of teams for the implementation phase | | | | | | **-** |
| Activity 2: Identification of co-benefits of a national MRV development | Accurate analysis of co-benefits | 30,000 | | | | | **30,000** |
| Activity 3: Definition of forest and scope of REDD mechanism | Identification and characterization of intermediary formations | 20,000 | | | | | **20,000** |
| | Analysis of impacts of various forest definitions | 10,000 | | | | | **10,000** |
| | Establish a qualitative advancement schedule for the MRV system | 10,000 | | | | | **10,000** |
| Activity 4: Training and capacity-building | General training for Coordinator and ONE | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | **100,000** |
| | Specific training on GHG/REDD inventories | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | **100,000** |
| | Specific training on GIS/Remote-sensing | 35,000 | 35,000 | 35,000 | 35,000 | 35,000 | **175,000** |
| Activity 5: Activity data: Methodology definition and tool selection | Methodology reports from report conclusions of Activity 2.1 | 25,000 | | | | | **25,000** |
| | Production of base cartography | 800,000 | 300,000 | 300,000 | | | **1,400,000** |
| | Production of thematic cartography | | 300,000 | 150,000 | 150,000 | | **600,000** |
| | Support to identification of forest typologies | | 20,000 | 20,000 | | | **40,000** |
| | Analysis of thematic data for historical forest cover monitoring | | | 10,000 | | | **10,000** |
| | Assessment step of results from the design phase of the MRV system | | | | 25,000 | | **25,000** |
| | Implementation of the MRV system | | | | | | **-** |
| Activity 6: Carbon density and emission factors : methodology definition and tool selection | Status of forest carbon stocks estimation | 20,000 | | | | | **20,000** |
| | Creation of a working group and decision on typology and methodology options | 20,000 | | | | | **20,000** |
| | Development of a | | | | | | **-** |

| Component 4 Main activity | Sub-activity | Estimated cost (in US$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 2010 | 2011 | 2012 | 2013 | 2014 | Total |
| | monitoring plan and a research program by the working group | | | | | | |
| | Training, capacity-building | 60,000 | 60,000 | 60,000 | | | **180,000** |
| | Data collection and analysis | | 100,000 | 100,000 | 100,000 | | **300,000** |
| | Implementation of the research program | 85,000 | 85,000 | 85,000 | | | **255,000** |
| | Implementation of the research program | | 40,000 | 40,000 | 40,000 | 40,000 | **160,000** |
| Activity 7: National spatial database :data accuracy and comparison | Feasibility study for a national spatial database | 25,000 | | | | | **25,000** |
| | Creation of a national spatial database | | 50,000 | | | | **50,000** |
| | Training and capacity building of spatial database management | | 20,000 | | | | **20,000** |
| | Equipment purchase | | 60,000 | | | | **60,000** |
| | Organization of acquisition, long-term management program | | | | | | **-** |
| Activity 8 : MRV data storage : transparency and validation | Establishment of an inventory data storage system | | 45,000 | | | | **45,000** |
| Activity 9: Articulation with other Malagasy REDD pilot projects | Exchange workshops between REDD pilot projects and national MRV development team | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | **50,000** |
| | Creation of a database for REDD projects, coordination and database maintenance | 15,000 | | | | | **15,000** |
| | Database maintenance, information dissemination, network coordination | | 10,000 | 10,000 | 10,000 | 10,000 | **40,000** |
| Activity 10: Regional and international approach | Connection with Reunion Island (SEAS) | 25,000 | 20,000 | 20,000 | | | |
| | Connection with CNES and IGN Espace | | | | | | **-** |
| | **Total 4** | **1,310,000** | **1,275,000** | **960,000** | **410,000** | **135,000** | **4,090,000** |

# ANNEXES

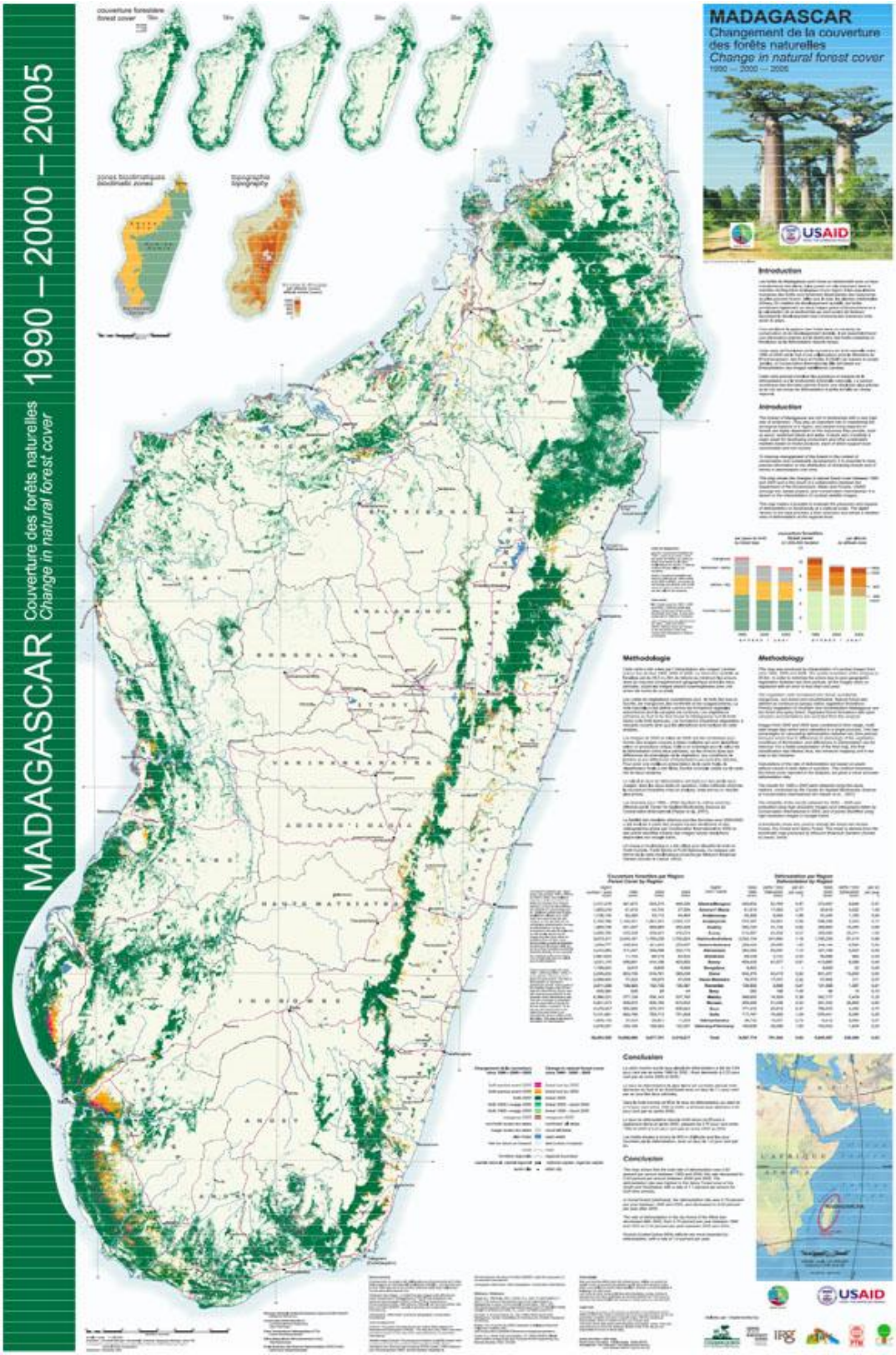
**Annex 1a : 2005 Forest Cover, Deforestation for 1990 – 2000 – 2005 and Main REDD Pilot Projects in Madagascar**

