



Conservation and Improvement of Ecosystem Services for the Atsinanana Region through Agroecology and the Promotion of Sustainable Energy Production

Part I: Project Information

GEF ID

9793

Project Type

FSP

Type of Trust Fund

GET

Project Title

Conservation and Improvement of Ecosystem Services for the Atsinanana Region through Agroecology and the Promotion of Sustainable Energy Production

Countries

Madagascar

Agency(ies)

UNEP

Other Executing Partner(s):

Ministry of Environment, Ecology and Forestry (General Directorate of Environment and General Directorate of Ecology) and the National Association of Environmental Action (ANAE)

Executing Partner Type

Government

GEF Focal Area

Multi Focal Area

Taxonomy

Land Degradation, Focal Areas, Land Degradation Neutrality, Food Security, Sustainable Land Management, Sustainable Livelihoods, Sustainable Pasture Management, Ecosystem Approach, Community-Based Natural Resource Management, Income Generating Activities, Sustainable Agriculture, Restoration and Rehabilitation of Degraded Lands, Integrated and Cross-sectoral approach, Improved Soil and Water Management Techniques, Sustainable Forest, Convene multi-stakeholder alliances, Influencing models, Transform policy and regulatory environments, Demonstrate innovative approaches, Strengthen institutional capacity and decision-making, Type of Engagement, Stakeholders, Consultation, Partnership, Information Dissemination, Participation, Civil Society, Non-Governmental Organization, Community Based Organization, Private Sector, Individuals/Entrepreneurs, Behavior change, Communications, Public Campaigns, Education, Awareness Raising, Beneficiaries, Local Communities, Gender Mainstreaming, Gender Equality, Women groups, Gender-sensitive indicators, Sex-disaggregated indicators, Gender results areas, Capacity Development, Access and control over natural resources, Participation and leadership, Knowledge Generation and Exchange, Access to benefits and services, Capacity, Knowledge and Research, Innovation, Learning, Theory of change, Adaptive management, Indicators to measure change

Rio Markers

Climate Change Mitigation

Climate Change Mitigation 0

Climate Change Adaptation

Climate Change Adaptation 0

Duration

48in Months

Agency Fee(\$)

360,045

A. Focal Area Strategy Framework and Program

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
BD-4_P9	Managing the human-biodiversity interface (Output 1.1; Output 1.2; Output 1.3; Output 1.4; Output 2.2; Output 2.3;)	GET	1,324,201	10,000,000
LD-1_P1	Agro-ecological intensification. (Output 2.3; Output 2.4)	GET	800,000	5,900,000
LD-2_P3	Landscape Management and Restoration (Output 1.4; Output 1.5; Output 1.6; Output 2.1; Output 2.2; Output 2.4)	GET	341,553	4,000,000
CCM-1_P1	Promote the timely development, demonstration, and financing of low-carbon technologies and mitigation options. (Output 3.1; Output 3.2; Output 3.3; Output 3.4; Output 3.5; Output 3.6)	GET	1,324,201	10,000,000
Total Project Cost(\$)			3,789,955	29,900,000

B. Project description summary

Project Objective

To optimise sustainable land use management, biodiversity conservation, and access of local communities to renewable household energy security and climate change mitigation in Madagascar.

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
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Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
1. Strengthen national policies and the legal and institutional framework for mainstreaming biodiversity and landscape restoration	Technical Assistance	Enabling policy and institutional environment for integrating SLM, BD conservation and sustainable energy production within the national, regional and municipal frameworks	<p>1.1 Establish and operationalize multi-stakeholder / inter-sectoral coordination mechanism for SLB, BD strengthened at Atsinanana district landscape level in accordance with local authorities and administrations</p> <p>1.2 Regulatory framework (1. Environment Code of Madagascar, 2. National Agroecology strategy and 3. National strategy for land management) is drafted/amended to strengthen SLB, BD mainstreaming</p> <p>1.3 Stakeholders' knowledge on natural resources management at national, regional, district and municipal level are improved and data to support sustainable management of the biodiversity and forest resources of the Atsinanana Region is collected and available at the end of the project</p> <p>1.4 Institutions' capacity is strengthened across sectors to collaborate and manage the Atsinanana region landscape by the end of the project</p> <p>1.5 Two sectorial actions plans (agriculture, energy) developed that integrate biodiversity dimensions, sustainable energy and SLM</p>	GET	479,200	3,500,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
2. Ensure scaling up of SLM practices and agroecology in a wider landscape	Technical Assistance	Biodiversity management / ecosystem service provision mainstreamed in forest landscape management in two priority districts	<p>2.1 Conservation agreements entered into by MEEF and local communities resulting in the conservation and active management of at least 3,500 ha of globally significant biodiversity habitat.</p> <p>2.2 At least 500 ha of degraded land adjacent to or within identified High Conservation Value Forests restored using native and adapted species with bamboo if appropriate.</p> <p>2.3 For production cultivated land (4,800 ha targeted): technologies developed, tested and appropriate infrastructure established to operationalize SLM in line with developed ILMPs, namely : (i) incorporation of nitrogen-fixing trees into annual monocropping; (ii) improvement of planting methods and use of high yielding varieties; (iii) improved water management; (iv) increase in use of organic fertilizer and (v) integrated pest management.</p> <p>2.4 Local communities are capacitated on decision making about ecosystem services management</p>	GET	1,757,295	15,000,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
3. Improving rural energy generation systems and wood services to reduce deforestation	Technical Assistance	Local community, local leaders and private sector aware and contribute to rural energy strategy for Atsinanana Region	<p>3.1 Report on Rural Energy Assessment available for Atsinanana Region by the end of year 2 of project implementation</p> <p>3.2 Development of private sector/community engagement strategy of transforming the energy sector in Atsinanana Region towards use of sustainable energy technologies</p> <p>3.3 Training on alternative fuel and improved stove is provided for local communities and private individuals</p> <p>3.4 Demonstrate energy efficient and renewable energy technologies in the Vohibinany and Vatomandry Districts of Atsinanana Region: (i) 3,000 households adopt use of energy efficient cook stoves; (ii) one village electrified with one 25kW bamboo gasification generator</p> <p>3.5 300 ha of shrub species and bamboo plantation established for energy use and wood services</p> <p>3.6 Technologies transferred, adapted and produced locally as part of local enterprise activity</p>	GET	1,196,308	10,400,000

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Project M&E	Technical Assistance			GET	179,000	
Sub Total (\$)					3,611,803	28,900,000
Project Management Cost (PMC)						
				GET	178,152	1,000,000
Sub Total(\$)					178,152	1,000,000
Total Project Cost(\$)					3,789,955	29,900,000

C. Sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount(\$)
CSO	International Network for Bamboo and Rattan (INBAR)	Grant	1,000,000
CSO	Professionals for Fair Development (GRET)	Grant	7,000,000
CSO	National Association of Environmental Action (ANAE)	In-kind	1,000,000
CSO	PROSPERER - Programme de Soutien aux Pôles de Micro-Entreprises Rurales et aux Economies Régionales de Madagascar	Grant	2,000,000
CSO	Appui aux investissements durables (AIDES)	In-kind	100,000
Government	FID – Development Investment Fund	Grant	17,800,000
Government	Ministry of Environment, Ecology and Forests (MEEF)	In-kind	1,000,000
Total Co-Financing(\$)			29,900,000

D. Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount(\$)	Fee(\$)
UNEP	GET	Madagascar	Biodiversity		No	1,324,201	125,799
UNEP	GET	Madagascar	Land Degradation		No	1,141,553	108,447
UNEP	GET	Madagascar	Climate Change		No	1,324,201	125,799
Total Grant Resources(\$)						3,789,955	360,045

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)

PPG Required

PPG Amount (\$)

136,986

PPG Agency Fee (\$)

13,014

Agency	Trust Fund	Country	Focal Area	Programming of Funds	NGI	Amount(\$)	Fee(\$)
UNEP	GET	Madagascar	Biodiversity		No	45,662	4,338
UNEP	GET	Madagascar	Land Degradation		No	45,662	4,338
UNEP	GET	Madagascar	Climate Change		No	45,662	4,338
Total Project Costs(\$)						136,986	13,014

Core Indicators**Indicator 3 Area of land restored**

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
0.00	5600.00	0.00	0.00

Indicator 3.1 Area of degraded agricultural land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
	4,800.00		

Indicator 3.2 Area of Forest and Forest Land restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
	500.00		

Indicator 3.3 Area of natural grass and shrublands restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
	300.00		

Indicator 3.4 Area of wetlands (incl. estuaries, mangroves) restored

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 4 Area of landscapes under improved practices (hectares; excluding protected areas)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
0.00	297300.00	0.00	0.00

Indicator 4.1 Area of landscapes under improved management to benefit biodiversity (hectares, qualitative assessment, non-certified)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
	800.00		

Indicator 4.2 Area of landscapes that meets national or international third party certification that incorporates biodiversity considerations (hectares)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
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Type/Name of Third Party Certification

Indicator 4.3 Area of landscapes under sustainable land management in production systems

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
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293,000.00

Indicator 4.4 Area of High Conservation Value Forest (HCVF) loss avoided

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
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3,500.00

Documents (Please upload document(s) that justifies the HCVF)

Title	Submitted
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Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
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Expected metric tons of CO ₂ e (direct)	0	1013805	0	0
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Expected metric tons of CO ₂ e (indirect)	0	0	0	0
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Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
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Expected metric tons of CO ₂ e (direct)	1013805
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Expected metric tons of CO ₂ e (indirect)	
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Anticipated start year of accounting	
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Duration of accounting	
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Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
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Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO ₂ e (direct)				
Expected metric tons of CO ₂ e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
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Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female		7,000		
Male		8,000		
Total	0	15000	0	0

PART II: Project JUSTIFICATION

1. Project Description

OVERVIEW OF WHAT HAS CHANGED SINCE THE PIF STAGE

Topic	At PIF Stage	At CEO Endorsement Stage
Revision of Output 1.1	<p>At PIF stage it read:</p> <p>1.1 Strengthen existing multi-stakeholder / intersectoral coordination mechanism for SLB, BD at Atsinanana district landscape level in accordance with local authorities and administrations.</p>	<p>At CEO endorsement it reads:</p> <p>1.1 Establish and operationalize multi-stakeholder / inter-sectoral coordination mechanism for SLB, BD strengthened at Atsinanana district landscape level in accordance with local authorities and administrations.</p> <p>During project development and the validation stakeholders reported that there is no multi-stakeholder / intersectoral coordination mechanism for SLB, BD at Atsinanana district. Hence, instead of strengthening these mechanisms, the project will have to support their establishment.</p>
Revision of Output 2.2	<p>At PIF stage it read:</p> <p>2.2 At least 500 ha of degraded land adjacent to or within identified High Conservation Value Forests restored using bamboo as pioneer species.</p>	<p>At CEO endorsement it reads:</p> <p>2.2 At least 500 ha of degraded land adjacent to or within identified High Conservation Value Forests restored using native and adapted species with bamboo if appropriated.</p> <p>During project development and the validation stages, key stakeholders noted and recommended that it was not appropriate to assume that bamboo was going to be the most appropriate and desired species for all local pilot areas. Instead, the planting of bamboo should be subject to local acceptability and desires, as well as to its conformity with local ecology.</p>

Topic	At PIF Stage	At CEO Endorsement Stage
Co-financing	Estimated at time of PIF: 20,775,000	At CEO: 29,900,000. During the process of project development and the validation at country level, consultations with potential local stakeholders led more partners expressing interest in supporting and participating in the project. Specifically, institutions newly committed to co-financing the project include: Appui aux investissements durables – AIDES (USD 100,000 in-kind); Programme de Soutien aux Pôles de Micro-Entreprises Rurales et aux Économies Régionales – PROSPERER (USD 2,000,000 in cash); and Professionals for Fair Development – GRET (USD 700,000), Development Investment Funds – 17,800,000
Potential of avoided GHG emissions	43,044 tCO ₂ -eq GHG emission avoided over a 10-year period due to active management of forests by communities, and about 65,383 tCO ₂ -eq over a 10-year period sequestered as a result of enhancing carbon stocks through increasing of current vegetation cover.	Over a 20-year period, potential avoided GHG emissions of 1,013,805 tons of CO ₂ e resulting from changes in land uses. These changes include improved management through the conservation of at least 3,500 ha of globally significant biodiversity habitat, restoration of at least 500 ha of degraded land adjacent to or within identified High Conservation Value Forests, and improved management through the implementation of SLM in at least 4,800 ha of production landscapes. Within the same 20-year period, potential avoided GHG emissions of 1,080 tons of CO ₂ e will be achieved through the production of electricity by bamboo gasification, and through the use of improved cookstoves. See the project document for details on the calculation.

Estimated co-financing at PIF stage:

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
CSO	International Network for Bamboo and Rattan (INBAR)	Grants	165,000
CSO	National Association of Environmental Action (ANAE)	In-kind	100,000
Recipient Government	Ministry of Environment, Ecology and Forests (MEEF)	In-kind	100,000
Donor Agency	IFAD - Programme de Soutien aux Pôles de Micro-Entreprises Rurales et aux Economies Régionales de Madagascar	Grants	410,000
Donor Agency	JICA - Projet de développement de l'Approche Intégrée pour promouvoir la Restauration Environnementale et le Développement Rural (PRODAIRE)	Grants	700,000
Donor Agency	JICA - Projet d'Amélioration de la Productivité Rizicole sur les Hautes Terres Centrales (PAPRIZ)	Grants	9,650,000
Donor Agency	WB-IDA - Projet de filet de sécurité sociale (FID/ PURSAPS)	Cash	9,650,000
Total Co-financing			20,775,000

Cofinancing at CEO stage:

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Amount (\$)
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CSO	International Network for Bamboo and Rattan (INBAR)	Grants	1,000,000
CSO	National Association of Environmental Action (ANAE)	In-kind	1,000,000
Recipient Government	Ministry of Environment, Ecology and Forests (MEEF)	In-kind	1,000,000
CSO	PROSPERER - Programme de Soutien aux Pôles de Micro-Entreprises Rurales et aux Economies Régionales de Madagascar	Grants	2,000,000
CSO	Appui aux investissements durables (AIDES)	In-Kind	100,000
CSO	Professionals for Fair Development (GRET)	Cash	7,000,000
National Government	FID – Development Investment Fund	Cash	17,800,000
Total Co-financing			29,900,000

A.1. Project Description. Elaborate on:

1) the global environmental and/or adaptation problems, root causes and barriers that need to be addressed;

Madagascar is renowned for its highly endemic biological diversity, rich forests and a wealth of natural resources. However, the country is also plagued by environmental degradation, low agricultural productivity, and poverty. Madagascar's various ecosystems are home to more than 250,000 species of plants and animals most of which do not exist anywhere else.

Notwithstanding its very rich environmental heritage, Madagascar is suffering from many environmental problems. Madagascar's major environmental problems include: deforestation and habitat destruction; overexploitation of living resources including hunting and over-collection of species from the wild; erosion and soil degradation; agricultural fires; and the introduction of alien species. The impacts of the above problems for Madagascar and the international community are immense. For example, the 2007 IUCN Redlist^[1] includes 472 species at risk of extinction in the country. Approximately 55 species of endemic birds are threatened and 32 are already extinct, including the Alaotra grebe and Madagascar *pochard*. Many species, such as the tomato frog, *brookesia* chameleon, and flying fox are becoming increasingly threatened by the introduction of alien species, hunting, deforestation, and agriculture. At the local level, rapid environmental changes are contributing to the loss of ecosystem services that are vital to support local livelihoods and viable communities. The persistence of the above challenges is attributed to weaknesses in regulatory and policy frameworks for environmental governance, the lack of viable spatial and long-term planning in the management of land and land-based resources, and on the fact that local communities do not have alternatives (for example on choices of energy sources) in exploiting environmental resources.

Madagascar has experienced severe deforestation and fragmentation. Overall forest cover in the country decreased by over 40% between 1950-2000[2]² and by an additional 4.3% from 2000 to 2010[3]³. Slash and burn farming (tavy in local terms), logging for timber, land conversion for agriculture, fire, fuelwood, and charcoal production, and overgrazing are all major sources of deforestation and land degradation in Madagascar. Because agriculture is the mainstay of the rural economy, one of the largest drivers of forest clearance is the demand for additional agricultural land, driven primarily by population growth and the declining productivity of existing croplands. Another important factor is the demand for wood products for energy generation; one study estimated that wood energy (firewood and charcoal) accounts for 93% of energy supplies in Madagascar and is used by 82% of Malagasy Households[4]⁴. Natural forests provide an estimated 20% of the wood energy supply; this part of the wood energy sector consists of many thousands of small producers and is characterized by uncontrolled and sometimes illegal exploitation of forest resources. To further compound this problem, communities in Madagascar rely predominantly on slow-growth woods to produce the majority of their firewood and charcoal. In addition, the use of energy efficient stoves in homes in Madagascar is still extremely low, and the vast majority of Malagasy smallholders still use inefficient charcoal-making processes and cookstove technologies that typically have biomass conversion rates as low as 10% and energy efficiency rates of just 10-17%. The resulting inefficient burning of solid biomass both puts more pressure on forest resources and also is a major cause of health problems. For example, using business-as-usual scenarios for household energy generation and use in Africa, one study[5]⁵ estimated that cumulative emissions will reach 6.7 trillion tons of carbon by 2050, or 5.6% of Africa's total emissions; the same study also showed that emissions could be reduced by somewhere between 5-19% if African households intensively adopted efficient cookstoves and if SMEs used efficient charcoal production technologies.

Overall, loss of natural habitat in the country is estimated at 0.55% per year; given that more than 80% of plants, mammals, amphibians and reptiles are endemic in Madagascar, this rapid destruction and degradation of natural habitats is of immense global significance (Harper et al., 2007). A recent assessment of 2,300 floral species in Madagascar determined that 78% of the species were under threat of extinction, and according to the WB Data Portal, 540 plant species, 119 mammal species, and 87 fish species are threatened in the country. The primary threats to biodiversity are the destruction and degradation of natural habitats, over-exploitation of natural resources, mining and climate change. Information on the condition of biodiversity in the Atsinanana region is limited, including the levels of degradation of natural habitats. However, some data on existing species is available, which shows that the region harbours 16 endemic floral species (of 310 endemic species in the country) and seven endemic terrestrial fauna (of 106 endemic species in the country). The region is also known to harbour 20 species of freshwater fish, as well as 15 species of marine algae and 112 species of marine fish[6]⁶. In Atsinanana, significant land degradation and rapid deforestation continues to take place, including very high levels of slash and burn agriculture (which is prevalent in 75 of the 84 municipalities in the Region). Between 2005 - 2013, 22,892 hectares or 7% of the forest area was cleared[7]⁷, which has contributed to the high rates of soil erosion and declining agricultural productivity prevalent in the area. Fires from human or natural causes are also an important contributor to deforestation in Atsinanana; in 2007, an estimated 1,556 hectares of forest were burnt.

Root causes and threats: To forests – deforestation and land degradation

The historical causes of loss of forest cover, land degradation and a decline in the quality of ecosystem services in Madagascar are still present. The expansion of agricultural and cattle ranching activities, urban development, forest fires, encroachment of protected areas, illegal logging, the use of firewood in rural areas, and natural disasters are among such causes. The drivers of deforestation in Madagascar, including in the eastern regions where this project will be implemented, can be divided into three categories: a) structural drivers, b) direct drivers, and c) indirect drivers.

The main *structural drivers* of deforestation are high demand for land, unequal land rights, the complexity of property rights regimes, very high levels of population growth, limited access to employment and services, and insecurity and inequality related to land and income distribution. This is more evident in areas of the country where forests are replaced with cattle ranching, agroindustry for export, or where there is a lack of opportunity for livelihood: areas are deforested for cultivation to extract firewood for cooking, or timber products are traded illegally. Additionally, a long history of ill-advised public policies and policy instruments, such as soft loans, easy access to land, agricultural incentives and trade, industrial development, and technology transfer, have all further side-lined interest in forestry activities and the sustainable production of environmental goods and services.

Some of the major *direct drivers* of forest cover loss and associated land degradation include:

- a) Land use change: The constant expansion of agricultural areas continues to contribute to the conversion of forests.
- b) Firewood consumption: 80% of households in Madagascar depend on firewood for cooking and heating, especially in poor rural areas. At the national level, each household on the average consumes 5,531 cubic meters of firewood annually^[8]. Praene et al. (2017)^[9] identify four main uses of wood energy in Madagascar that are contributing to changes in forest cover in the country. These include the use of wood for: (i) Home cooking: In 2011, 92.64% of energy production of Madagascar rely on wood energy, against 7.36% petroleum products and less than 1% of renewable energies. In areas where there are logging and wood processing plants, residents nearby use residues for cooking and heating. (b) Brick cooking: Rapid population growth resulted in an increase in the construction of houses and the cooking of bricks – this practice is mainly based in the Analamanga region. Wood residues are among the three main fuels used with the peat and the rice ball. (iii) Drying in wood processing industries: In large wood-processing industries, a part of the residues is used for drying of wood through a boiler. (iv) Mixing with organic fertilizers: Wood residues (leaves, roots, sawdust) especially those left on the site are mixed with the manure as organic fertilizer. Praene et al. (2017) also quote USAID estimating the wood consumption in Madagascar in 2008 to be 21.7 million m³, including 41.8% for firewood and 39.7% for charcoal manufacture. In the Atsinanana region, it is estimated that up to more than 95% of the population relies on traditional firewood for energy.
- c) Illegal logging: although first-hand data are not available for the project's prioritized regions, national estimates indicate that illegal logging of commercial wood is a serious problem^[10].

Key *indirect drivers* of deforestation include a) High unemployment rate in the rural areas: Poverty and deforestation can be associated with the frequently low offering of non-agricultural-related jobs in the rural area. The lack of other income-generating opportunities and the lack of land available for agriculture forces the rural population to work in low-paying activities or to transform forests into unsustainable agricultural systems for farming. b) Institutional weakness in monitoring and control: Institutional weakness in monitoring and control is mainly due to: i) weaknesses in public institutions to manage and control forest use, little enforcement of related regulations, and lack of coordination among the institutions in charge of sectorial public policy related to the forest and environmental sector; ii) weak institutional presence in the rural areas, including a lack of qualified technical experts and equipment in the municipal offices, who would be tasked with managing forest and environmental issues; and iii) the scarce allocation of public funds for forestry-related institutions. Additionally, weakness and lack of coordination among the institutions responsible for sectorial public policy is an indirect cause of deforestation. c) Public Policies: Public policies historically have been oriented exclusively towards the development of farming, including encouraging farming activities in forests or rainforest lands. In general, policy instruments such as soft credits, land access, farming incentives, and technology transfer to encourage industrial development have not included environmental goods and production of services.

