Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo Forest Corridor (COFAV) – Madagascar

Climate, Community & Biodiversity Standards

Project Design Document

Developed By: Conservation International

Version: 1.0 – 07 Jan, 2014

i. **Project Name:** Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo Forest Corridor (COFAV)

ii. **Project Location:** Madagascar

iii. **Project Proponent:** Government of Madagascar, through the Ministry of Environment and Forests (MEF) represented by the Direction Générale des Forêts (DGF) -
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v. **Project Start Date**: November 01, 2007 and **GHG accounting period and project lifetime:** 30 years from project start date

vi. **Validation:** PDD submitted for full validation of Climate, Community & Biodiversity Standards,

vii. **History of CCBS status:** first validation

viii. **CCBS edition:** second edition

ix. **Project's Climate, Community and biodiversity benefits:** The protection of COFAV will provide significant climate benefits through the REDD mechanism, which aims to reduce the historical annual deforestation rate of 1 percent. The net climate impact of the project is estimated as 3,955,936 tCO_2e over 10 years. It is also critically important for biodiversity as it represents one of Madagascar's last remaining intact corridors that links areas of low, mid, and high altitude forest and allows for genetic connectivity of animal and plant populations. The protection of the corridor will also maintain the provision of freshwater for much of the center of the country as the headwaters of 25 rivers begin within this forest corridor. COFAV is of tremendous importance to the people of the region. Over 166,000 habitants live in the project zone and use the forest for collecting timber and non-timber forest products, grazing their cattle, and in cultural and spiritual ceremonies. The project will work with local communities to: enhance well-being of resident communities, improve food security and nutrition, increase adoption of farming alternatives to *tavy*, improve local infrastructure (roads, dams, irrigation, water, energy systems), increase revenue-generating activities compatible with forest conservation, increase effectiveness of community management of protected area, increase establishment of partnerships and funding for development projects, increase capacity building for local civil society organizations, increase provision of forest products and services, development of small business, and increase access and quality of local health and education.

x. **Golden Level criteria:** The project is opting for:

   a. Climate Change Adaptation Benefits: In the absence of the project, the

anticipated climate changes are likely to exacerbate the threats to biodiversity and have significantly impact on community. Most families could experience several months a year with insufficient food. The project aims to maintain the forest corridor and ensure that it is protected into the future. Maintaining optimal habitat for the forest biodiversity of COFAV is the essential activity that is needed to help ensure large and healthy populations of plants and animals, and ensure the provision of ecosystem services (i.e. freshwater). The project will assist communities to improving food security, which is absolutely essential to increase community resilience in the face of climate change.

b. Execptional Cumminity Benefits: Madagascar is ranked 151 of 186 countries in the UNDP's Human Development Index. Many of the households in the project zone are classified as vulnerable. The project expects to provide substantial benefits to the majority of the vulnerable population and with extremely low income levels, identified through the process to develop the social safeguards plan. The project aims to provide direct benefits (e.g. employment opportunities, development activities…) and indirectly through ensuring that these people have access rights to natural resources, that the resource continues to exist and that land is not appropriated for other interests.

c. Exceptional Biodiversity Benefits: COFAV has been identified in many conservation priority setting analyses as being of exceptional importance for the protection of global biodiversity. Over 800 species of plants and 300 species of animals have been identified in these forests, including 17 species of lemur and two highly endangered species of bamboo lemur (*Hapalemur aureus* and *Prolemur simus*). Four species in the corridor are considered critically endangered based on the 2008 IUCN red list (*Prolemur simus, Neodrepanis hypoxantha, Paratilapia vondrozo, Bedotia sp.* and *Vevembe*), 4 species are listed as endangered (*Eulemur cinereiceps, Hapalemur aureus, Mantella bernhardi,* and *Ptychochromoides vondrozo*) and many more are considered vulnerable to extinction.

xi. PDD developed by: Conservation International, Version: 1.0 completed on 07 Jan, 2014

xii. Expected schedule for verification: 2015

Acknowledgements

Conservation International prepared this document on behalf of the Ministry of Water and Forests of Madagascar and the people living around the COFAV forest corridor. We wish to acknowledge the invaluable collaboration, support and contribution of the many organizations named in this document that have brought the COFAV project from its initial conception stage to the reality that it is today.

Executive Summary

The Ambositra-Vondrozo Forest is located in the southern half of the humid eastern forest biome of Madagascar and is a narrow strip approximately 300 km long. A new protected area, the Ambositra-Vondrozo Forest Corridor Natural Resource Reserve is being created in this area, 135,212 hectares of which forms the project area of the Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo (COFAV)1. The project lies on Madagascar's eastern escarpment and links Ranomafana National Park in the north and Andringitra National Park in the south.

The protection of COFAV will provide significant climate benefits through the REDD mechanism as set out in the Project Description prepared under the VCS guidelines and entitled "Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo (COFAV) – Madagascar". It is also critically important for biodiversity as it represents one of Madagascar's last remaining intact corridors that links areas of low, mid, and high altitude forest and allows for genetic connectivity of animal and plant populations. Over 800 species of plants and 300 species of animals have been identified in these forests, including 17 species of lemur and two highly endangered species of bamboo lemur (*Hapalemur aureus* and *Prolemur simus*). Four species in the corridor are considered critically endangered based on the 2008 IUCN red list (*Prolemur simus, Neodrepanis hypoxantha, Paratilapia vondrozo, Bedotia sp.* and *Vevembe*), 4 species are listed as endangered (*Eulemur cinereiceps, Hapalemur aureus, Mantella bernhardi,* and *Ptychochromoides vondrozo*) and many more are considered vulnerable to extinction.

In addition to its role in carbon storage and harbouring biodiversity, COFAV is of tremendous importance to the people of the region. The Betsileo and Tanala ethnic groups use the forest for collecting timber and non-timber forest products, grazing their cattle, and in cultural and spiritual ceremonies. Their main livelihood pursuits include rice cultivation, cattle herding, and growing cash crops such as coffee and bananas. The corridor is a vital source of freshwater for much of the center of the country as the headwaters of 25 rivers begin within this forest corridor.

The forest corridor is largely a remote, rural area and encompasses 10 districts comprised of 43 communes. The project zone is the area immediately around the forest in which people's activities influence the project area. The project zone includes all of the Fokontanys (a Malagasy administrative area) that neighbour the forested project area, encompassing a population of aproximatelly 166,000 habitants.

Threats to this unique site include slash-and-burn agriculture, illegal small-scale mining and illegal, but selective and small-scale logging. The corridor is also threatened by its geography as it is a mosaic of land uses that includes villages, agricultural lands, grazing lands, roads,

[1] Unless specifically indicated otherwise, the term COFAV in this Project Description refers to the Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo (COFAV) rather than the COFAV protected area or any other definition of the Ambositra-Vondrozo Forest Corridor

and a railway. Of these threats slash and burn is by far the most important cause of deforestation and carbon dioxide emissions. The human activity in and around COFAV threatens its long-term ecological viability, jeopardizing the very cultures and communities that currently depend upon it so heavily. In addition, unsustainable practices threaten the unique biodiversity of the area, which has been identified as a priority conservation site in Madagascar due to its high level of endemism.

In order to reduce deforestation and the fragmentation of the corridor, while also promoting alternative livelihoods and development for the resident communities, the Government of Madagascar, in collaboration with Conservation International, has developed the **Reduced Emissions from Deforestation in the Ambositra-Vondrozo Forest Corridor (COFAV).** Through the development of COFAV, the project will use carbon finance to implement activities needed to reduce deforestation. The foundation of the Avoided Unplanned Deforestation (AUD) project is the creation and long term management of a Natural Resources Nature Reserve (equivalent to a VI protected area following IUCN's categories). Two types of management zones comprise the project area: an inner strict conservation zone; and a belt of sustainable use areas that surround the strict conservation zone. The management rights for the sustainable use areas are delegated to the resident communities. Conservation International provides technical support to the communities and is the central, overall manager of the project. It is the community units, within the overall management of the protected area, that form the building blocks of the project and the means by which the communities will undertake the project activities that aim to stop deforestation.

By conserving highly threatened biodiversity, bringing new alternative revenues to communities and ensuring the continued provision of ecosystem services to them in the face of climate change, this project will contribute to three important objectives: community development; biodiversity conservation and reducing global greenhouse gas emissions.

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Abbreviations and Acronyms

AFOLU – Agriculture, Forestry and Other Land Use

AMNH - American Museum of Natural History

AUD – Avoided Unplanned Deforestation

CBO – Community-based Organisation

CCBS – Climate, Community and Biodiversity Standard

CI – Conservation International

CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora

CMP – Conservation Measures Partnership

COBA - Communauté de Base

COFAV - Corridor Forestier Ambositra-Vondrozo

COGE - Comite de Gestion

CBNRM - community-based natural resource management

DPRH – Direction de la Pêche et de Ressources Halieutiques

DSRP – Document de Stratégie de Réduction de la Pauvreté

FAO – Food and Agricultural Organisation

FID – Fonds d'Intervention pour le Développement

GCF – Gestion Contractualisée des Forêts

GELOSE – Gestion Locale Sécurisée

GHG – Greenhouse Gases

GoM – Government of Madagascar

HCV – High Conservation Value

HDI – Human Development Index

IUCN - International Union for Conservation of Nature

MAEP – Ministère de l'Agriculture, de l'Elevage et de la Pêche

MEF – Ministry of Environment and Forest

MODIS – Moderate Resolution Imaging Spectroradiometer

MRV – Monitoring, Report and Verification

NASA – National Aeronautics and Space Administration

NTFP - Non-timber Forest Products

ONE – Office National de l'Environnement

PA – Protected Area

PAP – People affected by the Project

PGESS - Social Safeguards Management Plan

PSDR – Projet de Soutien au Développement Rural

PSP – Projet Sectoriel Pêche

REDD – Reduced Emissions from Deforestation and Degradation

SAPM – Système d'Aires Protégées de Madagascar

UNFCCC - United Nations Framework Convention on Climate Change

VCS – Verified Carbon Standard

VCU – Verified Carbon Units

WCS – Wildlife Conservation Society

ZOC - Controlled Occupation Areas

Basic Data

1) The title of the CCB Standards project activity:

Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo (COFAV), Madagascar

2) The version number of the document:

Version 1.0

3) The date of the document:

07 Jan, 2014

4) Approved CCBS Standard :

For validation using the Climate, Community & Biodiversity Standard (CCBS), Second Edition.

General Section

G1. Original Conditions in the Project Area

G1.1. Location of the Project and Basic Physical Parameters

The Ambositra-Vondrozo Forest is located in the southern half of the humid eastern forest biome of Madagascar and is a narrow strip approximately 300 km long. A new protected area, the Ambositra-Vondrozo Forest Corridor Natural Resource Reserve is being created in this area, 135,212 hectares of which forms the project area of the Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo (COFAV)[2].

The **Reduced Emissions from Deforestation in the Ambositra-Vondrozo Forest Corridor (COFAV)** is formed by part of the Natural Resource Reserve, between 46°55' and 47°44" East Longitude, and 20°35' and 22°16' South Latitude. It is about 200 km in length and varies in width between two and 50 km, in total the project area extendes over 135,212 ha. The project area links two national parks managed by Madagascar National Parks – Ranomafana in the north and Andringitra to the south. Figure 1 presents the location of the project area.