## 2005 Forest Cover[37]




37 USAID/JariAla (2009): Etude sur la Production et la Consommation en Produits Forestiers Ligneux

## 1990 – 2000 – 2005 Deforestation [38]




38 USAID and CI (2009): Change in Natural Forest Cover 1990 – 2000 – 2005, Madagascar

## 2005 Forest Cover, Deforestation for 2000 – 2005 and Potential Wood Production per Region[39]

| REGION | Type de forêt | | | | | | | | | | Type de zone | | | | | | | | Total | | | Production durable annuelle | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Dense humide | | Dense sèche | | Epineuse | | Mangrove | | Plantations | | AP actuelles | | Prioritaire SAPM | | Prioritaire SGFD | | Autres | | | | | | | | |
| | Déf. ann. [%] | 2005 [ha] | Déf. ann. [%] | 2005 [ha] | Déf. ann. [%] | 2005 [ha] | Déf. ann. [%] | 2005 [ha] | Pin + mél. [ha] | Eucal. [ha] | Déf. ann. [%] | 2005 [ha] | Déf. ann. [%] | 2005 [ha] | Déf. ann. [%] | 2005 [ha] | Déf. ann. [%] | 2005 [ha] | Déf. ann. [%] | Déf. ann. [ha] | 2005 [ha] | CDS [m3] | Charbon [m3] | Feu [m3] | Totale [m3] |
| Alaotra-Mangoro | 0,38 | 493 701 | 0,14 | 749 | 0,00 | 0 | 0,00 | 0 | 71 403 | 33 749 | 0,30 | 247 229 | 0,95 | 25 394 | 0,29 | 160 645 | 0,27 | 166 332 | 0,32 | 1 932 | 599 601 | 1 519 982 | 1 102 250 | 427 270 | **3 049 502** |
| Amoron'i Mania | 1,37 | 41 597 | 0,00 | 87 | 0,00 | 0 | 0,00 | 0 | 0 | 273 | 1,40 | 37 343 | 2,00 | 953 | 0,00 | 0 | 0,71 | 3 660 | 1,36 | 610 | 41 957 | 6 786 | 11 927 | 6 467 | **25 179** |
| Analamanga | 1,01 | 49 670 | 0,14 | 807 | 0,00 | 0 | 0,00 | 0 | 462 | 85 869 | 1,18 | 17 063 | 1,50 | 11 788 | 0,26 | 10 709 | 0,10 | 97 247 | 0,38 | 527 | 136 808 | 49 354 | 1 757 925 | 40 545 | **1 847 824** |
| Ananjirofo | 0,21 | 1 055 757 | 0,13 | 124 | 0,00 | 0 | 0,00 | 0 | 0 | 0 | 0,16 | 384 254 | 0,22 | 185 486 | 0,17 | 268 139 | 0,36 | 218 002 | 0,21 | 2 277 | 1 055 881 | 986 639 | 938 672 | 938 672 | **2 863 983** |
| Androy | 0,00 | 0 | 0,36 | 5 636 | 0,66 | 448 789 | 0,00 | 3 | 0 | 7 | 0,36 | 71 122 | 0,18 | 32 987 | 1,02 | 92 718 | 0,67 | 257 608 | 0,66 | 3 091 | 454 435 | 6 986 | 144 179 | 144 039 | **295 204** |
| Anosy | 0,79 | 208 879 | 1,48 | 10 584 | 1,16 | 263 346 | 0,00 | 0 | 0 | 1 149 | 0,75 | 282 799 | 1,02 | 120 684 | 0,00 | 0 | 1,86 | 80 475 | 1,01 | 5 146 | 483 958 | 47 120 | 88 791 | 65 811 | **201 722** |
| Atsimo-Andrefana | 0,00 | 0 | 0,02 | 384 497 | 1,25 | 1 308 133 | 0,00 | 10 194 | 0 | 2 944 | 1,32 | 664 678 | 0,96 | 287 118 | 1,26 | 76 603 | 0,60 | 677 369 | 0,97 | 17 483 | 1 705 768 | 65 654 | 374 312 | 315 432 | **755 397** |
| Atsimo-Atsinanana | 0,93 | 274 463 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0 | 0 | 0,74 | 175 573 | 0,92 | 20 417 | 1,55 | 40 225 | 1,14 | 38 248 | 0,93 | 2 689 | 274 463 | 159 301 | 151 552 | 151 552 | **462 405** |
| Atsinanana | 0,56 | 340 286 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0 | 5 349 | 0,34 | 272 194 | 1,01 | 31 213 | 2,95 | 10 494 | 0,99 | 31 734 | 0,55 | 1 971 | 345 635 | 74 864 | 178 203 | 71 223 | **324 289** |
| Betsiboka | 1,24 | 14 132 | 0,01 | 51 218 | 0,00 | 0 | 0,00 | 0 | 1 290 | 1 212 | 0,00 | 5 691 | 0,37 | 6 090 | 0,00 | 86 | 0,30 | 55 985 | 0,28 | 193 | 67 851 | 51 826 | 64 711 | 40 471 | **157 008** |
| Boeny | 0,00 | 0 | 0,58 | 333 508 | 0,00 | 0 | 0,10 | 70 443 | 0 | 0 | 0,27 | 167 635 | 0,71 | 79 291 | 3,45 | 5 580 | 0,49 | 151 446 | 0,49 | 2 049 | 403 952 | 29 772 | 82 936 | 82 936 | **195 644** |
| Bongolava | 0,00 | 0 | 0,05 | 8 585 | 0,00 | 0 | 0,00 | 0 | 0 | 940 | 0,00 | 0 | 0,00 | 2 707 | 0,00 | 0 | 0,07 | 6 819 | 0,05 | 4 | 9 525 | 1 176 | 21 269 | 2 469 | **24 914** |
| Diana | 0,82 | 421 890 | 0,16 | 130 653 | 0,00 | 0 | 0,11 | 46 148 | 25 440 | 0 | 0,29 | 326 862 | 1,29 | 135 126 | 0,33 | 32 374 | 0,70 | 129 769 | 0,60 | 3 871 | 624 131 | 540 090 | 187 058 | 187 058 | **914 205** |
| Haute-Matsiatra | 0,08 | 55 548 | 0,00 | 3 905 | 0,00 | 0 | 0,00 | 0 | 32 494 | 4 420 | 0,05 | 50 949 | 0,13 | 773 | 0,00 | 0 | 0,04 | 44 644 | 0,05 | 44 | 96 366 | 496 015 | 97 477 | 9 077 | **602 569** |
| Ihorombe | 0,44 | 129 432 | 0,16 | 20 315 | 0,00 | 0 | 0,00 | 0 | 0 | 0 | 0,49 | 91 768 | 0,50 | 5 327 | 0,00 | 0 | 0,23 | 52 653 | 0,40 | 610 | 149 747 | 74 554 | 74 986 | 74 986 | **224 525** |
| Itasy | 0,01 | 5 | 6,89 | 42 | 0,00 | 0 | 0,00 | 0 | 0 | 1 306 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0,32 | 1 353 | 0,32 | 4 | 1 353 | 19 | 26 148 | 28 | **26 194** |
| Melaky | 0,00 | 0 | 0,28 | 499 157 | 0,00 | 0 | 0,06 | 50 880 | 0 | 0 | 0,17 | 149 997 | 0,31 | 125 506 | 0,36 | 65 699 | 0,26 | 208 834 | 0,26 | 1 431 | 550 037 | 49 605 | 170 447 | 170 447 | **390 498** |
| Menabe | 0,00 | 0 | 0,63 | 846 064 | 0,00 | 0 | 0,01 | 33 216 | 0 | 0 | 0,47 | 254 370 | 0,65 | 97 183 | 0,75 | 197 063 | 0,60 | 330 665 | 0,60 | 5 463 | 879 280 | 104 550 | 232 005 | 232 005 | **568 559** |
| Sava | 0,24 | 845 478 | 0,12 | 13 298 | 0,00 | 0 | 0,12 | 2 413 | 0 | 0 | 0,17 | 428 312 | 0,45 | 88 847 | 0,28 | 154 631 | 0,26 | 189 398 | 0,24 | 2 059 | 861 189 | 679 095 | 652 904 | 652 904 | **1 984 904** |
| Sofia | 0,27 | 481 457 | 0,46 | 233 031 | 0,00 | 0 | 0,05 | 43 541 | 0 | 0 | 0,37 | 135 488 | 0,43 | 89 581 | 0,16 | 217 904 | 0,37 | 315 056 | 0,32 | 2 429 | 758 030 | 739 618 | 764 821 | 764 821 | **2 269 261** |
| Vatovavy-Fitovinany | 0,37 | 166 256 | 0,00 | 0 | 0,00 | 0 | 0,00 | 0 | 0 | 283 | 0,23 | 131 712 | 0,31 | 9 374 | 3,25 | 5 849 | 0,32 | 19 605 | 0,37 | 625 | 166 539 | 51 096 | 54 270 | 48 610 | **153 977** |
| Vakinakaratra | 2,28 | 23 241 | 0,00 | 595 | 0,00 | 0 | 0,00 | 0 | 9 819 | 12 896 | 1,24 | 17 493 | 2,03 | 1 076 | 2,41 | 3 420 | 0,96 | 24 561 | 1,21 | 598 | 46 551 | 156 961 | 267 253 | 9 333 | **433 546** |
| **National** | **0,40** | **4 601 792** | **0,43** | **2 542 855** | **1,17** | **2 020 267** | **0,06** | **256 839** | **140 908** | **150 397** | **0,53** | **3 912 531** | **0,72** | **1 356 923** | **0,52** | **1 342 139** | **0,52** | **3 101 466** | **0,55** | **55 107** | **9 713 059** | **5 891 061** | **7 444 094** | **4 436 154** | **17 771 309** |

39 USAID/JariAla (2009): Etude sur la Production et la Consommation en Produits Forestiers Ligneux ; updated version 2009

## Existing REDD Pilot Projects

In parallel to the national position and involvement of Madagascar in national processes, 5 pilot projects on REDD have been implemented. These include:

- The Makira Forest (with WCS as main operator).
- The 2 CAZ and COFAV forest corridor projects (operated by CI).
- The FORECA project (GTZ and the Swiss Intercooperation as main operators).
- The Holistic Forest Protection Project (PHCF with WWF and Good Planet as main operators).

These projects vary greatly in terms of history, general approach, and methodology choices. They cover different areas in Madagascar. Capitalizing on their results would provide the country a concrete basis to develop a national strategy.

First, three of these projects (Makira, CAZ, and COFAV) aim at directly obtaining negotiable carbon units. These projects cover the largest areas (240,000 to 425,000 hectares) and are located in the eastern part of the country in forest areas with the greatest potential for carbon storage.

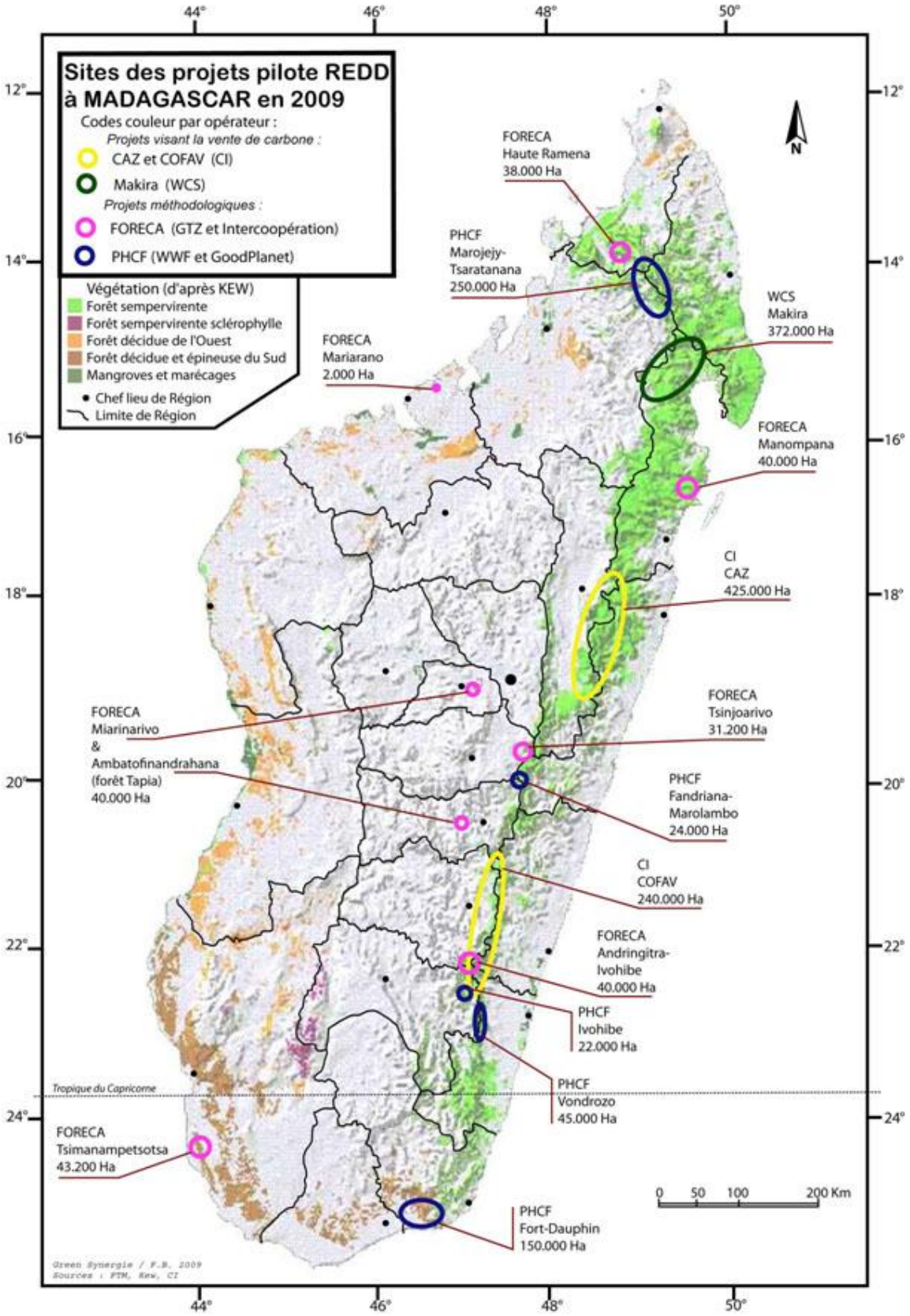
The other two projects (FORECA and PHCF) are more focused on methods and do not directly target carbon credits sales at this phase. Therefore, affected sites are more scattered and cover almost all types of forest in Madagascar on smaller surfaces.