Root causes and threats to biodiversity - loss of biodiversity and associated ecosystem services. There are multiple threats to biodiversity in Madagascar, key among which are: loss, degradation, and fragmentation of habitat, water contamination, forest fires, and climate change. The *loss, degradation, and fragmentation of habitat* can endanger species survival and even contribute to extinction in severe cases. In the Atsinanana Region alone, the PPG thematic study reports that with an endemic rate of over 80%, further loss, degradation or

fragmentation of habitat can lead to very severe negative consequences for biodiversity[11]¹¹. In cases of loss, degradation, and fragmentation of habitats, local and regional endemic varieties are the most affected. *Contamination of water bodies* usually results from use of agrochemicals, including fertilizers and pesticides (insecticides, fungicides, and herbicides) is common, and the water bodies are contaminated directly through the washing of agrochemical containers or by simply throwing the containers into the water bodies, or indirectly by runoff. This is the case with areas of large-scale commercial production in Madagascar and the Atsinanana regions specifically. *Forest fires* play a role in the loss of forest cover, the forced migration of animal species, and habitat fragmentation. Forest fires in the Atsinanana Region are generally due to the traditional practice of slash and burn, as well as from the unintentional actions of land users. The impacts of *climate change* are already evident and will have drastic consequences in the short and medium term on the ecosystems and biodiversity of Atsinanana. The main negative effects of climate change on ecosystems are related to the increase in temperature, which implies higher water demands of the vegetation (evapotranspiration), and a sharp decrease in water availability due to drought and irregular rainfall patterns.

The threats to biodiversity as those of changes in forest area have both direct and underlying causes. Conditions of poverty and extreme poverty that prevail in the rural areas of the Atsinanana Region and in general in the rural areas of Madagascar constitute the principal cause for the loss of biodiversity in the region. A consequence of poverty is subsistence based on the exploitation of natural resources, including the transformation of natural ecosystems into agricultural fields and pasturelands for cattle ranching, hunting, and extraction of timber and non-timber forest products. The poverty rate of Madagascar stands at more than 80% of the population[12]¹². Poverty is manifested to a greater extent in the rural areas, where the situation is the most critical among local indigenous communities. Population growth in Madagascar in general, and particularly in the poor rural areas of the Atsinanana Region lead to the overexploitation of natural resources and the transformation of forested areas. The population growth rate of Madagascar stands at 2.5% - a substantially higher rate compared to many countries in East and Southern Africa[13]¹³. Structure of land tenure is related to the use of natural resources and biodiversity since land is the main factor for production. In particular, the demand for agricultural lands puts high pressure on existing natural ecosystems, biodiversity, and forests. The distribution of land in Madagascar also determines the distribution of wealth. Deficient environmental planning and weakness in the formulation and implementation of public policies. The application and enforcement of environmental regulations are weak both nationally and locally. This deficiency is due to a series of factors that includes regulatory gaps, limited capability within the groups charged with enforcing the law, inadequate policies, and limited inter-institutional coordination. The need for biodiversity conservation has not been properly incorporated into policies and regulations of multiple sectors. Additionally, limited budgets and inadequate budgetary allocation, lack of staff that are adequately trained to manage environmental issues and the effective conservation of biodiversity and duplication of functions and the lack of coordination among public institutions directly related to environmental issues on both the national and local levels, prevents the reduction of threats to biodiversity.

The long-term solution to the above threats to be addressed by this project will be to contribute to increased sustainable access to ecosystem services by supporting the implementation of SLB, BD management as well as the access to, and use of renewable energy and energy efficient cook stoves. However, there are a number of barriers that hinder efforts towards addressing the above-mentioned threats.

Barriers 1: Weak legal, policy and institutional framework for mainstreaming biodiversity conservation, sustainable land management and sustainable energy production: Land tenure is very problematic in Madagascar, and many rural populations who exploit the land legally are vulnerable to the illegal appropriation of their lands by political actors or economic operators, which greatly reduces their motivation to conserve natural resources. At the institutional level, coordination structures such as environmental committees were established as far back as 2003 to support the mainstreaming of environmental dimensions across sectors. However, despite the presence of these structures, the lack of experience and technical capacities to develop tools and approaches for integrating the conservation of biodiversity and ecosystem services into productive sectors, and to develop and disseminate critical information and knowledge management tools, has greatly limited the country's efforts to mainstream biodiversity conservation, sustainable land management, and other environmental priorities into the activities of planners and productive sectors. For example, although the updated 2014 NBSAP supports the integration of biodiversity into sectoral policies and strategic frameworks for poverty reduction, to date the integration of biodiversity and forest protection issues into other sectoral and cross-sectoral policies remains very

limited. Furthermore, an association of NGOs, Agricultural Research Centre and private agricultural operators called *Madagascar Direct Sowing Group (GSDM)*, with financial support from the French Government and technical support from CIRAD, IFAD and the World Bank, has implemented a number of projects focused on agricultural conservation and the development of integrated agriculture / livestock raising / silviculture production systems. Starting in the 1990s, these projects have identified a wide array of potential cropping systems suitable for various ecological zones in Madagascar with varying agro-ecological and socio-economic conditions and different levels of intensification and risk (Seguy, 2005). GSDM has proposed various forms of Conservation Agriculture to increase soil nutrients and preserve mycorrhizal associations between fungi and cultivated plants, with benefits for reducing erosion and increasing soil biological activity. However, although these projects demonstrated their high agronomic, environmental and economic performance, as well as their sustainability, their adoption has remained limited due to limited human and financial resources, the lack of an approach for expansion of these intensive knowledge systems, and the prevalence of smallholders with extremely limited capacities to invest in new production approaches. In terms of energy policy, Madagascar's existing energy policies do not focus on biomass and environmental management aspects and do not include appropriate measures to address rural biomass and energy demand that depends on forest resources. Furthermore, the country's law for Ethanol Production (2003) and related government policies constitute a significant risk of promoting land clearance for sugar cane cultivation, including within protected areas.

Barrier 2: Existing land management systems do not integrate sustainable ecological production and restoration processes to benefit rural smallholders. The ability of agricultural producers in the project target area and the country in general to generate sufficient production and incomes is constrained by many factors, including an already degraded resource base and limited availability of raw materials, which often results in over-exploitation and land degradation. However, these fundamental problems are compounded by the absence of an integrated vision and related solutions that take into account the entire array of problems in rural areas, such as land degradation, loss of biodiversity and resources, limited energy producing options, and food insecurity that together compel rural households to carry out activities that are unsustainable. Existing land management systems are a combination of modern and traditional systems, and while the national government, through regional and local affiliates, promotes measures and projects to improve productivity, these are not always adapted to respect local needs and available resources. Furthermore, even where the Government of Madagascar has begun to enact integrated sustainable land management and restoration projects, these frequently rely on the planting of exotic, fast-growing tree species such as eucalyptus, which are known to have negative biochemical impacts on native species, as well as negative influences on water, biodiversity, and soil nutrients and loss. As a result, rural communities in Madagascar do not have the policy and institutional support or training and information necessary to develop resource management systems that integrate agriculture, forestry, fisheries, water, and livestock management; are adaptive for potential future impacts, including climate change; and focus on both increasing levels of output and productivity while also maintaining the ecological integrity of the land.

Barrier 3: Existing practices for rural energy production are inefficient and do not utilize sustainable locally-produced biomass. Lack of access to electricity among rural inhabitants in Madagascar, combined with the inability of most rural inhabitants to pay for generators, renewable energy generation, and other options, produces a high level of demand for wood products from a very degraded forest landscape. Development of sustainable and profitable wood resource production systems, such as bamboo, could reduce the pressure on the natural forest landscape significantly, but is constrained by a lack of experience and capacities among resource management agencies and local communities in bamboo cultivation or the production of additional economic benefits from bamboo products that would make it more competitive with harvesting of natural wood or other energy supply options. The level of demand for wood resources also can be reduced by the use of more efficient wood energy production processes, including more efficient charcoal production and more efficient wood-burning stoves. However, in Madagascar rural inhabitants as well as micro and small businesses that might serve them do not have the experience or technical and financial resources to adopt these technologies and improved practices, and in many cases, are not aware that such alternatives exist. In addition, adoption of more efficient energy production and use technologies is constrained by the lack of financing mechanisms that can make the adoption of these technologies financially feasible.

This project will support the institutional and regulatory enabling environment for the management of land and land-based resources by improving the framework for natural resources governance through incorporating SLM, and BD management in key policy and regulatory governance frameworks. It will also build the capacity of institutional actors in understanding, amending, and implementing these frameworks for the benefit of SLM, and BD management.

In contributing to address issues of land and land-based resources management, this project recognizes that zoning of Malagasy forests is a critical condition to facilitating better management of national forests. The purpose of zoning is to help provide a strategic vision for forest management over a given period of time. Zoning facilitates greater transparency

as well as improved management. This project will therefore contribute to: (i) supporting community-based management of natural resources; and (ii) supporting and build capacity in the development and implementation of land management plans; (iii) reinforcing land tenure legislation to help improve the land tenure system.

In the domain of rural energy, this project will contribute to: (i) reducing the need to extract forest resources by reducing dependence on fuel wood for cooking with alternative energy sources and technologies. This will reduce pressure to harvest fuel wood from adjacent protected and unprotected areas; (ii) improve technical efficiency of energy biomass consumption by utilizing efficient biomass with little environmental impact to create biomass energy (through gasification) for local communities and to enhance quality of life and livelihoods for households; and (ii) proving local access to efficient tools (cookstoves) for household energy use.

2) the baseline scenario or any associated baseline projects,

Baseline Projects in the Agricultural sector:

Vocational Training and Agricultural Productivity Improvement Programme – FORMAPROD (2012-2022): This is a project financed by the IFAD at a total cost of US\$ 97.38 million^[14]¹⁴. The goal of FORMAPROD is to contribute to an increase in the income of smallholder farmers through professional and vocational training, leading to higher productivity and improved marketing of agricultural products. The target group consists of 2.7 million households in 13 regions – a total of 7 million people, or about 20 per cent of Madagascar's rural population. FORMAPROD specifically aims to support vulnerable groups, with special attention to uneducated youth and young women who are heads of household. The programme's three primary components include: supporting the development and implementation of the National Strategy for Agricultural and Rural Training; operationalizing the regional system of rural and agricultural training, and ongoing vocational training; and increasing agricultural productivity. FORMAPROD is being implemented in Atsinanana, and some of the skills required by this project to support the growth entrepreneurship among local populations have already been imparted on some sections of the population. This project will collaborate with FORMAPROD to identify and fill the gaps needed to sharpen entrepreneurship in the renewable energy value-chain in the Atsinanana region. This way, resource use will be targeted to relevant gaps – avoiding duplication and streamlining the development of relevant skills.

Improve Agricultural Productivity in Madagascar (Améliorer la productivité agricole à Madagascar, PAPAM) (2016-2020) is a project being funded by the French Agency for Development (AFD) and implemented by the Ministry of Agriculture^[15]¹⁵. Its main objectives include: (i) development of support services for farmers and their organisations (counselling, training, investment), and the sustainable improvement of farm productivity through diversification and agroecological intensification of production systems^[16]¹⁶. The project intends to contribute to sustainable impact at three main levels: (a) At the economic level through the sustainable improvement of the productivity and income of agricultural holdings, notably through diversification and agro-ecological intensification of production systems and the development of irrigated perimeters built or rehabilitated during previous projects. (b) At the environmental level through the promotion of agroecological practices and reforestation (wood-energy). (c) At the institutional level through the development of support services for farmers. Collaboration with PAPAM will be at the level of supporting the incorporation of SLM in the sustainable improvement of the productivity and income of agricultural holdings, notably through diversification and agro-ecological intensification of production systems. This collaboration will include the identification of potential SLM best-practices to promote and their demonstration for local sampling and adoption.

Madagascar Sustainable Landscape Management Project (2017-2022): This is a US\$ 13.6 million GEF Trust Fund project being implemented by the World Bank. The goal of this project is to increase access to improved irrigation services and agricultural inputs and strengthen the integrated management of natural resources in the targeted landscapes by the local actors and, to provide immediate and effective response to an Eligible Crisis or Emergency. The beneficiaries of the project are smallholder farm households in the targeted

landscapes that depend on land, forestry and agro-forestry resources for their livelihoods. These farm households and their communities will benefit from the improved management of the natural resources and improved access to productive inputs. The current project offers SLM as a tool for improved land use management that can contribute to enhancing the productivity of smallholder farmers in the Madagascar Sustainable Landscape Management Project.

Project to Support Development in the Menabe and Melaky Regions – Phase II (AD2M-II) (2015-2022): This is a project financed by the IFAD to the tune of US\$ 56.7 million, with co-financing from the OPEC Fund for International Development. AD2M-II aims to improve sustainably the incomes and the food security of smallholder producers of Menabe and Melaky regions in Madagascar^[17]¹⁷. This will be done by helping to strengthen and build smallholder farmers' resilience to the effects of climate change through the development of irrigated agriculture including spate-irrigation and the natural resource management approaches. The project will help the smallholder family farmers to improve the agricultural production and the marketing of their products. It will continue addressing the issue of land tenure security and work to safeguard land rights of the smallholder farmers so that they can invest more in their land and increase their incomes. The current project sees land tenure as an essential element of consideration while developing and implementing land use plans. Lessons learned with smallholder producers of the Menabe and Melaky regions will be useful in mitigating potential downsides associated with land tenure changes and rights. Collaboration with AD2M-II will therefore contribute to supporting a sound basis for land tenure security.

Rural Junior Enterprise Project in the Middle East (Projet Jeune Entreprise Rurale du Moyen-Ouest, PROJERMO) - Ministry of Agriculture: 5 years (2016-2021): PROJERMO is an extension of the project Young Rural Entrepreneurs (PROJER), financed by the African Development Bank from 2000 to 2007 in Madagascar. PROJERMO aims to consolidate on the one hand the achievements of the PROJER and on the other hand to extend its interventions in other contiguous regions. The project will support the evolution towards an agriculture that better meets the needs and demands of the domestic market, the agri-food industry, and external markets. The objective of the project is to improve the income of the target population through support for rural businesses and to contribute to the increase of agricultural production in Madagascar^[18]¹⁸. This support from the project preparation financing mechanism (PPF) will: (i) establish a baseline situation for the rural entrepreneurship project in the Middle West; (ii) develop development proposals for new areas of intervention and development of non-financial support services to agricultural enterprises; (iii) define a strategy for the development of private investment in agriculture and a development plan for three promising agricultural value chains; (iv) to evaluate the economic viability of the proposed investments; (v) to carry out feasibility studies, and ODA and DAO of selected options for hydro-agricultural development, rural roads, and other infrastructures; and (v) to carry out an environmental and social impact study of the proposed activities and infrastructures. PROSPERER (a co-financing partner of the current project) is a technical partner of PROJERMO. The knowledgebase of PROJERMO and PROSPERER will be used to establish baseline condition for the current project. PROSPERER will also support partnership with PROJERMO in developing the renewable energy value chain, building on existing on-the-ground social, economic and institutional networks with which PROJERMO and PROSPERER have developed and been working with.

Sustainable Agriculture Landscape Project (2017-2022) is a GEF Trust Fund project with the objective to improve agricultural productivity and management of associated natural resources in selected landscapes, and to set up a landscape approach to promote sustainable agriculture nationwide in Madagascar. Many aspects of Component 2 of the current project align with those of the Sustainable Agriculture Landscape Project. The nationwide reach of the Sustainable Agriculture Landscape Project offers avenues for collaboration in which lessons learned from the current project can be channeled to a national audience. Also, the current project can draw of experiences from the Sustainable Agriculture Landscape Project's operations in diverse landscapes to build a foundation for a more viable intervention on matters of SLM in project pilot locations. This project that builds on a close collaboration between the GEF, the World Bank, and the French Agency for Development (AFD), will help the rural population of Madagascar to better manage the natural capital provided by agricultural lands, forests, and protected areas.

Baseline projects in the energy sector:

With support from IFAD, INBAR implemented a project from 2010-13 entitled "*Integration of livelihoods of the poor and addressing environmental degradation with bamboo in eastern and southern Africa*". It represented the first major attempt to formalize a market for an NTFP (bamboo) in Madagascar by improving cooking stove technologies and

production of charcoal, coupled with development of a value chain for bamboo resources intended to help provide sustainable renewable energy, improve rural and urban livelihoods, and support landscape restoration and mitigation of climate change and adaptation. In partnership with MEEF and the IFAD projects on **Promotion Program for Rural Knowledge (PPRR) and Support Programme for rural Micro-enterprises and Regional Economies (PROSPERER)**, INBAR established four mother nurseries and 67 village nurseries, introduced the use of five species of bamboo from India that produce high biomass yields and offer significant potential for value-added products, trained 1,500 youth in various value chain activities, and established two bamboo charcoal production centres. The proposed project will benefit greatly from the models and lessons learned in this INBAR project (INBAR is a key project co-financing partner).

The **National Ethanol Fuel Program** (2016-2030) is a state program to facilitate ownership of household ethanol cookstoves. The program is an initiative of the Government of Madagascar and partnerships will be developed progressively, but the World Bank is already supporting various studies to design the program implementation phase. The program cost is estimated at \$15 million for the first ten years, primarily for coordination and implementation of production areas and small industrial units. The pilot site for this program is the Atsinanana region. The current project is working towards similar goals as the National Ethanol Fuel Program – supporting the achievement of locally sourced energy for rural communities in Madagascar. There is therefore scope for cross-fertilization of knowledge and experiences on the models of local engagement that are being tested and have worked in the case of the National Ethanol Fuel Program. Collaboration with this project will also identify areas of common interest in outreach and project implementation, hence avoiding duplication of effort.

Madagascar Enterprise Development Project (MED): MED is a long-term project being implemented by the organization AIDES. MED is a support program for project promoters and small enterprises in Madagascar. This program responds to the practical problems of entrepreneurs, and aims to strengthen through training and field accompaniment, their management skills and economic performance, through appropriate and practical training, the transmission of management tools and specific support for each entrepreneur. MED accompanies project promoters (from idea to full project development, and project to implementation), producer associations and local urban and rural entrepreneurs who have identified training needs on rural energy related topics. Until 2018, the programme has trained more than 600 micro enterprises, 60% of which are women. This project will benefit from the existing networks and structures developed and maintained by MED at the local level, as they operate in the two pilot districts of the current project. The established and recognized expertise of AIDES as a platform for supporting the development of small and medium sized enterprise development will be essential in the development of the renewable energy value chain of the current project (Component 3).

The PAGE Programme supported by GIZ (2015-2020)[19]¹⁹: In partnership with the Ministry of Environment and Sustainable Development, the GIZ leads, through the ECO consultation study office, a Programme of Support to Environmental Management (PAGE). A component of this program aims to improve the diffusion and professionalization of the biomass energy value chain (users of reforested surfaces, charcoal producers, charcoal sellers, improved stoves producers, etc.) to reduce fuel use in 3 regions: Diana, Boeny and Atsimo Andrefana. Thus, this component is involved, inter alia, in the setting up of a chain ranging from production to the marketing of improved coals and stoves (establishment of the production chain, supply, subsidized production equipment, training of craftsmen, etc.) and their marketing (networking of value chain players).

According to the 2020 vision[20]²⁰, the current annual consumption of the Diana Region is in the order of 24,560 tonnes of charcoal and 187,757 tonnes of firewood. According to the PAGE Eco, about 5,600 people live from carbonization activity in the Diana Region. The project supported the establishment of new energy plantations of around 9,000 ha until 2015. Coalfield reforesters were trained in the use of improved reversed grinding wheels. Currently, the training extends over a vast area with a very high intensity in the axis of the National Road n°06. The use of the improved reversed grinding wheel shortens the carbonization time and also has a better weight yield of up to 20%. While PAGE does not specifically operate in the Atsinanana region, many lessons can be learned on its work in the development of value chains involving the supply, subsidized production equipment, training of craftsmen in the production of household energy accessories, etc. This project will therefore liaise with PAGE to learn from and share relevant experiences. In this collaboration, materials developed by PAGE for capacity building will contribute to the design of materials for capacity building in project pilot locations.

The AFIBERIA Projects of Planète Urgence and ARINA[21]²¹ supported by CIRAD: These are two projects funded largely by the European Union. The AFIBERIA project or Supporting the Wood Energy Sector in Itasy and Analamanga Region and the objective is to structure the wood energy sector in these two regions. Support for this included reforestation in these areas, the formation of coal miners for the adoption of improved carbonisation and the dissemination of improved cookstoves in the capital. Support for reforestation efforts reached 1,450 ha in 2015. Until August 2017, the AFIBERIA project was able to train 1,058 coal miners out of a target of 1,500. CIRAD's ARINA project was launched in parallel with AFIBERIA. The objective of the project is to sustainably strengthen the production capacity of wood energy of the organised rural populations and collectives in the fields of forest planting, carbonization, energy efficiency and product marketing. Thirty thousand improved cookstoves are expected to be produced by 18 craftsmen trained and supported by the project in the Analamanga region.

PROSPERER/INBAR Bamboo Carbonization Dissemination Project: Since 2004, INBAR has supported the transfer of technologies for upgrading bamboo including carbonization (for raw coal and briquettes). The project developed the manufacture of bamboo charcoal in Mahajanga, Port-Berger, Toamasina, Mananjary and Fianarantsoa. 7 coal pilot domes, 5 to 10m² were built and 700 farmers were trained for their use, according to INBAR. This training on carbonisation is mainly carried out with the PROSPERER programme, which has already trained 230 rural micro-enterprises in coal production. This program trains farmers on technology at the level of training centres such as Ilaka-Est and Niarovana Caroline de Vatomandry. At the end of the project, its bamboo processing yield is 60%.

National experience in promoting and disseminating improved stoves

Dissemination experience can be divided into 2 approaches: business approach, or with project support.

(i) Commercial approach

Improved OLI C/B hosts produced and disseminated by the NGO AIDES: The NGO AIDES works in several regions of Madagascar to promote improved stoves that save 65% of wood and coal and to raise awareness of their use at the population level, in particular urban households. This NGO has set up its own manufacturing workshops and offers several ranges of improved cookstoves sold at 10,000 MGA for wood cookstoves and from 15,000 MGA for coal cookstoves. It sets a sales target of 12,000 stoves per year. To promote and disseminate these stoves, this structure takes a commercial approach by opening retail outlets (Antananarivo, Toliara, Mahajanga, Fianarantsoa, Antsirabe, Ejeda, Morondava, etc.) or by developing distribution networks and offering 3-year guarantees. AIDES monitors its customers on the use of its stoves to collect their feedback and improve its performance. It also benefits from the support of projects and NGOs such as the World Wildlife Fund (WWF) and Welthungerhilfe (WHH) to distribute the stoves. Such support can take the form of advertising of stoves in the mass media, organisation of events for the promotion of stoves, wholesale purchase of stoves for the purpose of subsidized distribution or sale.

The TSINJOHARENA improved stoves produced and distributed by TANDAVALANA: This NGO has set up its own workshop with the support of the CNRIT research centre and is looking to disseminate products especially in rural areas. It sets a target to commercialize 40,000 stoves and incorporates carbon credits from that volume. Products are sold at 5,000 MGA for wood cookstoves and coal cookstoves between 10,000 and 12,000 MGA. The NGO markets its products on its own in markets or at events. It does not have a point of sale.