[2] Unless specifically indicated otherwise, the term COFAV in this Project Description refers to the Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo (COFAV) rather than the COFAV protected area or any other definition of the Ambositra-Vondrozo Forest Corridor

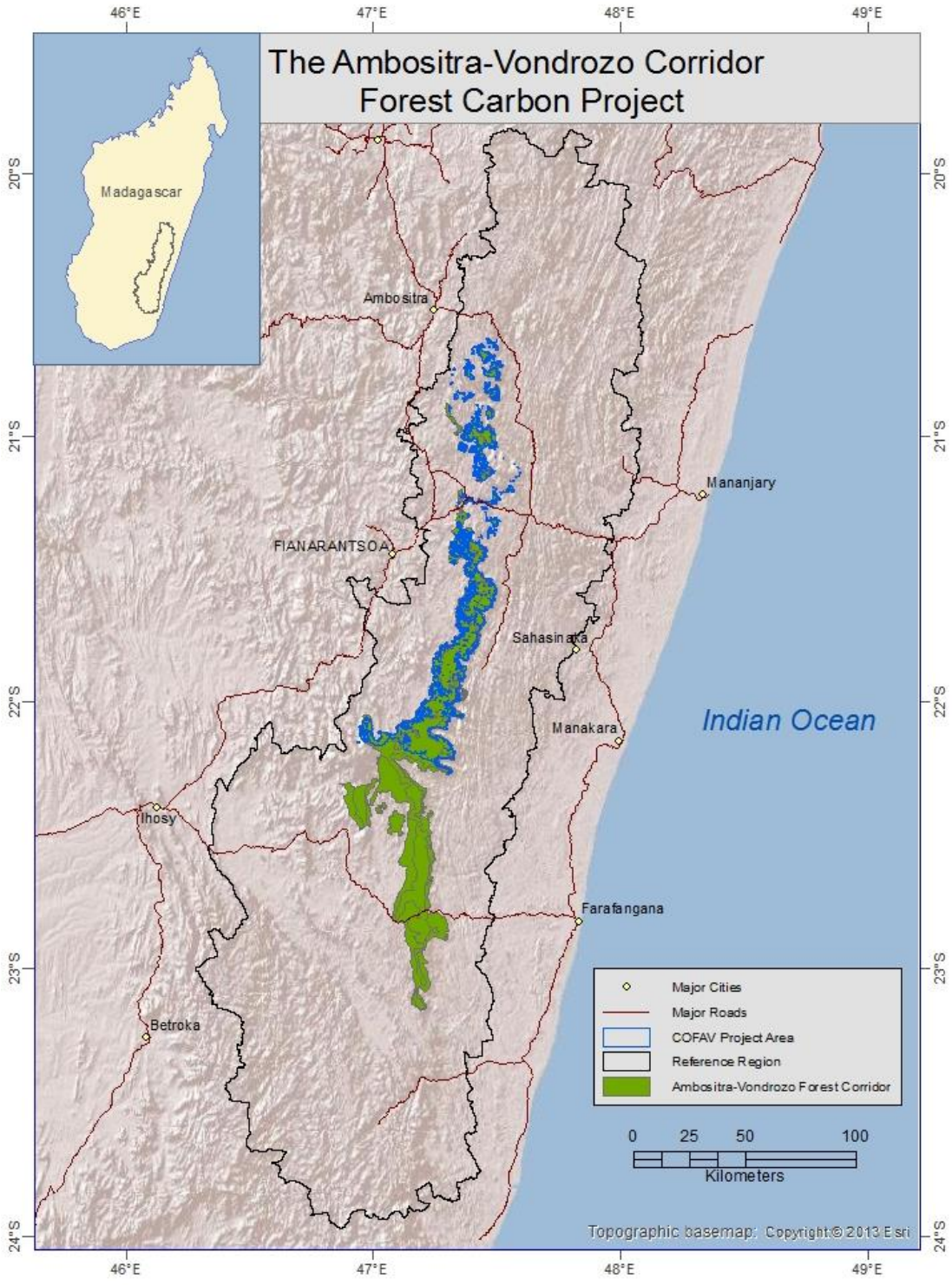

Figure 1. COFAV REDD Project Location

Relief, Geology and Soil

The project area is located within the humid eastern rainforest corridor that extends in a north-south direction for a distance of about 200 km along the eastern escarpment of East Madagascar. The altitude of the corridor varies between 250 and 2,000 m, with most of the project area encompassing a mid-range of approximately 900 to 1,300 m and a slope range of 0 to 67 degrees. The corridor has a highly broken relief, with deep, enclosed valleys and summits that can attain 1,500 m. The soil is dominated by crystalline basement metamorphic series and series-quartz schist and limestone (MEF 2010).

Climate conditions

The project is located on the eastern escarpment of Madagascar where it is permanently influenced by the Alizée (trade winds) year-round (Serpantié et al., 2007). Consequently rainfall in the area is high and sustained, particularly in the eastern part. Globally the climate is tropical with a dry season between April and September and a rainy season between November and March. The local climate varies with aspect and altitude. The eastern part of the corridor is tropical and humid, while the central parts are high-altitude tropical (see Figure 2 based on Hijmans et al. 2005) Rainfall varies from 1000 to 2,000 mm a year according to the region, while the average annual temperature varies from 10 to 30°C (MEF, 2010).

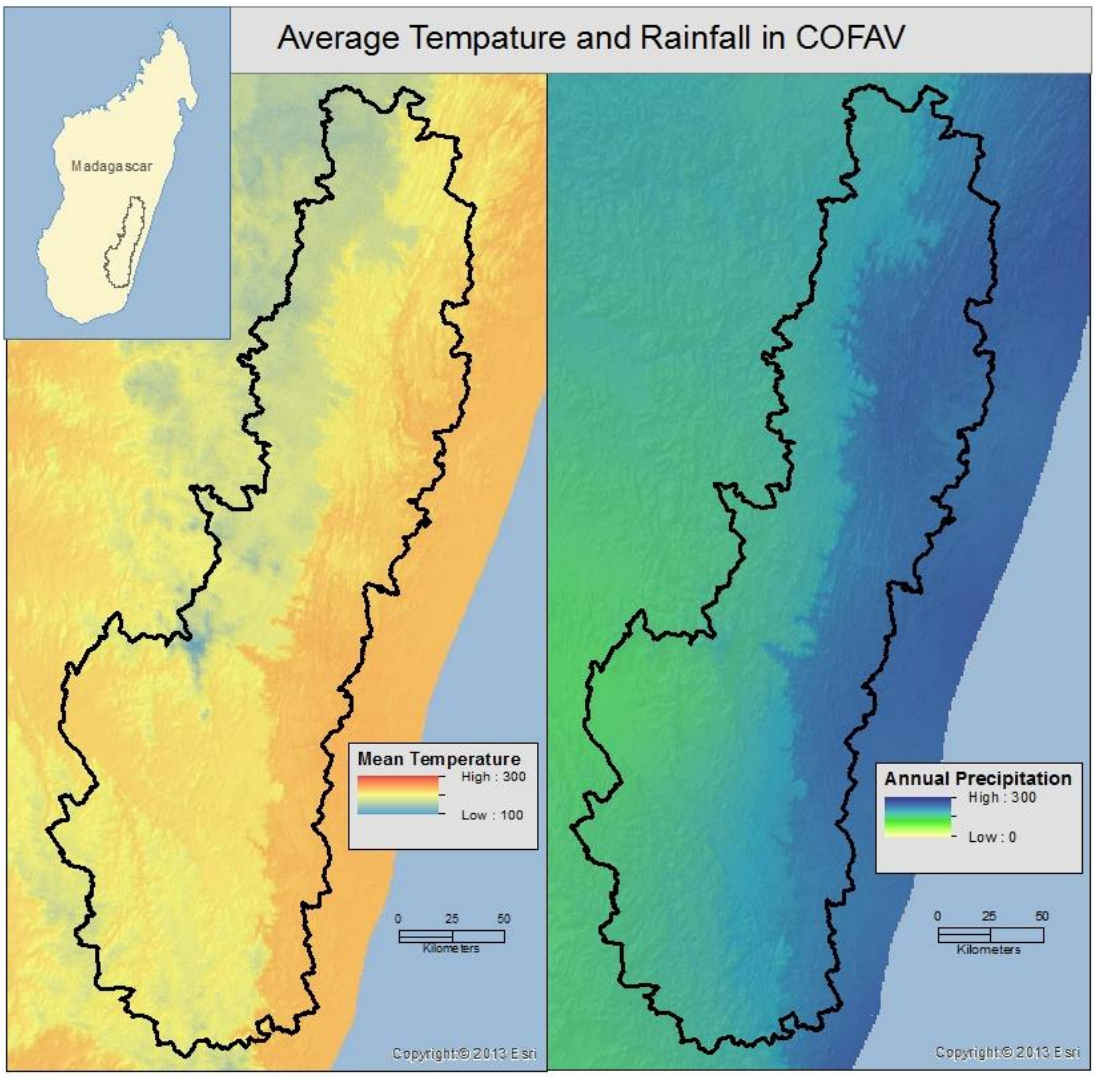

Figure 2. Annual rainfall and temperature in the COFAV region

G1.2. Types and Condition of Vegetation within the Project Area

At a landscape-level the project area falls within a region that is classified as eastern humid forest (Moat & Smith 2007). The forest occurring within the project area can in three broad categories: low-altitude evergreen rain forest (at altitudes less than 800 m); mid-altitude evergreen rain forest (800 - 1,800 m), where the canopy is lower and epiphytes are common; and high-altitude or montane evergreen forest (1,800 - 2,000 m). However on the ground, a continuum of changes in forest structure in relation to altitude is not very distinguishable and the forest is highly variable throughout. The majority of the project area is constituted by dense, mid-altitude, humid evergreen forest with a canopy of 20 - 25 m at lower altitudes (although forest strata are indistinct). There are small herbaceous wetlands on valley floors. Characteristic canopy genera include *Weinmannania, Tambourissa, Symphonia, Dalbergia, Ravensara,* and *Vernonia*. The dense understory is comprised of genera such as *Smilax* and *Cyathea* with a high diversity of epiphytes, especially orchids.

A heterogeneous agricultural landscape surrounds the forest corridor:

- The western edge of the corridor is a highly fragmented, fine-grained mosaic of cultivated and non-cultivated habitats, including mature forest fragments, secondary forest at different stages of succession, eucalyptus and pine plantations, slash-and-burn fields on slopes, young fallows, areas of degraded low herbaceous regrowth following intensive slash-and-burn agriculture, paddy fields on valley floors and savannah.
- The eastern edge of the corridor has a more clearly defined limit that is roughly traced by the 800 m altitude contour. The landscape to the east of this is a mosaic of forest, *tavy* cropland, *savoka* fallows, and agroforestry. Continuous forest cover is not common, but some natural forest remnants, varying from a few square metres up to approximately a square kilometer do occur. Such remnants are more common between 400 – 800 m of altitude, but there are very few lower than 400 m where the Tanala people first settled.

Research indicates that much of the corridor has been exploited, probably over several centuries, and is not primary forest in the strict sense of the term (Serpantié et al. 2007). Mature secondary forest older than 25 years is difficult to distinguish from primary forest on the ground.

G1.3. Boundaries of the Project Area and the Project Zone

The project area includes all forest areas within the boundaries of COFAV defined for VCS. The protected area is divided into different management zones. Table 1 and **Error! Reference source not found.**3 present which protected area management zones make up the project area and the leakage management areas respectively. The project area is constituted by:

- forest within the strict conservation zone (Category A);
- sustainable use forest areas within the sustainable use zone; these forest areas are principally community-managed (Category B); and
- the sustainable use forest areas within the community managed areas bordering the COFAV protected area (Category B).

Table 1. Protected area management zones and the corresponding spatial boundaries

Zone	Corresponding CCBS spatial boundaries
Protected Area	

Zone	Corresponding CCBS spatial boundaries
1. Strict conservation zone	
Strict conservation zone	Project area (Cat. A)
2. Buffer zone	
Sustainable use forest	Project area (Cat. B)
Settlement enclave	Project zone
Managed Forest areas contiguous with the Protected Area	Project area (Cat. B)
Non-forest land within Fokontanys adjacent to the project boundary	Project zone

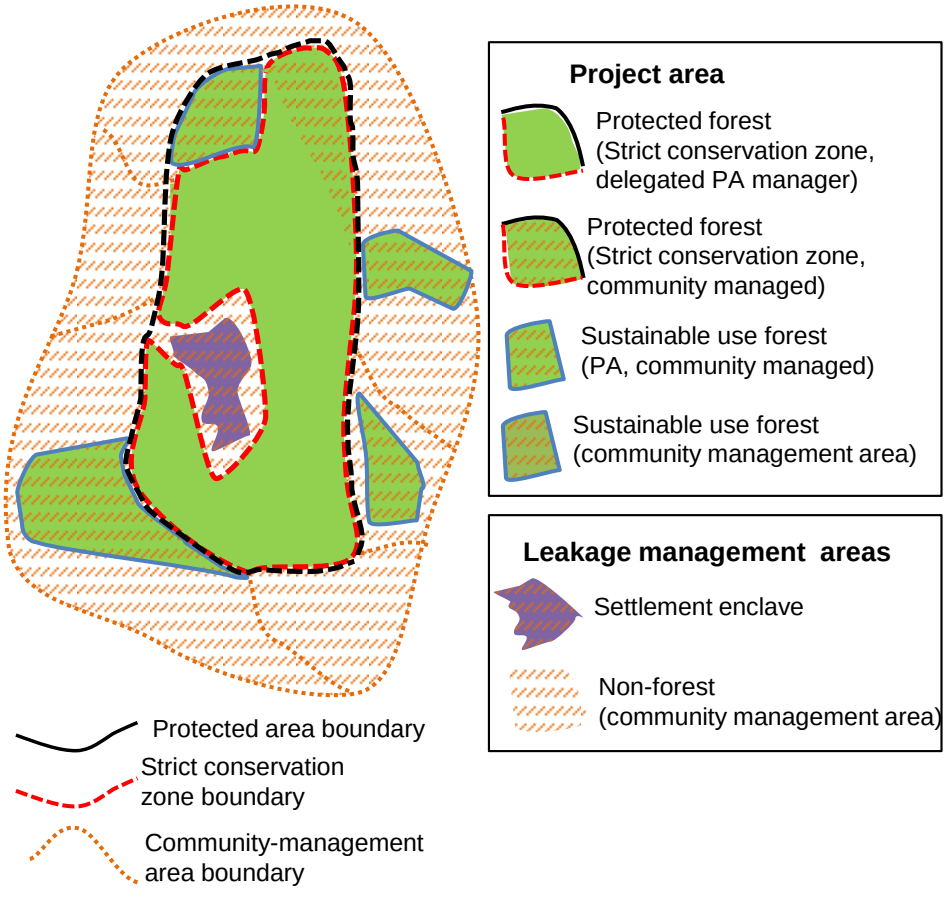

Figure 3. Simplified representation of the division of the protected area into the project area and leakage management areas. The outer boundary of the project zone is defined by the outer boundary of the leakage management area.