A provisional summary provides the following figures:

- Number of projects: **5** Number of sites: **16**
- Total affected forest area: **1,762,400 hectares**
- Potential carbon credits (30 years): ballpark volume of **40 to 45 million T CO2e** for all projects, including 28 million T CO2e clearly planned for the three main sites (Makira, CAZ, and COFAV).
- Affected forest types: **four out of the five main forest types** in Madagascar (evergreen rainforest, evergreen sclerophyllous forest, western deciduous forest, and southern deciduous and spiny forest). Eleven sites out of 16 are in the eastern rainforest, 2 in the southern spiny forest, 2 in the evergreen sclerophyllous forest of the high plateaus, and only one (the smallest in surface area) in the western deciduous forest.
- Preliminary estimates of forest storage capacity: **73 T CO2e/ha** (Tapia forest of the FORECA Project) to **549 T CO2e/ha** (eastern rainforest / CAZ Project). However, these figures should be treated with caution due to the lack of details on applied methodologies (and included carbon pools).

Location of the various sites and main features of projects are presented on the map and in the tables below.

## REDD Pilot Sites in Madagascar[40]




40 Busson, F (2009) : REDD; Etat des Lieux et Expériences en Cours

**Origin and General Approach**

***Main Elements:***

- With the exception of the Makira Project for which the preliminary phase started in 2001, REDD pilot projects are recent (less than 5 years) and are still in their development phase;
- They all adopted an integrated approach with multiple objectives (including biodiversity conservation and improvement of livelihoods of neighboring populations). Activities often include afforestation and reforestation;
- Forest areas for each project are between 230,000 and 500,000 hectares, and 2,000 to 425,000 hectares per site;
- Ballpark volume for potential carbon credits (over 30 years) for all projects is between 40 to 45 million tons of CO2e;
- Two projects target short-term production of "carbon credits" (Makira and CAZ) while two others focus more on "methodology assessment" (FORECA and PHCF);
- Projects have a large spatial distribution as affected sites are located in all the main forest formations of Madagascar. However, an "eastern tropism" is noted (all projects have one or several sites in the eastern part of the country, while the southern, western, and central formations only include one or two sites);
- A complex institutional organization is a source of delays and difficulties for information flow; and
- Approaches adopted by projects are mainly based on creation of protected areas and management transfer to local populations of part of the forest areas.

**Institutional Organization**

- All projects have a complex institutional organization and multiple partners due to the need for varied capacities for this type of projects. Institutional complexity has often delayed implementation.

**Funding arrangements**

The projects have multiple objectives, usually multiple partners, and sometimes multiple sites. Therefore, financial analysis is particularly complicated.

One main interest of REDD pilot projects should be the ability to gather actual data on REDD and its cost-effectiveness. However, many issues are still unsolved: are inherent costs (survey, modeling, certification, etc.) compatible with expected benefits? Which configuration (forest type, surface, existing preliminary data, etc.), would make these costs acceptable?

Answering these questions would require assessing this REDD component in terms of expenses and benefits, which is difficult at the moment.

- Implementation of these projects requires mobilization of several million dollars. Budgets are however variable based on affected surfaces and diversity of activities.
- Only the Makira Project undertook some carbon credit transactions (40,000 T CO2e in 2006, from 2004 to 2006 production)

**Methodology and technical aspects**

It is very difficult at the moment to compare the projects in terms of methodologies.

Methodologies seem to be diversified both for surveys and estimation of carbon stocks (integration of different pools, including litter and soil carbon) and for establishing baseline and scenarii (based on "macro" approaches or more complex multi-parameter modeling). This is still a new area, at the interface of research and operational application. Therefore, detailed methodologies and calculation are often unknown (and it will be the case until research work is published) and applied approaches are far from being standardized.

Such methodology discrepancies could rapidly cause consistency and credibility problems at national level. For forests of the same type under the same pressures, two different operators could as well produce different quantities of carbon credits, based on different carbon pools and different scenario assumptions.

- Depending on multiple project objectives, planned certification standards should include both forest carbon and co-benefits (biodiversity and social benefits). Both projects aiming at selling certified credits in the short run selected the VCS and CCBS standards.
- Both the FORECA and the PHCF Project are supposed to contribute to the development of new methodologies but results are not yet available.
- For current assessable elements, projects adopted variable methodologies: this range of approaches is interesting in terms of experimentation, but could be an issue for coordination at national level.

## Annex 1b: Results of Consultation Held during Development of the R-PP

| Entity | Issues - Concerns | Answers - Follow-up |
|---|---|---|
| Extended CT REDD | Under REDD, how should forest in Madagascar be defined given the multiple definitions used in determining surface and deforestation and forest degradation considerations? | The FAO forest definition should be considered, under which the forest range covers 12 million hectares |
| | | The R-PP is based on this definition which also expresses differences between deforestation and forest degradation |
| | | Applicable definition should be integrated in formulating strategy options and in the MRV |
| | Differentiate and classify correctly causes of deforestation and forest degradation: root causes, direct causes, future causes. | Causes are classified in categories based on various criteria and variables in the R-PP |
| | | Future causes include international causes and climate change and are identified from sectoral strategic plans |
| | | Root and direct causes are included under Components 2a and 2b |
| | | The MRV component takes into account future and international causes for which monitoring is partly included in the MRV and partly in a social and environmental monitoring system |
| | Isn't "energy" a full cause and not included under the cause labeled as "unsustainable forest management"? | Energy is viewed as a root cause in the R-PP. Causes related to forests and exterior causes should be well distinguished in the R-PP. |
| Extended CT REDD | What are "REDD forests" and how to effectively and efficiently carry out actions and define intervention sectors? | REDD forests will be designated by consensus. Field actions will have specific targets. |
| | | Intervention levels are defined for each strategy option : national, regional, local, administration, civil society, private sector, etc. |
| | | Based on assessment of the current situation and REDD pilot projects, formulation of strategy options will take into account past successes, particularly those related to deforestation. |
| | Isn't food security a root cause? | Food security is included under the agricultural production issue in the R-PP. |
| | What about causes related to population and poverty? | Population and poverty issues are taken into account in all root causes. |
| | Are administrative weaknesses a root cause? | In the R-PP, "administration weaknesses" are addressed under "governance" and "lack of resources and coordination among sectors". |
| Ministry in charge of Agriculture | Main causes related to deforestation and forest degradation include:<br>• Weak agricultural productivity in general;<br>• Unsustainable land use: rudimentary agricultural practices, populations living near forests only practice clearing;<br>• Forest pasture and use of fires to renew pastures;<br>• Collapse of cash crop prices (eastern region);<br>• Promotion of maize production (western region);<br>• Unauthorized cash crops (sugar cane for local rum, indigenous tobacco, etc.) in forests;<br>• General policy inconsistency (1975 example: "land belongs to its tiller"). | The R-PP integrated all these aspects under root causes and strategy options. |

| Entity | Issues - Concerns | Answers - Follow-up |
|---|---|---|
| | Other problems leading to decapitalization of farming :<br>• Rural insecurity;<br>• Settlement of farmers in forest areas ;<br>• Social problem related to inheritance;<br>• Conflicts between breeders and planters;<br>• Access to inputs. | Move towards a green revolution. The sector has response strategy frameworks:<br>• Agricultural sectoral policy promoting environmental-friendly sustainable agriculture (to be integrated in all programs/projects);<br>• Development of conservation agriculture by the SDM – FAO partnership;<br>• National rice production development strategy;<br>• National seed strategy;<br>• National fertilizer strategy. |
| | | Recommend a study to obtain figures and clear ideas on the extent of "decapitalization" of farming. |
| | How to carry out a migration program to displace local populations from forests (at sites of strong anthropogenic pressure)? | Discuss a clear and efficient inter-sectoral strategy for successful organized migrations |
| General Direction of Energy | Root causes related to deforestation and forest degradation include:<br>• Production of fuel wood (charcoal and firewood);<br>• Applied carbonization techniques (traditional) ;<br>• Low access to non wood energy sources (availability, price, etc.);<br>• Equipment used for fire wood (traditional braziers);<br>• Illegal exploitation ; and<br>• Organization of the supply chain | The R-PP addresses these root causes in Component 2a, and under strategy options |
| | | Strategy options to address these causes should be based on "supply" and "demand". |
| | Experience and capitalization of results show that in the next 10 to 20 years, the most current household energy source will still be fuel wood as other types of energy will not be competitive enough. | Sustainable supply of these combustibles should be ensured in the long run. |
| | | The "Energy - Forests" Committee can contribute to the REDD process. |
| General Direction of Mining | Confirmed root causes by the sector include:<br>• Illegal exploitation and rushes;<br>• Inconsistencies of spatial land planning (overlapping mining and forest resources);<br>• Inherent impacts of mining activities and secondary effects (infrastructure, migration, etc.) particularly in areas of concentrated small-scale activities and gold washing;<br>• Lack of monitoring and control of mining activities ;<br>• Lack of enforcement regulations (provision for environmental restoration); and<br>• Weak coordination among sectors and between sector and territory. | The R-PP addresses all causes under Components 2a and 2b.<br><br>The cause "Inconsistencies of spatial land planning (overlapping mining and forest resources)" is expressed as "overlapping mining and forest resources". |
| | | Strategy options should consider:<br>• Awareness actions at all levels;<br>• Popularization and awareness sessions on regulatory tools for specific areas (mining decree, regulations on Mines-Environment, regulations of forests and mines, MECIE, etc.) for CTDs, local populations, operators, etc.<br>• Support of operators in areas with high concentrations of small-scale mining operations/gold washing within or near forest on exploitation and restoration techniques |
| | | Strengthen the CIMF and arbitration system (between the Mining and Forest sectors) |
| | | Enhance intersectoral approach (for rushes) |
| Ministry of Land Planning and Decentralization | Root causes related to this sector include:<br>• Monopolization of lands;<br>• Tenure insecurity;<br>• Fragmentation of agricultural lands;<br>• Land entitlement processes;<br>• Land offices not reaching problem areas (forests and adjacent areas);<br>• Modern and traditional rights;<br>• Lack of clarity on natural resources uses; | • The R-PP addresses all causes under Components 2a and 2b.<br>• The cause related to land offices is expressed as "Lack of respect of land limits with specific status". |
| | | Strategy options should :<br>• Enhance integration of forest issues in SNAT and SRAT;<br>• Strengthen the sectoral approach;<br>• Standardize applied spatial planning tools |