(ii) Promotion of improved stoves with project support

This action is practiced by technical and financial partners including CIRAD, GIZ with NGOs such as the ANAE association, the TANY MEVA Foundation. Two approaches are developed: (i) it involves engaging and training farmers and craftsmen in the development of a model of improved stoves, the creation of a manufacturing workshop, and then accompanying producers in marketing by connecting them with a distribution network. (ii) In addition, the projects invest directly in beneficiary target group training. Training covers how to manufacture their own improved, often fixed, stoves. This approach was adopted by the NGO FAFIFI in the Itasy Region, and ANAE in the Boeny Region.

In addition, these projects can also organize communication and awareness events on the use of improved stoves, in partnership with the producers of stoves to promote their products. Stoves can be offered at low prices in order to attract a large clientele and make the technology known to as many people as possible.

3M Stoves distributed with ASA support: A network of improved stoves manufacturers has been set up by the ASA programme. Stoves are distributed by sales outlets in Antananarivo accompanied by an advertising campaign. In partnership with CNRIT, the AFIBERIA project funded by the ASA programme has set up 18 workshops to produce improved stoves to meet the objectives of the two projects and produce and market 70,000 stoves over the next three years.

The Kopandroa stoves distributed by ANAE: Disseminating these stoves is done in collaboration with the National Environmental Action Association or ANAE and the Regional Directorate of Environment, Ecology, Sea and Forests. The Kopandroa cookstove is made from earth and clay. It uses as fuel bozaka charcoal, made from biomass and clay release. Considering its socio-cultural, economic and environmental effectiveness, the unique feature of the Kopandroa stoves is that their technology is within the reach of local communities' knowledge levels. Raw materials are available on site and do not require additional materials. NAWA has trained direct users (hence households) to make this stove more widespread and popular.

The Pipa stoves distributed by Fondation Tany Meva: The Tany Meva Foundation, through its Angovo Meva project, has promoted the Pipa stoves. It is an upgraded cookstove for reducing wood consumption, cooking time, reducing the incidence of respiratory diseases through smoke removal and cleanliness of the cookstove. These improved stoves are promoted in 3 Regions including Analamanga, Atsimo Andrefana and Vakinankaratra. More than 3,800 biomass stoves were distributed to 3 regions, including Analamanga, Atsimo Andrefana and Vakinankaratra.

The **Kamado** improved stoves through Japanese cooperation: The kamado stoves are disseminated through the activities of Japanese volunteers. They made their appearance in the commune of Andramasina. Kamado as an improved cookstove using firewood as a source of energy. It is made from materials found in rural areas such as clay, red soil, ashes, straw and water. The purpose of its extension is to be able to save firewood, reduce cooking time and have better management of the wood resource. With its technological features and easy manufacturing, WWF and the NGO Tandavanala are collaborating with JICA-Madagascar for training and demonstration sessions for households living on the outskirts of the Forest Corridor Fandriana – Vondrozo.

Baseline projects in the forestry sector:

Sustainable Landscapes in Eastern Madagascar (2017-2026) is a US \$53.5 million Green Climate Fund medium-sized project being implemented by Conservation International Foundation (CI), and the European Investment Bank (EIB). The goal of this project is to implement sustainable landscape measures to enhance resiliency of smallholders, reduce GHG emissions and channel private finance into climate-smart investments in agriculture and renewable energy that transform livelihoods. The Project aims to demonstrate a replicable model for addressing smallholder vulnerability that mobilizes both the public and private sector. The project will achieve this by improving resilience to climate change of the vulnerable local population; avoiding/limiting deforestation of world-class natural forests and other habitats for the conservation of biodiversity and ecosystem services; improvement or protection of the ecosystem services of natural habitats; strengthening the communication management capacity, the management of protected areas and the maintenance of ecosystem services; and working to reduce soil erosion and improvement of soil structure and fertility through sustainable agricultural practices. Operating in roughly the same geography as the Sustainable Landscapes in Eastern Madagascar project, the current project sees strong avenues for collaboration in the implementation of aligned strategies and the achievement of common goals.

National Environmental Dashboard (“Tableau de Bord Environnemental - TBE”) is a system for environmental information managed by the National Office for the Environment^[22]. The main objective of this system is to monitor the state of the environment in Madagascar and its evolution. This system serves as a decision-making tool for decision-makers and economic actors at all levels, environmental managers, universities and research centers, consulting firms, students, tourists, journalists and all other opinion makers. The idea is to make data and information available to assess the environmental impacts of different economic policies and activities, to guide policy makers and the activities

of different actors, to raise economic awareness of environmental issues, assess the progress and management of the environment and natural resources, and integrate economic and environmental decisions. The current project will undertake activities that generate data, such as the assessment of rural energy (Output 3.1) and the implementation of SLM in line with ILMPs (Output 2.3). Activities in these outputs will both draw on existing data sources in the Environmental Dashboards, as well as contribute emerging data to these dashboards.

Responsible Land Policy – ProPFR (2017-2021) is a project being implemented by Eco Consulting Group on behalf of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)[23]²³. The project involves three core initiatives, geared towards realizing tangible benefits through sustainable forest management by local stakeholders: (i) mainstreaming of improved land-administration procedures and protocols, (ii) sustainable valorisation of forest resources, and (iii) empowerment of local stakeholders for more effective participation on a regional scale. ProPFR is working in pilot villages to undertake practical demonstration, capacity development and subsequent upscaling of SLM best practices, lessons learnt and "success stories".

National Development Plan (NDP): A National Development Plan (NDP) was adopted for the period 2015-2019. The NDP highlights the value of Madagascar's natural capital and provides new direction for the country's economic development based on an inclusive and sustainable approach". Axis number 5 of the National Plan states the need to "value natural capital and reinforce resilience to natural hazards", additionally it makes reference to "the integration of natural capital within economic and social development planning, and the national accounting system". The Action Plan to implement the NDP refers to natural resources as a legacy for future generations, and it includes, as an expected result, the responsible management of natural resources articulated within economic development. The NDP has a land based approach, highlighting the role of land use planning tools. This project aligns with the NDP in terms of the common desire of both projects to valorise Madagascar's natural capital and ensure sustainable use through efficient planning. Also, many of the ministerial bodies and state agencies involved with the NDP are also partners in the current project. Through strategic collaboration, the current project will therefore support to strategic planning, improving governance, technical assistance for policy implementation, support for operations and implementation of NDP programs.

Cross-cutting Gaps

To achieve the goals of SLB, BD management and the mainstreaming of renewable energy, there are some gaps in the policy and practice of natural resources management that the Atsinanana Region has to address. This project contributes to addressing these gaps.

Capacity building needs: Agroecology is an approach based on the combination of challenging principles (renewal of biomass, maintenance of soil fertility, minimizing water losses, erosion control, genetic diversification in time and space, improvement of biological interactions between organisms, innovative approaches to fighting against pests and diseases, and agriculture-livestock integration).

The technique applies ecological concepts and principles to agriculture, while the socio-economic and cultural dimension generates a transformation of the modes of management of this system and the economic environment of production in a participatory dynamic. These are demanding concepts and a radical change to the conventional approaches to improving land productivity and managing agricultural challenges. Capacity-building is necessary to enhance the ability of local land users and decision-makers to grasp these concepts and apply them to address local needs for SLM, and biodiversity management. Capacity building will concern not only adapted agricultural techniques but also local governance, the social organization of communities, the management of household waste, awareness of the economic importance of soils and the development of promising sectors. Several training activities of the current project contribute to building the above-indicated capacity needs.

Land degradation neutrality (LDN): One of the major outcomes of UNCCD-COP12 was the adoption of land neutrality (LDN) target. Within the LDN framework, countries have committed to ensuring that the amount of healthy and productive land stabilizes starting in 2030. The parties also agreed on the indicators they will use to measure progress, strengthen measures to make the land resilient to climate change and to halt the biodiversity loss that follows the destruction of ecosystems. Countries are expected to formulate

voluntary targets to achieve LDN according to their specific national circumstances and development priorities. LDN targets directly respond to countries achieving SDG 15- Life on Land and specifically meeting target 15.3: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world. Madagascar's specific targets to achieve LDN include: (i) improving the productivity and carbons stocks in cultivated areas and grazing areas; (ii) improving the cover of green infrastructure; (iii) reducing the conversion of forests into other types of land cover by 2030; and (iv) reducing conversion of wetlands into other types of land cover by 2030[24]²⁴. The contribution of this project in developing land use plans and implementing them for the benefit of sustainable land use contributes to the achievement of Madagascar's goals of attaining land degradation neutrality.

Improvement of the local governance: The continual waste of the forest's natural resources is a consequence of the weak functioning of the forest administration. Thanks to GELOSE, the decentralization of the management of protected areas is currently applicable everywhere on the Malagasy territory. However, flaws are still observed in the application of this approach of forest resources governance. It is thus necessary to support local leaders through training in sustainable methods of land management, resources utilization, and in the use of informed decision-making regarding the use of natural resources. In addition, the forest is traditionally considered as an inheritance of the ancestors - the access and use of which are governed by the customary authorities. These customary authorities are generally subject to indigenous people's customs and traditions. The influence of local authorities on communities is, therefore, a powerful factor to consider during project implementation – a factor that has not been properly integrated into the management of forest resources by other initiatives. For better governance, it is necessary to provide tools and an enabling framework that helps local people in solving the problems related to land. The conservation agreements that this project will support between the MEEF and local communities contribute to addressing this gap.

Social organization of communities. The creation of peasant organizations has developed in Madagascar since the state's withdrawal in the management of community resources in 1990. However, research suggests that these peasant communities have weaknesses that limit their ability to properly apply their role as natural resource managers at the local level[25]²⁵. To ensure the effective practice of agroecological techniques as well as the effective implementation of techniques of SLM, and BD management, it is necessary to strengthen the capacities of the peasant communities through training in good governance. Indeed, if the farmers are well organized, the diffusion of the techniques would be better. This project will provide capacity building and organizational support that supports the ability for peasant organizations to function more effectively, and to take advantage of opportunities offered by renewable energy value chains.

3) the proposed alternative scenario, GEF focal area[26]²⁶ strategies, with a brief description of expected outcomes and components of the project,

Project goal: This project will contribute to increase sustainable access to ecosystem services by supporting the implementation of SLB, BD management as well as the access to, and use of renewable energy and energy efficient cookstoves. This will be achieved by strengthening the integrated management of natural resources in the targeted landscapes, empowering local communities and institutions to play a more active and direct role in protecting and managing natural resources in their communities, and providing the enabling framework for the effective implementation of SLB, BD management and renewable energy development (capacity building and a responsive regulatory framework).

Project objective: The objective of this project is: To optimize sustainable land use management, biodiversity conservation, and access of local communities to renewable household energy security and climate change mitigation in Madagascar.

Project components and expected results

To arrive at the goal of increasing sustainable access to ecosystem services by supporting the implementation of SLB, BD management as well as the access to, and use of renewable energy, this project will have to achieve three outcomes (see Figure 7). (i) Provide an enabling policy and institutional environment for the integrating SLB, BD conservation and sustainable energy production within regional and municipal development frameworks; (ii) Mainstream biodiversity management and ecosystem service provision into forest landscape management; and (iii) Develop and implement a renewable energy strategy for the Atsinanana Region. The achievement of these outcomes occurs through the implementation of 16 outputs (Figure 7). Inputs to achieve the desired outcomes and goal of this project include practical applications of SLM and BD management; active engagement of communities in landscape conservation; capacity building of local residents and relevant institutions; the introduction of renewable energy technologies and a value chain to support sustainable development in the renewable energy sector; rural electrification; and technology transfer.

This project will use the Resilience, Adaptation Pathways, and Transformation Assessment (RAPTA) Framework to establish baselines (social, economic, and biophysical) and identifying impact indicators. The RAPTA Framework includes components on multi-stakeholder engagement and governance, and theory of change (e.g. an explicit description of how planned interventions will achieve, or contribute to the objective, underpinned by a set of assumptions) that will be useful in designing the project. The multi-stakeholder and cross-sectorial nature of this project therefore makes RAPTA ideal tool for applying the participatory process vital for achieving key outcomes^[27]²⁷. Additionally, RAPTA is useful in assessing the resilience of protected areas and production landscapes, and the need for adapting or transforming the social-ecological system in order to achieve sustainability.

Component 1. Strengthen national policies and the legal and institutional framework for mainstreaming biodiversity and landscape restoration

In 2003, an environmental unit was created in each sectorial department, with the target to mainstream the environmental dimension. The activities related to mainstreaming environment dimension (biodiversity, sustainable energy, and SLM) are developed by these structures in the Ministries in charge of agriculture and energy. As indicated in the baseline section, the lack of experience and technical capacities to develop tools and approaches for integrating the conservation of biodiversity and ecosystem services into productive sectors, and to develop and disseminate critical information and knowledge management tools, has greatly limited the country's efforts to mainstream biodiversity conservation, sustainable land management, and other environmental priorities into the activities of planners and productive sectors. The proposed project will assist in removing the main barriers to mainstreaming biodiversity conservation, sustainable forest management, sustainable land management, and sustainable energy production by strengthening national policy, regulations and capacities for SLM to integrate bioenergy, biodiversity, and livelihood considerations; demonstrating integrated land and forest management at a landscape level, and promoting wider adoption of efficient renewable energy technologies by households to reduce demands on natural forests. The project will enable stakeholders to produce an enabling legal, policy, planning and institutional environment for integrating sustainable land and forest management principles within the national, regional, district and municipal level frameworks. At the national level, the project will strengthen the efforts of the Ministry of Environment, Ecology, and Forests by assisting in the drafting of related Chapters to the Code of the Malagasy Environment, the development of a National Agroecology strategy, and the dissemination of policy recommendations on SLM and BD mainstreaming. The project will ensure stronger inter-sectoral coordination and capacity building on integrated natural resource management, with a specific focus on intensifying agriculture through SLM. Capacity strengthening and knowledge management at the grassroots and higher governmental levels through peer-to-peer learning, systematic capacity building, and information dissemination will be carried out, focusing on critical issues of SLM practices, forest rehabilitation, promotion and financing of bioenergy, community-based natural resource management and monitoring of threats to biodiversity.

Furthermore, to address the threats of land degradation and biodiversity loss related to the agricultural and energy sectors, sectorial action plans will be developed on how these sectors can be actively engaged and how their practices can be adapted to provide support to produce environmental as well as developmental benefits. To increase funding and mainstreaming of biodiversity, sustainable energy, sustainable land, and forest management into existing development plans at a local level or support development of these plans where they do not exist to influence biodiversity, SLM considerations. The project assistance will be provided on the development or review of four municipal development plans that fall within the Vohibinany and Vatamandry districts. Lessons will be drawn from the process, and a methodology developed to ensure the upscaling of this integration into other municipalities in the

Atsinanana region and Madagascar. The involvement of local communities in all of the activities above will strengthen their knowledge and confidence to defend their interests and to seek political and social support regarding land and resource use rights. Key outputs to deliver will include:

1.1 Establish and operationalize multi-stakeholder / inter-sectoral coordination mechanism for SLB, BD at Atsinanana district landscape level in accordance with local authorities and administrations

The objective of this output will be to establish, operationalize, and strengthen a multi-stakeholder and inter-sectoral coordination mechanism for SLB, BD based upon principles of good governance, and accountability. This mechanism will operate at the Atsinanana regional level. This project will strive for a coordination mechanism that meets some criteria. These include (i) Broad consultations (with state actors - government agencies, parastatal bodies; non-state actors - NGOs, CBOs and academia; private sector - from small to large enterprise) to lay the groundwork for establishing multi-level, multi-sector, multi-stakeholder coordination mechanism for SLB, BD, as well as to identify strategic options for SLM, and BD mainstreaming. (ii) Promote an enabling environment that ensures opportunity and support for stakeholder participation and encourages change agents such as individual leaders and champions. (iii) Have a clear mandate that is at least administrative (politically endorsed) but preferably legal (for legitimacy and accountability) to ensure: internal communication among stakeholders, and a system for documentation of activities to promote transparency and responsiveness. (iv) Have an institutionalized mechanism for regular review, evaluation, learning, and adaptation (for efficiency, effectiveness, and responsiveness) (v) Function as a two-way linkage between national and regional government processes. (vi) Address other functions specific to their scope and mandate including, among other things, using ecosystem-based approaches, social-ecological system frameworks, risk analysis, and resilience or vulnerability concepts, the details of which will differ by circumstance and change over time.

1.2 Regulatory framework (1. Environment Code of Madagascar, 2. National Agroecology strategy and 3. National strategy for land management) is drafted/amended to strengthen SLB, BD mainstreaming

The project sub-component will address challenges linked to the lack of an adequate enabling environment and institutional capacities to effectively strengthening SLB, BD mainstreaming. The drafting and amendment of existing regulatory frameworks for SLM and BD mainstreaming will be a highly collaborative process including several consultations and workshops with stakeholders at different levels and across different sectors. This sub-component will build on the recommendation made by the PPG study on actions to strengthen regulatory frameworks and policies as well as coordination mechanisms to mainstreaming SLM, and BD.

The identification of gaps in key regulatory frameworks will be done through a review of current policy documents, and an application of SWOT framework to identify strengths, weaknesses, opportunities, and threats of current policies and regulatory frameworks[28]²⁸. SWOT is a method used to evaluate Strengths, Weaknesses, Opportunities, and Threats of a project, an intervention, a program or a policy[29]²⁹. It is generally used for strategic planning, to outline the key internal and external factor that can influence the policy/program success. SWOT has been used widely in analyzing policies at different geographical scales and sectoral levels[30]³⁰.

SWOT analysis will be complemented with the adoption of a SMART approach, encompassing being *specific, measurable, achievable, relevant, and time bound*. Weaknesses and gaps identified in key regulatory frameworks will be addressed individually, including in the (i) Environment Code of Madagascar, (ii) National Agroecology strategy and (iii) National strategy for land management.

1.3 Stakeholders' knowledge on natural resources management at national, regional, district and municipal level are improved and data to support sustainable management of the biodiversity and forest resources of the Atsinanana Region is collected and available at the end of the project

This project takes the position that stakeholders' knowledge on natural resources condition and management is indispensable for fruitful collaboration in the achievement of sustainable outcomes for such resources. The goal of this sub-component will be to (a) develop capacity among local institutions to plan and adopt SLM, and BD management practices in a changing environment. (b) Improve the clarity of governance structures related to SLM, and BD management and establish links between local institutions and national government structures. (c) Strengthen the capacity of women's groups, and other gender-sensitive common initiative groups to analyse the gender aspects of SLM and BD management, as well as their practical implications for achieving key sustainable development outcomes for their communities.

1.4 Institutions' capacity is strengthened across sectors to collaborate and manage the Atsinanana region landscape

In this sub-component, this project will enhance the capacity of key stakeholder institutions to collaborate in the management of the landscape of the Atsinanana Region. The project will build on activities and initiatives that are already ongoing, to leverage synergies and avoid duplication of efforts – an approach that will be beneficial for both this sub-component as well as other components in this project. There are some initiatives underway in Madagascar that are looking at a range of best practice sustainable forest and land management (see Sub-Section 2.7) that the project will seek to work with in the project area. This calls for the project to strengthen collaboration and coordination, with particular attention to avoid the duplication of resources. This will include workshops to identify and review the appropriate best practices for the project areas, including innovative approaches of conservation practices of animal husbandry – from bee-keeping to ranching.

1.5 Two sectorial action plans (agriculture, energy) developed that integrate biodiversity dimensions, sustainable energy, and SLM

This sub-component will strive to integrate biodiversity dimensions into developments in agriculture and energy for the Atsinanana Region.

To achieve these outcomes, this project will begin by undertaking two studies: (a) A desktop study to establish situational analysis in the biodiversity dimensions, sustainable energy and SLM sectors; and (b) An institutional analysis to provide an overview of institutional arrangement including administration, roles, and responsibilities, of the energy and agriculture sectors. These studies are important to lay an informed foundation for the development of sectorial action plans. These workshops will also analyse institutional adequacy regarding technical and human resources for integrating BD management, SLM best practices, and sustainable energy options into the agricultural and energy sectors. While the suitability of different tools may be explored, the Strength, Weakness, Opportunities, and Challenges (SWOC) analysis approach can prove useful in this process^[31].

1.6 Municipal development plans developed for 4 municipalities in Atsinanana region integrating BD, sustainable energy, SLM and lessons learned to upscale to other municipalities

The expected outcome of sub-component will be that municipal development plans are developed, which integrate SLB, BD, and sustainable energy. By undertaking activities of this sub-component, this project will reduce pressures on an additional about 20% of priority conservation landscapes in Atsinanana through (1) integrated land-use planning, and (2) improving local community livelihoods, and (3) increasing stakeholders' capacity and awareness. In the process, lessons will be learned that will be used to upscale the process into other municipalities. The development of land use plans will take into account information from existing Municipal Land Management Plans (SAC), Municipal Development Plans (PCD), Regional Land Management Plans (SRAT) and Regional Development Plans (PRD). RAPTA will be used to assess the current and proposed land uses, and identify the most appropriate sites for different forms of intervention planning given the current conditions, constraints and stresses (e.g. increased demand for food, and pressure on land resources). RAPTA will help to focus efforts where interventions will be most effective through a structured approach to learning that enables constant improvement and adaptation to change. This project will adopt two approaches to integrate BD management, sustainable energy, SLM into municipal development plans.

Component 2. Ensure scaling up of SLM practices and agroecology in a wider landscape

In order to relieve the pressures from local communities on forest resources and the continued loss of soil fertility on arable lands, partnerships and agreements will be established between the Ministry of Environment, Ecology, and Forests (MEEF), the Ministry of Agriculture, and local communities on what areas to conserve and restore and what areas should

be supported to increase agricultural production using agroecological principles. Agricultural support will be provided to local villages at selected sites within the districts of Brickaville and Vatomandry, on the basis of their implementation of forest conservation strategies mutually agreed by MEEF and the communities and stipulated in signed Conservation Agreements between the parties. This project will build on initiatives being implemented by Conservation International in Brickaville. The PPG study[32]³² noted that in 2007, Conservation International (CI) initiated the Conservation Pact in the Brickaville district for the first time. This NGO contract with grassroots communities is being implemented by compensating the population, in return for stopping their intrusion for exploitation within protected areas and their contributions in monitoring biodiversity at the level of protected areas. The conservation pact is an opportunity to strengthen the capacities of communities in the organisational and institutional field. It also increased the motivation of the local community in terms of environmental protection.

The efficacy of such a scheme has been confirmed by national stakeholders. Based on the agreements, at least 2,500 ha of High Conservation Value Forests (HCVFs) will be conserved. The project also will restore/rehabilitate 500 ha of degraded land in areas adjacent to and within the HCVFs through the planting of different species of trees and shrubs including bamboo. To address continued land degradation (loss of soil fertility) on the arable land, as well as address the contribution of the agriculture sector to deforestation and forest degradation, agroecology principles will be implemented in the areas covering the agreements. The practices to be applied on these degraded lands covering at least 4,800 ha will include the incorporation of nitrogen-fixing trees in cropping fields, the improvement of planting methods and use of high yielding adapted varieties, the improvement of water management, integrated pest management, and use of organic materials that are available to improve soil structure, water and nutrient holding capacity and soil fertility.