The Project Zone includes the project area and the surrounding area within which the communities are affected by the project. The project zone has conservatively been delimited by the outer boundaries of the Fokontanys which are contiguous with the project area and these represent the communities directly affected by the project activities. Within the project zone a concerted and long term programme of activities has been put into place to provide livelihood alternatives to the communities.

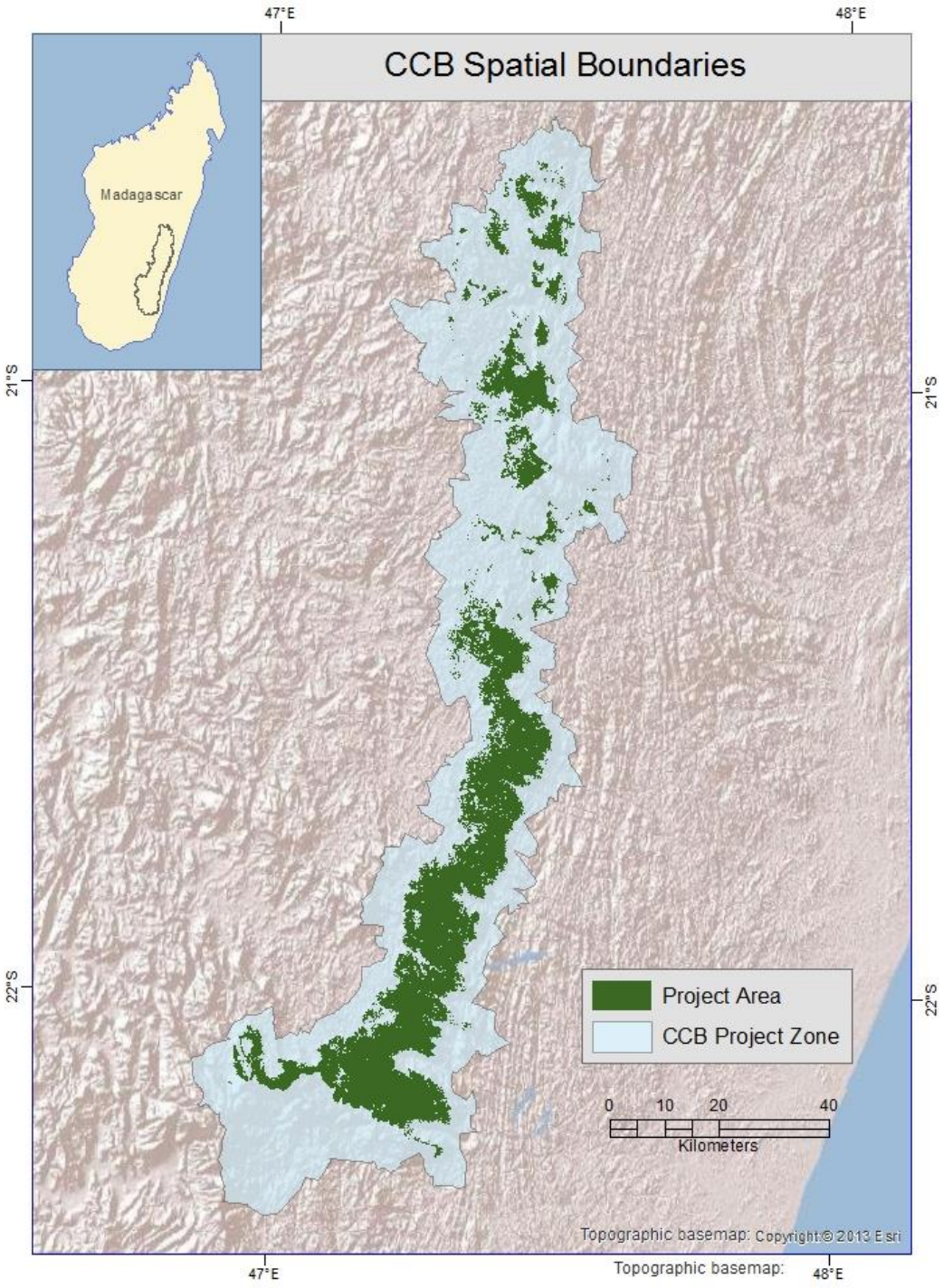

Figure 4. Limits of Project Area and Project Zone

G1.4. Current Carbon Stocks for Each LULC Class or Forest Stratum at Project Site

Carbon stock estimates are derived through use of VCS methodology VM00015 undertaken for the VCS PDD developed for COFAV. The protocols for forest inventory and field work were based on standard operating procedures for forest carbon estimates developed by Winrock International (Pearson et al., 2005) and implemented in 2008. Average carbon stock estimates of the forest classes in the project area and leakage belt were derived through field measurements. Forests store an average of 706 tCO_2, being 566 tCO_2 in above ground biomass, 106 tCO_2 in below-ground biomass and 34 tCO_2 in dead wood.

Carbon stocks for post-deforestation land-use classes were conservatively estimated based on available literature (Styger et al. 2007 and 2009), and added 30% of its mean, as recommented by VCS methodology. Post deforestation land uses store an average over 20-years of 38 tCO_2, being 36 tCO_2 in above ground biomass, and 2 tCO_2 in below-ground biomass. For details, see Andrianarivelo et al, 2009 and section VM Step 6 of the VCS PD.

Few deviations from the VCS methodology VM0015 was applied, as described below, in all cases the variation leaded a more conservative estimation of carbon benefits.

The historical land cover and land use change analysis, which was also used to estimate the baseline, was performed based on a national mapping effort by the Malagasy government (MINENVEFT et al. 2009). The forest cover and loss was classified using mid-resolution (30 m) Landsat imagery. The final product classification was filtered to a Minimum Mapping Unit (MMU) of 2 hectares, eliminating small patches of forest and forest loss, and improving the overall classification accuracy. This is in compliance with version 1.0 of the methodology, which requires the MMU to be *equal or at most 5 times above the minimum area threshold used for defining "forest"*.

Version 1.1 of the methodology, approved on December 03, 2012, changed the MMU requirement to a minimum of 1 hectare, irrespective of forest definition. Even though the MMU used by the project does not currently meet the new requirement, it is likely to be more conservative than the 1 ha MMU suggested by the methodology, as changes below 2 ha will not be counted as deforestation in the baseline.

The project has applied the root biomass allometric equation for tropical forest, described in Cairns et al 1997, instead a constant root to shoot ratio value as suggested in the VM0015. The root to shoot ratio based on Table 4.4 in IPCC GL AFOLU leads to a below ground biomass average of 74 tdm/ha, while using allometric equation the average is 55 tdm/ha. Therefore using Cairns et al equation resulted in a more conservative estimation and justifies the deviation. The allometric equation estimates the below-ground biomass density based on above-ground biomass density, in the case of the project, it was used the above-ground biomass density of trees (DBH > 5cm).

G1.5. Description of the Communities Located in the Project Zone

Administration

The project is located within five of Madagascar's administrative regions: Amoron'I Mania, Haute Matsiatra, Ihorombe, Vatovavy Fitovinany and Atsimo Atsinanana. Within these regions, the project is located within 32 communes and 154 Fokontany. The administrative areas encompassing the project are summarised in Unless otherwise specified, all the information provided in section G1.5 comes from socio-economic surveys commissioned by Conservation International at the start of the project and conducted by three local non-governmental organizations: Hoana Soa, Sahala and Accademis. The original reports of these organizations have been provided to the auditors.

Table 2

Unless otherwise specified, all the information provided in section G1.5 comes from socio-economic surveys commissioned by Conservation International at the start of the project and conducted by three local non-governmental organizations: Hoana Soa, Sahala and Accademis. The original reports of these organizations have been provided to the auditors.

Table 2. Administrative areas in which the project is located

Region	District	Commune	Fokontany
Amoron'i Mania	Ambositra	Ambohimitombo l	Ambatolampy, Ambohimanarivo, Ambohimanjaka, Ambohimitombo, Ambohipo, Andepontany
			Antanifotsy, Ifasina Miherintsoa, Itandroka
			Kidodo, Mahambo
			Manindroavia, Ranomena Sud
		Ambohimitombo II	Ambohimanendrika, Ampasina

			Ampidirana, Anivoala, Behelatra, Sahanato
		Antoetra	Ambahona, Ambalavero
			Ambatomalama, Ampanenjanandava, Analamanana, Andraitokonana, Anjorozoro, Ankarenana, Anosizato, Antetezandrotra, Antoetra, Faliarivo, Fempina, Sakaivo Atsimo, Sakaivo Avaratra, Vohitrandriana
Haute Matsiatra	Ambalavao	Ambohimahamasina	Andohanimananatanana, Itaolana, Lomaka, Soatsihanino
		Miarinarivo	Angalampona, Miarinarivo, Vohiboay
		Sendrisoa	Amindranjamanony, Morafeno, Namoly Centre, Namoly Est, Namoly Ouest
	Ambohimahasoa	Ambalakindresy	Andraina Fototra, Antsiho, Sahanimaitso, Tambohobe
		Ambatosoa	Ambatohazo, Ranomainty, Sahanimira
		Fiadanana	Ambohimitombo, Matahitrony
		Morafeno	Namorombe Volahotro, Vohimarina
	Lalangina	Alatsinainy-Alamarina	Ambalaivo, Anara, Andaobatobe, Andralamboanivo, Anjamambe,

			Manakarongana, Ranomena, Sahafiana
		Androy	Ambatovaky, Amindrabe, Andranovondrona, Iambara, Vohiparara
		Sahambavy	Ampasina, Bedia, Imorona
	Vohibato	Andranomiditra	Antarambiby, Ikongo Ouest, Marokona II, Marokona III, Vohibato Seranana
		Vinanitelo	Sandranata, Vinanitelo Atsinanana, Vinanitelo Sud
Vatovavy Fitovinany	Ifanadiana	Ambohimiera	Ambinanitomarosana, Ambohidaza, Ambohimahatsinjo, Ambohimiera, Ambohimilanja, Ambolo, Ampantsona, Manarinony, Marofotsy, Maromanana, Sahasomangana, Tsinjorano, Vohimena
		Analampasina	Ambaro, Analavory, Androrangavola Sud, Betampo Nord, Manjiriana Sud, Matsitsirano
		Kelilalina	Ambodivoangy, Ambohinihaonana
		Ranomafana	Ambatolahy, Ambodiaviavy, Ampasimpotsy, Menarano, Ranomafana, Tsaramandroso, Vohimarina

		Tsaratanana	Ambodimanga Ouest, Ambohipo, Androrangavola Vatofotsy, Antaralava, Vohitrarivo
		Ambohimanga du sud	Marolananana, Ambalavary, Androrangavola, Ambohiiranty, Ambohimanga du sud, Vohitrarivo, Ambohimanga nord, Soaniherenana, Morarano, Amblaherana, Ambodirafia, Nosimboahangy, Sahamarina, Masoarovana, Ambodiara, Ambatofamokonana, Ambodivoasary, Marosatroka, Faliarivo, Antanjona, Mandroalina
		Antaretra	Antaretra, Andranomaitso
	Mananjary	Kianjavato	Kianjavato, Ambohitsara, Ambolotara, Ambodifandramanana, Ankosibe
	Ikongo	Ambatofotsy	Marohita, Tsaratanana, Tandrokomby
		Ambinanitromby	Ambohinamboarina, Antanivelona, Ambodiara-homby
		Ambolomadinika	Tsianovoha, Antarehimamy
		Ankarimbelo	Ambohimaneva,

			Faliarivo, Iarinomby, Tsialamaha,
		Antodinga	Ambolomboro, Anivorano I, Mamolifoly
		Ikongo	Ambalagoavy, Ambodiara Dihy, Ambohimahasoa Nord, Anorombatobe, Anorombatotelo, Antekoho, Antsatrana
		Kalafotsy	Ambahaka, Kalafotsy Hazomena
		Maromiandra	Ambohimahasoa, Anaviavy
		Tolongoina	Ambalakizitina, Ambodivanana, Andrambovato, Madiorano, Mandriandry, Tanambao, Tsimbahambo Iladitra

The National Socioeconomic Context

The Malagasy population of 20.7 million people is 70% rural but a steady migration to towns and cities over the last 20 years means that the urban population growth rate is higher than the rural rate (4.0% versus 2.4% in 2011; World Bank, 2012). On average, 81% of the Malagasy population lived on less than $1.25 USD per day in 2011 (and 92% live on less than $2 USD per day) and are therefore classified as poor; this is one of the highest poverty rates in Africa (World Bank, 2012). Moreover, based on the national definition of poverty, 82% of the rural population is poor, versus 54% of the urban population, and on average 65% of household expenditure is on food (INSTAT, 2010). Poverty is most pronounced in those households whose primary revenue comes from agriculture, particularly for small-scale farmers. The

great majority of rural children aged 7-14 work in agriculture, with over 83% of girls and 91% of boys being classified as employed in this sector in 2005 (World Bank, 2012).