| Entity | Issues - Concerns | Answers - Follow-up |
|---|---|---|
| | • Weak inter-sectoral coordination ;<br>• Weak sectoral and territorial coordination ; and<br>• Ineffective decentralization (in terms of roles and responsibilities) | (SRAT, regional forest zoning, etc.);<br>• Continue spatial delimitation of forest areas ;<br>• Continue and enhance SFR ( relative tenure security) |
| General Direction of Meteorology | The Ministry in charge of Meteorology is the IPCC focal point in Madagascar<br>Like forest aspects, climate aspects are not adequately included in the development of the SNAT.<br>Existing weather stations are very old: they were established for the purposes of the transportation sector only and not for "development" aspects. | • Climate risks in forest and reforested areas (studies);<br>• Better integration of climate and forest/environmental aspects in the SNAT and SRAT;<br>• Studies on opportunities of renewable energies (climate aspects for solar, wind, hydraulic energies, etc.);<br>• Implement and/or strengthen weather stations located in forest areas;<br>• Enhance and continue inter-sectoral collaboration. |
| National Confederation Koloharena SAHAVANONA | Koloharena are located near forest corridors<br>Objectives:<br>• Agricultural practice without environmental destruction ;<br>• Apply improved techniques;<br>• Improve livelihood of members.<br>Concerns:<br>• By 2013, there will not be sufficient areas for families due to their growth, leading to possible risks of leakage | Issues mentioned in the agricultural sector are confirmed<br>Koloharena issues are included in the agriculture sector and already taken into account in the related strategy options. |
| General Direction of Forests | For the Forest Administration, key issues to be solved by REDD include :<br>• Management arrangement;<br>• Implementation framework;<br>• Strategy options. | These issues are covered under Components 1a and 2c of the R-PP |
| Conservation International (CI) | • Deforestation analysis 1990, 2000, 2005;<br>• Projected deforestation (reference scenario)<br>*Methodology* : Supervised classification (manual), LCM, historical trend<br>*Difficulty* : selection of variables, lack of data;<br>• Perceived reduction of deforestation : establishment of protected areas;<br>• Monitoring fire points (50 m²) : number is know but not burnt surface ;<br>• Other discussion point: carbon legislation | Uncertainties at each methodology level are not well determined. Therefore, results cannot be applied based on international standards : they can be improved accordingly<br>The LCM can be used at national level to locate deforestation.<br>Carbon legislation does not exist yet, but carbon is assumed to belong to the land owner. |
| PGM-E/GTZ | • Monitoring and evaluation of all MAP environmental indicators (SNISE): currently suspended;<br>• Different forest definitions:<br>While definition is the basis for selection of : RED, REDD, and REDD+<br>• Extrapolation of regional baseline<br>Location<br>Quantity (historical and projected)<br>• REDD FORECA Project: No result has yet been published.<br>Reduction of deforestation 2000-2005: | • Priority of definition choice of forest in Madagascar.<br>• Ongoing: funding of a thesis at ESSA-Forêts on "identification of criteria for defining forests in Madagascar"; this could serve as a basis to choose the definition of forests in Madagascar.<br>• Selecting a definition should integrate not only the benefits gained for a given threshold but also monitoring costs.<br>• National baseline should be developed with national data and include deforestation location and quantity.<br>• Cost will be too high if the REDD FORECA methodology is applied at national level.<br>All results from REDD pilot projects should be |

| Entity | Issues - Concerns | Answers - Follow-up |
|---|---|---|
| | administration policies, natural resources management transfer, adjudication 2007, Jariala sustainable management, reform of Forest Administration | published and shared in order to capitalize on these experiences to develop the national scenario. |
| National Office for the Environment (ONE) | Environmental Outlook (Tableau de Bord Environnemental or TBE)<br>• TBE : 2 national versions: 2002 -2008;<br>• TBE of 20 regions;<br>• Project to update maps every 3 years but acquisition of satellite images remains highly challenging<br><br>Different result for different analyses done by different institutions<br>Vision of deforestation in Madagascar<br>Result of forest policies in Madagascar: SAPM, management transfer, etc.<br>Degradation/regrowth: difficult or even impossible to evaluate<br>Re- processing of 2000-2005 images<br>1990 processing: images from 1989-1993<br>2000: images from 1999-2000-2001<br>2005: images from 2005<br>• Statistics of land use changes<br>• Evolution matrices<br>*Implementation of database software at the level of each region* to help data update, to be filled in and managed at the level of each region. | Different years of operation – impossible to compile or compare<br><br>Regular acquisition of satellite images can be recommended as a REDD measure<br><br>Different processing method based on objective Required common basis under REDD.<br><br>Errors and uncertainties for each level of processing should be specified. The evolution matrix is interesting (particularly for the MRV system) as it allows monitoring of forest cover area trends and land-use change.<br><br>Under REDD, ONE can be in charge of the national database given its structure and capacity. |
| Etablissement Supérieur des Sciences Agronomiques (ESSA-Forêts) | • ESSA-Forêts study with REDD FORECA: 4 students' thesis: supply chain, socioeconomic aspects, biomass inventory, and GIS.<br>Applied factors: demographics, markets, agricultural aspects<br>Difficulties: accessibility, reliability, and representativeness of sites<br>• Reduction of deforestation: mainly due to environmental policies.<br>• Structure and operation of ESSA-Forêts: associate students in studies (data collection, field work), dissertation or thesis, applied research laboratory (service) | Methodology proposal at national level : identification of threats at local level and use of parameters at national level. |
| WCS | Methodology to develop the regional model:<br>• LCM, use of different variables viewed as static: Density, distance to villages, distance do roads, permanent rivers, demography, slope, and distance to protected areas.<br>• Difficulties: Population variable (existing up-to-date data and reliability)<br>• Historical approach<br>Reduction of deforestation<br>Durban Vision: creation of new protected areas<br>Revenue-sharing and applicability at national level:<br>50% local communities<br>15% Administration<br>25% Makira protected area management. | Experience on locating deforestation and revenue-sharing can be capitalized on at national level. |
| WWF Good planet (PHCF) | Development of allometric equations<br>Studies on soil carbon<br>Soon : Use of LIDAR to assess degradation | Capitalizing these studies is important as applied methods can contribute to more accurate results adapted to Madagascar.<br>Costs will certainly be very high for LIDAR ; Potential cost-benefit analyses. |
| Direction of Information | Existing data: | Material, financial, and technical support are |

| Entity | Issues - Concerns | Answers - Follow-up |
|---|---|---|
| Systems (DSI) / Ministry of the Environment and Forests | • Several old analogical maps<br>• IEFN0: systematic approach in 1996 / forest classification in Madagascar (DFS, FTM).<br>• IEFN1: DGEF, 2000-2001 sample, Ministry, ESSA - forêts/FTM.<br>• National Forest Domain<br>• CI : 2008 (Vegetation 1990-2000-2005) : CI - WCS - ONE – FTM.<br>• National (2002) and regional forest zoning (Jariala, 2006)<br>• Reforestation: MAP quarterly report 2008 ; see large plantations (Haute Matsiara and Haut Mangoro, railroad)<br>**Problems:**<br>No or very little specification on uncertainty level<br>Diverging methods largely due to different objectives<br>Different zoning nomenclature<br>Consequently, results are not comparable | required for data management.<br><br>Regarding methodologies, IEFN0 is a good example of a national inventory. Repeating the same type of inventory is a possibility, but it would require a lot of money.<br><br>To analyze land-use changes, the same language and concept should be used both at national and project levels. |
| Foibe Tao-saritanin'i Madagasikara (FTM) | Participation in national forest surveys (IEFN0 and IEFN 1)<br><br>Has data and satellite images<br><br>Current situation: FTM is in decline ; each entity has its own GIS, generating different languages and concepts (a lot of them do not comply with the national reference) )<br>Cause : high cost of products | Currently undergoing a restructuration phase<br>Objective : Coordinate the national information system<br>Update national map<br>Zoning nomenclature |
| IOGA | Member of the remote-sensing technical committee<br>Training of GIS specialist | Could have a significant role in training a GIS technician under the MRV system |
| ATW Géosystème | Consulting firm specialized in GIS<br>Development of the SRAT for Amoron'i Mania<br>Reseller of satellite images | Can play a role in the MRV |
| Ministry in charge of Transportation | • The Ministry Department should be part of the REDD+ strategy Coordination Platform<br><br>• The Ministry and attached organisms have environmental units, but they need to be reinforced (financial and human resources)<br><br>• Conclusive experience on integration of World Bank Procedures in environmental recommendations<br><br>• On strategy options: enhance collaboration between the two sectors (Transportation – Forests) for the sub-sector (fluvial), a potential source of degradation (case of the Pangalanes Canal) | Establishment and members of this platform to be revised – integrate other non governmental entities<br><br>Already planned in the R-PP but the "fluvial" and not only the "terrestrial" aspect should be enhanced<br>Can play a role in REDD |
| NGOs and structures involved in conservation/protected areas | **On strategy options related to protected areas**<br>Capitalize on results of CI experiences and revenue-generating activities (direct contract, subsidy, etc.)<br>Law enforcement for protected areas– Capitalize lessons learned from the MAKIRA, CAZ, and COFAVO protected areas to prevent leakage<br><br>**On application of World Bank safeguard procedures** : lessons learned on procedures of creation of protected areas show that applying | Include these observations and remarks in the R-PP strategy options (especially Strategy Option 7 on protected areas)<br><br>Strategy options related to law enforcement will be included under both Option 7 (Protected areas) and Option 8 on enhancing intervention means of the Administration<br><br>Component 2d on ToRs of the strategic environmental and social assessment includes this |

| Entity | Issues - Concerns | Answers - Follow-up |
|---|---|---|
| | these procedures are relatively costly (financially)- provisions for REDD<br><br>**On the implementation framework**<br>Launch studies / discussions to define a strategy for the use of carbon finance in protected areas (new protected areas) and on carbon revenue sharing<br><br>Monitoring of degradation should be done by the protected area manager (tools, etc.) | concern of economical feasibility of safeguard procedures<br><br>All issues will be included under Component 2c of the R-PP. This Component presents, among other information, key principles of the REDD implementation framework, the institutional framework and strategy measures, carbon governance, distribution and sharing of revenues from transactions, etc. |
| Direction of Social and Environmental Impacts (DISE) of the Ministry of Public Works | • Propositions on strategy options<br>• The Ministry has a Direction in charge of environmental and social impacts<br>• The main causes of deforestation related to this sector include:<br>  • Roads: construction et extension, rehabilitation and maintenance<br>  • Quarries and borrow areas<br>  • Infrastructure<br>Several initiatives were carried out in this Department to include environmental and social aspects: complaint management procedures, capacity building, upstream integration of environmental and social aspects during selection of technical options<br>• Public investment projects subject to environmental impact assessments (EIA and EEP) : over 60%<br>• A handbook on environmental and social impacts has been finalized and advocacy and awareness actions are planned by the Department<br>• The Direction also has experience in implementing World Bank safeguard policies<br>**Strategy options**<br>• Support capacity building of the various stakeholders (training, awareness, communication) at multiple levels<br>• Enhance collaboration between the two sectors (Public Works and Forests) especially on restoration<br>• For public investment on major works, the Ministry of Public Works will have trouble funding the planned 0.5% of the total investment costs, representing EIA monitoring costs for large infrastructure. Therefore, application of the MECIE is limited. | • The R-PP addresses both options<br><br>Can play a role in REDD<br><br>• Specific attention should be given to studies planned under Component 2a. Evaluation of land use, forest policy and governance. ToRs of the study of deforestation and forest degradation causes under this component should assess, among other elements, performance, effectiveness, and efficiency of the MECIE specifically for major works. |