The exact measures will be established during the early phases of the project implementation. The selection will be guided by WOCAT-based criteria presented in “Sustainable Land Management: Guidelines and Best Practices in Sub-Saharan Africa”, prepared by WOCAT in 2011[33]³³. Madagascar is one of the case countries on which the experiences developed in this book are based. The use of these criteria has further been illustrated and organized in “Decision support to select appropriate Sustainable Land Management (SLM) practices within the landscape[34]³⁴” and offers option for the selection and choice of SLM technologies that cover a range of landscape types. For example, choices could be made based on coastal, lowland, upland/hilly land, or highland landscapes. These choices are disaggregated according to conservation measures, which include: agronomic, vegetative, structural, management, agronomic and vegetative, other combination of measures. There is scope to make choices based on the envisioned outcome of SLM, as well as on the type of land degradation that is being addressed.

A number of measures have been proposed by the PPG study[35]³⁵. These include:

- **Elaborate zoning maps:** The establishment of zoning maps is an often neglected or unknown but essential stage to have a good vision of the various actions(shares) to be led, of the prioritization of implementation and the working distribution between communities.
 - **Control the erosion:** The control of the erosion is also important as the previous two activities. The aim is to stabilize the sloping areas and also to protect the rice fields and infrastructure downstream. Erosion control consists of two main components: soil control (solid particles) and fertility control. This work necessitates community participation on community or non-agricultural public land, and the involvement of peasants in their agricultural land.
 - **Improve resilience to shocks:** This activity necessitates capacity-building programmes but also diversification of income-generating activities that provide daily household spending throughout the year.
 - **Reduce deforestation and bush fires:** This activity is based on sufficient income from agricultural production or income generating activities. It uses knowledge on ecosystem services, farm management and improved farming techniques.
-

- **Improving disease and pest control:** Diseases and pests are the main problems affecting agriculture; Knowledge of pest biology and the role of ecosystem services (biodiversity) helps to address it.

- **Reduce the practice of tavy:** Despite the awareness and training sessions on agricultural production, the practice of *tavy* continues to be practiced in any forest area. It is mainly due to the poverty of the population and the lack of technical guidance. The actions to be taken must be able to improve knowledge but above all to generate sufficient income to meet family needs throughout the year.

- **Sustainable management of water sources:** Perennializing water sources provides long-term production and health insurance. Farmers need to know the importance of water as a major limiting factor in agricultural production and how to manage it.

A capacity building programme will be developed and implemented to assist local community members in making informed and wise decisions concerning the management of ecosystems and the maximization of the services that these ecosystems provide to the communities.

To ensure the success of this action, the strategies identified below should be applied:

- Strengthening information/awareness-raising actions for authorities and communities on the comparative advantages of the project implementation and the different achievements
- Participation of all stakeholders in all project implementation processes,
- The endowment of all means contributing to the transfer of technical and financial skills to the beneficiary,
- Technical capacity building especially in agroecology,
- The capitalization of the achievements realized by the target communities and taking into account national and regional success stories,
- The development of action research that really meets the needs of beneficiaries,
- The valorization of local skills to guarantee the proximity technical supervision of the beneficiaries to achieve the objectives of the project
- The establishment of a system for the sustainability of actions implemented through the consultation of stakeholders including the authorities
- The adoption of the landscape approach in the implementation of all planned activities
- The installation of a liaison team within the intervention sites for a close and regular monitoring.

The participatory approach is essential to ensure the ownership of stakeholders and the dissemination of agroecological practices. It will also facilitate the effective involvement of stakeholders in the project during all phases of implementation through the organization of a series of multi-stakeholder workshops. In addition, all stakeholders involved in the project will be able to determine together the key to the success of the project following a process of knowledge capitalization.

The integrated approach will ensure that the various parameters that can influence the project in a positive or negative way are taken into account. By this approach, at least the social, environmental, legal and economic aspects of the project will be considered. Analysis of the interrelationship of these different parameters will facilitate the validation of the technical and socio-economic viability of the project.

Both approaches will be reinforced by a gender approach that will be considered across the board and should emphasize a development methodology that encourages farmer participation, use of traditional knowledge, and adaptation of farm enterprises that fit local needs and socioeconomic and biophysical conditions.

These key strategic points will be reinforced by: (i) The optimal mobilization of resources available for the realization of the project. (ii) The valorisation of local skills. The outputs to be delivered through this components will be:

2.1 Conservation agreements entered into by MEEF and local communities resulting in the conservation and active management of at least 3,500 ha of globally significant biodiversity habitat.

2.2 At least 500 ha of degraded land adjacent to or within identified High Conservation Value Forests restored using native and adapted species with bamboo if appropriate.

2.3 For production cultivated land (4,800 ha targeted): technologies developed, tested and appropriate infrastructure established to operationalize SLM in line with developed ILMPs, namely, among others: (i) incorporation of nitrogen-fixing trees into annual monocropping; (ii) improvement of planting methods and use of high yielding varieties; (iii) improved water management; (iv) increase in use of organic fertilizer and (v) integrated pest management.

2.4 Local communities are capacitated on decision making about ecosystem services management

Component 3. Improving rural energy generation systems and wood services to reduce deforestation

Around 3 billion people in developing countries rely on wood fuels for their daily cooking needs with profound negative implications for their workload, health, and budget as well as the environment. The island nation of Madagascar has a serious energy shortfall, especially as fuel becomes scarcer and more expensive, both locally and worldwide. In its developing economy, Madagascar's rural populations remain disconnected from electricity networks, relying instead on charcoal and firewood for basic needs such as cooking. Demand for wood to burn and for making charcoal is driving deforestation on the biodiverse island – especially as the population increases. Furthermore, deforestation and burning of biomass is contributing to climate change. According to Polly Seplowitz (August 2009)[36]³⁶ in Building Energy-Efficient Stoves in a Madagascar Village, “throughout the villages of Madagascar, food is traditionally cooked on open fires, a method that leads not only to respiratory problems within household members, but also requires nearly twice the amount of firewood as does cooking with the energy-efficient stoves. The excessive use of wood for both cooking and building has led to serious deforestation throughout Madagascar, and an attendant loss of the island's precious biodiversity”. Improved cook stove (ICS) technologies in many cases appear to be an obvious solution.

Bamboo as a bioenergy feedstock: In searching for a bioenergy feedstock, the idea is to look for a material (fuel source) that meets three key demands: (i) is fast-growing – a high-productivity to provide enough biomass; (ii) is adapted to the agronomic, and climatic conditions of the 2 Districts; (iii) and, several options for upgrading energy products that are usable, affordable and accessible to consumers.

Bamboo sufficiently satisfies the three criteria above. It has a rapid growth and regeneration rate with high biomass production of up to 40 tonnes/ha in Madagascar[37]³⁷. Some varieties of this plant are already well established in the agroecosystem of Eastern Madagascar, which is a sign of some adaptation to existing agronomic conditions. Several species are native to the region, including: *Dendrocalamus asper*, *Bambusa vulgaris striata*, *Bambusa vulgaris constrictidona* and many others[38]³⁸. Bamboos are therefore part and parcel of the landscape and ecosystem of the districts of Brickaville and Vatomandry. In addition, bamboo provides a range of ecosystem services, it can be an alternative to timber and lumber. It can contribute to the purification of water. These include provisional, regulatory, socio-cultural, and economic services[39]³⁹.

In this project the use of bamboo will contribute to enhance the use of two energy sources, as well as the development of the value chain for renewable energy in the pilot locations. Hence three elements of renewable energy will result from this project:

(i) The production of combustible gas from the gasification of bamboo biomass. Gasification is the production of a gaseous fuel from a solid fuel. It consists of a thermal and chemical conversion of organic material at high temperature under restricted air supply[40]⁴⁰.

(ii) The production of an advanced solid fuel (charcoal) from the carbonization of bamboo. Carbonization technology, which consists of a charring technique, will be adapted to bamboo for the production of charcoal for cooking. The development of this technology will be in line with the existing system of organising the production of charcoal in the areas, that is to say the production of charcoal by local charcoal producers. Carbonisation is the method of burning wood or other biomass in the absence of air after which it breaks down into liquids, gases and charcoal.

(iii) The creation of a renewable energy value-chain. Improved wood energy supply must combine increased charcoal production with increased energy efficiency through the use of improved cookstoves.

This project can take inspiration on the experiences of bamboo use as a fuel source to supplement energy sources in other tropical countries. In a review of the situation of energy in Malaysia and the role bamboo can play in meeting some of the energy challenges of the country, Chin et al. 2017[41]⁴¹ noted that bamboo is quite high in lignin content and makes a desirable species as an energy crop for solid biofuel production. In a study of bamboo biomass yield and feedstock characteristics of energy plantations in Thailand, Darabant et al. 2014 noted that while the potential for bamboo to serve as a bioenergy feedstock was good, there was need to consider issues of site selection for bamboo plantation and management options for improved yields[42]⁴². The study cautioned that plantations established on marginal sites without proper plantation management will result in very low yields. Management is an important aspect in the cultivation of bamboo for several reasons, besides its effects on yields, management (including land use practices associated with bamboo production) also have effects on ecosystem services. For example, Rakotovo N. et al. (2017) found that agroecological practices integrated at farm scale reduced significantly farms carbon footprint up to 364% in terms of land surface and up to 578% in terms of food production, suggesting an important GHG sequestration at farm scale[43]⁴³.

The cultivation of bamboo as an energy feedstock comes with a number of challenges. (i) Bamboo cultivation like the large-scale cultivation of any single crop has the potential of bringing with it negative environmental consequences[44]⁴⁴. (ii) There is also potential that a massive increase in the demand for bamboo biomass may lead to mass conversion of natural forest into bamboo monoculture forest which might lead to biodiversity loss[45]⁴⁵. (iii) Another concern is that bamboo plantation can compete with food crops for land[46]⁴⁶. For the concerns above, the current project employs participatory land use planning including a broad cross-section of stakeholders will vastly reduce the possibility of unregulated largescale cultivation of bamboo at the expense of other relevant land uses[47]⁴⁷. (iv) Lastly, if bamboo species is imported for plantation, there will be a risk of invasion of new species. This project will undertake an environmental impact assessment to understand the full range of potential consequences and mitigation strategies associated with the cultivation and use of bamboo as biomass feedstock in the pilot locations. Part of this assessment will identify the form of bamboo that is best suited for the local biophysical and socio-economic environment. Without anticipating the assessment processes and methodology, it is expected that local varieties of bamboo will be assessed for suitability as they are indigenous to the local agroecology.

Bamboo and carbon storage/sequestration: Bamboo has very high productivity and high potential for carbon accumulation. Nath et al (2015) report that the mean carbon storage and sequestration rate in woody bamboos range from 30–121 Mg ha⁻¹ and 6–13 Mg ha⁻¹ yr⁻¹, respectively[48]⁴⁸. They also note that the vigorous growth potential of bamboo enables the crop to complete the growth cycle in between 120 and 150 days. Because of its rapid biomass accumulation and effective fixation of CO₂, it has a high carbon sequestration capacity. When properly managed, the use of bamboo as a biofuel can be net carbon neutral. Under selective felling strategy, biomass and carbon stock in bamboo are also the permanent stock as harvesting of bamboos and subsequent loss of biomass and carbon are balanced by new culm produced in the clump every year[49]⁴⁹. Besides its potential for carbon storage and sequestration, bamboo ecosystems can provide income stream to rural communities from dual source (i) selective harvest and selling bamboo products (e.g. for scaffolding purpose, to paper making industry, bamboo crafts) and, (ii) from carbon credits (Certified Emission Reductions) under various afforestation/reforestation mechanisms[50]⁵⁰.

Justification of Choices vs. Other Renewable Sources

Below is a comparison of the different technologies with the local conditions of the two districts (Vatomandry and Brickaville) – the choice of developing and using gasification for the production of electricity and on the carbonization for the production of cooked coal[51]⁵¹.

In the case of rural electrification: There are several technologies that promote renewable energies. The advantage of gasification technology over solar and hydroelectric power is the ability to put a local value chain through the pre-production of biomass in the form of bamboo cultivation. This contributes to the creation of added value and employment despite the need for a large initial investment in the acquisition of the gasification unit and a relatively high level of technical competence to ensure the maintenance and operation of the unit. The technical knowhow can be developed in local communities – constituting an element of technological transfer that will benefit the communities in the long-term. Bamboo planting should also integrate ecosystem services (see description of bamboo above). Due to its location, Madagascar has a high solar energy potential[52]⁵². Although solar power allows the installation of small-scale units and a fast installation at the same speed as the gasification unit, the environmental problem posed by the battery is its handicap. The installation of central hydroelectric power stations, on the other hand, must face complex procedures of (water management, development) and the probability of investing on a long transmission/distribution line. Also, the investments in terms of finance and technical knowhow in the installation and maintenance of hydroelectricity units are far higher. Madagascar has an important wind energy potential. Indeed, with three kinds of winds: the coastal winds, the local wind and the ocean wind such as the trade wind and the cyclones, Madagascar can reach a wind energy potential of about 2000 MW[53]⁵³. The problem with the installation and use of wind power technology at the local level is that of high cost. Wind power technology also has a steep curve for implementation at the local level. Unlike the competence for running, managing and repairing a gasification plant, the same competencies for wind power demand higher investments in training in terms of time and financial resources. Other disadvantages that have been cited of wind power are that it is not a profitable use of land – Alternative uses for the land might be more highly valued than electricity generation. Also, that it is a threat to wildlife – birds have been killed by flying into spinning turbine blades[54]⁵⁴.

For charcoal production: The traditional charring technique is still the most common. Methanization remains handicapped by the difficulty of supplying fermentable materials: availability, seasonality, collection and competition of use (fertilizers) and a sociocultural barrier (or mentality for the acceptance of the use of biogas from organic waste for cooking). Thus, biogas can find only a small number of users: wealthy households, ranchers, etc. In addition, urban households will have collection problems[55]⁵⁵.

The use of fuel ethanol obtained by the distillation technology is being practiced by a small number of households in the pilot locations. These are mainly households of a high economic class who can afford the very high distillation costs and the large volumes of firewood needed for the process.

Charcoal production is thus the appropriate technology, especially since charcoal, like firewood, is the most affordable fuel and the form of fuel that the population is used to handling. In addition, carbonization is the most widely used technology available to charcoal producers. Improved charring techniques are available and national experiments have shown their effectiveness and the possibility of implementation in Madagascar for the benefit of charcoal producers. This project proposes the use of an improved carbonization technique that makes use of a dome structure, constructed with local materials, and with bamboo as the fuel feedstock. The choice of the dome carbonization technique is to harness two key advantages: (i) The carbonisation dome allows a high yield of up to 30% while the traditional grindstone reaches a maximum of 10%. (ii) The dome significantly reduces the carbonization time, and thus responds to the main concern of the charcoal producers in the practice of improved carbonization linked to its low frequency. Component 3 will help to generate the following outputs:

3.1: Report on Rural Energy Assessment available for Atsinanana Region by the end of year 2 of project implementation

3.2: Development of private sector/community engagement strategy of transforming the energy sector in Atsinanana Region towards use of sustainable energy technologies

3.3: Training on alternative fuel and improved stove is provided for local communities and private individuals

3.4: Demonstrate energy efficient and renewable energy technologies in the Vohibinany and Vatomandry Districts of Atsinanana Region: (i) 3,000 households adopt use of energy efficient cook stoves; (ii) one village electrified with one 25kW bamboo gasification generator

3.5: 300 ha of shrub species and bamboo plantation established for energy use and wood services

3.6: Technologies transferred, adapted and produced locally as part of local enterprise activity

4) **incremental/additional cost reasoning** and expected contributions from the baseline, the GEFTF, LDCE, SCCF, CBIT and **co-financing**;

Without GEF support : *Persistence of the degradation of land resources and associated ecosystem services:* Land degradation is in progress, increasingly affecting land resources in Madagascar as well as in the pilot locations for the current project[56]⁵⁶. The negative consequences of land degradation are manifold, including on: (i) the country's potential for economic growth; (ii) poverty and vulnerability of rural people; (iii) social costs; (iv) ecosystem functions and services; and on the country's biodiversity. As far as the negative impact of land degradation on the ecosystem functions and services are concerned, Madagascar's territorial ecosystems and their products are an important part of Madagascar's natural wealth and essential to country's food security[57]⁵⁷. Land degradation is considered one of the key factors of continuing imbalances in the ecosystems (including water

resources) and worsening of wildlife habitats. In the absence of GEF support, this process and its negative outcomes will continue to blight efforts towards socio-economic and environmental development in the Atsinanana Region and Madagascar as a whole.

A persistent weak enabling environment for SLM, and BD management mainstreaming: SLB, BD management, and the use of renewable energy technologies offers a means to address land degradation and enhance rural land productivity on a long-term basis, thus supporting economic growth and improving food security, while preserving ecosystems' critical functions and services. However, despite some isolated technical successes, the adoption and replication of SLM has remained relatively limited in Madagascar. One of the key reasons that have prevented the adoption and/or wide-scale replication of SLB, BD management, and renewable energy adoption and use is that of a weak enabling environment (characterized by a poor regulatory environment). A clearly-defined and strong regulatory environment is necessary to effectively address land degradation and successfully promote SLM, a more cross-sectoral and programmatic approach to scaling up SLM is needed. Under the existing scenario (baseline), the regulatory environment will remain weak, poorly effective, and poorly adapted to meet the goals of sustainable natural resources management expected of it.

Limited multi-stakeholder and inter-sectoral interactions: The management of land resources to achieve sustainable outcomes involve complex processes that cut across different sectors and involve many stakeholders. The current approach in Madagascar does not sufficiently integrate stakeholders and sectors to leverage synergistic effects and the cross-fertilization of efforts and outcomes for optimal results. Unless the conditions for a more cross-sectoral and programmatic approach to SLM are created, and the enabling environment for SLM strengthened, the current approach to address land degradation characterized by scattered, fragmented, and un-coordinated interventions and supported by weak institutions would continue, and the issue of land degradation would not be effectively tackled. Without GEF support efforts to sustainably manage land and land resources will remain sectoral with stakeholder interactions limited - leading to duplication of efforts, inefficiency, and limited positive outcomes.

Poor access to sustainable energy engenders limited economic progress: The endemic spiny forests of Madagascar are being cut at an alarming rate for charcoal production. Local people continue to use these resources as a source of household energy in inefficient stoves. Besides their use in inefficient cook stoves, charcoal production and sale is also used to sustain household economies. The current inefficient form of cookstoves uses more wood, entailing greater deforestation, and are associated with negative health consequences for households. Without GEF support, the demand for wood and charcoal will only grow as the population grows – entailing greater deforestation to meet the energy needs of an increasing population. The negative health consequences of the use of inefficient cook stoves will continue to impact on the health of a majority of the Malagasy households.

With GEF support : *Support for sustaining the health of land resources and associated ecosystem services:* GEF resources will be strategically and incrementally used to support activities aimed at creating the enabling conditions to allow Atsinanana in particular, and Madagascar in general to progressively adopt a more cross-sectoral and programmatic approach to SLB, BD management, and renewable energy development. This will be done by taking proactive steps to restore degraded lands, build capacity on the management of natural resources, capacitate key stakeholders on collaborative management, and promoting the development and use of efficient cookstoves. GEF resources will also be used to promote the growing and use of a locally adapted, fast-growing plant (bamboo) for renewable energy production and for its environmental benefits. These initiatives, together with support for the adoption and mainstreaming of SLB, BD management, and renewable energy technologies will contribute to easing the pressure on local land resources as well as the restoration of ecosystem services.

Enhanced enabling environment for SLM, and BD management mainstreaming: GEF resources will support the establishment of cross-sectoral coordination mechanisms for strengthening SLB, BD management and the upscaling of renewable energy development and use. By supporting the progressive shift towards a more programmatic approach to SLM scale-up, this Project will facilitate the alignment and harmonization of current and future interventions and the sharing of experiences, thus reducing transaction costs and increasing the impact of interventions. This is expected to eventually generate greater economies of scale and improve the cost-effectiveness of the interventions.

Addressing the important issue of access to and use of renewable energy: With a heavy reliance on traditional wood fuels and inefficient forms of household cookstoves, the unsustainable harvesting of wood products is destroying biodiversity resources and rendering many areas less productive for other uses. Alternatives to reduce pressure on land and therefore land degradation would require a drastic shift of Madagascar's energy portfolio towards renewable energies. GEF resources will be used to support a multi-pronged, cross-sectoral, and multi-stakeholder approach that leverages the potential of public-private partnerships in changing the landscape and future of energy use in Atsinanana, with potential for

national adoption. The multi-pronged approach will involve support for initiatives that support the planting of the main feedstock for renewable energy generation for the region (bamboo) while supporting the adoption and use of efficient cookstoves, and developing a renewable energy value chain.

Building local capacity for sustainable, transformative action: GEF support will enable this project to develop local competencies in SLM, and BD management, as well as its intervention areas. This will include capacities for participatory management of critical resources, and for developing and sustaining value chains that are supportive to strategic goals of sustainable natural resources management. It will also build local capacity in competencies that pave the way for local participation in the renewable energy value chain in the Atsinanana Region. These competencies will include all aspects of product development (e.g., the manufacture of efficient cookstoves and the setting up and running of bamboo plantations) as well as service delivery (such as marketing of bioenergy feedstock, compliance with renewable energy delivery frameworks, and access to finance for small-scale investments in the value chain). In compliance with the decentralization policy of Madagascar, these actions aim at empowering populations at the local level and involving them in all aspects of development, ranging from designing conservation and development programs to implementing them.

Enabling financial resources for transformational change: The use of GEF funds to seed projects in SLB, BD management, and renewable energy solutions is vitally important in Madagascar. This country (especially its rural areas), lacks sources of available capital for private investment in land improvement-related activities, especially community-based sustainable agriculture and access to energy. Most of the financial instruments are dedicated, are designed to benefit small-and medium-sized enterprises, mostly in fast-growing sectors such as telecom, agro-business, and retail. There is no financial offering for communities' and farmers' organizations where lies the largest potential to lead a transformational change of land use, which is critical to ensure reduction of deforestation and enable the deployment of a climate-resilient environment in Madagascar.