Health and education indicators are also poor. In 2008, 35% of youth and 36% of adults were illiterate and literacy rates are higher in urban areas than in rural areas (World Bank, 2012; INSTAT, 2010). Health infrastructure and services are also poor in Madagascar and infant mortality is high (see table 4). Expenditure on health has consistently been between 12-15% of the government budget over the last decade (World Bank, 2012). In 2011, life expectancy at birth was 64 years for men and 68 years for women (World Bank, 2012). Only 47% of total households, and only 36% of rural households, have access to improved water sources (World Bank, 2010). Similarly, only 12% of the population and 10% of the rural population have access to improved sanitation (World Bank, 2010). The only relatively encouraging health statistics are related to AIDS, since Madagascar has managed to escape much of the high transmission and prevalence rates of mainland Africa, with a 1% adult prevalence rate in 2009.

Overall, Madagascar's Human Development Index (HDI) ranking is 151 out of 187 countries assessed in 2011 (UNDP, 2013). As table 4 below shows, several of the Millennium Development Goals are getting worse and with the notable exception of mobile telephone use and internet connectivity, the World Bank considers that most of the targets will not be achieved by 2015 (Table 3).

This selection of indicators shows the poor state of the country's development that has unfortunately become even worse since the undemocratic regime change in 2009. The indicators also reflect the many disadvantages faced by the largely agricultural rural Malagasy whose poverty leaves them highly vulnerable to risks from large natural catastrophes such as cyclones, drought or flooding as well as more localized events such as crop disease outbreaks or pest infestations. More than half of rural households report agricultural losses from such environmental shocks (Thomas, 2009).

Current work being conducted by the CI's Madagascar program and science program suggests that the situation is even more precarious for the remote communities living closest to natural resources with whom CI works most closely. In response, many households turn to opportunistically harvesting wild products such as fruits and bush meat, and moving to clear new areas of forest to meet their food needs. These responses demonstrate both the dependence that remote rural communities have on natural resources and also the persistent threat that extreme poverty poses for Madagascar's natural ecosystems and native species. The COFAV REDD project is therefore being undertaken in a remote rural area characterized by high rates of poverty where economic and food security are a continuous challenge for a large portion of the people. The project aims to provide important economic benefits through generating revenues from the carbon markets for communities living in or adjacent to the forest to improve their living conditions and provide incentives to protect the forests which provide them with an important range of products and ecosystem services.

Table 3. The road to the Millennium Development Goals

MDG	Description	Baseline	Most recent	Target 2015	Likelihood
MDG1	**HALVE THE RATE OF EXTREME POVERTY**				
Poverty rate (% households under poverty line)		68.7 (2005)	77 (2010)	35	No
MDG2	**ENSURE THAT CHILDRENARE ABLE TO COMPLETE PRIMARY SCHOOL**				
Net enrollment ration in primary education (%)		83 (2006)	73.4 (2010)	100	No
Primary education completion (%)		57 (2006)	64.5 (2009)	100	No
MDG3	**ELIMINATE GENDER DISPARITY**				
Ratio of girls to boys in primary and secondary education		96 (2006)	97(2009)	100	Possibly
Proportion of seats held by women in national parliament		7 (2006)	7 (2008)	50	No
MDG4	**REDUCE UNDER -5 MORTALITY BY TWO-THIRDS**				
Under-five mortality (%)		94 (2003)	72 (2009)	153	Possibly
MDG5	**REDUCE MATERNAL MORTALITY BY THREE-FORTHS**				
Maternal mortality rate (per 100,000 live births)		469 (2003)	498 (2009)	122	No
MDG6	**HALVE AND REVERSE SPREAD OF HIV/AIDS AND OTHER MAJOR DESEASES**				
Incidence of tuberculosis (per 100,000 people)		359 (2003)	417 (2009)	90	No
HIV prevalence rate (%/year)		1 (2003)	1 (2009)	1	Yes
MDG7	**ENSURE ENVIRONMENTAL SUSTAINABILITY**				
Improved water source (% population with access)		37 (2000)	41 (2008)	65	Possibly
Improved sanitation services (% population with access)		10 (2000)	31 (2008)	57.5	Possibly
Deforestation rate (%/year)		2 (1990)	0.5 (2010)	0	Possibly
MDG8	**DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT**				
Mobile phone subscribers (per 100 people)		6 (2005)	31(2011)	..	Yes
Internet users (per 100 people)		0.6 (2005)	1.6 (2009)	..	Possibl

				y

Source: IDA 2011; World Bank 2012; UNDP 2013; and INSTAT 2010

Population

The number of people living within the project zone is aproximatelly 165,923. The total populations per Fokontany is presented in Table 4**Error! Reference source not found.**.

The Fokontanys of the district of Ambohimahasoa have the highest population density with on average 52 people/km² ; those of Ivohibe have the lowest as 5 people/km² (INSTAT 2010); while the communes of the districts of Ambositra, Vohibato, Lalangina, Ambalavao, Ikongo, Vondrozo and Ifanadiana have intermediate population densities of about 55 people/km². The rate of population growth also varies between the two sides of the corridor: for the Betsileo areas, it is around 2.5% a year; while for the Tanala areas (Ikongo et Ifanadiana) it is less that 2% a year.

The principal ethnic groups living along the edges of the corridor are the Betsileo (the western edge), the Tanala (the eastern edge), and the Bara and Sahafatra (to the South). While the Betsileo are the majority on the western edge of COFAV; the eastern and southern edges of the corridor are settled by more of a diversity of groups, even if the Tanala, Bara and Sahafatra are slightly the majority.

Table 4. Populations of the communes within which the project is taking place

DISTRICT	COMMUNE	FOKONTANY	Population	Census Date
Ambositra	Ambinanindrano	Marimarina	1,014	1/2005
Ambositra	Ambinanindrano	Soanierana	1,114	12/2004
Ambositra	Ambinanindrano	Vohibola	1,107	1/2008
Ambositra	Ambinanindrano	Vohitraivo I	1,460	10/2006
Ambositra	Ambohimitombo I	Ambatolampy	350	2/2008
Ambositra	Ambohimitombo I	Ambohimanarivo	1,295	3/2008
Ambositra	Ambohimitombo I	Ambohimanjaka	1,295	4/2004
Ambositra	Ambohimitombo I	Ambohimitombo	1,134	7/2007
Ambositra	Ambohimitombo I	Ambohipo	379	2/2008
Ambositra	Ambohimitombo I	Andepontany	509	1/2008
Ambositra	Ambohimitombo I	Antanifotsy	597	1/2008
Ambositra	Ambohimitombo I	Ifasina Miherintsoa	675	2/2008
Ambositra	Ambohimitombo I	Itandroka	684	6/2006

Ambositra	Ambohimitombo I	Kidodo	292	2/2008
Ambositra	Ambohimitombo I	Mahambo	623	10/2007
Ambositra	Ambohimitombo I	Manindroavia	540	2/2008
Ambositra	Ambohimitombo I	Ranomena Sud	465	12/2007
Ambositra	Ambohimitombo II	Ambohimanendrika	565	12/2007
Ambositra	Ambohimitombo II	Ampasina	433	2/2008
Ambositra	Ambohimitombo II	Ampidirana	1,378	2/2008
Ambositra	Ambohimitombo II	Anivoala	315	2/2008
Ambositra	Ambohimitombo II	Behelatra	370	2/2008
Ambositra	Ambohimitombo II	Sahanato	602	11/2007
Ambositra	Antoetra	Ambahona	663	12/2007
Ambositra	Antoetra	Ambalavero	550	2/2008
Ambositra	Antoetra	Ambatomalama	874	12/2007
Ambositra	Antoetra	Ampanenjanandava	407	11/2007
Ambositra	Antoetra	Analamanana	490	2/2008
Ambositra	Antoetra	Andraitokonana	590	12/2007
Ambositra	Antoetra	Anjorozoro	970	11/2007
Ambositra	Antoetra	Ankarenana	922	1/2008
Ambositra	Antoetra	Anosizato	483	2/2008
Ambositra	Antoetra	Antetezandrotra	390	11/2007
Ambositra	Antoetra	Antoetra	1,900	7/2006
Ambositra	Antoetra	Faliarivo	534	12/2007
Ambositra	Antoetra	Fempina	506	2/2008
Ambositra	Antoetra	Sakaivo Atsimo	972	11/2007
Ambositra	Antoetra	Sakaivo Avaratra	592	1/2008
Ambositra	Antoetra	Vohitrandriana	618	12/2007
Vondrozo	Moroteza	Bemahala	947	2/2008
Vondrozo	Moroteza	Ivato I	2,696	3/2008
Vondrozo	Moroteza	Tanambao	2,358	12/2007
Ambalavao	Ambohimahamasina	Andohanimananatanana	1,613	7/2007
Ambalavao	Ambohimahamasina	Itaolana	2,033	8/2007
Ambalavao	Ambohimahamasina	Lomaka	1,442	2/2008
Ambalavao	Ambohimahamasina	Soatsihanino	801	11/2007
Ambalavao	Miarinarivo	Angalampona	2,798	9/2007
Ambalavao	Miarinarivo	Miarinarivo	1,378	7/2007

Ambalavao	Miarinarivo	Vohiboay	574	4/2007
Ambalavao	Sendrisoa	Amindranjamanony	814	11/2007
Ambalavao	Sendrisoa	Morafeno	1,408	2/2008
Ambalavao	Sendrisoa	Namoly Centre	1,030	2/2008
Ambalavao	Sendrisoa	Namoly Est	1,201	1/2008
Ambalavao	Sendrisoa	Namoly Ouest	743	4/2007
Ambohimahasoa	Ambalakindresy	Andraina Fototra	3,250	12/2007
Ambohimahasoa	Ambalakindresy	Antsiho	1,901	1/2007
Ambohimahasoa	Ambalakindresy	Sahanimaitso	2,737	1/2007
Ambohimahasoa	Ambalakindresy	Tambohobe	956	2/2008
Ambohimahasoa	Ambatosoa	Ambatohazo	1,239	2/2008
Ambohimahasoa	Ambatosoa	Ranomainty	1,112	1/2008
Ambohimahasoa	Ambatosoa	Sahanimira	1,330	8/2007
Ambohimahasoa	Fiadanana	Ambohimitombo	657	3/2008
Ambohimahasoa	Fiadanana	Matahitrony	1,690	2/2008
Ambohimahasoa	Morafeno	Namorombe Volahotro	1,172	11/2007
Ambohimahasoa	Morafeno	Vohimarina	2,796	1/2008
Lalangina	Alatsinainy Ialamarina	Ambalaivo	1,049	9/2008
Lalangina	Alatsinainy Ialamarina	Anara	1,187	9/2008
Lalangina	Alatsinainy Ialamarina	Andaobatobe	940	6/2009
Lalangina	Alatsinainy Ialamarina	Andralamboanivo	919	5/2009
Lalangina	Alatsinainy Ialamarina	Anjamambe	1,431	4/2007
Lalangina	Alatsinainy Ialamarina	Manakarongana	1,698	10/2008
Lalangina	Alatsinainy Ialamarina	Ranomena	955	10/2008
Lalangina	Alatsinainy Ialamarina	Sahafiana	1,085	4/2007
Lalangina	Androy	Ambatovaky	2,522	8/2008
Lalangina	Androy	Amindrabe	982	9/2005
Lalangina	Androy	Andranovondrona	943	4/2007
Lalangina	Androy	Iambara	1,640	2/2008
Lalangina	Androy	Vohiparara	441	6/2008
Lalangina	Sahambavy	Ampasina	1,013	6/2007
Lalangina	Sahambavy	Bedia	1,876	11/2008
Lalangina	Sahambavy	Imorona	990	10/2008
Vohibato	Andranomiditra	Antarambiby	887	6/2008
Vohibato	Andranomiditra	Ikongo Ouest	813	1/2008