## Annex 2a: Detailed Results of Assessment of Past Efforts to Reduce Deforestation and Forest Degradation

| *Root cause* | *Past efforts* | *Results* | *Strengths* | *Weaknesses* |
|---|---|---|---|---|
| Irrational management and promotion of forest resources | Support to management transfer of forest resources to local communities | ✓ 1 000 000 hectares under management transfer to about 500 CoBa and VOI<br>✓ Over 200 000 ha planned for management transfer for KoloAla sites | ⇨ Diversification of actors of forest resources management<br>⇨ Empowerment of local actors<br>⇨ Creation of tangible benefits (employment and sale of products) for managing communities | ⇨ Management is not always effective in the field<br>⇨ Benefits are often very limited due to an uneconomical approach<br>⇨ Limited management capacities at the level of CoBas and VOIs<br>⇨ Lack of support and monitoring of the Forest Administration |
| | Promotion of forest management delegation to actors from the private sector | ✓ Management of existing PA delegated to MNP<br>✓ Management of some NAP delegated to national and international NGOs<br>✓ Pilot transfer of the Mandaratsy plantation to a private operator | ⇨ Diversification of actors of forest resources management<br>⇨ Inclusion of professional actors in forest resources management<br>⇨ Links between the private sector and managing communities | ⇨ Standardized procedures of management delegation have not yet been promulgated<br>⇨ Contractual insecurity of private operators<br>⇨ Lack of monitoring by the Forest Administration of operators' management tasks |
| | Development and implementation of a more integrated planning of forest resources management | ✓ Interministerial order defining the national vision of forest management<br>✓ Forest zoning finalized in 5 DREFT covering over 3,000,000 hectares of forests | ⇨ Inclusion of all stakeholders in forest resources management planning<br>⇨ Existing planning tools at various levels<br>⇨ Integration of validated zoning plans in PRDs and PCDs | ⇨ Persistent conflicts between protection-production, even within the Forest Administration<br>⇨ Lack of targets in precise figure for forest management (surface, volume, etc.)<br>⇨ Forest zoning not formalized yet |
| | Development of clear standards and procedures on forest management and promotion | ✓ Granting of cutting permits and management contracts by tender<br>✓ Tools for forest management and monitoring by the Administration | ⇨ Transparent and competitive procedures for the granting of exploitation and management contracts<br>⇨ Efficient tools for contract management and operations monitoring are available | ⇨ Standards have not yet been promulgated as a regulation<br>⇨ Many tools have not yet been generalized or formalized |
| | Promotion of reforestation | ✓ 300 000 hectares of pine and eucalyptus plantations | ⇨ Reduction of pressures on natural forests<br>⇨ Creation of employment and benefits | ⇨ Unfavorable conditions (tenure, price of products, security, etc.)<br>⇨ Low impact on clearings |

| *Root cause* | *Past efforts* | *Results* | *Strengths* | *Weaknesses* |
|---|---|---|---|---|
| Mining exploitation | Inclusion of environmental and social aspects in mining activities: laws and regulations, tools and procedures, structures | ✓ Any mining activity is subject to an environmental assessment[41]<br>✓ SEA for World Bank projects [42] (PRSM et PGRM) for development and governance of the mining sector<br>✓ Handbooks, guidelines and guidance for mining activities EIAs<br>✓ Regional mining environmental units are operational | ⇨ Mining sector: one of the first economic sectors which includes environmental aspects in Madagascar<br>⇨ Widespread application of tools on integration of environmental and social aspects | ⇨ Lack of consideration of environmental assessment in areas of high concentration of licit mining activities and gold washing (strategic dimension)<br>⇨ Lack of monitoring and control of environmental and social aspects for small and medium-scale operations<br>⇨ Legislation and regulation on rebates (general and mining) do not allow their use for environmental aspects<br>⇨ Limited effective environmental impact assessments for gold washing, quarries and borrow areas |
| | Setting up arrangements to solve mining-forests conflicts<br><br>Availability of national map on geological resources | ✓ Creation and implementation of the Mining-Forests Interministerial Committee to standardize management tools for both sectors and process disputes<br>✓ Handbook on handling overlapping mining areas and new protected areas and Koloala sites<br>✓ Interministerial decrees on suspension of mining permit emissions in some forest areas (since 2004)<br>✓ Protocol of data exchange between both ministries | ⇨ Consultation and participation mechanism for PA-mining or KoloAla-mining conflict resolution<br>⇨ Standardization of regulations of both sectors: (i) Inclusion of environmental and social aspects in the mining code and enacting regulations and (ii) New management code for protected areas (COAP) allow for simultaneous presence of mining activities in some categories of protected areas, under certain conditions<br>⇨ Standardization of databases of both ministries | ⇨ CIMF is an advisory and not a decision-making committee, it has limited resources<br>⇨ Lack of a territorial planning scheme (national, regional)<br>⇨ Lack of a clear strategy against illegal mining operations in general and in forest areas in particular<br>⇨ Case-by-case processing of overlap issues with protected areas or KoloAla sites is time-consuming and quite expensive |
| | Decentralization of mining resources management, including environmental and social aspects | ✓ Dialogue / participation mechanisms on environmental and social aspects in areas of large mining projects are operational | ⇨ Better participation of populations affected by large projects on monitoring aspects s<br>⇨ Empowerment of local actors<br>⇨ Better governance | ⇨ Participatory monitoring of mining projects is limited to large operations<br>⇨ Resources (human and financial) allocated to monitoring permits or authorizations are very limited |

41 Busson, F (2009) : REDD; Etat des Lieux et Expériences en Cours

[42] PRSM : Reform project on the mining sector and PGRM governance program for mineral resources

| *Root cause* | *Past efforts* | *Results* | *Strengths* | *Weaknesses* |
|---|---|---|---|---|
| | | ✓ Participatory monitoring for areas with large mining projects | | |
| Oil exploration | • Integration of environmental and social aspects in oil operations<br>• Creation of arrangements to solve oil-forests conflicts | ✓ Any activity related to oil exploration and exploitation is subject to environmental studies<br>✓ Better consideration of environmental and social aspects as well as oil-forest conflict management in the new Oil Code (being finalized)<br>✓ Creation and implementation of the Environment-Oil Committee | ⇨ Widespread application of tools to integrate environmental and social aspects | ⇨ Limited resources for the Environment-Oil Committee<br>⇨ Relatively limited experience in Madagascar on oil exploitation (limiting assessment of efficiency of available tools for conflict management) |
| Weak agricultural productivity | Fertility management:<br>• Development of forest valleys. SAVOKA operation in 4 areas. DRS Program.<br>• Use of fertilizer. Compost, GOPR, PEM, TAFA | ✓ Increase of rice production but not enough to compensate population growth. Stagnant or even decreasing productivity | ⇨ There are successful alternatives | ⇨ Does not include forest areas.<br>⇨ Is not legally binding<br>⇨ Poverty of farmers and land tenure |
| | Dominant archaic cultivation practices<br>Demand of fertile lands ➔ expansion of clearing.<br>• Agricultural extension<br>• Various development projects | ✓ Observer of rural sector/ rap for data collection.<br>✓ ERI Program, ADRA, | ⇨ Existing conservation project working on development in forest habitat<br>⇨ KoloHarena and their federations, ensuring perpetuation of improved techniques in forest areas | ⇨ Degrading practices continue<br>⇨ Weakness of projects in developing supply chains.<br>⇨ Lack of application of existing regulations<br>⇨ All local habitants are not members of KoloHarena<br>⇨ Lack of funding towards the end of the project |
| | Unauthorized cash crop (sugar cane, indigenous tobacco, hemp)<br>• Corn in the West and South-West<br>• Sugar Cane in the East<br>• Hemp in the North-East and in the South | ✓ Study of the ILO Program (FOFIFA Cornell University)<br>✓ Campaigns against rongony plantations in forests were done in the North (Famafa, Fandio etc.) | ⇨ The mechanism and the phenomenon are known | ⇨ Market issue for alternative products<br>⇨ Forests are refuges for unauthorized crops<br>⇨ Depends on international coffee/vanilla prices<br>⇨ Sporadic operations, no sustainable solution |
| | Food security, energy: | ✓ Diversification of cash | ⇨ Microfinance | ⇨ No EIAs on individual small-surface |

| *Root cause* | *Past efforts* | *Results* | *Strengths* | *Weaknesses* |
|---|---|---|---|---|
| | • Promotion of agroforestry and agrobiological soil management<br>• EIAs for large farms<br>• Green revolution<br>• Jatropha<br>• Introduction of new varieties of sorghum<br>• New competitive race | crops<br>✓ Equitable trade<br>✓ Organic products | ⇨ Existing technical tools | farms which are the most destructive<br>⇨ In microfinance, loan interest rates are still high |
| Weaknesses of the Administration | • Implementation of decentralization policy<br>• Reform of the Administration<br>• Implementation of interministerial arrangements to solve disagreements among sectors<br>• Establishment of participation, consultation, and decision-making arrangements and mechanisms | ✓ Creation of decentralized structures : 22 regions and communes<br>✓ Reform of the forest sector at three levels : sectoral objectives, sector management, Forest Administration<br>✓ Creation of Forestry Commissions, PRPSE (regional planning and monitoring and evaluation platform) for the 22 regions<br>✓ Establishment of a Mining-Forests Interministerial Committee (CIMF)<br>✓ Organization chart of the Ministry in charge of Forests based on sectoral objectives | ⇨ Separation of technical support functions and control functions within the Forest Administration<br>⇨ Autonomy of forest control<br>⇨ Progress towards a better integration of forests in other sectors' baselines<br>⇨ Task force against illegal logging of precious woods<br>⇨ The Forest Administration focuses more on sovereign functions and accepts decentralization and delegation of forest resources management<br>⇨ Role sharing: the Forest Administration is not the sole manager for the sector anymore; other actors are involved such as private operators, local communities, nongovernmental organizations (NGOs), the civil society and decentralized territorial collectivities (CTD), and other sectors. | ⇨ Strong resistance to change among the Administration's agents<br>⇨ Administration's reform only covers some sectors<br>⇨ Capacities of other actors for forest management and implementation of strategies to reverse the spiral of degradation are still very limited<br>⇨ Formalization of consultation, co-management and/or co-decision making structures is not effective<br>⇨ Difficult enforcement<br>⇨ Lack of motivation of Administration's agents to carry out their tasks |
| Monopolized land by clearing | • Tenure policy and national tenure program<br>• Revision of tenure regulations (reconcile modern law and customary rights)<br>• Regulation of illegal settlement<br>• Migration policy and program (organized migration with training and support) | ✓ Adoption of regulations on relative tenure security<br>✓ Creation of land offices<br>✓ Application and implementation of contractual resources management<br>✓ Implementation of organized migration projects PROJER (Mid-West), Zomandao, Ampamoizankova, Sakay, Ambohimanambola | ⇨ Recognition of customary rights by the State and international development organizations<br>⇨ Existing experience and knowledge on the issue<br>⇨ Successful migration in some economically attractive areas | ⇨ Environmental aspects are rarely included compared to social aspects<br>⇨ Lack of a clear national policy on migration<br>⇨ Migration programs/projects are not well targeted/ directed in problem areas (forest areas) |
| Public infrastructure | • Tools to integrate | ✓ Over 60 % of public | ⇨ First integration of environmental and | ⇨ Difficulties experienced by the |

| *Root cause* | *Past efforts* | *Results* | *Strengths* | *Weaknesses* |
|---|---|---|---|---|
| (roads and transportation) | environmental and social aspects (handbooks, processing of complaints)<br>• Direction for social and environmental impacts (DISE) within the Ministry of Public Works (since 2003)<br>• Environmental and social managers in attached entities (road authorities, civil aviation, etc.)<br>• Consideration of environmental and social requirements of financial partners (such as the World Bank) for activities financed by them. | infrastructure works – (road construction, extension and restoration) comply with the MECIE<br>✓ Capacity building of public works companies, territorial collectivities and other directions of the Ministry and awareness of populations affected by the project<br>✓ Experience and training on environmental and social aspects are selection criteria for service providers | social aspects in technical construction/extension/restoration procedures for major public infrastructure<br>⇨ Experience of restoration of quarries and borrow areas in collaboration with technical services in charge of forests | Ministry of Public Works and of Finances to cover the 0.5% of investment fees to assess EIAs (as required by the MECIE). Therefore, limited EIAs for public investment projects (PIP)<br>⇨ Limited inclusion of environmental and social aspects in the selection of technical options for major infrastructure<br>⇨ The Government is penalized for some non-compliance with environmental and social procedures<br>⇨ Difficulty in regulation enforcement<br>⇨ Limited resources of the DISE |

## Annex 2d: Available Capacity and Required Capacity-Building for the Strategic Environmental and Social Assessment

**Available capacities in environmental assessment in Madagascar**

The first decree on EIA came into force in 1992. Since 2004, the year ONE became the sole office for EIAs in Madagascar, about 300 environmental permits have been granted.