5) [global environmental benefits](#) (GEFTF) and/or [adaptation benefits](#) (LDCF/SCCF); and

The Global Environmental Benefits that will be generated from the project implementation include the sustainable management of natural resources and critical habitats in an integrated manner providing development and environmental benefits. The promotion of bamboo as a strategic resource to address land degradation and climate change will deliver numerous ecosystem services and benefits, including enhanced carbon sequestration, reduced soil erosion and improved nutrient cycling, protection of vulnerable and marginal rainfed farming systems, and avoided deforestation. More specifically, the following GEB will be generated from the project implementation:

1. The conservation of biodiversity across 3,500 ha of high conservation value forests and the restoration of 500 ha of forest adjacent or within these forests;
2. Improved management of 800 ha of forests ecosystems ensuring that the ecosystems provided by these forests are maximized for human benefit (i.e. through wood energy services)
3. Over a 10-year period, potential avoided GHG emissions of 2,657,232 tons of CO₂e resulting from changes in land uses (see Appendix 2: Calculation of carbon dioxide emissions avoided). These changes include improved management through the implementation of SLM on 293,000 ha, conservation of at least 3,500 ha of globally significant biodiversity habitat, restoration of at least 500 ha of degraded land adjacent to or within identified High Conservation Value Forests, and improved management through the implementation of SLM in at least 4,800 ha of production landscapes.
4. Within the same 10-year period, potential avoided GHG emissions of 120,930 tons of CO₂e will be achieved through the production of electricity by bamboo gasification, and through the use of improved cookstoves (see Appendix 2: Calculation of carbon dioxide emissions avoided).
5. Arresting land degradation through good SLM practices within at least 5,600 ha.

Among the key biodiversity hotspots, the project will support conservation through the local land use plans include:

- i) The Zahamena National Park is located on the Eastern coast of Madagascar within the tropical rainforest. The ZNP is home to many endangered species that are specific to its environment. It typically rains year-round, it has a moist and warm climate which is favorable to the plants and animals within the ecosystem. The 423 km² national park is divided in an eastern and a western forest, in the corridor in between is villages. In 2007, Zahamena was declared UNESCO World Nature Heritage site. Thirteen species of lemurs live inside Zahamena's rainforest, among them the largest lemur, the Indri (*Indri indri*), as well as diademed sifakas (*Propithecus diadema*) and black-and-white ruffed lemurs (*Varecia variegata*). Besides these, there is a secret nocturnal and little researched inhabitant of Zahamena: The hairy-eared dwarf lemur (*Allocebus trichotis*). Much easier to find are mouse lemurs and fat tailed lemurs. But Zahamena is especially famous for its bird kingdom: 112 species of birds, more than the half being endemic and occurring nowhere else than on Madagascar;
- ii) Mangerivola Special Reserve was created in 1958 and covers 11,900 ha and is located in Atsinanana Region. It is home of 100 species of birds with high level of endemism. It hosts 6 species of lemurs, 3 species of carnivores, 13 species of small mammals, 19 species of reptiles, 45 species of amphibians. The reserve is rich in flora with 325 species from 66 families; 52% of the species are endemic;
- iii) The Marolambo National Park covers 95,063 ha and has a temporary protection status by decree taken by the Government in 2013. The Park lies between several regions including Atsinanana, Vatovavy-Fitovinany, Vakinankaratra and Amoron'i Mania. It is home of 10 species of lemurs, 4 species of carnivores, 7 species of rodents, 13 species of birds, 2 species of reptiles, 3 amphibians and 4 local endemic fish species. In term of flora, it has 324 species among which 2 endemic species of Sarcolaenaceae family; and;
- iv) The classified forest of Vohibola which is the home of important species of lemurs which are in critical condition due to the fragmentation of the forest.

6) innovativeness, sustainability and potential for scaling up.

Innovativeness: Several aspects of the project design are innovative for Madagascar – the project will combine scientific and participatory approaches in ways that have not been attempted before in the country; it will implement a multi-level approach, strategically targeting decision-makers at household, community, district and regional levels; and it will promote an adaptive management approach that strengthens the capacities of farmers to adapt to new challenges and opportunities in the future, including climate change. The project's focus on agroecology and the integration of bamboo, which could provide fast returns on investment for landscape restoration initiatives and address the current shortage in biomass for household energy as a sustainable energy source, is innovative for Madagascar. Following several years of baseline pilot and proof of concept projects, this GEF project will represent the first effort in Madagascar to integrate bamboo production into a program for combined sustainable land management and climate change mitigation objectives. Most rural development programs focus on agriculture and livestock improvements. The proposed project will include production strategies, but also will identify important habitats within the landscape that are providing ecosystem services that people depend on, and will plan for their protection and/or restoration.

Environmental sustainability: The environmental sustainability of the project's outputs will be achieved through the implementation of actions that will enable the recuperation of forest cover in the two pilot regions through planning for, and implementing SLM, and BD management in key landscapes, reforestation, natural regeneration, and implementation of sustainable agroforestry systems. This will allow the protection and restoration of secondary forests and/or degraded forests in the project's prioritized areas (i.e., pilot areas) as well as reduced pressure on natural floral and faunal resources and their associated ecosystem services. In addition, the development of sustainable agroforestry systems (by way of bamboos cultivation) in degraded forest lands will contribute to stabilizing the soils promoting ecological sustainability. These activities will contribute to reversing land degradation, the protection of areas of hydrological catchment and regulation, the protection of water sources, and improvement of the nutrient recycling processes for the stability of Atsinanana's forest ecosystems. The establishment of long-term conservation agreements between the MEEF and local communities in the districts of Atsinanana will contribute to the conservation of BD and forests, the protection of key habitat, the establishment of connectivity between existing protected areas and forest patches in the surrounding landscapes, and sustainable agriculture. This includes the creation of horizontal and vertical biological corridors, which will benefit vulnerable and/or endangered species as well as endemic species. Together, these actions will contribute incrementally to generate long-term local and global environmental benefits

Social sustainability: The social sustainability of the project will be achieved mainly through the direct participation of the local communities and local governments in the planning and implementation of SLM, and BD conservation activities, as well as through the long-lasting direct and indirect economic benefits that will result from them. These include, but are not limited to, social and economic benefits derived from the adoption of energy-efficient stoves that will facilitate the cooking of food while reducing firewood consumption and GHG emissions, the implementation of sustainable agroforestry that will contribute to food security and revenue generation while improving carbon stocks and ecosystem connectivity, and improved access to economic incentives to maintain and improve forest cover. The implementation of the policy instruments for SLM and BD management activities will increase participation of the local population in both project pilot locations. It will encourage ownership and empowerment of the communities and local governments on the systems established for SLM, and for the improvement of degraded lands This will contribute to the creation of a sustainable supply of environmental goods and services that will benefit the local communities and governments, while helping to guarantee their long-term commitment to SLM. Through the four conservation agreements, the participation of the local authorities (at the municipal level) and local communities will be strengthened, improving communication and coordination between them, which will reinforce long-term cooperative relationships. This project will strive to ensure that activities that are developed for local implementation are founded on the principles of free, prior and informed consent. In this context, the projects implemented in the pilots will have a solid basis for their social sustainability from their inception. Activities that will be implemented in the pilots to reduce deforestation will promote the sustainability of productive systems – particularly agriculture and water conservations. Supporting local communities to have access to sustainable sources of renewable energy as well as improved efficient stoves serves a vital social purpose for local populations. Renewable energy and the efficient use of environmentally friendly cooking tools such as improved stoves have a direct effect on the health outcomes of rural populations, especially women and children who are most exposed to pollutants from kitchen woodfuel use in this part of the world. Overall, the project will be socially sustainable in both of the prioritized regions since it will improve the quality of life of the populations in the medium and long-term.

Institutional sustainability: By strengthening the mechanism for interagency cooperation between key institutional stakeholders, as well as strengthening the capacity of regional, district and municipal officials and field staff, these agencies will be better positioned to developed joint proposals for the implementation of SLM and BD management well beyond the life of this project. Similarly, skills developed at the municipal and community levels will facilitate the adoption of SLM and BD management at the local level. More specifically, the sustainable use plans developed for municipalities taking part in this project, and the incorporation of SLM principles into the participating municipalities' development plans will enable the sustainability of the actions developed by the project at the local level in the medium and long-term. At the local level, institutional sustainability will be ensured through increased knowledge by the local stakeholders on issues related to SLM, and BD management. Increased knowledge and skills will facilitate monitoring actions that are implemented and their complementarity with future initiatives. Also, the project will strengthen local institutional capacity through capacity building in different ways – including on decision-making in relation to ecosystem services, and on collaborative landscape management. These will serve as key instruments for mid-term land use planning and decision-making locally. Additionally, local institutional capacity will also be increased through expanding the implementation of forestry and agroforestry projects, which are programs envisaged, and in some cases being undertaken by the regional and district level administrations. This project will, therefore, be providing support for longer-term goals of these bodies. The project will also strengthen the capacity of local institutions and CSOs to effectively coordinate with regional and national government agencies the implementation of activities for

the forest management and protection, restoration and recuperation of degraded land, and BD conservation. In this respect, the municipal environmental/forestry offices will play a strategic role by facilitating and supporting activities for the development of local, municipal, and/or sub-national environment and forest-based projects.

Financial sustainability: This project has a built-in mechanism to ensure the financial sustainability of its major outcomes. The functioning of this mechanism is made possible partly as a result of the adoption of a holistic approach to understanding and solving key challenges in this project. In Atsinanana, traditional fuelwood is the most common form of energy for cooking, and wood provides for more than 80% of their energy needs generally. Cooking with wood and charcoal results in negative health impacts and indoor air pollution is responsible for respiratory, heart and eye problems. This translates to financial costs associated with the health outcomes of using traditional wood fuels. This is coupled with the cost of buying more fuel to feed an inefficient traditional open cooking technology and practice. By introducing improved cookstoves this project can cut down the wood requirements for cooking by as much as 25 – 50% compared to traditional stoves. With less wood being used, this project helps to reduce the deforestation and illegal logging in Atsinanana and reduces carbon emissions from burning. The reduced emissions result in less indoor air pollution and improved health of the users. Households also spend less money to buy the fuel or spend less time to collect the wood. In addition, this project will support the local manufacture of these cookstoves, support local access to financial resources to enter the renewable energy value chain, creating new job opportunities for the local communities in production, distribution, and sales of the stoves.

Replication:

On scaling-up SLM and BD management: This project will support on-the-ground implementation of the landscape approach. It will facilitate and finance preparation, implementation, monitoring, and scaling-up of investments to improve agricultural performance and effective natural resources management in a landscape context, as well as build local structures' capacity for the effective and long-term adoption of improved practices. Effective adoption of the approach and its sustainability will depend on the capacity present in the very landscapes to implement it, but also on the tangible economic impacts that the approach yields.

The expected goal of scaling up sustainable landscape management (SLM and BD), will be that SLM practices promoted under this project (cover crops, crops rotation, mulching, improved fallows, compost management, green manure, organic fertilizer, residue management, agroforestry, forest restoration) will contribute to establishing agroecology as a common practice in agricultural production, as well as promote the rehabilitation of degraded land. The project will be expected to generate socio-economic and environmental benefits through increased productivity and enhanced resilience to climate variability and change.

This project has been designed specifically for up-scaling in other regions of Madagascar. The need for scaling up is indispensable as many other regions of the country are facing problems of land degradation, loss of biodiversity and reduction in the quality and quantity of ecosystem services. These degraded lands constitute essential resources for addressing climate mitigation and adaptation challenges, strengthening ecosystem health and resilience, and improving livelihoods. The project will therefore work with other regional and sub-regional governments and other stakeholders to formulate strategies for scaling up landscape restoration projects based on experiences from the Atsinanana region. Some of the built-in activities that support upscaling include demonstration of best-practices on project sites to stimulate adoption; close inter-sectorial collaboration with relevant stakeholders; capacity building; the development of documentation on project approach, model, deliverables and lessons learned.

Many of the activities carried out through the project will be relevant to other areas of the country. It is expected that through successful demonstration of local plans, policies, governance frameworks, incentive programs, and capacity-building exercises, national actors will adopt some of these practices for replication in other parts of the country. Extension services in particular are one area in which the project anticipates strong interest from the national government, potentially restarting the extension programs that were once successful in Madagascar.

The project will document the lessons learned from training workshops and other capacity-building activities that will be undertaken, and develop materials that will facilitate sharing of the experiences in Atsinanana with other projects both within and out of Madagascar. This project will also work closely with other relevant GEF funded projects in the country and on the African continent to share lessons and experiences on landscape restoration and sustainable land management so that best practices can be replicated throughout the region, especially in countries where degraded arid dominate.

On scaling-up renewable energy development, access, and use: The pilots in this project will be used to demonstrate the economic, social and environmental viability of low carbon development pathways in the energy sector by creating new economic opportunities and increasing energy access through the use of renewable energy. To achieve these goals for renewable energy scaling up, this project will provide support to (i) Address the additional costs and risks associated with renewable energy technologies, which adversely affect the viability of investments. (ii) Support the drafting or amendment of regulatory frameworks that support specific requirements of removing financial and institutional barriers and to leverage additional public and private financing. (iii) Finance investments and capacity building for both public and private sector entities. (iv) Increase the installed renewable energy capacity in the Atsinanana Region by supporting the installation of the bamboo gasification plant to support local energy needs and demonstrate the workability of renewable energy supply at the local level. (v) Support to proven renewable technologies, as well as the development and use of energy efficient cookstoves.

This project has the potential to be highly transformational as it will support the kick-start of serious public and private investments in renewable energy technologies for on-grid generation and enhance the Atsinanana Region's supply of power. Also, this project could considerably contribute to an increase in access to energy services from a renewable source while partially mitigating the high dependence on expensive fossil-fuel and the hydro-based generation that can be highly affected by the negative impacts of climate change (e.g., droughts). Already in Madagascar, climate change patterns are some of the major drivers of water shortages that impact, among others, hydro-energy generation capacity and increasingly cause challenges to the sector planners, leading to eventual power shortages.

The strategy for scaling-up renewable energy development and use in Atsinanana will involve four main actions: (i) Support the drawing up of a plan of electrification of the 2 Districts as part of the regional master plan of the ADER. This approach will involve carrying out an evaluation of the opportunities of electrification by the biomass for 19 municipalities. (ii) -Demonstration of the success of the proposed model - the monitoring of the operation of the biomass plant set up is important to appreciate the strengths and constraints in order to learn the lessons. This is important to demonstrate the profitability, and efficiency of the model and this technology. Making good communication on the model is important. (iii) -Awareness raising and capacity building of local actors: municipal authority, community, local private operators on regulation and procedures for rural electrification so that they can seize opportunities, take their Responsibility. (iv) Development scheme to increase the areas of reforestation dedicated to bamboo and other species to feed the future biomass power plants.

The PPG thematic studies identified potential locations for scaling up bamboo gasification technologies for the production of local renewable energy in the Atsinanana Region (see Figure 11). The analysis was based on available land for bamboo production, availability of other forms of energy, population size, and land use history.

As with SLM scaling up, renewable energy development also has the same built-in activities that support upscaling include demonstration of best-practices on project sites and for stimulating adoption; close inter-sectorial collaboration with relevant stakeholders; capacity building (the development of documentation on project approach, model, deliverables and lessons learned).

[1] See [morehere](#).

[2] Harper, G., Steininger, M., Tucker, C., Juhn, D. & Hawkins, F. (2007). Fifty years of deforestation and forest fragmentation in Madagascar. *Environmental Conservation* 34, 325–333.

[3] FAO 2010. *Global Forest Resources Assessment 2010*. Rome, Italy

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- [5] Robert Bailis 2005. Mortality and Greenhouse Gas Impacts of Biomass and Petroleum Energy Futures in Africa. *Science* 308, 98.
- [6] Office National pour l'Environnement – Madagascar (ONE)
- [7] Office National pour l'Environnement – Madagascar (ONE)
- [8] United Nations Energy Statistics Database.
- [9] Praene J.P., et al. (2017). "Electricity generation from renewables in Madagascar: Opportunities and projections". *Renewable and Sustainable Energy Reviews* 76 (2017) 1066–1079.
- [10] See: [Forest Governance and Timber Trade Flows Within, to and from Eastern and Southern African Countries](#). Madagascar Study
- [11] Ministère de l'Environnement et des Eaux et Forêts 2018. *Analyse écologique*. Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatovandry. Étude thématique PPG.
- [12] [World Bank Country Statistics – Madagascar](#). Almost 80% of the population lives on less than *\$1.90 per day*, with one child in two under 5 years suffering from stunting, and Madagascar is the fifth largest country in the world with the highest number of unschooled.
- [13] Estimate for 2017. See United Nations Population Division data [here](#).
- [14] More on FORMAPROD can be found [here](#).
- [15] See more here: <http://www.afd.fr/fr/ameliorer-la-productivite-agricole-madagascar-papam>
- [16] <https://afd.dgmarket.com/tender/20443ou721>
- [17] More on AD2M-II can be found [here](#).
- [18] See [ADB](#).
- [19] Ferrer M., 2017, *Capitalisation des expériences biogaz et foyers améliorés à Madagascar*, Compte-rendu – Atelier du 14 Novembre 2017.
- [20] 2009, PGME, Vision 2020, Région DIANA
- [21] ARINA stands for: Aménagement et reboisements intégrés du district d'Anjozorobe en bois énergie (ARINA)
- [22] More on the dashboard can be found [here](#).

[23] More about ProPFR [here](#).

[24] UNCCD 2018. Country Profile Madagascar Investing in Land Degradation Neutrality – Making the Case: Overview of Indicators and Assessments. Found [here](#).

[25] PENOT, 2010

[26] For biodiversity projects, in addition to explaining the project's consistency with the biodiversity focal area strategy, objectives and programs, please also describe which [Aichi Target\(s\)](#) the project will directly contribute to achieving..

[27] More about the application of RAPTA can be found here: <http://www.stapgef.org/rapta-guidelines>

[28] ODI 2009. [Context Assessment: SWOT Analysis](#). Research and Policy in Development.

[29] ODI 2009. Ibid.

[30] See (1) Fertel et al. 2013. Canadian energy and climate policies: A SWOT analysis in search of federal/provincial coherence. Energy Policy, Volume 63, December 2013, Pages 1139-1150; and (2) City of Oakland 2017. Strengths, Weaknesses, Opportunities & Threats (SWOT) Analysis. Equity in Oakland. Oakland, California.

[31] See more about the SWOC methodology, its strengths and weaknesses [here](#).

[32] Ministère de l'Environnement et des Eaux et Forêts 2018. [Analyse agro-écologique](#). Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatomaniry. Étude thématique PPG.

[33] Author: Hanspeter Liniger, Rima Mekdaschi Studer, Christine Hauert, and Mats Gurtner 2011. [Sustainable Land Management in Practice - Guidelines and Best Practices for Sub-Saharan Africa](#)

[34] See [here](#).

[35] Ministère de l'Environnement et des Eaux et Forêts 2018. [Analyse agro-écologique](#). Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatomaniry. Étude thématique PPG.

[36] See [here](#).

[37] Ramamonjisoa B., Rabenanjara Z. et Rabefarihy T., 2012, *Elaboration du plan de développement de la filière bambou dans les régions Analamanga, Antsinanana et Analanjirifo*

[38] Ministère de l'Environnement et des Eaux et Forêts 2018. [Energie durable](#). Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatomaniry. Étude thématique PPG.

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[55] Ministère de l'Environnement et des Eaux et Forêts 2018. *Ibid.*

[56] See PPG thematic studies: (i) Ministère de l'Environnement et des Eaux et Forêts 2018. *Conservation et amelioration des services ecosystemiques de la Region Atsinanana à travers l'agroecologie et la promotion de la production d'energie durable*; (ii) Rakotoarivelo Manitra 2018. *Base pour l'amelioration des systemes de production d'energie rurale et des services du bois pour reduire la deforestation*; And (iii) Ministère de l'Environnement et des Eaux et Forêts 2018. *Analyse écologique.*

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A.2. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

N/A

A.3. Stakeholders

Please provide the Stakeholder Engagement Plan or equivalent assessment.

This project is cross-sectoral and multi-stakeholder in nature – meaning that stakeholders will be drawn in and contribute to project outcomes at different levels. The goal of this Stakeholder Engagement Plan is to involve all stakeholders of the project as early as possible in the implementation process and throughout project duration so as to ensure that their views and concerns are made known and taken into account. The plan will help the project in implementing effective communication channels and working relationships. The Executing Agency will continue to hold consultations throughout project implementation as deemed necessary. This section provides a summary of the engagement of the major stakeholders. The Stakeholder Engagement Plan will be implemented in conjunction with the Gender Mainstreaming Strategy and the process framework for restriction of access to natural resources.

TABLE 1 STAKEHOLDER ENGAGEMENT PLAN

Stakeholders	Engagement Methods/Mean	Engagement Activities
National Government Ministries and Agencies [MEEF; MEH; MINAGRI; DREEF; ANAE; ONE; Madagascar National Parks]	Emails, face-to-face meetings, workshops	<ul style="list-style-type: none"> - Project Management Unit meetings through the Thematic Technical Working Groups - Project Steering Committee meetings - Project Inception workshop - Strategic landscape level planning meetings - Share midterm and final project evaluation - Participation in high-level advocacy meetings

Stakeholders	Engagement Methods/Means	Engagement Activities
Local communities in project sites	During the PPG, local communities represented by the village Chiefs have been consulted and involved in all project validation activities. These community representatives will continue to be engaged through face-to-face community meetings, individual interviews, and workshops. A representative will also be included in the Project Steering Committee and the Project thematic Technical Working Groups.	<ul style="list-style-type: none"> - The range of activities may include: participatory appraisals of gender-specific and community needs using standard PRA methods and tools; capacity building and awareness raising; feasibility studies for Community Conservation Agreements; data collection for research purposes; Consultations to attain Free, Prior and Informed Consent; Involvement in Strategic landscape level planning meetings and localized land use planning, thematic working groups and steering committee meetings
NGOs and civil society organizations <i>[PROSPERER; AIDES; FORMAPROD; CRAM]</i>	Emails, face-to-face meetings, workshops	<ul style="list-style-type: none"> - Project Inception workshop - Share midterm and final project evaluation - Landscape restoration workshops - Strategic landscape level planning meetings - Support to local communities' conservation agreements implementation - Subcontract for restoration activities - Participation to capacity building events as beneficiary and as providers to local communities' groups
Private Sector	Emails, face-to-face meetings, workshops	<ul style="list-style-type: none"> - Project Inception workshop - Share midterm and final project evaluation - Strategic landscape level planning meetings - Landscape restoration workshops - Implementation of a financial mechanism - Beneficiaries of capacity building activities
Bilateral/ Multilateral Entities <i>[IFAD; INBAR]</i>	Emails, face-to-face meetings, workshops	<ul style="list-style-type: none"> - Project Inception workshop - Share midterm and final project evaluation - Strategic landscape level planning meetings - Landscape restoration workshops - implementation of the financial mechanism - Experience sharing and lessons learning meetings - Policy dialogue and review
Local Governments	Emails, face-to-face meetings, workshops, formal meetings	<ul style="list-style-type: none"> - Project Inception workshop - Share midterm and final project evaluation - Strategic landscape level planning meetings - Technical Thematic working groups - Participation in the Project Steering Committee - Implementation of a Financial mechanism - Implementation of Communities Conservation Agreements - Policy and legal framework dialogue and review

Stakeholders	Engagement Methods/Means	Engagement Activities
Private landowners and land users	Emails, face-to-face meetings, workshops, public meetings, print media, and radio announcements	<ul style="list-style-type: none"> - Strategic landscape level planning meetings - Protected area workshops - Capacity building workshops - Policy and legal framework dialogue and review

Documents

Title

Submitted

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement.

See above.