Vohibato	Andranomiditra	Marokona II	1,679	4/2008
Vohibato	Andranomiditra	Marokona IIi	1,770	5/2008
Vohibato	Andranomiditra	Vohibato Seranana	914	2/2008
Vohibato	Vinanitelo	Sandranata	1,489	3/2009
Vohibato	Vinanitelo	Vinanitelo Atsinanana	2,470	2/2008
Vohibato	Vinanitelo	Vinanitelo Sud	2,012	5/2007
Ivohibe	Ivongo	Ambahatsy	1,216	8/2007
Ifanadiana	Ambohimiera	Ambinanitomarosana	516	3/2007
Ifanadiana	Ambohimiera	Ambohidaza	316	3/2007
Ifanadiana	Ambohimiera	Ambohimahatsinjo	810	7/2007
Ifanadiana	Ambohimiera	Ambohimiera	888	4/2007
Ifanadiana	Ambohimiera	Ambohimilanja	655	7/2007
Ifanadiana	Ambohimiera	Ambolo	309	6/2007
Ifanadiana	Ambohimiera	Ampantsona	845	11/2006
Ifanadiana	Ambohimiera	Manarinony	1,042	6/2007
Ifanadiana	Ambohimiera	Marofotsy	447	3/2007
Ifanadiana	Ambohimiera	Maromanana	878	3/2007
Ifanadiana	Ambohimiera	Sahasomangana	1,178	7/2007
Ifanadiana	Ambohimiera	Tsinjorano	396	1/2007
Ifanadiana	Ambohimiera	Vohimena	892	4/2007
Ifanadiana	Analampasina	Ambaro	834	4/2007
Ifanadiana	Analampasina	Analavory	367	2/2007
Ifanadiana	Analampasina	Androrangavola Sud	565	3/2006
Ifanadiana	Analampasina	Betampo Nord	689	3/2006
Ifanadiana	Analampasina	Manjiriana Sud	510	2/2007
Ifanadiana	Analampasina	Matsitsirano	520	3/2006
Ifanadiana	Kelilalina	Ambodivoangy	749	9/2005
Ifanadiana	Kelilalina	Ambohinihaonana	806	12/2006
Ifanadiana	Ranomafana	Ambatolahy	929	4/2007
Ifanadiana	Ranomafana	Ambodiaviavy	353	7/2007
Ifanadiana	Ranomafana	Ampasimpotsy	1,357	7/2007
Ifanadiana	Ranomafana	Menarano	513	11/2006
Ifanadiana	Ranomafana	Ranomafana	2,696	7/2007
Ifanadiana	Ranomafana	Tsaramandroso	899	4/2007
Ifanadiana	Ranomafana	Vohimarina	891	9/2006

Ifanadiana	Tsaratanana	Ambodimanga Ouest	835	6/2007
Ifanadiana	Tsaratanana	Ambohipo	825	7/2007
Ifanadiana	Tsaratanana	Androrangavola Vatofotsy	1,239	6/2007
Ifanadiana	Tsaratanana	Antaralava	346	1/2007
Ifanadiana	Tsaratanana	Vohitrarivo	550	7/2007
Ikongo	Ambatofotsy	Marohita	413	5/2007
Ikongo	Ambatofotsy	Tsaratanana	561	10/2006
Ikongo	Ambinanitromby	Ambohinamboarina	1,400	4/2007
Ikongo	Ambinanitromby	Antanivelona	2,027	7/2006
Ikongo	Ambolomadinika	Antarehimamy	1,490	6/2007
Ikongo	Ambolomadinika	Tsianivoha	890	7/2007
Ikongo	Ankarimbelo	Ambohimaneva	1,263	6/2006
Ikongo	Ankarimbelo	Faliarivo	3,300	11/2006
Ikongo	Ankarimbelo	Iarinomby	2,793	6/2007
Ikongo	Ankarimbelo	Tsialamaha	1,110	4/2007
Ikongo	Antodinga	Ambolomboro	812	12/2006
Ikongo	Antodinga	Anivorano I	1,662	3/2004
Ikongo	Antodinga	Mamolifoly	1,252	9/2005
Ikongo	Ikongo	Ambalagoavy	670	7/2007
Ikongo	Ikongo	Ambodiara Dihy	947	7/2007
Ikongo	Ikongo	Ambohimahasoa Nord	535	5/2006
Ikongo	Ikongo	Anorombatobe	1,132	6/2007
Ikongo	Ikongo	Anorombatotelo	1,010	3/2006
Ikongo	Ikongo	Antekoho	745	7/2007
Ikongo	Ikongo	Antsatrana	510	7/2007
Ikongo	Kalafotsy	Ambahaka	2,504	11/2006
Ikongo	Kalafotsy	Kalafotsy	1,492	3/2006
Ikongo	Maromiandra	Ambohimahasoa	1,970	6/2006
Ikongo	Maromiandra	Anaviavy	1,034	6/2007
Ikongo	Tolongoina	Ambalakizitina	620	7/2007
Ikongo	Tolongoina	Ambodivanana	909	7/2007
Ikongo	Tolongoina	Andrambovato	1,749	6/2006
Ikongo	Tolongoina	Madiorano	850	7/2003
Ikongo	Tolongoina	Mandriandry	1,362	8/2006
Ikongo	Tolongoina	Tanambao	672	10/2006

Ikongo	Tolongoina	Tsimbahambo	340	7/2005
		total	**165,923**	

Source: Source: data from the National Statistics Institute, INSTAT, 2006-2008

Migration

Migration takes place mostly to the western edge of the corridor, where two forms of migration are currently observed:

- The first is that of Betsileo people who migrate from the forest edge, either into the interior of the forest so that they can convert marshy areas of valley bottoms into rice paddies or to the Tanala villages on the east of the corridor, where they move seasonally to cultivate rice or coffee. The Tanala value the Betsileo migrants because of their productivity as labourers and their skills in building terraced rice paddies. Tanala employ Betsileo to work large rice fields and to convert coffee plots into rice paddies, a practice that has become increasingly common recently. It is mostly young households who do not own any land who migrate. Frequent contact with the Tanala often leads to the Betsileo settling permanently by forming alliances through marriage and so gaining access to land (MEF 2010).
- The second type of migration is undertaken by people of the communes not immediately bordering the corridor. Here, the combination of population growth and the lack of low-lying areas suitable for rice cultivation push households with no land to migrate into the forest in search of new land (MEF 2010).

Land tenure

The rural population is typically clustered in small villages, from which people walk to their fields or workplaces. Farmers frequently cultivate several plots of land which are not necessarily contiguous. Farmers try to combine both low-lying rice paddies with hillsides for cultivation of rainfed rice, manioc and other crops.

Land tenure is essentially customary and the vast majority of residents in the project zone do not have official title to their land. Even if they wished to attain this, the region government cadastral service is extremely complex and obtaining title to land is a very expensive process. Instead, local people uphold the customary system of land tenure and it gives secure ownership to the landowner. Land is gained either by inheritance, or by whoever first gains a value from it (mostly by clearing forest for *tavy*). Wealthier farmers will often pay landless farmers to clear forest by *tavy*; the paid labour is usually allowed to keep part of the harvest, while the wealthier farmers are able to expand their land holdings by being the first to clear the land. Farmers who have enough land will also rent out fields to landless farmers (MEF, 2010).

Social infrastructure

Table 5 summaries the existing social infrastructure within the communes that encompass the project zone. The communes have basic essential infrastructure but are rural and residents must go to the regional urban areas (Fianarantsoa, Ambositra, Ambalavao, Ranomafana) to be able to access better health services and to finish high school.

Table 5. Summary of the social infrastructure of the rural communes of within the COFAV project zone.

Social infrastructure	Occurrence
Hospital or private clinic	1
CSB 1 Local health center without Doctor	13
CSB 2 Local health center with Doctor	24
Micro-credit Institutions	13
Post office	04
Primary school	417
Secondary school (1st cycle)	29
Secondary school (2nd cycle) – lycée	3
Local transport (taxi-brousse)	17
Law Court	02
Daily market	Typically once per week in each commune
Small Shops	Most communes have. Typically associated with roads
Telephone coverage	Most of communes have mobile phone coverage
Drinking water supplied by JIRAMA (government agency)	Only 1 town has mains water supply
Electricity	Only 2 towns have public electricity supply. A few (<1%) individuals have private generators

Source: Socio economic survey report from Haona Soa 2008, Accademis 2008 and Sahala 2008

Health

There are no proper hospitals or private clinics in the communes and access to medical services is limited. Some villages have community health centres, staffed by a nurse, that provide basic health care. Villages may also have a private dispensary that provides basic medicaments. The main illnesses treated are malaria, pulmonary illnesses and diarrhoea.

Local people are frequently dissatisfied with the health services, primarily because of the travel distance to medical facilities, inadequate medical capacity to diagnose and treat

illnesses and the limited availability and high cost of drugs. For these reasons, people frequently resort to the use of traditional medicines and visit formal health facilities only in the event of more serious illness. Malaria and gastro-intestinal infections are generally the most frequent conditions presented at clinics.

Isolation from markets, limited agricultural production and large family size mean that farmers in the eastern mountains of Madagascar often have difficulty meeting their basic economic and food security needs. Children are frequently chronically malnourished (Hardenbergh 1997). Food poverty in Madagascar is widespread, with two-thirds of the Malagasy population consuming less than the minimum caloric intake necessary to support a productive and normal life (Dostie et al. 2002). There is also a strong seasonal trend, with poverty and infant mortality increasing during the lean season when food prices are high and caloric intake falls. This cyclical trend is most pronounced in rural areas, where prices may rise or fall by close to 50% seasonally (Dostie et al. 2002).

Education

Most of the Fokontany have a government primary school and each of the communes has a "Collège d'Enseignement Général" (CEG) – a secondary school offering the first three years of higher schooling. There is only one lycee in the project zone, located in Ikongo with 4 classes and a ratio of 12 students per teacher.

In the project area zone, we have an average ratio 63 classes/ per commune, with a ratio of approximately 43:1 students per teacher, for primary schools (EPP) and 10 classes of secondary school per commune with a ratio of 33:1 students per teacher for secondary schools. Few children carry on schooling beyond the seventh year for reasons linked to the poverty of their families. Frequently families take their girls out of school first to work at home and fewer girls carry on to secondary school than boys. There are few secondary schools and these are distant from much of the population. Faced with the choice between the costs of sending children to school and a need to keep them at home to work, secondary school is beyond reach for many families. Given pressures on land and forest resources, and the consequent need to diversify the local economy, the lack of secondary school attendance is a significant issue which will impact the future socioeconomic development potential of these communities.

Water

Most of the communes are not serviced by the government agency responsible for water supply – JIRAMA. However, some villages have public drinking water points installed; in many other people rely on river water or traditional wells (Source: Socio economic survey report from Haona Soa 2008, Accademis 2008 and Sahala 2008).

Livelihoods and production systems

The occupations of the households impacted by the project in the project zone reflect a rural population dependent on subsistence agriculture and forest products for their livelihoods (Table 6). For the entire corridor, small-scale crop growing is the primary economic activity for 90% of households, with only 4% of households raising animals as a primary activity. A minority of households, approximately 1000 households according to the 2008 socio-economic surveys that are summarised in MEF (2010), practise a range of secondary activities (fishing, hunting, collection of forest products, artisanal work, logging, charcoal production, salaried employment, commerce, transport, artisanal mining). While virtually all households are primarily dependent on crop production and animal husbandry, most families living close to the forest will also practise a number of these other activities in an effort to fully secure their livelihoods (BIODEV, 2010)

Table 6. Summary of the percentages of households engaged in major livelihood activities in the project zone

Commune	Crop production	Fishing	Animals Husbandry	Manufacturer and Artisanal	Other
ANTOETRA	98	0	1	0	2
AMBINANINDRANO	90	0	0	0	10
FIADANANA	95	0	0	0	5
SENDRISOA	98	0	0	0	2
AMBOHIMAHAMASINA	98	0	1	0	1
MIARINARIVO	99	0	0	0	1
KELILALINA	99	0	0	0	1
TSARATANANA	93	0	0	0	7
RANOMAFANA	60	0	0	0	40
AMBOHIMIERA	95	0	0	0	5
ANALAMPASINA	98	0	0	0	2
MORAFENO	98	0	0	0	2
AMBATOSOA	99	0	0	0	1
FIADANANA	99	0	0	0	1
MORAFENO	75	0	0	25	1
VINANITELO	100	0	0	0	1
IKONGO	90	0	0	0	10
AMBOLOMADINIKA	98	0	0	0	2
AMBATOFOTSY	90	0	0	0	10
TOLONGOINA	85	0	0	0	15

ANKARIMBELO	97	0	0	0	3
MAROMIANDRA	95	0	0	0	5
MOROTEZA	99	0	0	0	1
IVONGO	50	0	50	0	0
ANDROY	90	1	3	4	2
ALATSINAINY IALAMAR.	95	0	4	1	1
VINANITELO	100	0	0	0	0
ANDRANOMIDITRA	98	0	0	0	2
SAHAMBAVY	58	0	30	10	2
AMBINANINDRANO	95	0	0	0	5
TSARATANANA	50	0	49	0	1
MAROMIANDRA	98	0	0	1	1
average	**90**	**0**	**4**	**1**	**4**

Source : Census data, ILO 2001

Crop Production

The principle crops, in order of importance, are: rice, manioc, maize, beans, sweet potatoes, bananas and a variety of vegetables. Agriculture is largely subsistence with a major part of the production being consumed for household food. Families sometimes sell a part of their production in order to buy essential items for their day-to-day living. The main source of the information on agricultural practices in the project zone is the Socio economic survey reports from Haona Soa 2008, Accademis 2008 and Sahala 2008 .

Three principal systems of cultivation coexist throughout the areas bordering the protected forest:

Tavy (slash-and-burn) - while farmers practice *tavy* throughout the COFAV region, its importance and practice vary from one region to another. In the east and south-east of the corridor, *tavy* is used to grow rainfed rice on newly established fields; in the second year, rice is replaced by beans for two growing seasons. In the west of the corridor, the Betsileo and Bara combined or rotate maize and beans after the initial rice crop. From the third year, manioc is planted until the field is left to fallow for one to five years (and sometimes more). Suitable *tavy* cropland may be converted to continuous hillside cultivation (or *tanety*), which is dominated by planting tubers (manioc, taro, sweet potatoes) and vegetables (mainly different beans, and groundnuts).