About 20 SESAs were carried out, including:

- The strategic environmental assessment of a logging area (KoloAla) in 2008
- The environmental and social assessment of the Integrated Growth Poles Project (PPIC) in 2005
- The environmental assessment of the phase 3 of the environmental program (EP3) in 2003
- The governance program for mineral resources (PGRM) in 2003 and its extension in 2005
- The environmental assessment of the transportation sectoral program (PST)
- The environmental assessment of the rural development action program (PADR) in 2001
- The Isalo area of ecotourism interest (ZIE) in 2000
- The special economic activity area of Vatomandry (ZAES) in 2002

Therefore, Madagascar has national consultants (consulting firms, consortium of individual consultants) who have the capacity of carrying out consulting work on the REDD SESA. However, support of an international consultant is required for the following aspects:

- Integration of the SESA process in the strategy development process: tools and charter of responsibilities
- Integration of some criteria in the SESA process
    - Sustainability : definition of sustainability criteria, assessment based on these criteria
    - Public participation
    - Monitoring and improvement: Indicators and mechanisms for sustainability monitoring and assessment
- Support to information dissemination and communication on the process and SESA results and to capacity-building

These aspects have not been adequately handled in previous SESAs in Madagascar.[43]

[43] Inventaire des meilleures pratiques et proposition des directives pour les EES à Madagascar, ONE, June 2006

**Capacity-building and training on SESA**

| Targets | Training objectives | Content | Location / Contributor |
|---|---|---|---|
| - Decision-makers of sectoral ministries, members of Parliament and territorial authorities<br>- REDD Operational Office | Involve decision-makers and sectors affected by REDD in the SESA process | - SESA concept (objectives and main functions of SESA, legal framework, international practices)<br>- Different SESA phases and charter of responsibilities of involved actors<br>- Role of SESA in program, plan, or policy development<br>- REDD case: main stakes and challenges, implementation schedule, role of SESA<br>- Public consultation and participation in SESA: objectives, process, decision-making | 2 per year at central level<br>2 per year at decentralized level<br><br><u>Contributors</u><br>Ministry in charge of Forests<br>Ministry in charge of the Environment<br>ONE<br>National and international consultants |
| - Sectoral ministries (technical directions and environmental units)<br>- Representatives of environmental units and sectoral ministries<br>- Environmental NGOs and associations<br>- Civil society<br>- Academic representatives | Build ownership of the SESA process | - SESA concept (Objectives and goal of SESA, legal framework, international practices)<br>- Different SESA phases and charter of responsibilities<br>- Role of SESA in program, plan, or policy development<br>- REDD case: main stakes and challenges, implementation schedule, role of SESA<br>- Sustainability criteria: criteria definition and SESA<br>- SESA supervision and review– arrangement, tools<br>- Public consultation and participation in SESA: objectives, process and tools, decision-making<br>- Monitoring of SESA: why, how, where, by whom – link with the MRV | 2 per year at central level<br>2 per year at decentralized level<br><br><u>Contributors</u><br>Ministry in charge of Forests<br>Ministry in charge of the Environment<br>ONE<br>National and international consultants |

## Assessment of Compliance of Proposed Activities for the Development of the REDD+ Strategy with the World Bank Safeguard Policies

In general, proposed activities in the R-PP strategy components include:

- Studies and analyses;
- Capacity-building of various actors affected by REDD and/or existing or planned structures
- Development of required tools (legal, technical, organizational/structural) for strategy preparation and implementation of the strategy itself.

The principle underlying all these activities is based on consultation of various actors from many sectors/entities at different levels (national, central, regional, and local).

Support from the World Bank to develop the REDD+ strategy requires that all activities comply with this institution's safeguard policies. The Bank makes use of a set of operational policies requiring that some potentially adverse environmental impacts and some social impacts selected based on their strategic nature, and related to the Bank's investment projects, should be identified, prevented or mitigated where feasible.

Potential applicable safeguard policies for REDD+ strategy implementation activities include O.P. 4.01, O.P. 4.04, O.P. 4.10, O.P. 4.12, and O.P 4.36 respectively on environmental assessment, natural habitats and biodiversity, indigenous people, involuntary resettlement, and forests.

**OP 4.01 – Environmental assessment**

Recommendation for an environmental assessment is included in the Bank's operational policy 4.01, requiring any project/activity proposed for Bank financing to be environmentally and socially sound and sustainable. Environmental assessment should take into account all elements of the safeguard policies set off by the project, potentially including the natural environment (air, water, and land), human health and safety, social aspects (involuntary resettlement, indigenous people, and cultural property), and transboundary and global environmental aspects.

The Bank pre-screens each proposed project/activity to define the required type of environmental assessment and to determine other applicable safeguard policies. Classification is based on project/activity type, location, degree of vulnerability and scale, as well as the nature and extent of potential environmental impacts.

In addition to the REDD+ strategy SESA (Component 2d) which complies with Bank procedures, only some feasibility studies (see step 3 of the finalization process of the REDD+ strategy) will possibly require application of OP 4.01 and existing national legislation, i.e. the MECIE decree. These would include pilot feasibility pilot studies which have not yet been defined (as final options have not yet been selected).

For example, if strategy option 8b is selected, a feasibility study on site restoration for small-scale mining activities would be required to gather information and elements in order to revise current regulations and procedures on inclusion of environmental aspects in small-scale mining activities.

In general, field pilot actions/studies do not have significant adverse environmental and social impacts.

However, it is noted that planned analyses and studies already take into account the Bank's safeguard procedures. In order to comply with existing laws and Bank procedures (in case of overlap, the most restrictive requirement applies) while implementing field activities, the environmental and social management framework is presented below for pilot activities.

| *Environmental assessment process* | *Structure in charge* | *Observations* |
|---|---|---|
| Pre-screening (definition of required environmental assessment and determination of other applicable safeguard policies ) | ONE with support from environmental units | - Under the MECIE, an EIA (annex I of the decree) and a PREE (environmental commitment program annex II)<br>- However, in some cases, ONE and the environmental units might define simplified environmental studies or not recommend any |
| Executing entity for the study | REDD Operational Office | The ToRs of the study must be validated by ONE and the relevant environmental units<br>The same applies to public participation |
| Study | Service providers | For EIAs and PREEs |
| | REDD Operational Office | Environmental and social recommendations to be included in ToRs of pilot studies |
| Assessment of the study | ONE with the Technical Assessment Committee (CTE) | For EIAs |
| | Environmental units for the activity | For PREEs (Environmental Commitment Program) |
| | REDD Operational Office and ONE (with CTE) | Development and integration: Environmental and social recommendations<br>Validation: ONE and CTE |

**OP 4.04 – Natural Habitats**

The safeguard policy 4.04 aims at protecting natural habitats and their biodiversity and ensuring sustainability of services and products provided by natural habitats to human societies.

As for OP 4.01, this Bank policy only applies to SESAs and field pilot studies/actions proposed for preparation of the REDD+ strategy. As noted in the environmental and social management framework, pre-screening will determine safeguard policies set off by this field activity.

Therefore, the environmental and social management framework complies with this element of the safeguard policies.

**OP 4.12 – Involuntary resettlement**

The safeguard policy 4.12 aims at avoiding or minimizing resettlement or displacement of people. When resettlement is required, the policy provides assistance to displaced persons to improve their livelihoods and standards of living or at least, or where possible, to restore them. The Policy is meant to be inclusive and ensures that support applies to any displaced person regardless of the legitimacy of their tenure status.

The policy is set off by: a) the involuntary taking of land or other assets, b) restriction of access to physical assets (pastures, water, forest products, etc.) or c) restriction of access to national parks and other protected areas.

Potential pilot actions to prepare the REDD+ strategy will not involved resettlement or displacement of persons. However, this policy is taken into account in planned assessments and studies.

**OP 4.36 – Forests**

The Policy 4.36 – Forests applies to the following types of Bank-financed projects:

- Projects that have or might have impacts on the health and quality of forests;
- Projects that affect the rights and welfare of people and their level of dependence upon or in interaction with forest resources;

- Projects that aim to bring about changes in management, protection, or utilization of natural forests or plantations, whether they are publicly, privately, or communally owned.

Planned studies and assessments in the REDD+ strategy development process take into account principles and criteria stated in the OP 4.36.

For field activities, pre-screening planned in the social and environmental management framework defines consideration and integration of this OP in the environmental assessment process.

Planned activities and this framework also comply with this safeguard policy.