Select what role civil society will play in the project:

Consulted only;

Member of Advisory Body; Contractor; Yes

Co-financier; Yes

Member of project steering committee or equivalent decision-making body; Yes

Executor or co-executor; Yes

Other (Please explain)

A.4. Gender Equality and Women's Empowerment

Please briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

In Madagascar, women play a critical role in the use and management of land resources. In rural Madagascar, women carry out both productive and reproductive roles in tandem, which involves shouldering a large part of the rural labor burden, ensuring the welfare of children, undertaking farm work and meeting household demand for energy sources and water. Women, therefore, interact substantially with the environment as they perform their diverse tasks, including accessing food, energy and water resources, and ensuring household food and nutrition security. Improved agricultural practices that incorporate integrated approaches must, therefore, be gender-responsive and factor in impacts on women’s time and energy expenditure give their multiple roles in both systems of cultivation and livestock husbandry. At the same time, women need to be actively engaged as agents of change within resource decision-making environments. Currently, the level of inclusion of women in important decision-making processes remains less than optimal and substantial barriers in the way of women’s ownership of key natural resource assets, including land. Women therefore stand to be both as beneficiaries but often as victims of the effects of reduced productivity and environmental change (damage). In recognition of this fact, a gender analysis underpins the development and implementation of SLM, NRM and BD management promoted by the project.

The goal of this project in this regard is to ensure that critical issues related to access and control of land and other natural resources as they relate to women are identified and addressed. The project strives to arrive at an outcome in which its activities and benefits promote a more effective targeting of initiatives, and provide disaggregated data for monitoring, in line with relevant gender markers (see *Project toolkit on results and indicators on gender equity* in the table below). Thus, a number of project activities to be implemented under all components with the goal of directly and indirectly contributing towards improving the condition of women. This would be through enhancing their capacity to participate in decision-making processes, and engaging in land use activities that increase the flow of benefits from land use, have the potential to improve their economic situation through participation in renewable energy value chains, and have the ability to access energy-efficient, clean technologies for household use (cook stoves).

Table 2. Project toolkit on results and indicators on gender equity.

Result	Indicators
<i>Gender Equality Dimension: Human Capital</i>	
Increased fuel, water, and food security for poor women and men – Increased capacity of poor women and men to adapt and respond to environmental change	<ul style="list-style-type: none"> • Number and percentage of women using renewable, sustainable, and efficient household energy sources
<i>Gender Equality Dimension: Gender Capacity Building</i>	
Women and men benefit equitably from investments in SLB, BD management and renewable energy	<ul style="list-style-type: none"> • Number of training and awareness sessions with environmental agencies and other stakeholders on gender issues in SLB, BD management, and renewable energy; and number and percentage of women and men attending
<i>Gender Equality Dimension: Economic Empowerment</i>	
Equal access by women to support for land improvement and renewable energy projects	<ul style="list-style-type: none"> • Evidence that project finance facilities (for SLB, BD management, and renewable energy) include special windows for funding activities with women’s groups and gender-sensitive guidelines for all funded activities, and employ women and men in fund management

This project, therefore, takes a Gender-Responsive approach at each stage and at each level in which it works. At the core of this approach is a strong focus on the development of women as leaders and decision-makers, including within the Project Implementation team. In particular, women need support in becoming agents of decision making over livelihoods options and choices. During the stakeholder consultations on gender carried out on project sites during the PPG thematic studies[1], there was a strong consensus that women in rural communities would benefit disproportionately from greater livelihoods diversification, including in non-farm activities. For this reason, this project is designed to be inclusive in offering equal opportunities for women to benefit from the activities and decision-making processes to improve the lives. This project also supports gender empowerment by enhancing their role in mediating demand for food, energy, and water resources at a household. Indicators developed and used in this project will ensure accomplishment of gender empowerment, including establishing a cohort of women key informants in the project sites who will be interviewed throughout the project, establishing change within their lives and the impact of this change on wider development at household and community levels. The project will also identify women leaders and provide guidance and support to their development in these roles within the project sites.

This project is committed to a minimum of 50% of all beneficiaries being women, with indicators of their benefit focusing on access to natural resources, stake and agency in decision making on integrated approaches at a farm household and community level, decision making over their own lives, including capacity to establish greater livelihoods diversification.

The project logic argues that this is an essential element in ensuring the achievement of the wider goals and objectives of integrated approaches to sustainable energy, and agricultural development through agroecology. Both women and men involved in the process will be encouraged to be equally committed and able to engage through interactive learning and sharing. Participatory empowerment tools will be used to assess gender-specific elements in the development of key components of this project – sustainable energy and sustainable agriculture through agroecology. In these dimensions, intervention pathways will be identified between value chain support, environmental impacts, and focus on methods and tools that will support women smallholder land users given their multiple key responsibilities of matching household demand and supply for food, energy and water resources through their labor.

There are no simple pathways to impact, however. The nature of women's relationship to natural resources and the wider environment in rural areas is complex. It is mediated by the context to their labor provision, the capacity, and role in decision making and management (including access to key knowledge), and the cultural and social structuration of their responsibility for meeting household demand for food, water, and energy resources. Because of this predicament their socio-economic status (including their own personal food and nutrition security, and access to fodder, fuel for cooking and water) is generally more adversely affected than men when there are conditions of progressive environmental degradation. Therefore the negative effects of environmental change can serve to reinforce gender inequalities, both reducing women's income and increasing their workloads (and therefore their own expenditure of energy) as they search for increasingly scarce sources of water and fuel-wood/other biomass energy.

[1] (1) Rakotoarivelo Manitra 2018. ***Base pour l'amélioration des systèmes de production d'énergie rurale et des services du bois pour réduire la déforestation.*** Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatovandri. Étude thématique PPG. Ministère de l'Environnement et des Eaux et Forêts. (2) Ministère de l'Environnement et des Eaux et Forêts 2018. ***Analyse socio-économique.*** Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatovandri. Étude thématique PPG.

Documents

Title

Submitted

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?

Yes

If yes, please upload document or equivalent here

See above.

If possible, indicate in which results area(s) the project is expected to contribute to gender equality:

Closing gender gaps in access to and control over natural resources; Yes

Improving women's participation and decision making Yes

Generating socio-economic benefits or services or women Yes

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

see attached results framework

A.5. Risks

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being, achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.

Risks	Risk rating	Mitigation measures
Component 1		
The capacity for relevant institutions to engage in collaboration and set up relevant platforms is insufficient	Low	Institutional capacity will be strengthened across sectors to support their ability to engage in collaborative endeavours

<p>The local government's commitment to national policy for renewable energy and to streamline local decision-making fails over time</p>	<p>Low</p>	<p>Build capacity for regional and district administrators and develop procedures to streamline decisions affecting renewable energy implementation within local government structures.</p> <p>Maintain policy dialog with all stakeholders to ensure commitment to reform.</p>
<p>Project activities lead to land related changes that affect land-based livelihood reliant activities (such as food security and access to non-timber forest resources)</p>	<p>Moderate</p>	<p>The broad stakeholder consultative group that will be created to manage the implementation of action plans and municipal plans will have representatives of local land owners and users, and serve to ensure that issues of property land rights are properly addressed</p>
<p>Component 2</p>		
<p>Land use and tenure conflicts and conflicts among different interest groups (hunters, ranchers, fuel wood collectors, etc.) may exacerbate current threat driven pressures on natural assets (e.g. demand for farm land, brush fires, grazing and fuel wood collection, etc.).</p>	<p>Moderate</p>	<p>The project will introduce conflict resolution measures as part of the community consultation mechanisms to be established for participatory management of natural and social assets.</p> <p>Representatives of local communities in the broad stakeholder consultative group will serve in parallel as advisers on local land matters and guide the project towards avoiding land use and land tenure conflicts as a result of project implementation.</p>
<p>Local communities and relevant groups of stakeholders (e.g. municipal authorities, community groups, NGOs, public entities) are not receptive to changing traditional practices that threaten the provision of agro-ecological and hydrological services and persist in using unsustainable methods.</p>	<p>Moderate</p>	<p>This project will support the establishment and operationalization of appropriate local level participatory platforms for project execution, specifically considering gender dimensions. As a principle for community interaction a "farmers schools" approach to demonstrations will be applied, actively involving and putting into the drivers' seat local communities and making them work together with regional extension personnel from various sectoral ministries.</p> <p>The project social sustainability approach will also help to overcome this challenge.</p>

Challenges (e.g., organization, capacity - e.g., levels of literacy amongst local officials) at the community level to sustainably manage the investment and results.	Moderate	The project will work to build capacity at the local level, including via the process of developing local adaptation plans. Project initiatives will be implemented through close collaboration with local authorities and technical partners such as local civil society organizations. These technical partners will be key vehicles to test and validate pilot adaptation options as well as to disseminate best practices widely. Considerable effort must be invested into the proper design on knowledge products to ensure that they will, in fact, be useful and be applied.
The project may contribute to reinforce gender-based norms regarding access to land and land-based resources	Low	The project has developed a gender response plan to mitigate against gender-based negative outcomes emanating from project activities
Component 3		
Renewable energy's size and leverage may not be large enough to create a sustained market impact.	Low	Catalyse substantial commercial co-financing through both demonstration effects of successful projects and business partnerships.
The private sector will not be willing to invest in renewable energy projects	Moderate	Support legislation to ensure adequate feed-in tariffs or similar price incentive. [this falls under which output?] Technical assistance to enable optimal financial intermediation through appropriate financial support instruments.
Limited acceptance of renewable energy as a viable alternative to traditional energy sources by local population	Low	Promotional programs will be carried to explain the utility and value of renewable energy resources.
Limited affordability or resistance to commercial approaches engaged by the project in mainstreaming renewable energy	Low	Promoting income-generating uses of electricity would enhance affordability. Also, promoting indirect benefits of electricity access would increase the acceptability of commercial approaches

A.6. Institutional Arrangement and Coordination

Describe the Institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.

UN Environment will implement the project through its Ecosystems Division and will be responsible for overall project supervision to ensure consistency with GEF and UN Environment policies and procedures and will provide guidance on linkages with related UN Environment and GEF-funded activities. UN Environment will also monitor implementation of the activities undertaken during the execution of the project and will provide the overall coordination and to ensure that the project is in line with UN Environment Medium-Term Strategy and its Program of Work (PoW). More specifically UN Environment shall provide project oversight to ensure that GEF policies and criteria are adhered to and that the project meets its objectives and achieves expected outcomes efficiently and effectively. Project supervision is entrusted to the UN Environment/GEF Task Manager and Fund

Management Officer. The United Nations Environment (UN Environment) will bring to bear its vast scientific and empirical experience of critical relevance to the objectives of the project. UN Environment will be providing technical support in the project and expertise in coordinating the development of environmental policy consensus through sharing experiences of its other projects being supported by GEF or other agencies. As the GEF Agency for this project, UN Environment will provide a platform for a collaborative partnership between national and international organizations which will bring the best available expertise in science and knowledge from the scientific community to partners who are working at the development interface at the national level

Ministry of Environment and Sustainable Development will be the Project Executing Agency as well as a co-chair with UN Environment of the Project Steering Committee (PSC) which ensures the strategic orientation of the Project. It will work with a number of its directorates in meeting the specific goals of the project. Other ministries that will form part of the Project Steering Committee include the Ministry of Agriculture and Livestock (MINAGRI), the Ministry of Territorial Administration, and the Ministry of water. Other members of the PSC will include UN Environment, NGO representatives, Women representatives and Local Authorities whose roles will include, support for extension (improved stoves, agroecology, etc.), conflict resolution, ensuring compliance with regulations such as the “*dina*,” community mobilization, and facilitators. The final list of the PSC members will be agreed upon during project inception.

The Project Management Unit (PMU) will be established under the Ministry and will consist of a project coordinator (PC), M&E Expert, project administrative assistant, project accountant also specialized in tendering issue and thematic consultants (on a need basis). The project will also have some support staff (Driver and Secretary). The Commission clerk will serve the project on co-financing basis. The TORs for staff in the PMU are provided in Appendix 10. The full-time Project Coordinator in charge of the PMU, the Monitoring and Evaluation Expert, the Accountant and the Driver will be recruited on a competitive basis and will facilitate the execution of project activities by the project partners involved. The PMU will serve as the critical link between the Ministry, the project partners assuming the lead of thematic areas (Regulatory Framework; Forest Restoration and Agroecology; and Renewable Energy), and the different groups engaged on project activities, will ensure project planned activities are adequately executed and that lessons learned are shared among sites and within national committees and to provide visibility of the project at the national and international level. The PMU will be responsible for ensuring adequate communication of information to all national and international partners. The technical on the project site will be led by the central and regional bodies of the Ministry (Component 1); ANAE (Component 2); and AIDES (Component 3).

UN ENVIRONMENT :
IMPLEMENTIN AGENCY

MINISTRY OF ENVIRONMENT :
NATIONAL EXECUTING AGENCY

National
Coordination

Steering Committee : Min Environment, ONU Env, Min agriculture, Min Energy, min Water, Min Spatial planning, min Scientific research, representative of partenr project (INBAR, PROSPERER), region Atsinanana (head of region and heads of both Districts), representatives of the beneficiary community

Technical
Coordination

Project management unit :

- Coordinator : to be recruited
- Monitoring and evaluation and communication manager: to be recruited
- Administrative and Financial manager: to be recruited
- Driver : to recruit

Technical
Implementation

Component 1 :

- In charge by Min Env central and regional
- Consultants

Component 2 :

ANAE (Mou)

Component 3 :

AIDES (Mou)

Additional Information not well elaborated at PIF Stage:

A.7. Benefits

Describe the socioeconomic benefits to be delivered by the project at the national and local levels. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

In terms of responses to the current and emerging threats to biodiversity, this project promotes a paradigm shift from site based work to a landscape approach. The project will develop a collaborative governance framework for sectoral biodiversity mainstreaming into SLM, INRM and renewable energy development involving the private, public, CSO and CBO actors (Output 1.1 – 1.3). Biodiversity considerations are integrated into the development of economically relevant sectors across the landscape, in particular agriculture, forestry, and energy production, but also in the livelihoods and land use patterns of local communities (Output 2.1 & Output 2.2).

Access to knowledge on key relationships between landscape environmental and social development components were identified in the PPG stage as an impediment to the viable implementation of good SLM, BD and management practices (Output 2.3). The project will enhance the knowledge and understanding of the role of ecological processes and the services that Biodiversity provides in benefit of local development (Output 2.4). The project will engage with relevant sector ministries (e.g. MEEF, MEH, MINAGRI, etc.) and the private sector, in discussions and negotiations, where biodiversity and ecosystem conservation will be presented as an essential part of development planning, introducing a long term and sustainable development vision.

The project will promote a multi-sector landscape governance structure enhancing the negotiating capacity of local stakeholders, such as community members living in and around areas of biodiversity interest, hence building their knowledge and capacity to defend their rights to a safe environment and strengthening their ability to monitor potential violations of local and national biodiversity rules (Outputs 1.4 – 1.6). Communities will be able to participate actively in decision making regarding land use planning, and safeguard their environment and their livelihood base (Output 2.1 & Output 2.4)).

The project contributes to improved understanding and conservation of ecosystem services and values in local landscapes is also expected to entail positive social, health and wellbeing impacts, as these services provide important benefits to local communities, such as improved water supply and quality, protection against different forms of degradation. They also provide resources on which livelihoods can be strengthened, for example, access to markets for diversified food and handicraft products. The strong focus of the project on promoting community-alliances coupled with project focus on institutions and governance, capacity building and social inclusion at all levels will guarantee participation of socio-economically marginalized groups and individuals in decision making process as well as ensure more equitable distribution of income from project activities, including benefiting from investments in the renewable energy value chain.

The immediate target beneficiaries of this project will be: local communities, women, youth, land users, families, households and farmers dwelling and earning a living in the project pilot locations. At the national level, scientists, researchers, development practitioners and policy-makers are also among the beneficiaries in terms of participation, knowledge generation, networking and partnerships. The project will also provide a proof of concept which can be used and scaled-up in the many other landscape-level intervention strategies which integrate SLM, INRM, BD management and renewable energy practices (Outputs 3.4 – 3.6). The project outcomes will also influence national policy and other relevant initiatives in this regard. Given its focus on conserving biodiversity and ecosystem service values while supporting local communities to access renewable energy, this project will

have positive social, health and environmental impacts. By integrating biodiversity, ecosystem service considerations, land management, SLM practices in ecologically-sensitive areas, and renewable energy development and mainstreaming (Outputs 3.1 – 3.3), the project will help to preserve and restore essential ecosystem functions while supporting livelihoods. This will contribute to increasing the resilience of populations in degraded and degrading landscapes, thereby help buffering them against the negative impacts of global environmental changes such as land degradation and climate change.

A.8. Knowledge Management

Elaborate on the Knowledge management approach for the project, including, if any, plans for the project to learn from other relevant projects and initiatives (e.g. participate in trainings, conferences, stakeholder exchanges, virtual networks, project twinning) and plans for the project to assess and document in a user-friendly form (e.g. lessons learned briefs, engaging websites, guidebooks based on experience) and share these experiences and expertise (e.g. participate in community of practices, organize seminars, trainings and conferences) with relevant stakeholders.

The GEF Knowledge Management (KM) strategy will guide the project's KM approach, which will be mainstreamed into the project's design, its M&E system and adaptive management, ensuring that risks are identified and addressed, and successes and failures are documented and shared. Cross-learning and experience-sharing will be conducted in 3 ways:

- Ensure that knowledge from other relevant projects and initiatives, and from what ANAE and INBAR already know, is accessed and used by project stakeholders. Extensive literature research was performed at project design stage, to learn from well documented, relevant programmes and their implementing partner. Alignment was also sought with national policy documents, which lay out the consensus about approaches to follow. Learning will further be promoted through some of the project activities.
- Ensure that project learnings are captured, documented, systematized (= M&E System). In order to generate needed data on project outputs and results, the project will develop a comprehensive monitoring and evaluation system that will capture data and provide reliable and timely evidence to track progress
- Ensure that project knowledge is shared with, and used by relevant stakeholders, thus promoting their scaling out to future projects, improving practices and policies. Producing information on project successes and challenges will constitute a key element of the project's shareable knowledge base. Evaluations will be performed at mid-term and end-of-project to assess the project's contribution to achieving stated objective-level and outcome-level indicators. The project will support the work of an existing community of practice by organizing roundtables and field-testing tools and compiling and sharing lessons learned. Results from the project will be disseminated within and beyond the project intervention zone through a number of existing information sharing networks and forums. This includes networks, forums and events organized by the project itself as well as project-sponsored events (e.g. side events) at national and international fora. In addition, the project will participate, as relevant and appropriate, in UNEP-GEF sponsored networks, organized for Senior Personnel working on projects that share common characteristics.

The project will specifically conduct:

Public awareness: In each district of the project area, a communication strategy will be designed to increase public awareness of the goals of the project, its activities, partners and strategic vision. Activities that are ongoing or have been completed, as well as their immediate and observable impacts, will be communicated to the local population and all stakeholders on an on-going and near real-time basis. All mass media (radio, TV, newspapers, and internet) will be used to generate and develop a broad understanding of, and support for activities such as forest restoration, the practice of agroecology, opportunities in the renewable energy value chain, etc. These media will also serve as platforms through which local stakeholders can interact with other stakeholders to get clarification and explanations of some

project activities, plans, and strategies. Specific elements of the communication needs for each district in the Atsinanana Region, as well as a general communication strategy for dissemination of information at the regional and national levels, will be elaborated during the project inception workshop.

Communications strategy: Beyond the local context, communication activities will also be linked to the global communication strategy being developed to support the work of UN Environment on issues including awareness raising and mobilization of resources and support for SLB, BD management, and renewable energy development. The communication strategy of this project is designed to achieve multiple objectives through a targeted and phased approach which addresses the information needs of all stakeholders. This strategy involves:

- i. Building stakeholder awareness, engagement, and buy-in regarding the process and benefits of effective well managed land administration particularly from the regional administration at Atsinanana and its districts, and from all stakeholder groups to ensure sustainability
- ii. Promote public education and awareness on issues of SLB, BD management, and renewable energy development and use in the region, with a special focus on opportunities available to local populations including women, youth, and other vulnerable groups
- iii. Build the capacity of local stakeholders (including residents and community groups) to be able to understand opportunities and challenges associated with land development in the short and long-term, understand the role played by SLM, and BD management in resolving these challenges. Be able to collaborate with other local, district, regional and national stakeholders in resolving natural resources problems and leveraging existing opportunities.
- iv. Disseminate information about project activities and results to all stakeholder groups with interests in further development and roll-out, including information required for MEEF monitoring and reporting
- v. Develop effective, scalable communications materials and models and provide training to stakeholders in such a way that ensures sustainability (ownership, affordability, adaptability) capacity for investment, negotiation, and transactions for access to land

B. Description of the consistency of the project with:

B.1. Consistency with National Priorities

Describe the consistency of the project with nation strategies and plans or reports and assessments under relevant conventions such as NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

Madagascar's Environmental Charter (Law No. 90-033 of 21 December 1990) and its amendment by Law No. 2015-003 of 19 February 2015. This Charter and its amendments define the National Environmental Policy and have dictated much of the national policies. The promotion of sustainable development, better management of natural resources, and the resolution of land issues are among the plan's objectives that are favorable to the fight against land degradation, desertification, and drought. The enabling policy and institutional environment for integrating SLB, BD conservation and sustainable energy production to be developed in Outcome 1 will further strengthen this Charter. Also, several Outputs under Outcome 2 of this project will contribute to the attainment of the goals of this Charter.

The Environmental Plan for Sustainable Development (PEDD). PEDD is intended as a strategic reference document for Madagascar for environmental management and sustainable development. Three goals have been identified by the PEDD that align closely with this project, namely: (i) the implementation of PEDD will contribute to a systematic

decentralization and local development to increase the responsibility of collectivities and communities in the governance of the natural resources in their territory. (ii) The development of green infrastructure, and services that safeguard all pillars of sustainability, as well as guarantees socio-economic resilience; (iii) Economic productivity and growth based on the valuation of the natural capital; and (iv) An equitable sharing of the benefits of Nature for equitable and sustainable development in all territories. Several initiatives in the current project support the decentralization of governance of natural resources to local communities – Output 1.6 and Output 2.1 for example. The development of renewable energy and supporting value chain contributes to achieving the goals of green infrastructure envisaged by the PEDD.

The Environmental Action Program. The Government of Madagascar prepared a National Environmental Action Plan (NEAP) in 1988, with the support of a group of donors, international agencies and NGOs, led by the Bank. The NEAP, together with the National Environmental Policy and the Environmental Charter, clearly recognized the link between environmental protection and economic development. The vision of achieving economic development within the context of environmental protection is one strongly shared by this project – hence the strong coupling of initiatives for environmental sustainability with those of livelihood development and sustainable energy production.