Irrigated rice is grown along the narrow valley floors, accompanied by cultivation up the surrounding hillsides, initially by *tavy* and then by continuous cultivation (*tanety*). Thereafter there is a tendency to extend the paddies by terracing the lower, humid slopes of the surrounding hillsides. However the challenges of irrigating the hillsides limit this extension of rice paddies upwards.

Tanety - rainfed crops are grown on *tanety* lands, where any trace of the initial forest vegetation has disappeared. The crops include manioc, sweet potatoes, beans, groundnuts, maize, bananas, sugar cane and potatoes, grown either together or alternately through successive cycles with very short fallow periods.

Animal Husbandry

Most people living on the edges of COFAV integrate some form of cattle, pig or poultry raising into their production systems, though the importance and type of animal varies with region and household wealth.

- Poultry are part of many of the local peoples' farming systems and they bring important revenues to the middle and poor households. Households normally have only a dozen chickens.

- Only a minority of households own pigs. Raising pigs is a strategy for investing money that local people earn from farming or paid labour. Earnings from pigs are then invested into buying land or zebu. Pig raising is over a short-cycle and is semi-intensive with animals being fed with kitchen and agricultural waste.

- Farmers also raise cattle, though only a minority of households living close to or within the forest corridor have cattle and those that do normally only have two to three cows. For the wealthier households who own rice paddies, zebu are used for ploughing, transport and providing manure for fertilisation, allowing these households to increase rice production. The sale of zebu brings sizeable revenue to the better-off households. Valley floors and riparian areas are places of high quality forage for zebu; grassy fields within the agricultural mosaic and forest also provide forage and farmers will maintain these by burning. Some areas of the corridor include humid prairies that provide abundant forage; this is renewed every year by the use of fire.

The farming production systems of the households in the project zone vary from the west to the east side of the corridor, as well as with the level of household wealth as described below:

Eastern edge

On the eastern edge of the corridor, household livelihoods vary with social category:

- The most affluent group possess large rice paddies and *tanety* croplands. These families have capital in the form of land and zebu. They also produce coffee and bananas. They exploit forest land either to reserve it for their children, or to speculate in land (clearing the forest and then using the land to establish their ownership, and then selling it).

- The middle group has annual production of less than 200 kg of rice, 120 kg of coffee and one tonne of bananas. This type of household sometimes supplements their household revenue by making traditional rum (*toaka gasy)*.

- Finally, the poorest category of household possess little or no land. Their livelihood comes essentially from working as manual labourers (portage of bananas, containers of rum, lychees, rice and coffee) and by collecting freshwater shrimp.

The middle and poor households settle and use forest resources in order to survive – forest is critical in providing land so that they can increase the availability of food.

Farmers are beginning to abandon rainfed rice because of decreasing yields. The loss of soil fertility pushes more and more of them to convert valley floors and lower-lying slopes to rice paddies. A large portion of the coffee plantations and irrigable valleys have been converted into rice paddies.

While rice is the principal subsistence crop, the revenues of the local people are mostly from the sale of bananas, coffee, beans and manioc.

- In areas of the corridor where farmers have access to markets, bananas are grown for sale and bring important revenues over the period from December to March. Middlemen work in the area, exporting bananas to Fianarantsoa or Antananarivo.

- Manioc is also grown commercially over the length of the corridor in areas where farmers are able to access markets, in particular via the transport of the railway to Fianarantsoa. In addition to being a source of cash income, bananas and manioc are also grown for household consumption and are important to farmers to meet their own dietary needs.

- Beans bring annual revenue of $18,000 – $120,000 Ariary ($9-$60 USD) to households, notably during the 'lean period' (Haonasoa, 2008).

The area of sugar cane cultivated has increased recently. Local people use sugar cane juice as sugar, but more importantly to produce local rum. The sale of rum can bring additional revenue to households of between $30,000 – $280,000 Ariary ($15-$140 USD) per year (Haonasoa, 2008).

The cultivation of other cash crops has also begun to take place. Ginger is a significant product from the area around the rural commune of Tolongoina (200 tonnes a year). Some households have also begun to grow vanilla and peppers, which are well suited to the local climate.

Western edge

In general, the production system of people living in the north western and centre western edges of the corridor is based on flooded or irrigated rice cultivation. The agro-ecological conditions of the zone allow for two rice growing seasons (early rice and the main rice season) The Betsileo region benefits from large, well-watered valleys that are suited to growing irrigated rice. The type of household farming system depends on the area of irrigated rice available to a family. In these areas, dominated by Betsileo people, three types of households can be distinguished:

- Affluent families who have more than 0.5 ha of irrigated rice, at least five zebu and who do not experience a lean period. Zebu are an integral part of their production system and are used for ploughing, transport and providing manure for fertilisation.
- A middle class, who own 0.25 – 0.5 ha of irrigated rice (bas-fond) and experience a lean period of four to six months.
- A vulnerable group, who have no or very little irrigated rice. These households earn the totality of their revenue and food by working as manual labourers (building and maintaining rice paddies, transporting goods), either locally or in the broader region. Forests provide these households with essential food products (such as freshwater shrimps, fish, wild yams, and wild honey), which they either eat, exchange for rice and manioc or sell. They also collect wood and other materials from the forest for making household goods, weaving packaging material for agricultural goods and making crafts for sale.

Out of season cultivation of other crops, notably potatoes and beans, on rice fields forms an integral part of the rice growing system. People also commonly earn income from raising livestock and making artisanal products.

Some households cultivate tobacco as a cash crop. Young households often produce and sell local rum to raise the money to buy rice paddies. The rural markets of the High Plateau, such as Ialamarina, Mahazony, and Ambatosoa, are centres for the sale of local rum and tobacco.

Citrus orchards are found in Betsileo villages and growing citrus is common in the Districts of Ialamarina and Vohibato. In the area, fruit trees (lychee, mango, avocado) are planted at the bottoms of slopes. In isolated areas, fruit is for household food, while in those areas that have access to markets fruit is also grown for sale.

Trade across the corridor

The corridor is a zone of exchange of goods and labour between the Betsileo and Tanala communities.

Betsileo farmers are specialists at converting land to rice paddies. Part of the workforce migrates temporarily across to the east of the corridor to work in converting valley floors or

terracing slopes to rice paddies, and for the coffee harvest. From the eastern side, Tanala people specialize in clearing forest and offer their services to the Betsileo to cultivate maize and beans by *tavy*.

At certain times of the year, zebu are driven along the west of the corridor towards the main cattle markets of the high plateau (Mahasoabe, Ambalavao and Ihosy). People from the east buy cattle from these markets and then herd the cattle on foot back across the corridor. Local people go to these markets to trade coffee and local rum for sale in the highlands or to the east of the corridor. Young households often undertake this trade in order to buy land and provide for the lean period.

Young people come to the areas of Ambalavao or Ialamarina to buy tobacco that they will resell in the East. About a hundred men move back and forth year-round along the foot paths that traverse the corridor, so facilitating human settlement within the corridor and trade.

Forest resources

To local people the forest corridor represents an area that they depend on for subsistence and regard as a resource to fall back upon. In addition to representing a reserve of future productive land, local people gather a range of products from it, including fuelwood, timber for construction, and medicinal plants. Many studies have emphasised the importance of forests to the livelihoods and wellbeing of local people (Socio economic survey report from Haona Soa 2008, Accademis 2008 and Sahala 2008).

Notable examples of forest use in COFAV include:

- More than 700 households within most of the Fokontanys at the edge of the forest corridor live from hunting or the collection of forest products, such as shrimp, honey, material for weaving and wood for making implements.

- About 500 families live from the sale of handles for farming tools, pestle and mortars (sahafa), pans for gold panning, and wooden scoops (garaba). Artisans earn between $100,000 and $180, 000 Ariary ($50-$90 USD) per year (Haonasoa, 2008). A shrimp fisherman may sell 5kg each market day for four months of the year, earning between $35,000 and $100,000 Ariary ($17-$50 USD) per year.

- The natural resources of the corridor are of primary importance to women. The forest area provides them with the raw materials for weaving, such as *harefo, zozoro, rambo, vakoana* and *rindra*. These materials are becoming scarce and growing of plants to supply weaving materials is developing. Weaving palm baskets and mats is exclusively a women's activity, and provides for their own household needs and brings important revenues to the household budget.

- The forest corridor is also a source and reserve of food (fruit, yam and bushmeat), as well as medicinal plants.

- The forest of COFAV is used to collect honey from wild hives as well as an excellent place to raise bees. The techniques used remain traditional (the use of holes in tree trunks or rocks). Farmers make traditional hives with a tree trunk (ramy, vatsilana) of 50 to 60 cm in length and 30 cm diameter. Local people still collect honey from wild hives by cutting down the tree harbouring the hive. Few local people in the western and south eastern areas of the corridor use modern apiculture and 80% of the honey is for household food (Socio economic survey reports from Haona Soa 2008, Accademis 2008 and Sahala 2008).

- In the Betsileo areas, far more people use modern apiculture methods. The abundance of nectar sources (such as eucalyptus plantations, the natural forest of the corridor, lychee orchards) is well-sited for apiculture. 40% of honey production is sold and this forms an important source of income for certain households. A Betsileo household can earn $18,000 – $60,000 Ariary ($9-$30 USD) per year from apiculture (Haonasoa, 2008); while an Ivohibe household earns $5,000 to $20,000 Ariary ($2.5-$10 USD) per year from the sale of honey (SAHALA, 2008).

Logging

Logging within the corridor is selective and small-scale (MEF 2010). It is either for precious hardwoods or to supply urban centres with timber. All logging within the corridor is illegal but enforcement has been weak in the past. Logging is largely done by people working either independently or as daily wage labourers for outside timber merchants who have obtained cutting permits for other areas. Permits are often something of a formality, and unregulated cutting is common in Madagascar. Permits are also sometimes shown to officials when transporting wood out of an area, but the wood is often not taken from the permitted concession.

Artisanal mining

The southern and central parts of the Réserve de Ressources Naturelles Ambositra - Vondrozo have deposits of precious stones and potentially other minerals. Consequently, a number of small-scale, artisanal miners are attracted to the region. In certain areas, such as Miarinarivo, Ankarimbelo and Vondrozo, there are a number of small, illegal mines.

Fish farming

Abundant water has permitted the recent development of fish farming. There are an estimated 1,900 fish and rice farmers within the communes of the corridor. Fish farming serves both to provide protein to the household as well as to earn income.

Water

In an area characterized by poverty and lack of credit, water is the primary agricultural input. The project takes place within a comparatively high rainfall area. However, it is the unpredictability of rainfall that constrains production. The failure of rains to arrive in the October/November period in recent years has affected the labour cycle associated with rice production, with reported reductions in yields of up to 50%. (Socio economic survey reports from Haona Soa 2008, Accademis 2008 and Sahala 2008) Furthermore, the rainy season brings intense downpours and often includes extreme weather events, such as cyclones, that can destroy rice paddies and wash away fields. Many farmers depend on cultivation techniques that are reliant on rainfall, but also affected by intensive rainfall events, so making them particularly vulnerable to changes in rainfall patterns, local hydrodynamics and climate change.

In addition to agriculture, local people depend on natural watercourses for drinking water. Streams are used to water livestock, for fishing and for raising ducks and geese. Access to water and control of water are seen as pivotal to the livelihoods and wellbeing of the local communities.

G1.6. Description of the Current Land-use and Property Rights

Current land-use: please refer to the previous section.

All the forest in the project area is owned by the Government of Madagascar and the government is ultimately responsible for project activities. The Government of Madagascar has delegated the protected area management to CI through a management delegation contract (Table 7). The following describes more details related to land tenure in the different parts of the project zone:

1. **Protected area:** The protected area is state land with the status of a protected area. Its boundaries have been defined in the protected area management plan based on public consultation and will be recorded in the government cadastral services at the time of permanent gazettement of the protected area. It is comprised of:
    a. The project area within the strict conservation zone. The MEF is responsible for the management of this zone and has delegated that responsibility to the protected area manager. . Enforcement activities remain the responsibility of the Forestry Service.

b. The project area within the sustainable-use forest areas of the protected area. The MEF remains responsible for the management of these zones and has delegated responsibility for management to the protected area manager. Day to day management of specific areas within the sustainable use forest has been further delegated to local community management associations (COBA) that participate in the overall management of the project. The delegation to COBAs is through GCF "transfer of management" contracts and/or delegation agreements agreed as part of the protected area management (e.g. conservation agreements or a "cahier des charges").

2. **Community managed areas outside of the protected area:** The forest outside of the proposed protected area belongs to the State. Community stakeholders may apply to manage these areas through a GCF "transfer of management" contract, though this is an expensive process for communities and only happens if supported as part of project activities. Conservation activities in these areas are an extension of the work inside the official protected area boundaries.