## Annex 3a: Consultations to be held for the Development of the Reference Scenario

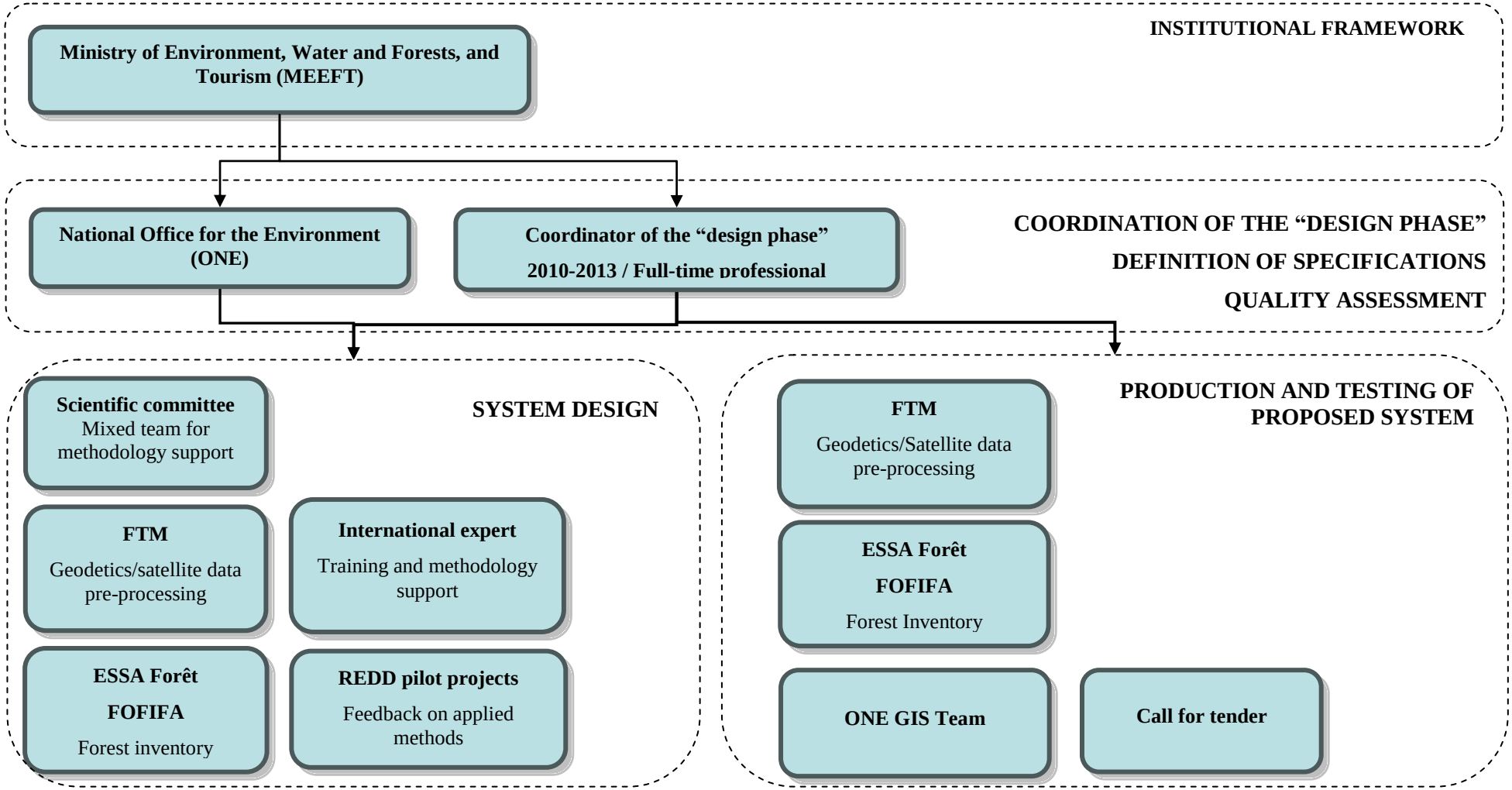
| *Themes* | *Contact* | *Consultation period* | *Level of consultation* | *Type of consultation* | *Consultation costs (thousands of dollars)* |
|---|---|---|---|---|---|
| Activity 3.1: Identification of the best explanatory variables of deforestation and degradation | REDD projects, other projects tackling deforestation, regional and local administration | Year 1 | Regional | Workshops | 55$ (11 workshops 5,000$/ workshop) |
| Activity 4.4: Validation of model | REDD projects, other NGOs, administrations | Year 2 | National | Workshop | 15$ (also includes travel of regional partners approached under 3.1) |
| Activity 4.5: Policy simulation | Central Administration (Prime Minister's Office, MEF[44], MRFDAT[45], MAEP[46], MTPM[47], MEI[48], MEM[49]…) | Year 2 | Central | Workshop | 5$ |
| Activity 5.4: Presentation and validation of a demonstration draft of model | REDD projects, other NGOs, central and regional administrations | Year 4 | National | Workshop | 15$ (also includes travel of regional partners approached under 3.1) |
| Activity 5.4: Presentation and validation of a demonstration draft of model | Central Administration (Prime Minister's Office, MEF, MRFDAT, MAEP, MTPM, MEI, MEM…) | Year 4 | Central | Workshop | 5$ |
| Activity 5.5 : Presentation of final version of model and a strategy report | REDD projects, other NGOs, central and regional administrations | Year 4 | National | Workshop | 15$ (also includes travel of regional partners approached under 3.1) |

[44] Ministry of Environment, Forests, and Tourism
[45] Ministry of Land Tenure Reform and Regional Planning
[46] Ministry of Agriculture, Livestock, and Fisheries
[47] Ministry of Public Works and Meteorology
[48] Ministry of Economy and Industry
[49] Ministry of Energy and Mining

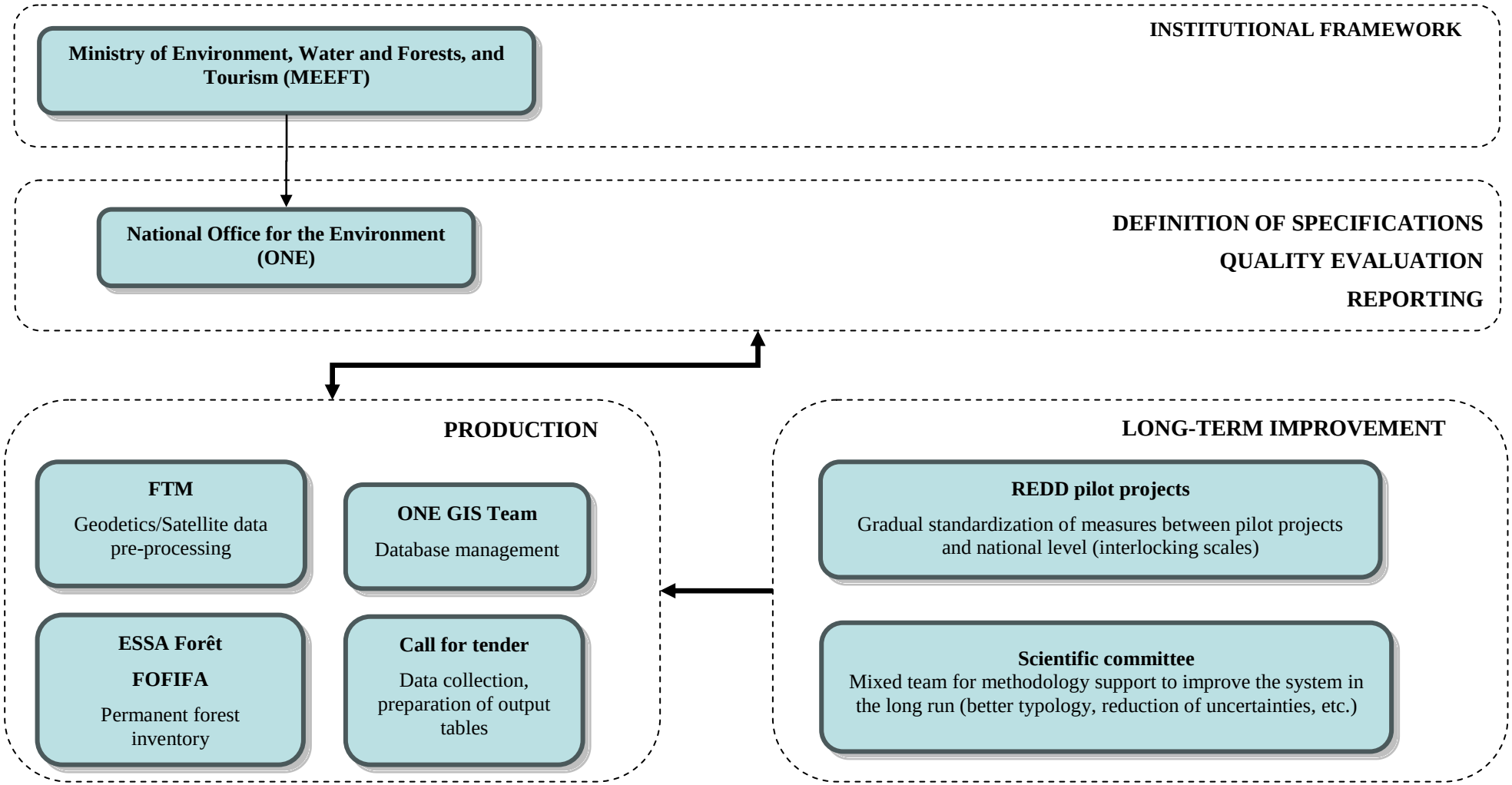
## Annex 4a: Details of Planned Activities to Estimate Carbon Stocks

| *STEP* | *ACTIVITIES* |
|---|---|
| 1. Status of estimation of carbon stocks in forest areas | 1.1 First estimation of carbon stocks by biome based on the 1996 survey data. |
| | 1.2 Estimation of coefficients of variation (CV) on biomass data from the 1996 survey. |
| 2. Development of a national biomass monitoring system | 2.1 Creation of a working group including the State, research organizations, NGOs involved in REDD projects on methodology choices of the national carbon monitoring system. |
| | 2.2 Organization of technical workshops for decision-making on key methodology options:<br>• "Systematic" biomass monitoring system or inventory at t0 and occasional monitoring of degradation and forest trends.<br>• Permanent or temporary plots (for the "systematic" monitoring system).<br>• Selection of a standardized forest typology at national level including biome type and degradation level.<br>• Choice of applicable pools (particularly dead wood).<br>• Potential consideration of the 1996 data to lighten inventory protocol.<br>• Features of the survey (intensity, plot size and shape, accounting methods for additional pools).<br>• Involvement scheme of local communities in data collection.<br>• AGB calculation method |
| | 2.3 Development of a national monitoring scheme based on methodology options selected in 2.2 |
| | 2.4 Development of a carbon research national plan to support monitoring:<br>• Development of allometric equations<br>• Study of soil carbon storage<br>• Knowledge of aboveground/underground biomass ratios<br>• Knowledge of AGB/non wood biomasses (creepers, epiphytes, shrubs, grasses, etc.) ratios<br>• Studies of attributes of slash-and-burn |
| 3. Capacity-building, training | 3.1 Organization of training workshops on carbon stocks estimation for ONE and administration agents. |
| | 3.2 Training of field technicians on biomass data collection. |
| 4. Implementation of estimation of stocks at $t_0$ | 4.1 Setting up plots and data collection at t0 |
| | 4.2 Implementation of the biomass research program |
| | 4.3 Development of a table and geographic database to store collected data. This database will be managed by ONE. |
| | 4.4 Data analysis and estimation of carbon densities for each biome and each degradation level. |
| 5. Implementation of monitoring system at $t_n$ | 5.1 Setting up a permanent plot system (research program):<br>• To monitor forest trends<br>• To monitor biomass degradation on a small number of pilot plots in high-risk areas. |
| | 5.2 Plots for systematic monitoring (if this option was chosen). |

## Annex 4b: Roles and Responsibilities for the Design Phase of the MRV System



## Annex 4c: Roles and Responsibilities for the Implementation of the MRV System



## Annex 4d: Consultations to be held for the Development of the MRV System

| *Themes* | *Contact* | *Period of consultation* | *Level of consultation* | *Type of consultation* | *Costs of consultation (thousands of dollars)* |
|---|---|---|---|---|---|
| National base and thematic cartography. Analysis of co-benefits | FTM, MRFDAT[50] MEEFT[51], MINEAU[52], MAEP[53], MTPM[54], MEI[55], Ministry of transportation, MEM[56] | Year 1 | Central | Workshops, individual interviews | 5-10$ |
| Reference data for REDD projects | REDD project developers | Twice a year, each year | Project | Workshop | 10$/year |
| Image classification methodology | Scientific committee | Year 1, 2, 3 | National | Workshop | 5$/year |
| | | | | | |
| | | | | | |

[50] Ministry of Land Tenure Reform and Regional Planning
[51] Ministry of Environment, Forests, and Tourism
[52] Ministry of Waters
[53] Ministry of Agriculture, Livestock, and Fisheries
[54] Ministry of Public Works and Meteorology
[55] Ministry of Economy and Industry
[56] Ministry of Energy and Mining

## Annex 4e: Summary and Analysis of Available Data

### A. Existing Data on Carbon Densities (Emission Factors)

Existing data on carbon densities per hectare in Madagascar come from two main sources:

**1) National forest inventories**

- **1996 Forest inventory (IEFN 0)**
  These data are the most exhaustive for the country. They were applied in the Rakotomaro 2001 study to estimate biomass and carbon stocks per hectare in the Makira Forest. Data were collected on small plots in clusters of six, with a maximum individual area of 0.125 ha. Trees with dbh > 15 cm were measured.
- **IEFN 1 Forest inventory (2003)**
  This inventory focused on mapping to measure forest surface trends. Field surveys only covered two specific sites, in Moramanga (dense rainforest) and in Morondava (dense dry forest).