The National Action Plan on Combating Desertification aligned with the 10-year Strategic Framework Plan 2008 -2018. Madagascar ratified the Convention to Combat Desertification in 1997, three years after its adoption. The overall objective of the Adjusted National Action Plan is to improve productive capital (soil, water, and natural biological resources) as a means of combating desertification and land degradation. This project dedicates several initiatives to address issues of environmental degradation – such as the restoration of 500 hectares of degraded land adjacent to or within identified High Conservation Value Forests restored using locally adapted species (Output 2.2); and the development of sectoral action plans for the implementation of SLM, and BD management for landscape improvement (Outputs 1.5 & 1.6).

National Development Plan (NDP): A National Development Plan (NDP) was adopted for the period 2015-2019. The NDP highlights the value of Madagascar’s natural capital and provides new direction for the country’s economic development based on an inclusive and sustainable approach”. The Action Plan to implement the NDP refers to natural resources as a legacy for future generations, and it includes, as an expected result, the responsible management of natural resources articulated within economic development. The NDP has a land based approach, highlighting the role of land use planning tools. This project recognizes the value of land use planning, and so dedicates many activities under Outputs 1.5, 1.6, & 2.3 to achieving such planning in project pilot locations. Besides supporting the development and implementation of land use plans, this project supports training on zone plan development and the governance associated with their implementation to ensure sustainable land use planning beyond the life of the project.

National Land Use Planning Policy (NLUPP): The government of Madagascar has developed a National Land Use Planning Policy (NLUPP) which states the importance of integrating inter-sector planning processes by coordinating planning processes at the landscape level, to enhance the country’s social and economic development (see planning initiatives of this project above).

The UNDAF 2015-2019 which is coming to an end and which aims to actively contribute to the promotion and fulfilment of human rights of all of the Malagasy population, particularly the most vulnerable, and the promotion of the culture of peace for better security, and to mobilize development partners to coordinate actions in favour of inclusive growth to a favourable social and economic progress. One priority is to strengthen the strategic and operational management capacity of the environment sector and the incorporation of the main parameters of sustainable development into sectoral policies. The current project will take the advantage of the process of new UNDAF development to ensure it contributes to the future UNDAF Outcomes

C. Describe The Budgeted M & E Plan:

The project will follow UNEP standard monitoring, reporting and evaluation processes and procedures for GEF projects. Substantive and financial project reporting requirements are summarized in Annex G of the Project Document, the Costed M & E Plan (see Table below). Reporting requirements and templates are an integral part of the UNEP legal instrument to be signed by the executing agency and UNEP.

The project M&E plan is consistent with the GEF Monitoring and Evaluation policy. A detailed monitoring and evaluation plan has been provided in Annex H, including the indicative budget and time frame for its implementation. The Project Results Framework presented in Annex A includes SMART indicators for each expected outcome as well as mid-term and

end-of-project targets. These indicators along with the key deliverables and benchmarks included in Annex G will be the main tools for assessing project implementation progress and whether project results are being achieved. The costs associated with obtaining the information to track the indicators, as well as other M&E related costs, are presented in the Costed M&E Plan in Annex H and are fully integrated in the overall project budget.

The M&E plan will be reviewed and revised as necessary during the project inception workshop to ensure project stakeholders understand their roles and responsibilities vis-à-vis project monitoring and evaluation. Indicators and their means of verification may also be fine-tuned at the inception workshop. Baseline data gaps will be addressed during the first year of project implementation. Day-to-day project monitoring is the responsibility of the project management team but other project partners will have responsibilities to collect specific information to track the indicators. It is the responsibility of the Project Coordinator or Manager to inform UN Environment of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely fashion.

Table 4 costed M&E plan

Type of M&E activity	Responsible Parties	Budget from GEF	Budget co-finance	Time Frame
Inception Meeting	Project Management Unit (PMU) UNEP	10,000		Within 2 months of project start-up
Inception Report	PMU	0		1 month after project inception meeting
Measurement of project indicators (outcome, progress and performance indicators, GEF tracking tools) at national and global level	Project Coordinator PMU/ Project team	20,000		Outcome indicators: start, mid and end of project Progress/perform. Indicators: annually
Semi-annual Progress/ Operational Reports to UNEP	Project Coordinator with inputs from partners	0		Within 1 month of the end of reporting period i.e. on or before 31 January and 31 July
Project Steering Committee meetings	Project Coordinator PMU UNEP	32,000		Once a year minimum
Reports of PSC meetings	Project Coordinator with inputs from partners	0		Annually
PIR	Project Manager PMU UNEP	0		Annually, part of reporting routine

Type of M&E activity	Responsible Parties	Budget from GEF	Budget co-finance	Time Frame
Monitoring visits to field sites	Project Coordinator PMU UNEP	35,000		As appropriate
Middle Term Review	UNEP TM/ UNEP Evaluation Office PMU	30,000		After 2 years of implementation
Terminal Evaluation	UNEP TM/ UNEP Evaluation Office PMU	40,000		Within 6 months of end of project implementation
Audit	PMU			Annually
Project Final Report	Project Coordinator with inputs from partners	0		Within 2 months of the project completion date
Co-financing report	project Coordinator and input from other co-financiers	0		Within 1 month of the PIR reporting period, i.e. on or before 31 July
Publication of Lessons Learnt and other project documents	Project Coordinator with inputs from partners	12,000		Annually, part of Semi-annual reports & Project Final Report
Total M&E Plan Budget		179,000		

The project Steering Committee will receive periodic reports on progress and will make recommendations to UN Environment concerning the need to revise any aspects of the Results Framework or the M&E plan. Project oversight to ensure that the project meets UN Environment and GEF policies and procedures is the responsibility of the Task Manager in UN Environment-GEF. The Task Manager will also review the quality of draft project outputs, provide feedback to the project partners, and establish peer review procedures to ensure adequate quality of scientific and technical outputs and publications. Project supervision will take an adaptive management approach. The Task Manager will develop a project supervision plan at the inception of the project, which will be communicated to the project partners during the inception workshop. The emphasis of the Task Manager supervision will be on outcome monitoring but without neglecting project financial management and implementation monitoring. Progress vis-à-vis delivering the agreed project global environmental

benefits will be assessed with the Steering Committee at agreed intervals. Project risks and assumptions will be regularly monitored both by project partners and UN Environment. Risk assessment and rating are an integral part of the Project Implementation Review (PIR). The quality of project monitoring and evaluation will also be reviewed and rated as part of the PIR. Key financial parameters will be monitored quarterly to ensure cost-effective use of financial resources.

In-line with UNEP Evaluation Policy and the GEF's Monitoring and Evaluation Policy the project will be subject to a Terminal Evaluation and, additionally, a Mid-Term Review will be commissioned and launched by the Project Manager before the project reaches its mid-point. The possibility of a Mid-Term Evaluation will be discussed with the Evaluation Office.

The Evaluation Office will be responsible for the Terminal Evaluation (TE) and will liaise with the Task Manager and Executing Agency(ies) throughout the process. The TE will provide an independent assessment of project performance (in terms of relevance, effectiveness and efficiency), and determine the likelihood of impact and sustainability. It will have two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP, the GEF, executing partners and other stakeholders. The direct costs of the evaluation will be charged against the project evaluation budget. The Terminal Evaluation will be initiated no earlier than six months prior to the operational completion of project activities and, if a follow-on phase of the project is envisaged, should be completed prior to completion of the project and the submission of the follow-on proposal. Terminal Evaluations must be initiated no later than six months after operational completion.

The draft TE report will be sent by the Evaluation Office to project stakeholders for comment. Formal comments on the report will be shared by the Evaluation Office in an open and transparent manner. The project performance will be assessed against standard evaluation criteria using a six point rating scheme. The final determination of project ratings will be made by the Evaluation Office when the report is finalised and further reviewed by the GEF Independent Evaluation Office upon submission. The evaluation report will be publically disclosed and may be followed by a recommendation compliance process

PART III: Certification by GEF partner agency(ies)

A. GEF Agency(ies) certification

GEF Agency Coordinator	Date	Project Contact Person	Telephone	Email
Kelly West	5/30/2019	Adamou Bouhari	2252251462	Adamou.Bouhari@un.org

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
Project Objective: To optimize sustainable land use management, biodiversity conservation, and access of local communities to renewable household energy security and climate change mitigation in Madagascar						
Component 1: Strengthen national policies and the legal and institutional framework for mainstreaming biodiversity and landscape restoration						
Outcome 1.1 Enabling policy and institutional environment for integrating SLB, BD conservation, and sustainable energy production within the national, regional and municipal frameworks	Area of forest and agricultural land in the Atsinanana district that will benefit from improved management as a result of improved enabling policy and institutional environment	■ 0 ha	■ At least 125,000 hectares of forest land and 70,000 hectares of agricultural land	■ At least 239,000 hectares of forests and agricultural land with 4 municipal councils have management plans to guide restoration and conservation efforts	<ul style="list-style-type: none"> ■ Reports from field assessments using geospatial tools to calculate areal change. ■ Municipal activity reports, and management plans 	Sufficient momentum for positive action on issues of environmental degradation is garnered during the early stages of project implementation

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
Biodiversity and landscape restoration mainstreamed into the xx through strengthened national policies, legal and institutional framework	Number of multi-stakeholder and multi-scale platforms in place to support the integration of natural resources management in food production practices <i>[including gender dis-aggregated data on participation]</i>	None	At least 12 functioning (convening and decision-making) multi-stakeholder platforms in place in the project sites; plus one at national-level [including gender disaggregated data on participation reporting 50% of representation of men and women]	At least 12 functioning (convening and decision-making) multi-stakeholder platforms in place in the project sites; plus one at national-level [including gender disaggregated data on participation reporting 50% of representation of men and women]	Project reports	<ul style="list-style-type: none"> ■ Willingness and capacity of institutions under the project to engage in collaboration through multi-stakeholder platforms ■ Local administrative authorities have a sustained impetus and interest in supporting renewable energy over time. ■ Wider food insecurity, drought, and natural disaster conditions do not preclude active institutional engagement in this component of the project
	Number of policies and incentives in place at national and local level to support SLM, and BD mainstreaming	None	At 2 regulatory frameworks supports SLM, and BD mainstreaming in the Atsinanana region	At 3 regulatory frameworks supports SLM, and BD mainstreaming in the Atsinanana region	Relevant policies, legislation, plans, or strategies.	
Output 1.1 Establish and operationalize multi-stakeholder / inter-sectoral coordination mechanism for SLB, BD strengthened at Atsinanana district landscape level in accordance with local authorities and administrations						
Output 1.1 Regulatory framework (1. Environment Code of Madagascar, 2. National Agroecology strategy and 3. National strategy for land management) is drafted/amended to strengthen SLB, BD mainstreaming						

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
Output 1.3 Stakeholders' knowledge on natural resources management at national, regional, district and municipal level are improved and data to support sustainable management of the biodiversity and forest resources of the Atsinanana Region is collected and available at the end of the project						
Output 1.4 Institutions' capacity is Strengthened across sectors to collaborate and manage the Atsinanana region landscape						
Output 1.5 Two sectorial actions plans (agriculture, energy) developed that integrate biodiversity dimensions, sustainable energy, and SLM						
Output 1.6 Municipal development plans developed for 4 municipalities in Atsinanana region integrating BD, sustainable energy, SLM and lessons learned to upscale to other municipalities						
Component 2: Ensure scaling up of SLM practices and agroecology in a wider landscape						
Outcome 2.1: Biodiversity management/ecosystem service provision mainstreamed in forest landscape management in	Area of globally significant biodiversity habitat managed by communities through conservation agreements	0 ha	1,000 ha	3,500 ha	Project reports supported with maps	<ul style="list-style-type: none"> ■ The establishment of conservation agreements clarifies land tenure issues in the community and brings unity in a common vision for conservation

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
two priority districts	Number of smallholder farmers (at least 50% of whom should be women) benefiting from SLM or DB value-chains	None	<ul style="list-style-type: none"> ■ At least 50 farmers incorporating SLM into their land use practices ■ Women are supported to participate in at least 2 major activities in the renewable energy value chain in the Atsinana region 	<ul style="list-style-type: none"> ■ Techniques of SLM being practiced by at least 150 farmers in each of the Atsinanana districts ■ Women are participating in at least 4 major activities in the renewable energy value chain 	Rapid field appraisal/assessment	<ul style="list-style-type: none"> ■ The project will not lead to land conflicts or engender issues of land rights
	Extent of area (in ha) adjacent to or within identified High Conservation Value Forests restored	0 ha	200 ha	500 ha	Project reports supported with maps	<ul style="list-style-type: none"> ■ Local-level enthusiasm for forest restoration remains high among forest custodian communities

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
	Extent in ha of land area and agro-ecosystems under Integrated Land Management <i>[included gender-disaggregated data on land ownership/engagement in diversification / MHH and FHH requiring food assistance]</i>	Integrated land management is not a feature of land use in Atsinanana, and the extent of land area and agro-ecosystems under Integrated Land Management	At least 3,000 ha with improved soil and water management that also enhances biodiversity <i>[of which women-owned and managed land constitutes at least 50%]</i>	At least 4,800 ha with improved soil and water management that also enhances biodiversity <i>[of which women-owned and managed land constitutes at least 50%]</i>	Rapid field appraisal/assessment	<ul style="list-style-type: none"> ■ Sufficient interest amongst communities and local authorities to expand ILM activities and interest in maintaining biodiversity Major disasters do not preclude a focus on ILM by communities and local authorities. ■ The pilot communities will remain organized to properly manage the outcomes from project investments.
	Number of smallholder farmers (at least 50% of whom should be women) benefiting due to the implementation of agroecology measures	None	<ul style="list-style-type: none"> ■ At least 3,000 farmers incorporating SLM into their land use practices 	<ul style="list-style-type: none"> ■ Agroecology measures being practiced by at least 7,000 farmers in the Atsinanana districts 	Rapid field appraisal/assessment	<ul style="list-style-type: none"> ■ The project will not lead to land conflicts or engender issues of land rights
	% improvement in revenues of local farmers due to the implementation of agroecology measures	0%	5%	20%	Rapid field appraisal/assessment	<ul style="list-style-type: none"> ■ Local farmers understand the benefits of agroecology measures

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
	Number of gender-responsive systems/initiatives in place to monitor ecosystem services, as well as SLM adoption, use and gender disaggregated challenges	No gender-responsive system/initiative in place to monitor ecosystem services, and SLM in project	A framework and action-plan developed for gender-responsive system/initiative to monitor ecosystem services, and SLM in project	At least two gender-responsive systems/initiative in place to monitor multi-scale ecosystem resilience, food security and GEBs established at national and landscape levels	<ul style="list-style-type: none"> Gender-responsive SLM framework shared with stakeholders 	The gender safeguards adopted by the project are sufficient to engage communities at all levels in the development of a gender-responsive framework
Output 2.1 Conservation agreements entered into by MEEF and local communities resulting in the conservation and active management of at least 3,500 ha of globally significant biodiversity habitat.						
Output 2.2 At least 500 ha of degraded land adjacent to or within identified High Conservation Value Forests restored using native and adapted species with bamboo if appropriate.						
Output 2.3 For production cultivated land (4,800 ha targeted): technologies developed, tested and appropriate infrastructure established to operationalize SLM in line with developed ILMPs, namely: (i) incorporation of nitrogen-fixing trees into annual mono-cropping; (ii) improvement of planting methods and use of high yielding varieties; (iii) improved water management; (iv) increase in use of organic fertilizer and (v) integrated pest management.						
Output 2.4 Local communities are capacitated on decision making about ecosystem services management						
Component 3. Improving rural energy generation systems and wood services to reduce deforestation						
Outcome 3.1 Local community, local leaders and private sector aware and contribute to rural energy strategy for Atsinanana Region	Number of networks in support of the renewable energy value chain in the Atsinanana Region	There is no renewable energy value chain in the Atsinanana Region.	At least one network supporting renewable energy exists	At least three networks supporting different sectors of renewable energy exists	Report of consultative meetings with networks	<ul style="list-style-type: none"> Early buy-in of the private sector to the renewable energy value chain development

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
	Households using energy efficient cookstoves	Households do not use energy-efficient cook staves	At least 2000 households using energy efficient cookstoves	At least 3000 households using energy efficient cookstoves	Report from a rapid field appraisal	<ul style="list-style-type: none"> ■ The price of stoves is affordable to local households
	Number of people using energy from the gasification of bamboo	The Atsinanana Region does not have a bamboo gasification plant and do not sufficiently appreciate the usefulness of bamboo as a feedstock for energy production through gasification	At least 100 people using energy from the bamboo gasification plant	At least 200 people using energy from the bamboo gasification plant	Statistics from the energy distributors of the gasification plant	<ul style="list-style-type: none"> ■ Training workshops are effective in transmitting the value of renewable energy transformation for the society and limiting resistance
	Hectares planted with bamboo since project inception	There are no bamboo plantations to support the gasification	150 hectares of bamboo plantation supporting the renewable energy value chain	At least 300 hectares of bamboo plantation exist to support the renewable energy value chain	Registry of businesses for the districts of Atsinanana	<ul style="list-style-type: none"> ■ Local investors are enthusiastic about the economic and environmental values of investments in renewable energy <p>The renewable energy value chain is adopted by investors and develops</p>

	Indicator	Baseline	Mid-term target	End of project target	Sources of verification	Assumptions
	Commercial initiatives operating in the renewable energy value chain owned by local residents	Renewable energy technology is not common in Atsinanana	At least two locally-owned local commercial initiatives operating in the renewable energy value chain	At least six locally-owned local commercial initiatives operating in the renewable energy value chain		rapidly
3.1: Report on Rural Energy Assessment available for Atsinanana Region by the end of year 2 of project implementation						
3.2: Development of private sector/community engagement strategy of transforming the energy sector in Atsinanana Region towards use of sustainable energy technologies						
3.3: Training on alternative fuel and improved stove is provided for local communities and private individuals						
3.4: Demonstrate energy efficient and renewable energy technologies in the Vohibinany and Vatomandry Districts of Atsinanana Region: (i) 3,000 households adopt use of energy efficient cook stoves; (ii) one village electrified with one 25kW bamboo gasification generator						
3.5: 300 ha of shrub species and bamboo plantation established for energy use and wood services						
3.6: Technologies transferred, adapted and produced locally as part of local enterprise activity						

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Responses to GEFSEC comments

Secretariat Comment	Agency Response
<p>6) - Include a gender study in the PPG to better figure out the inequalities.</p> <p>- Explain at CEO endorsement how this study would have influenced the result framework.</p>	<p>A gender study was incorporated into all thematic studies during the PPG</p> <p>This has given rise to a comprehensive gender analysis in the project document (see Section 3.11) and a presentation in the CEO Endorsement (see A.4. Gender Equality and Women's Empowerment.). The attention to gender led to a comprehensive analysis of gender dimension on project implementation as well as indicators to ensure that the objectives for full gender equality in participation and benefits from the project are achieved (see Section 3.11 in the project document)</p>

8) During the PPG:

- Confirm the coverage of lands under conservation, restoration, and plantation/management (include baseline maps).
- Confirm the metrics and the methodologies to calculate the GEB.

- Provide a clear definition of each land use: conservation, restoration, plantation, management. Include the safeguards, if any.

- Provide an updated rural energy assessment to adjust the strategy and the interventions.

- Include CSO, scientific organizations, and local communities in the implementation phase.

- Develop a gender strategy.

- Develop a coordination mechanism with similar approaches, notably related to the Bonn Challenge, REDD+, and integrated approaches (GEF/WB/AFD PADAP for instance).

The metrics related to conservation, restoration and plantation/management are provided in UNEP Project Document section on Global Environment Benefits page 53. The metrics related to GEB are also included in that section.

The metrics and methodologies for calculating carbon emissions avoided is provided as the last Appendix of the Project Document.

Conservation in the context of the project is define in Footnote 1

Restoration: in the context of the project the definition of Land restoration by Smith et al., 2013; Lal, 2009, 2011 is adopted. See Footnote 1.

Plantation is defined in footnote 114. Environment Impact Assessment of Bamboo Plantation is envisaged in the project.

Natural Resources management: The definition of Science Direct is considered in the context of this document.

A comprehensive assessment of the energy situation in the project locations was carried out during the PPG. One entire study was dedicated to understanding the energy situation (the reference[1]). This study formed the basis for the design of activities and project goals related to sustainable energy.

CSOs, scientific organizations and local communities have been included in the implementation phase (see Section 2.5 – Stakeholder Mapping and Analysis; and Section 5 – Stakeholder Participation). The inclusion of these organizations follows several layers of engagement throughout the project preparation and validation phases

A gender strategy has been developed for the project (see Section 3.11, and the Gender equality and women’s empowerment). To support this plan, a number of indicators have been developed to guide the project towards meeting its gender vision (see Table 11)

Responses to Council comments

Comment	Response
<p>Germany: It is not clear why the main implementing partner of this initiative to promote agroecology (application of ecological concepts and principles to agricultural production for the optimization of agroecosystems) is the Ministry of Environment, Ecology and Forests but not the Ministry for Agriculture.</p>	<p>While we recognize the rationale of the comment, it will be good to recall that the project is an integrated one which brings together Environmental issues related to legal framework and land restoration, renewable energy issue, agroecology etc. With its transversal mandate on Sustainable Development, the Ministry of Environment and Sustainable Development is considered the most appropriate to act as the Executing Agency coordinating with other concerned departments. UN Environment the Ministry of the Ministry of Environment and Sustainable Development will ensure that other line ministries including Ministry of Agriculture, Energy among others are fully involved in the project implementation. Those line ministries are already included in the Project Steering Committee. See Section A.6 Institutional Arrangement</p>
<p>Although the proposal works on land use planning at regional and district level, the Regional Land Use Scheme (SRAT) is not mentioned.</p>	<p>The existence of SRAT has been recognized as part of the baseline activities on which this project can build in the development of land use plans to guide sustainable land management. The development of land use plans will take into account information from existing Municipal Land Management Plans (SAC), Municipal Development Plans (PCD), Regional Land Management Plans (SRAT) and Regional Development Plans (PRD) (see Component 1 output 1.6).</p>
<p>Component 2 on restoration of degraded landscapes does not mention the National Strategy on Forest Landscape Restoration validated in February 2017. Issues specifically mentioned by the Forest Landscape Restoration Strategy, such as land tenure security and private sector involvement, should be given more attention in the proposal in parallel to technical matters.</p>	<p>The role of the National Strategy on Forest Landscape Restoration has been added, including the important part played by its multi-stakeholder approach and four strategic orientations, which address key issues of land governance of which land tenure security is pivotal (see Section3.6.)</p>

The component on improved cooking stoves and energy production seems interesting but it is not clear why Atsinanana with its relatively abundant wood resources has been chosen as intervention zone for the project.