Table 7. Summary of the land tenure and ownership of the project area

Zone	Land tenure	Legal owner	Co-management responsibility
Protected Area			
Strict conservation zone (Delegated PA manager)	State land managed by a delegated PA manager under a revocable, fixed-term agreement	GoM	CI/delegated manager
Strict conservation zone (Community-managed area)	State land (PA) managed by PA manager and community management associations under revocable, fixed-term agreements	GoM	CI/delegated manager and Community Associations
Sustainable use forest (Community-managed area)	State land (PA) managed by PA manager and community management associations under revocable, fixed-term agreements	GoM	CI/delegated manager and Community Associations
Community-managed areas outside the Protected Area			

Zone	Land tenure	Legal owner	Co-management responsibility
Sustainable use forest	State land managed by community management associations under revocable, fixed-term agreements	GoM	Community associations

Customary Rights

Although Madagascar has an official land tenure system that recognizes individual freehold tenure under law, most people do not have land title and rely on community based rules and dispute resolution (USAID, 2010). Traditionally, land is perceived as belonging to the ancestors and as such many people believe that perpetual ownership rights can only be achieved by getting title to it. Under the customary system, village elders allocate plots of land to inhabitants. Traditionally inheritance of these plots is the main way of obtaining rights to use land and approximately 78% of farmers in Madagascar obtain access to land through inheritance (USAID, 2010). However in the case of land considered to be unused, farmers can acquire land rights by demonstrating occupancy and improvement (*mise en valeur*) of the land over a 10 year period. This 10 year occupancy provides legitimacy of traditional rights and is also recognized as the basis for applying for formal land titles.

Disputes over Land Tenure

There are no disputes over land tenure within the project area and have not been in the last 10 years

G1.7. Description of Current Biodiversity and Threats to Biodiversity

Though the topography of the eastern side of the corridor is different from the western side, the entire corridor falls within the dense, humid forest biome of East Madagascar.

The natural forest of Madagascar, including COFAV has a rich flora, with more than six hundred species of Angiosperms and more than two hundred species of Pteridophytes. These forests are also globally renowned for containing high numbers of species that are endemic to Madagascar. Examples of this exceptionally rich diversity of endemic species in COFAV is the presence of seventeen species of lemur, including two highly endangered species of bamboo lemur (*Hapalemur aureus* and *Prolemur simus*). Four species in the corridor are considered critically endangered based on the IUCN redlist (*Prolemur simus*, *Neodrepanis hypoxantha*, *Paratilapia vondrozo*, *Bedotia sp. Vevembe*), four species are listed as endangered (*Eulemur*

cinereiceps, Hapalemur aureus, Mantella bernhardi, Ptychochromoides vondrozo) and many more are considered vulnerable to extinction (MEF 2010).

The biodiversity of COFAV is presented in more detail in section G1.8. Lists of the species recorded within COFAV are given in the management plan of the protected area provided in the supporting documents.

Threats

The principal threat to the biodiversity of the corridor is deforestation. Sections 2.4 and 2.5 of the VCS PD present the causes of deforestation in detail.

By far, the main threat to the forests and its biodiversity is slash-and-burn agriculture (*tavy)*. Other less significance threats include illegal mining, hunting, and logging. The corridor is also threatened by its overall patters of land use as it is a mosaic that includes villages, agricultural lands, grazing lands, roads, and a railway. During the development of the COFAV protected area management plan, a detailed assessment of threats to biodiversity was carried out (MEF, 2010), and its main conclusions are summarised below:

Tavy

Slash-and-burn agriculture – called *tavy* – is a traditional technique favoured by the people of the region. The population of the region is largely rural and dependent on subsistence farming as their principal livelihood, some farmers may practice *tavy* exclusively. The primary crop in *tavy* is rice, often with cassava, or vegetables. (Styger et al. 2007; Styger et al. 2009). Importantly it is also a way of appropriating land.

The use of fire to clear fields rapidly decreases soil fertility and leads farmers to clear new additional forest, so expanding the area cleared by slash-and-burn (Brand and Pfund 1998). The drivers of deforestation by slash-and-burn are complex and have a number of linked, underlying causes. Population growth leads to shortages of productive land outside the forest. Low agricultural productivity, lack of knowledge about more effective techniques and risks associated with adopting new techniques limit food is availability. This creates pressure to exploit ever larger areas of forest for *tavy*.

Tavy is the principle cause of deforestation within the corridor and it is judged to be the highest threat (Green and Sussman 1990; Dufils 2003, Harper et al. 2007, Erdman. 2003, FCPF, 2010). In the longterm, deforestation is the main, underlying cause of poverty around the corridor. The principle impact of forest clearing for tavy is the fragmentation and loss of the forest habitat. This leads to the local loss of species and forest ecosystem services.

Illicit small-scale mining

Historically certain areas of the corridor, particularly those around Ambohimahamasina, were a source of iron ore for making arms and farm implements. More recently concentrations of gold have been found in the corridor and this has attracted artisanal miners from all over Madagascar. Strong immigration occurs in the areas such as Ikongo, Ifanadiana and Ihazomena. The control and management of mining in the corridor is a major challenge to its sustainable management and will require ongoing enforcement by the project and relevant authorities. This is particularly so because the mining is unregulated that can attract immigrants from all over the country.

Mining leads to localised deforestation and degradation in a number of ways: cutting trees for making shelters; cutting of the area to be mined; increased local erosion and sediment loads in streams; and general degradation of the forest areas immediately neighbouring the mine.

Despite local communities being given the mandate to manage their natural resources through management transfer contracts, illegal small-scale mining continues in certain parts of the corridor and requires control by government agencies.

Though mining causes marked damage to the forest, its impacts are very localised and negligible in area compared to the total area of the corridor and by comparison to the area threatened by *tavy*. It is therefore regarded as a relatively low threat to COFAV's forests overall.

Logging

The ever-increasing demand for forest products and timber, combined with a lack of effective forest management by communities and proper government control suggests that without the project, illegal logging would continue unabated in order to supply both local needs and commercial timber demand. Nevertheless, cutting of trees is highly selective and logging was considered to be a low level persistent threat to the corridor in the management plan. Overall logging is estimated to be a relatively low threat to the corridor forest (MEF 2010).

Hunting

Local people hunt for food and mainly target larger animals, such as lemurs, and birds. In addition to the people living within the vicinity of the corridor, those crossing it on footpaths also hunt to supplement their diet with protein. Hunting is mostly done by the setting of traps. While there is legislation against hunting certain species, there has been little local enforcement or control of hunting in the area. The creation of the protected area as part of the project provides legal protection for all animal species, an essential prerequisite for controlling the threat. The threat rating of hunting is average based on the assessment by biodiversity and conservation experts following the Open Standards for Practice of Conservation methodology that was used to develop the management plan (see page 34 of the management plan - MEF (2010)).

Over-exploitation of forest products

Certain species of animals and plants (especially reptiles, amphibians and orchids) are prized for local, regional and international trade. Uncontrolled collection of these species, including ones that are listed by CITES or the IUCN Redlist, has led to marked decreases in their populations in certain areas (MEF, 2010).

According to the COFAV management plan (MEF, 2010), the harvesting of eels, fish and shrimps during spawning and hatching periods has greatly reduced their stocks within the accessible areas of the corridor. Consequently, the area where these species are harvested is extending further into the heart of the corridor.

Many plant species are used in weaving, such as *Pandanus sp.* (*vakoana*), *Scyrpus sp.* (*forompisaka*), *Cyprus madagascariensis* (*zozoro*) and *rindra*, and their continued exploitation is likely to make them rarer. The majority of households neighbouring the corridor harvest these plants for the raw materials of weaving.

There is pressure on wildlife populations throughout the corridor and there is no tradition of sustainable management of this wildlife. Generally, people cut trees to meet household needs (fuel wood, making household utensils, such as pestle and mortars), and for building houses. The cutting of bamboo poses a particular threat to the lemurs *Hapalemur sp.* and *Prolemur sp.*, which feed predominantly on bamboo and live in this habitat (MEF, 2010).

G1.8. Identification and Description of High Conservation Value Areas

G1.8.1. Globally significant concentrations of biodiversity

Madagascar's most unique asset is its biodiversity. Many conservationists believe that a hectare of forest lost in Madagascar has a greater negative impact on global biodiversity than a hectare of forest lost anywhere else on earth. This is not because of unusual species richness, which is higher in many other countries, but rather because the great majority of species are endemic (Table 8). Endemism at the genera and family level is even more unusual with 22 endemic families and 478 endemic genera among the plants and vertebrates. By comparison, the biodiversity hotspots with the next highest rate of endemism globally have far fewer endemic genera (the Caribbean islands have 269) and families (New Zealand has 7) (Mittermeier et al, 2004; Ramananjanahary, 2010). Unfortunately Madagascar's species are also extremely threatened and there has been a steady trend in the number of species listed in IUCN's redlists. The combination of elevated endemism and high threat means that Madagascar has consistently been considered in the top 10 global hotspots in the various hotspot analyses that have been completed. Conservation International recognizes 164 Key

Biodiversity Areas and the Alliance for Zero Extinction lists 21 sites for Madagascar (CI Madagascar Program data).

The island of Madagascar is home to five endemic plant families and an estimated 14,000 plant species, of which nearly 90% are endemic (Ramananjanahary et al. 2010). Primate biodiversity and endemism are also very high, placing it among the world's highest priorities for primate conservation: 101 species and subspecies are all endemic (Mittermeier et al. 2008). There are five endemic families of birds with 209 breeding species, of which 51% are endemic to Madagascar (Goodman & Hawkins 2008). In addition, there are 370 species of reptiles (Glaw & Vences 2007) and Madagascar's amphibians are almost entirely unique to the country, with 244 species of which 99% are endemic (Vieites et al. 2009).

Table 8. Levels of species richness, endemism and threatened species in Madagascar

Taxa	No. of species	% Endemism	% Threatened
Fish (freshwater)	143	65	60
Amphibians	244	99	34
Reptiles	370	92	96
Birds (breeding species)	209	51	17
Bats	30	60	23
Carnivores	11	72	72
Insectivore	29	93	24
Rodents	25	88	20
Primates	101	100	39
Non-marine plants	14,000	83	9

Sources : Species figures are from Goodman & Benstead, 2005 except for sources listed in the main text. IUCN 2011.2 - www.iucnredlist.org. Downloaded on 23 April 2012.

The exceptional biodiversity harboured within COFAV itself is summarised in Table 9. The data was compiled from various sources for the development of the management plan (MEF, 2010). Important surveys for the area include Goodman and Razafindratsita (2001) and MICET (2005).

Table 9. Summary of the species richness, number of endemic and threatened species that have been recorded within COFAV

	Species Richness	Endemic (locally endemic)	IUCN Species

	Species Richness	Endemic (locally endemic)	IUCN Species
Plants			
Angiosperms	535	332	not assessed
Pteridophytes	186	72	31
Birds	94	65 (22)	33
Mammals			
Lemurs	17	17	11
Carnivores	3	3	2
Small mammals	36	35	27
Reptiles	68	68 (18)	1
Amphibians	111	107 (27)	41
Fish	17	10 (4)	9
Butterflies and moths	55	not assessed	not assessed

Source: MEF, 2010 based on references therein

Plants

To date, surveys of COFAV have identified 535 species of angiosperms, of which 62 % are endemic to Madagascar (MEF, 2010).

These results of surveys carried out in COFAV (eg. Goodman and Razafindratsita 2001; MICET, 2005) are summarised in the COFAV management plan (MEF, 2010). They show that despite the human pressures on the forest, the pteridophyte flora is still rich, diverse and little known. The forest corridor is therefore valuable as a reservoir of species for the progressive re-establishment of plant diversity within the Parc National de Ranomafana – an area that was heavily impacted before its protection.

Of the eight orchid species recorded, three are endemic to Madagascar and one to the region: *Aerangis citrata, Bulbophyllum hamellinii* and *Aerangis fastuosa vondrozoensis*. Four species of endemic palm were observed, namely *Beccariophoenix madagascariensis, Dypsis fibrosa, Dypsis nauseosa and Dypsis pinnatifrons*. Other rare plants belonging to families endemic to Madagascar are observed in the corridor, such as *Melanophylla, Sarcolaena, Physena madagascariensis, Rhopalocarpus sp*.

A number of IUCN Redlisted species occur within COFAV, notably: the orchid *Bulbophyllum hamelinii*; three critically endangered palms *Beccariophoenix madagascariensis, Dypsis trapezoides Dypsis nauseosa* (CR); as well as *Dalbergia baroni* and *Dalbergia orientalis* (VU).

The corridor also harbours a number of CITES listed plants, including four Annexe I species (*Aerangis citrata, Angraecum sp, Bulbophyllum hamelinii* and *Polystachya sp*); and five

Annexe II species (*Ravenea sp, Rhipsalis sp, Cyathea sp, Vaccinia sp* and *Blotia sp*) (MEF, 2010).

Lemurs

A total of seventeen species or sub-species have been observed from COFAV (MEF, 2010). Of these seventeen species, eight are nocturnal (*Microcebus rufus, Microcebus jollyae, Lepilemur microdon, Avahi peyrierasi, Avahi betsileo, Lepilemur betsileo, Cheirogaleus major* and *Daubentonia madagascariensis*) and nine are diurnal (*Varecia variegata, Propithecus edwardsi, Eulemur rubriventer, E. fulvus rufus, E. cinereiceps, Hapalemur griseus ranomafanensis, H.g.gilberti, Prolemur simus* and *Hapalemur aureus*).