**2) Survey initiatives of existing REDD pilot projects (see below).**

- REDD-FORECA Project on various sites (survey in Mariarano)
- CI CAZ and COFAV (East and South-East)
- The Holistic Program of Forest Conservation of WWF/Good Planet (various sites)
- The Makira Forest Project(WCS)

The following table summarizes methodology options and results of these surveys.

| ***SOURCE*** | ***AREAS*** | ***STRATA*** | ***PLOT SIZE AND LOCATION*** | ***INTENSITY*** | ***POOLS*** | ***AGB CALCULATION METHOD*** | ***DATA-RESULT*** |
|---|---|---|---|---|---|---|---|
| IEFN 0 / Rakotomaro 2001 | Whole country | Evergreen dense rainforests, dense dry forests, and xerophilous thickets | 6 cluster plots of undefined surface (<=0.125ha) | 800 clusters of 0.8 ha max. | AGB (DHP>15cm)<br>AGB shrubs – (extrapolation)<br>(BGB) (deducted at 17.5%*AGB)<br>Litter(estimated at 7%*AGB) | 3 methods<br>- Brown (f(V))<br>- Ogawa et al. (allo. equ.)<br>- Ohler et al. (allo.equ.) | **- 241 tC/ha**<br>**- 178 tC/ha**<br>**- 370 tC/ha** |
| IEFN 1 | Morondava (West)<br>Moramanga (East) | Evergreen dense rainforests<br>Dense dry forests | ? | ? | ? | ? | ? |
| FORECA | Haute Ramena (North)<br>Mariarano (East) | Evergreen dense rainforests<br>Dense dry forests<br>Mangroves | 0.015 ha (circular) | | AGB, (BGB) | Local allo. equ (under development – ESSA-Forêt) | **11 to 60 tC/ha** |
| MAKIRA | Makira (North-East) | Evergreen dense rainforests | 0.03 ha (circular) | 132 plots<br>Pre-inv 50 pl. | AGB, dead wood, Litter, $Biomass_{non\ tree}$ | Pan tropical allo equ. (Chave ?) | **150 to 245 tC/ha** |
| CAZ | Central East | Evergreen dense rainforests | 0.03 ha (circular) | | AGB, dead wood (BGB) (IPCC regression) | Allo. equ. Chave et al. | **220 tC/ha** |
| COFAV | South East | Evergreen dense rainforests | 0.03 ha (circular) | | AGB, dead wood, (BGB) (IPCC regression) | Allo. equ. Chave et al. | **260 tC/ha** |
| PHCF | ? | ? | ? | | AGB, litter and soil, (BGB) | Local allo. equ. (under development) | **?** |

A significant heterogeneity is noted in terms of methodology. Survey intensity is almost never known, even if we know that sampling occurred after stratification. It should be noted that circular plots are systematically preferred even though rectangular plots might be more reliable on mountainous terrain.

The adopted typology is different and more or less detailed for each inventory project. Forest types are never classified based on "degradation levels": classification only takes into account the biome type (rainforest, dry forest, etc.) but not the intensity of human impact, though it could represent a significant variation factor for biomass levels.

Similarly, selected carbon pools and methods vary among projects (particularly for dead wood).

Heterogeneity of methods is reflected in results, even for a given forest type: for dense rainforests, estimates vary between 60 and 370 TC/ha depending on sources. Therefore, it is important to recommend a common methodology framework for MRV monitoring at national level in order to improve accuracy: development of expansion factors (root, allometric equations, tree/non tree biomass rate) specific to Madagascar.

The importance of including artificial forest strata (high plateaus pine and eucalyptus reforestation areas) should be noted as artificial forests can represent a sizeable portion of woodlands in Madagascar. A result of over a hundred years of reforestation experiences and initiatives, these sparse stands represent a biomass stock that is truly threatened by anthropogenic pressure.

Currently, it is difficult to have reliable estimates of carbon density at t0 for the various forest types. The 1996 forest survey provides field data at the country scale, but lack of local allometric equations and inclusion of only one carbon pool (AGBtrees >15cm DHP) limit the accuracy of the analysis. It should be noted that this assessment was done for the Makira Forest (WCS Project, Rakotomaro 2001), using generic equations.

**B. Existing Data on Land-Use and Land-Use Changes Estimates**

National deforestation analyses in Madagascar have always been initiated by projects funded by international donors. There is no permanent and formalized monitoring system on the national forest cover and its trends. Recent available surveys (Jariala Project and CEPF Project) (Table 1) were performed using different criteria and methods. Results were different both for estimates of the national forest cover and estimated deforestation. Analyses of land uses at community level were done under the Jariala project (30 communes).

**Table 1 –** List of recent forest cover and forest trends analyses.

| Project | Date |
|---|---|
| • Jariala | • 1990/2000/2005 |
| • FAO | • 1990/2000/2005 |
| • National Forest Ecological Inventory<br>• IEFN 0 | • 1996 |
| • National Forest Ecological Inventory<br>• IEFN 1 | • 2000 |
| • ONE (in press) | • 2000/2005 |
| • Atlas of the Vegetation of Madagascar<br>• Joint project of the « *The Royal Botanic Gardens, Kew*", "*Missouri Botanical Garden*", and the «*Center for Applied Biodiversity Science* » of Conservation International, funded by the *Critical Ecosystem Partnership Fund* (CEPF) ; | • 1999-2003<br>• (2000) |
| • Faramalala | • 1972-1979 (1988)[57] |

**Satellite data :** In general, LANDSAT TM and ETM+ data are used for mapping. An interesting approach was used by the CEPF using MODIS (MOD43B4) for a first vegetation stratification, based on a supervised and visual classification of NDVI images and reflectance images (training data for classification come from Faramala 1988 (vectorized in 1995)).

**Table 2 –** Used captors and classification methods

| Project | Captor | Image classification method | Training data | Software |
|---|---|---|---|---|
| Jariala | 2000 Landsat 7 ETM+<br>2005 Landsat 5 TM/7 ETM+ SLC | Supervised classification (maximum likelihood) | ? | Erdas |
| FAO | N/A | Statistical | N/A | N/A |
| IEFN 0 | Landsat | Visual interpretation | N/A | ? |
| IEFN 1 | ? | Supervised classification | ? | ? |
| ONE | ? | Supervised classification | ? | ? |
| CEPF | MODIS<br>Landsat 7 ETM+ | Supervised classification (maximum likelihood) : MODIS and Landsat<br>Visual classification (no technical detail) | Faramala data<br>MODIS classification<br>Jariala defor. map | Erdas |
| Faramalala | Landsat | ? | ? | ? |

**Image processing method**: Globally, projects mainly used supervised classification. Only the IEFN 0 project used visual interpretation. There is little information available to assess applied algorithms and parameters in detail, which limits replication opportunities of project analyses. For the Jariala project on forest trends, changes are assessed by combining satellite data for two years (2000-2005) and analyzing differences between the two data sets. There is little information on algorithm training data.

**Geometric correction**: Projects provide very little information on methods applied for geographic corrections of images. Given the importance of surface measurement for the development of a reference scenario, of the required emission reductions and of the link between national and project inventory, geometric accuracy should be impeccable and standardized for each survey phase. Only the Jariala project provides information on accuracy, without providing any detail on the applied method.

[57] Digitalized in 1995

**Table 3 –** Geographic correction

| Project | Geographic baseline | Image mosaic | Geometric and altimetric correction | Estimation of geographic error | Number of control points | Use of MNT (resol.) |
|---|---|---|---|---|---|---|
| Jariala | WGS 84 / Laborde | Unspecified | Yes, unspecified procedure | < 1 pixel (28.5m) | Unspecified | Unspecified |
| FAO | N/A | N/A | N/A | N/A | N/A | N/A |
| IEFN 0 | ? | ? | ? | Unspecified | ? | ? |
| IEFN 1 | ? | ? | ? | Unspecified | ? | ? |
| ONE | Laborde | No | No | No | ? | No |
| CEPF | Projection: UTM area 38/39 North Geod. Syst.: WGS 84 & Laborde | No, vectorized data assembly at the end of processing | Yes, no information on used model or control points. | No | Unspecified | No |
| Faramalala | ? | ? | ? | ? | ? | ? |

**Radiometric corrections**: As noted previously, most projects use supervised processing for image classification. This type of processing is highly sensitive to radiometric variations for a given image, between images in a given mosaic, and is even more critical for multi-temporal analyses (such as the Jariala project). Without corrections, classification errors are more important and heterogeneous depending on images. Project reports and publications do not specify if and how radiometric corrections were done.

**Table 4 –** Radiometric corrections

| Project | Radiometric correction | Processing |
|---|---|---|
| Jariala | Unspecified | Unspecified |
| FAO | N/A | N/A |
| IEFN 0 | N/A | N/A |
| IEFN 1 | Unspecified | Unspecified |
| ONE | Unspecified | Unspecified |
| CEPF | No | Unspecified |
| Faramalala | ? | Unspecified |

**Elimination of clouds:** Only the CEPF projects specified the applied method for semi-automatic cloud elimination, a combination of automatic and visual procedure to eliminate cloudy sectors. Missing sectors are filled with other available Landsat data where possible.

**Stratification:** All projects apply forest stratification, but each project chose a different stratification that does not systematically integrate the same criteria or necessarily include trends and land-use such as natural regeneration, plantations, degraded forests, etc. Other land-use categories such as savannas, urban areas, fires, and agriculture are not identified.

**Table 5 –** Applied land-use categories

| Project | Measure | Stratification | Base data | Link with carbon stock /biomass |
|---|---|---|---|---|
| Jariala | Forest trends<br>Forest/non forest | 4 classes (F/NF) | Bioclimatic areas (CEPF)<br>Altitude (BD500 FTM) | No |
| FAO | ? | | | No |
| IEFN 0 | Forest surface | | | No |
| IEFN 1 | Forest surface | | | No |
| ONE | Forest surface | | | No |
| CEPF | Forest surface | 10 classes | | No |
| Faramalala | Vegetation map | 12 classes | | No |

**Forest trends:** Projects focusing on deforestation do not take conversion type into account, i.e. land use after forest cover loss (extensive agriculture, urban areas, tavy, etc.) which limits monitoring of regeneration, plantations, and use of specific emission factors for conversion types.

**Calculation of uncertainties**: None of the project specified classification errors, errors by strata or category, or the final accuracy.

**Table 6 -** Uncertainties

| Project | Classification control | Methodology | Uncertainty |
|---|---|---|---|
| Jariala | Aerial photography (how much? year?)<br>Aerial video (2003, how many points?)<br>THR (which images?, which years ?)<br>Google Earth (Quickbird) | Confusion matrix (omission/commission) | ? |
| FAO | ? | | ? |
| IEFN 0 | Field | | ? |
| IEFN 1 | ? | | ? |
| ONE | ? | | ? |
| CEPF | Field | | ? |
| Faramalala | ? | | ? |

**Minimal mapping unit (MMU)**: minimal remote-sensing units are variable. The minimal representation unit for a category (land use) is not distinguished from the minimal unit for land use change detection.

**Table 7 –** Minimal mapping unit (MMU)

| Project | MMU Land Use | MMU Land Use Change |
|---|---|---|
| Jariala | 2 ha | ? |
| FAO | N/A | ? |
| IEFN 0 | ? | ? |
| IEFN 1 | ? | ? |
| ONE | 0.5 ha | ? |
| Atlas of the vegetation of Madagascar | ? | ? |
| Faramalala | ? | ? |