The PPG thematic study on energy and associated sustainability issues touching the project made an effort to examine different options for achieving sustainable energy within the project communities. Regarding energy-efficient cook stoves, the study observed that the high rate of deforestation for fuelwood provision was one of the key reasons for deforestation in Atsinanana and neighbouring regions. The rationale for cook stove that are energy-efficient, constructed from local materials, with local technology is to reduce this rate of deforestation (See Component 3.3, and the thematic PPG report: *Rakotoarivelo Manitra 2018. Base pour l'amélioration des systèmes de production d'énergie rurale et des services du bois pour réduire la déforestation. Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatmandry. Étude thématique PPG. Ministère de l'Environnement et des Eaux et Forêts.*

Responses to STAP comments

Comment

Response

1. Clearly express the project theory of change, that is, the problem being addressed, its drivers, and how the planned interventions will address the problem, as a coordinated logical strategy. Focus on the specific region to be targeted. The proposal presents a number of environmental issues, with multiple causes, and a wide range of solutions. STAP suggests that this wide range is quite ambitious and presents a greater risk than acknowledged on page 17. STAP suggests applying a two-pronged approach that addresses land degradation through the introduction of SLM practices and land restoration, and alternative cooking technologies, to relieve pressure on forests. Bioenergy crops can play a role in both components. The Resilience Adaptation Pathways and Transformation Assessment (RAPTA) Framework provides guidance on applying a participatory process to identify key aspects to prioritize. RAPTA guidelines are described in: O'Connell, D., et al (2016). "Designing Projects in a Rapidly Changing World – Guidelines for embedding resilience, adaptation and transformation into sustainable development", available at: <http://www.stapgef.org/rapta-guidelines2>

The theory of change has been elaborated upon. Including the role RAPTA can play in establishing baselines; supporting multi-stakeholder engagement and governance; as well as properly applying the participatory process.

Example, see Sections 3.3; and Output 1.6;

2. STAP appreciates the intention to use energy crops in the rehabilitation of eroded land, and to use biomass efficiently as an energy source. The proposal mentions using exotic bamboo species. STAP urges the proponent to undertake a comprehensive environmental impact assessment: to evaluate alternative energy crop species; to be aware of the potential biodiversity impacts on monocultures of exotic bamboo; and to recognize that exotic or local bamboo, like any other crop, requires water and nutrients to produce high yields. The project developers could take a look at this paper for further information: Bowyer, J. et al. (2014). "Bamboo Products and Their Environmental Impacts". Dovetail Partners, Inc. http://www.dovetailinc.org/report_pdfs/2014/dovetailbamboo0314.pdf

Eucalyptus are rejected on the basis of allelopathy, plus potential impacts on water table, biodiversity and soil nutrients. While bamboo does not have the same allelopathic risk, the hydrological, biodiversity and soil fertility impacts must be considered.

During the project validation, this term raised a lot of discussion. It was agreed that such restoration should be done with “restored using native and adapted species with bamboo if appropriate.”

See Output 2.2 throughout the document; see the new sections discussing potentials and challenges of largescale bamboo cultivation in the introduction to Component 3; as well as Output 3.2

The implication of bamboo cultivation on ecosystems has been explored drawing of several references, including: **Houdanon, R.D., Mensah, S., Gnanglè, C. et al. 2018.** Ecosystem services and biomass stock from bamboo stands in central and southern Benin, West Africa. *Energ. Ecol. Environ.* (2018) 3: 185; and **Nath et al. 2015.** Managing woody bamboos for carbon farming and carbon trading. *Global Ecology and Conservation*. Vol. 3, Pages 654-663.

See the introduction to Component 3. and “Justification of Choices vs. Other Renewable Sources”

An environmental impact assessment will be undertaken under Output 3.4 to assess the full range of potential impacts as well as mitigation options for the use of bamboo as a feedstock for bioenergy production in the project area.

See Output 2.2 and Activity 50

3. For component 3, it would be useful to detail the evidence of using bamboo as a bioenergy source in conditions similar to the project site. The sentence about carbon sequestration rate (page 6) needs rewording, providing evidence of likely growth rate at the project site. These studies may be useful: Chin, et al. (2017). "Bioenergy Production from Bamboo: Potential Source from Malaysia's Perspective". BioResources. Vol. 12, No 3; and Darabant et al., 2014. Bamboo biomass yield and feedstock characteristics of energy plantations in Thailand. Energy Procedia, 59, pp.134-141, available at <http://www.sciencedirect.com/science/article/pii/S1876610214017263>.

It also would be valuable to consider how to advance knowledge on the use of bamboo for bioenergy, or for carbon sequestration. The description of carbon neutrality (Annex 1) requires rewording: bioenergy is carbon neutral if the biomass combusted is subsequently regrown, sequestering the same amount of carbon that was released.

The supplement attached to the project document brings excerpts from the PPG study on energy comparing bamboo and eucalyptus and their respective land demands for energy production.

See the introduction to Component 3. "Bamboo as a bioenergy feedstock" and "Justification of Choices vs. Other Renewable Sources"

The section has been improved with a better description of the justification of the use of bamboo as a bioenergy feedstock in this project. Sub-sections include: Bamboo as a bioenergy feedstock; Bamboo and carbon storage / sequestration; Issues of adoption of renewable energy technologies

See the introduction to Component 3. "Bamboo and carbon sequestration" and "Justification of Choices vs. Other Renewable Sources"

4. STAP appreciates that the proponent has presented an analysis of alternative renewable energy options. STAP suggests that this analysis should be expanded to acknowledge that some of these options supply heat for household cooking, and some provide electricity for the distribution system. Explain the displaced fuel source in the electricity case. Consider the barriers to adoption of cookstoves using solid biomass such as: additional fuel preparation time; perception that it is less convenient and "modern" than gas; and the need for operator skill to avoid smoke. Consider the potential to generate biogas from biosolids, animal manure, food waste as an alternative form of energy for household cooking. With respect to the proposed gasifier, the analysis should compare with conventional combustion technology, considering also costs, emissions and the skills, and the capacity to use and maintain the gasification generator once the project ends.

A comparison has been made on alternative fuel and energy options for the project pilot areas (including the potentials for hydroelectricity; biogas from organic waste, methane production, fuel ethanol, etc.). These comparisons bring in aspects of cost, skills, availability of raw material, transportation implications, etc.

See the introduction to Component 3. "Justification of Choices vs. Other Renewable Sources"

<p>5. The proposal mentions use of waste as a biomass source for energy. STAP suggests that the source of waste, and the current disposal method be detailed to ensure that the bioenergy technology is suitable, and that the full GHG impacts are included in the calculation of climate change mitigation.</p>	<p>The mention of waste in relation to bioenergy is referred to when describing the potential of the improved cookstove “kopadroa” (Output 3.4). In this case, waste is not indicated as an important source of energy – instead, the reference is on that this type of cook stove can efficiently burn waste from vegetable sources (such as maize stalks, or other forms of crop-based waste materials) if the household were to choose to use it to produce energy.</p>
<p>6. Provide details about the relationship with the National ethanol fuel program, which is nominated as a risk on page 8, and a baseline project on page 9. Will the project reduce the risk of inappropriate expansion of sugar cane? STAP suggests that it would be desirable to apply a landscape scale integrated approach to land use planning, to determine the optimal location for sugar cane and other crops, in conjunction with planning SLM and land rehabilitation actions (see also point 7).</p>	<p>The landscape scale integrated approach together with other aspects of site suitability analysis (transport access, land availability, local interest for selected land use, etc.) were used in the identification of proposed sites for key elements within the energy development component for this project (including the location of the gasification plant, potential bamboo plantations, etc.). <i>See PPG study[2].</i></p>
<p>7. To complement agro-ecological principles and the application of IUCN's Restoration Opportunities Assessment Methodology that the project will use, STAP recommends applying the UNCCD's "Scientific Conceptual Framework on Land Degradation Neutrality (LDN)". The LDN framework can be used to inform identification of target areas for SLM and rehabilitation activities, and monitoring of ecosystem services from climate change mitigation and sustainable land management. The LDN framework is applied at landscape scale, encompasses social-ecological dynamics, and emphasizes adaptive learning and knowledge management. The LDN approach can therefore guide stakeholders' decisions to adapt to future changes, including climate change. The framework can be accessed through this link: http://knowledge.unccd.int/knowledge-products-and-pillars/land-degradation-neutrality-ldn-conceptualframework/land</p>	<p>The important developments associated with the creation of LDN as well as its role in achieving sustainable landscapes has been described. Information has also been added on the vision of Madagascar towards achieving LDN by 2030, based on UNCCD records.</p> <p><i>See “Cross-cutting gaps” then “Land degradation neutrality (LDN)” and “Madagascar’s Land Degradation Neutrality Target” in Section 3.6</i></p>

<p>8. Key features of social-ecological systems approach resemble those of agroecology. These features include: connectivity across scales, strong governance arrangements, and cohesive links between social and ecological variables. Project proponents should consider these features in the project design. The following resources can help the project proponents consider these social-ecological system elements when designing the project: 1) RAPTA Guidelines: O'Connell, D. et al. (2016). "Designing Projects in a Rapidly Changing World – Guidelines for embedding resilience, adaptation and transformation into sustainable development": http://www.stapgef.org/rapta-guidelines; and, 2): Fischer, J. et al (2017). "Reframing the foodbiodiversity challenge". Trends in Ecology & Evolution Volume 32, Issue 5, May 2017, Pages 335-345.</p>	<p>The RAPTA framework has been identified as a tool to be used in the assessment of current land uses to identify the most appropriate sites for different land uses during the development of municipal land use plans <i>See Output 1.6</i>.</p> <p>This will help focus efforts where interventions will be most effective through a structured approach that enables constant improvement and adaptation to change</p>
<p>9. STAP appreciates that the types of SLM technologies cannot be detailed at this point in the project cycle. Thus, STAP encourages UNEP to define the criteria that will be used to identify the selection of SLM technologies (Component 2). It also will be important to detail how stakeholders' knowledge of SLM and integrated land management will be included in the analysis and selection.</p>	<p>The selection will be guided by WOCAT-based criteria presented in “Sustainable Land Management: Guidelines and Best Practices in Sub-Saharan Africa”, prepared by WOCAT in 2011[3]. Madagascar is one of the case countries on which the experiences developed in this book are based. The use of these criteria have further been illustrated and organized in “Decision support to select appropriate Sustainable Land Management (SLM) practices within the landscape[4]”</p> <p><i>See introduction to Component 2.</i></p>
<p>10. STAP suggests that further detail is required of the linkages with the baseline projects in the agriculture sector, clarifying the nature of the relationship, and how they support the project.</p>	<p>The section on agriculture-related baseline projects has been revised – adding new on-going projects and their relationships with the current project.</p> <p><i>See Section 2.6</i></p>
<p>11. A study in the Itasy region of Madagascar offers evidence that agro-ecological practices have an impact on climate change mitigation. The project proponents may want to refer to the paper to strengthen the knowledge base of agro-ecological practices in Madagascar while identifying the appropriate caveats – for example, the scale in the study may be different than the project scale. Rakotovo, N. et al. (2017). "Carbon footprint of smallholder farms in Central Madagascar: The integration of agro-ecological practices". Journal of Cleaner Production 140 (2017) 1165e1175</p>	<p>This study by Rakatovao and others has been included in discussing the role of management and land use practices in affecting bamboo yields and the provision of ecosystem services.</p> <p><i>See introduction to Component 3.</i></p>

<p>12. The following paper may be useful in providing recent data on biomass amounts, and data on annual consumption of wood in Madagascar. It also provides information on other sources of renewable energy, and their potential use in Madagascar, as well as details on the energy sector policy in Madagascar that may be used to complement the project description: Praene J.P., et al. (2017). "Electricity generation from renewables in Madagascar: Opportunities and projections". Renewable and Sustainable Energy Reviews 76 (2017) 1066–1079.</p>	<p>This reference has been used in grounding the basis for some of the driving factors of land use and land cover changes in Madagascar, as well as on potential for alternative energy sources in the country.</p> <p><i>See Section 2.3; introduction to Component 3; & Section 3.1</i></p>
<p>13. Finally, please provide further detail on the assumptions used to calculate the potential mitigation benefits of bioenergy. The calculations provided on page 23 lack clarity on the assumed reduction in fuelwood requirement of improved cookstoves. Correct the statement "every grain of atomic carbon" which presumably should say "gram".</p>	<p>A supplement has been added to clearly indicated the computation and assumptions associated with arriving at the emissions avoided through the implementation of this project.</p>

[1] Rakotoarivelo Manitra 2018. ***Base pour l'amélioration des systèmes de production d'énergie rurale et des services du bois pour réduire la déforestation.*** Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatohandry. Étude thématique PPG. Ministère de l'Environnement et des Eaux et Forêts.

[2] Ministère de l'Environnement et des Eaux et Forêts 2018. ***Energie durable.*** Pour le Projet: Conservation et amélioration des services écosystémiques de la région Atsinanana, à travers la promotion de l'agroécologie et de la production d'énergie durable. Districts Brickaville et de Vatohandry. Étude thématique PPG.

[3] Author: Hanspeter Liniger, Rima Mekdaschi Studer, Christine Hauert, and Mats Gurtner 2011. [Sustainable Land Management in Practice - Guidelines and Best Practices for Sub-Saharan Africa](#)

[4] See [here](#).

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS.

A. Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF:	
<i>Project Preparation Activities Implemented</i>	<i>GETF/LDCF/SCCF/CBIT Amount (\$)</i>

	<i>Budgeted Amount</i>	<i>Amount Spent Todate</i>	<i>Amount Committed</i>
National Consultants	28000	28000	
International Consultants	27000	27000	
Travel on Official Business	20000	20000	
Stakeholder Consultation/meetings/workshops	46986	46986	
Translation- Communication-office supplies	15000	15000	
Total	136986	136986	

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/CBIT Trust Funds or to your Agency (and/or revolving fund that will be set up)

N/A

ANNEX E: GEF 7 Core Indicator Worksheet

Use this Worksheet to compute those indicator values as required in Part I, Table G to the extent applicable to your proposed project. Progress in programming against these targets for the program will be aggregated and reported at any time during the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF and SCCF.

Core Indicator 1	Terrestrial protected areas created or under improved management for conservation and sustainable use				<i>(Hectares)</i>
	<i>Hectares (1.1+1.2)</i>				
	<i>Expected</i>		<i>Achieved</i>		
	PIF stage	Endorsement	MTR	TE	
Indicator 1.1	Terrestrial protected areas newly created				
Name of Protected Area	WDPA ID	IUCN category	Hectares		
			Expected		Achieved
			PIF stage	Endorsement	MTR

			Sum				
Indicator 1.2	Terrestrial protected areas under improved management effectiveness						
Name of Protected Area	WDPA ID	IUCN category	Hectares	METT Score			
				Baseline		Achieved	
					Endorsement	MTR	TE
		Sum					
Core Indicator 2	Marine protected areas created or under improved management for conservation and sustainable use						(Hectares)
				Hectares (2.1+2.2)			
				Expected		Achieved	
				PIF stage	Endorsement	MTR	TE
Indicator 2.1	Marine protected areas newly created						
Name of Protected Area	WDPA ID	IUCN category	Hectares				
			Expected		Achieved		
			PIF stage	Endorsement	MTR	TE	
		Sum					

Indicator 2.2	Marine protected areas under improved management effectiveness						
Name of Protected Area	WDPA ID	IUCN category	Hectares	METT Score			
				Baseline		Achieved	
				PIF stage	Endorsement	MTR	TE
		Sum					
Core Indicator 3	Area of land restored						(Hectares)
				Hectares (3.1+3.2+3.3+3.4)			
				Expected		Achieved	
				PIF stage	Endorsement	MTR	TE
					5,600		
Indicator 3.1	Area of degraded agricultural land restored						
				Hectares			
				Expected		Achieved	
				PIF stage	Endorsement	MTR	TE
					4,800		
Indicator 3.2	Area of forest and forest land restored						
				Hectares			
				Expected		Achieved	
				PIF stage	Endorsement	MTR	TE

					500	
Indicator 3.3	Area of natural grass and shrublands restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
					300	
Indicator 3.4	Area of wetlands (including estuaries, mangroves) restored					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 4	Area of landscapes under improved practices (hectares; excluding protected areas)					
			Hectares (4.1+4.2+4.3+4.4)			
			Expected		Expected	
			PIF stage	Endorsement	MTR	TE
					3,500	
Indicator 4.1	Area of landscapes under improved management to benefit biodiversity					
			Hectares			
			Expected		Achieved	

			PIF stage	Endorsement	MTR	TE
Indicator 4.2	Area of landscapes that meet national or international third-party certification that incorporates biodiversity considerations					
Third party certification(s):			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 4.3	Area of landscapes under sustainable land management in production systems					
			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 4.4	Area of High Conservation Value Forest (HCVF) loss avoided					
Include documentation that justifies HCVF			Hectares			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
				3,500		

Core Indicator 5	Area of marine habitat under improved practices to benefit biodiversity				<i>(Hectares)</i>	
Indicator 5.1	Number of fisheries that meet national or international third-party certification that incorporates biodiversity considerations					
Third party certification(s):			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 5.2	Number of large marine ecosystems (LMEs) with reduced pollution and hypoxial					
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 5.3	Amount of Marine Litter Avoided					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 6	Greenhouse gas emission mitigated				<i>(Metric tons of CO₂e)</i>	
		Expected metric tons of CO ₂ e (6.1+6.2)				

			PIF stage	Endorsement	MTR	TE
			Expected CO2e (direct)	1,013,805		
			Expected CO2e (indirect)			
Indicator 6.1	Carbon sequestered or emissions avoided in the AFOLU sector					
			Expected metric tons of CO ₂ e			
			PIF stage	Endorsement	MTR	TE
			Expected CO2e (direct)	1,013,805		
			Expected CO2e (indirect)			
			Anticipated start year of accounting			
			Duration of accounting			
Indicator 6.2	Emissions avoided Outside AFOLU					
			Expected metric tons of CO ₂ e			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
			Expected CO2e (direct)			
			Expected CO2e (indirect)			
			Anticipated start year of accounting			
			Duration of accounting			
Indicator 6.3	Energy saved					
			MJ			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE

Indicator 6.4	Increase in installed renewable energy capacity per technology					
		Technology	Capacity (MW)			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 7	Number of shared water ecosystems (fresh or marine) under new or improved cooperative management					(Number)
Indicator 7.1	Level of Transboundary Diagnostic Analysis and Strategic Action Program (TDA/SAP) formulation and implementation					
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE
Indicator 7.2	Level of Regional Legal Agreements and Regional Management Institutions to support its implementation					
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE
Indicator 7.3	Level of National/Local reforms and active participation of Inter-Ministerial Committees					
		Shared water ecosystem	Rating (scale 1-4)			
			PIF stage	Endorsement	MTR	TE

Indicator 7.4	Level of engagement in IWLEARN through participation and delivery of key products					
		Shared water ecosystem	Rating (scale 1-4)			
			Rating		Rating	
			PIF stage	Endorsement	MTR	TE
Core Indicator 8	Globally over-exploited fisheries Moved to more sustainable levels					<i>(Metric Tons)</i>
Fishery Details	Metric Tons					
		PIF stage	Endorsement	MTR	TE	
Core Indicator 9	Reduction, disposal/destruction, phase out, elimination and avoidance of chemicals of global concern and their waste in the environment and in processes, materials and products					<i>(Metric Tons)</i>
		Metric Tons (9.1+9.2+9.3)				
		Expected		Achieved		
		PIF stage	PIF stage	MTR	TE	
Indicator 9.1	Solid and liquid Persistent Organic Pollutants (POPs) removed or disposed (POPs type)					
		Metric Tons				
		Expected		Achieved		
	POPs type	PIF stage	Endorsement	MTR	TE	

Indicator 9.2	Quantity of mercury reduced					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.3	Hydrochlorofluorocarbons (HCFC) Reduced/Phased out					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.4	Number of countries with legislation and policy implemented to control chemicals and waste					
			Number of Countries			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 9.5	Number of low-chemical/non-chemical systems implemented particularly in food production, manufacturing and cities					
			Number			
		Technology	Expected		Achieved	
			PIF stage	Endorsement	MTR	TE

Indicator 9.6	Quantity of POPs/Mercury containing materials and products directly avoided					
			Metric Tons			
			Expected		Achieved	
			PIF stage	Endorsement	PIF stage	Endorsement
Core Indicator 10	Reduction, avoidance of emissions of POPs to air from point and non-point sources					<i>(grams of toxic equivalent gTEQ)</i>
Indicator 10.1	Number of countries with legislation and policy implemented to control emissions of POPs to air					
			Number of Countries			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Indicator 10.2	Number of emission control technologies/practices implemented					
			Number			
			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
Core Indicator 11	Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment					<i>(Number)</i>
			Number			

			Expected		Achieved	
			PIF stage	Endorsement	MTR	TE
		Female		7,000		
		Male		8,000		
		Total		15,000		

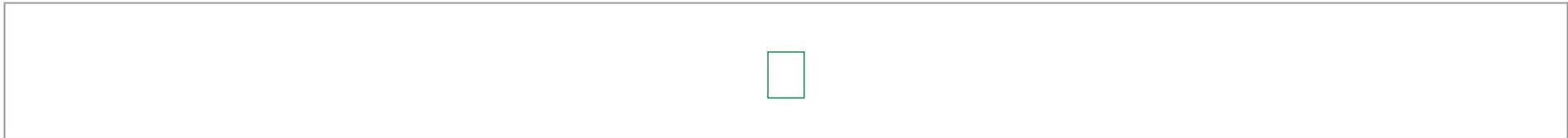
ANNEX: Project Taxonomy Worksheet

Use this Worksheet to list down the taxonomic information required under Part1 by ticking the most relevant keywords/topics//themes that best describes the project

Level 1	Level 2	Level 3	Level 4
Influencing models			
	Transform policy and regulatory environments		
	Strengthen institutional capacity and decision-making		
	Convene multi-stakeholder alliances		
	Demonstrate innovative approaches		
Stakeholders			
	Private Sector		
		Individuals/Entrepreneurs	
	Beneficiaries		
	Local Communities		
	Civil Society		
		Community Based Organization	
		Non-Governmental Organization	
	Type of Engagement		
		Information Dissemination	
		Partnership	
		Consultation	
		Participation	

	Communications		
		Awareness Raising	
		Education	
		Public Campaigns	
		Behavior Change	
Capacity, Knowledge and Research			
	Capacity Development		
	Learning		
		Theory of Change	
		Adaptive Management	
		Indicators to Measure Change	
	Innovation		
	Knowledge and Learning		
		Knowledge Management	
		Innovation	
		Capacity Development	
		Learning	
	Stakeholder Engagement Plan		
Gender Equality			
	Gender Mainstreaming		
		Beneficiaries	
		Women groups	
		Sex-disaggregated indicators	
		Gender-sensitive indicators	
	Gender results areas		
		Access and control over natural resources	
		Participation and leadership	
		Access to benefits and services	
		Capacity development	
		Awareness raising	
		Knowledge generation	
Focal Areas/Theme			
	Land Degradation		

		Sustainable Land Management	
			Restoration and Rehabilitation of Degraded Lands
			Ecosystem Approach
			Integrated and Cross-sectoral approach
			Community-Based NRM
			Sustainable Livelihoods
			Income Generating Activities
			Sustainable Agriculture
			Sustainable Pasture Management
			Sustainable Forest/Woodland Management
			Improved Soil and Water Management Techniques
		Land Degradation Neutrality	
			Land Productivity
			Land Cover and Land cover change
			Carbon stocks above or below ground
		Food Security	



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