COFAV is of critical importance to the conservation of *Eulemur cinereiceps, Prolemur simus* and *Hapalemur aureus* and contains most of the remaining habitat for these species (Mittermeier et al., 2008).

Reptiles and amphibians

The Ambositra – Vondrozo corridor harbours 111 amphibian species, including threatened species (*Mantella bernhardii, Mantella madagascariensis* (EN), *Anodonthyla montana* (CR) and *Scaphiophryne marmorata* (MEF, 2010). Habitat destruction and collection of animals for sale in the pet trade are the main threats for these species. About 97% of the amphibiens recorded are endemic to Madagascar; the distribution of 27 of these species is limited to southestern Madagascar.

Sixty-eight reptile species have been recorded in the corridor, including *Matoatoa spannringi* (MEF, 2010). All of the reptile species occurring within COFAV are endemic to Madagascar, with 18 species having a distribution that is limited to southestern Madagascar.

Certain species occurring in COFAV are highly prized in international trade and are listed in CITES (*Mantidactylus grandidieri, Uroplatus ebenaui, Uroplatus sikorae*). A species of *Gerrhosauridae - Zonosaurus maximus* - is also IUCN Redlisted (MEF, 2010)

Small-mammals

Thirty-six native small-mamal species have been recorded in the Ambositra-Vondrozo corridor, including the rare aquatic Limnogale mergulus. 35 of these species are endemic to Madagascar (MEF, 2010).

Birds

Ninety-nine bird species are found in the corridor, and include 65 that are endemic to Madagascar and 22 that are endemic to the area. Thirty-three of these species are listed on the

IUCN Redlist; two are critically endangered (*Neodrepanis hypoxantha* and *Sarothrura watersi*) and four are Vulnerable (*Mesitornis unicolor*, *Xenopirostris pollen, Brachypteracias leptosomus* and *Atelornis crossleyi*) (MEF, 2010).

G1.8.2. Globally, regionally or nationally significant large landscape-level areas with viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance

The project area is a 135,212 ha expanse of Madagascar's eastern rainforests that will link the existing protected areas of Ranomafana in the north and Andringitra and Pic d'Ivohibe in the south, all of which are important areas for the survival of Madagascar's endemic species (Table 8). It will also improve connectivity to the planned Fandriana – Marolambo protected area north of Ranomafana. Various conservation planning analyses show COFAV to be among the planet's highest priorities for biodiversity conservation such as WWF's Global 200 Ecoregions (Olson and Dinerstein, 2002); BirdLife International's Important Bird Areas (Project ZICOMA, 1999) and Conservation International's Key Biodiversity Areas (CI Madagascar program data). In addition, COFAV is recognised as one of the highest priorities for Conservation in national level analyses (Kremen et al., 2008) The project area falls within two Birdlife EBAs that are of critical and urgent priority - the "East Malagasy wet forests" and the "East Malagasy wetlands" (Birdlife, 2013). COFAV encompasses or is in close proximity to a number of Important Bird Areas, including: the Zafimaniry Forest, Ranomafana National Park, Andringitra National Park, and the Vondrozo Classified Forest and surrounding areas (Table 10).

At a regional level COFAV forms a vital link in a corridor that connects six protected areas, interspersed along the eastern escarpment of Madagascar, which make up the Rainforests of the Atsinanana – a UNESCO World Heritage site. The humid forests of eastern Madagascar are critically important for maintaining ongoing ecological processes necessary for the survival of Madagascar's unique biodiversity. The level of endemism within the eastern forests is approximately 80 to 90 percent for all groups, and endemic families and genera are common. COFAV aims to protect what is probably the most vulnerable part of this regional corridor. The ecological connectivity that COFAV will ensure is vital to allowing continued movement of species along the length of the corridor and between different altitudes. The genetic connectivity that the movement of species along the corridor enables is critical to the long term survival of their populations.

Table 10. Summary of the existing protected areas linked by COFAV

	Ranomafana	Andringitra	Pic d'Ivohibe
Designation	National Park	National Park	Special Reserve

IUCN category	II	II	IV
Area (ha)	40,523	32,082	3,638
IUCN Redlisted species	93	65	42
Location (lat. & long.)	-21.22S 47.47E.	-22.22S 46.93E.	-22.51S 46.97E.
Average annual rainfall (mm)	1,855	1,495	1,355
Altitude range (m)	537 to 1,396	685 to 2,623	590 to 1,950

Source: Protected areas extracted from "WDPA Consortium 2006 World Database on Protected Areas" - UNEP-WCMC (2006). Altitude from SRTM data. Rainfall from WorldClim data.

G1.8.3. Threatened or rare ecosystems

The project zone encompasses the following ecosystems that, given the globally important biodiversity that they support, the degree to which they have already been lost and the present anthropogenic pressures they are experiencing, are considered as rare and threatened.

Low-altitude humid forest

The dense humid forest of low altitude (less than 800 m) of COFAV is located almost entirely in the south east of the corridor and covers 31% of the protected area (MEF, 2010) This forest is dominated by *sciaphiles* species that characteristic of primary forest, such as *Chrysophyllum boivinianum*, *Cryptocarya sp.* and *Ocotea sp.*, as well as heliophilic species that are characteristic of secondary forests and clearings, such as *Aphloia theaiformis* and *Dombeya sp* (MEF 2010).

The low altitude forest of the corridor is marked by the absence of *Dalbergia baroni*, a species that is normally present in this formation. It is not only very important in that it provides habitat for *Eulemur cinereiceps*, but it also critically provides connectivity across the different altitudes of the corridor. *Tavy* is causing the continued loss and fragmentation of this habitat at both a national and regional level.

Mid-altitude humid forest

Humid forest of middle to high altitude (between 800 and 1,600 m) forms a continuous block that covers 67 % of the surface area of the Ambositra – Vondrozo corridor and encompasses almost entirely the project area. It is a sempervirente vegetation, forming a closed canopy and different strata. It is characterised by *Tambourissa sp., Chrysophyllum sp.* and *Oncostemum sp* (MEF 2010).

This forest type supports many rivers sources and provides protection to much of what is frequently a steep watershed. This protection of the regional watershed and modulation of

river flow is one of the principal ecosystem services that the corridor forest provides to the region.

High-altitude vegetation

The vegetation of high altitude (more than 1,600m) is made up of specific vegetation types that are determined by localised substrate types located in rocky mountainous areas. An example of this is the unique vegetation of the Andringitra area that covers about 8,000 ha. This vegetation type supports a high number of locally endemic species. These areas also play important ecological roles, such as providing connectivity between still undisturbed habitats and river sources.

This forest type is rare both nationally and globally. It is also intrinsically fragile because once converted it is more or less impossible for natural vegetation to regenerate to the native state. These habitats are threatened by their isolation, by the commercial collection of species and conversion of natural habitat to other land-uses (MEF 2010).

Wet / humid areas

Wet areas include streams and rivers, lakes and wetlands. These ecosystems support species that are both nationally and locally endemic. The lakes and wetlands provide important ecosystem services in regulating water flows. Many of the wetland species are threatened by over-collection, the habitats themselves are highly threatened by conversion to rice paddies (MEF 2010).

G1.8.4. Areas that provide critical ecosystem services

All COFAV, is a critical area, and has been identified as a priority for conservation, to maintain ecosystem services (Wendland et al., 2009). COFAV provides a number of important ecosystem services, including:

- Sequestration of CO_2;
- Supporting threatened biodiversity (ecosystem, species and genetic diversity) of global importance;
- Vital watershed services across five administrative regions, including a modulated and sustained flow of water for:
    - Agriculture situated downstream of the corridor's multiple river basins. Watershed services are critical to farmers as agriculture is largely rainfed or reliant on natural streams for irrigation.
    - Drinking water: Local people consider forest areas to be important for land use in that they provide sources of clean drinking water. Natural water

sources – streams and rivers – are the principal source of water for drinking and household use.

- Hydroelectricity is of primary economic importance for the region of Fianarantsoa, and the hydroelectric station at Ranomafana provides the region's main electricity supply. There is also good potential for smaller micro-hydroelectric stations suitable for communities around COFAV. One such station has been developed at Ikongo for example (with the early design stage funded by CI during the conception phase of the carbon project).

G1.8.5. Areas that are fundamental for meeting the basic needs of local communities

Areas of the project that are important for meeting the subsistence needs of the local people were identified by them during the public consultation process (see Figure 5). These are the areas that make up the sustainable use zones within the protected area/project area zoning as defined in the management plan (MEF, 2010). Fuel wood and a variety of construction materials are collected on a regular basis from these forest areas, which are also exploited for non-timber forest products.

As identified in the management plan (MEF, 2010), fish, shrimp and animals are foraged for consumption or sale in these areas, wild honey is collected, both for eating and sale, medicinal plants are sourced from natural forest, and several different types of plant leaves are used for household purposes (e.g. roofing, mat and basket construction). Many of these activities, such as the collection of medicinal herbs, contribute not only to income but to the quality of life for families. For some communities, and certainly for many households that live on the edge of subsistence, access to forests is important (MEF, 2010).

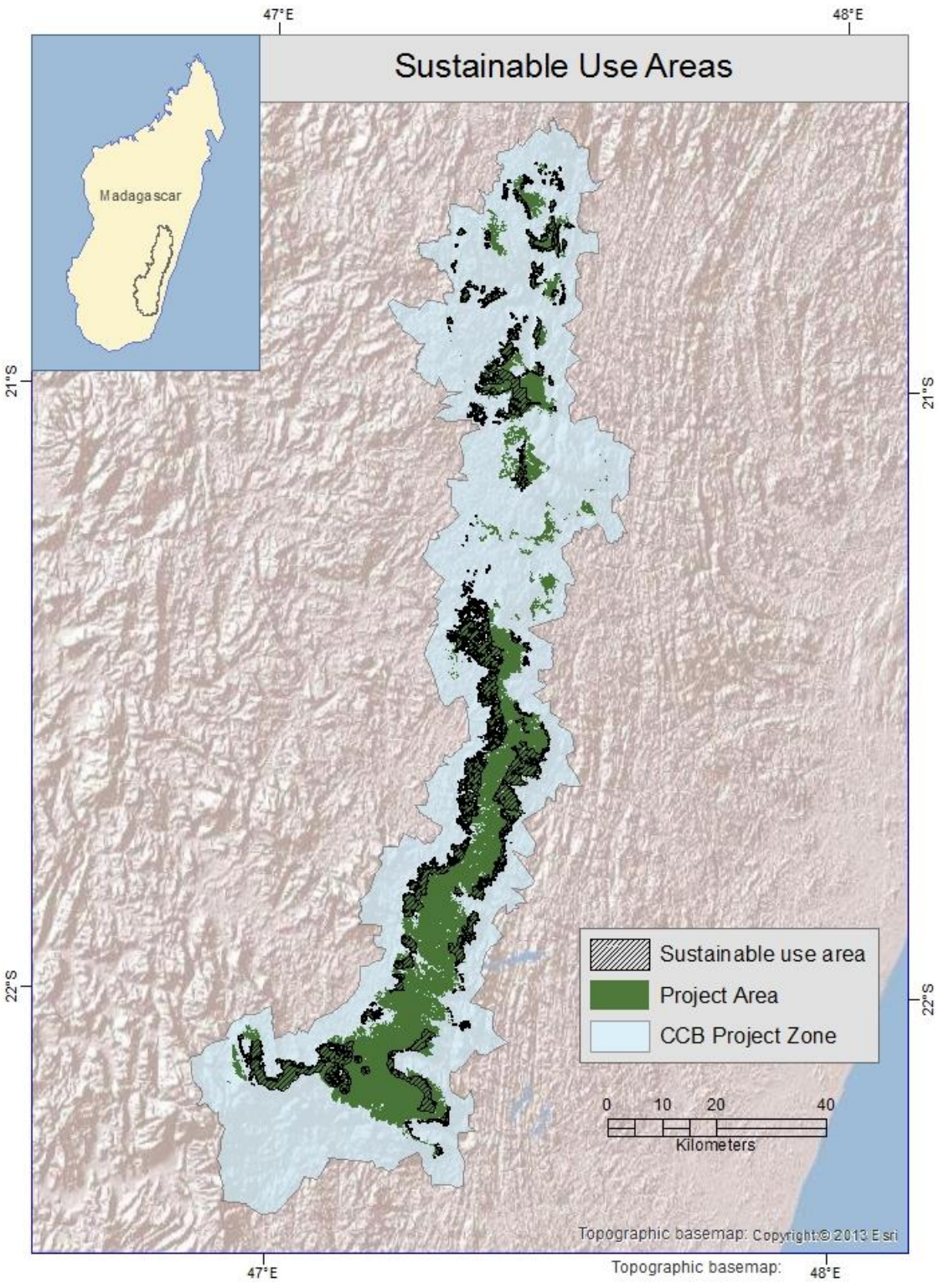

Figure 5. Map of sustainable use zones in COFAV

G1.8.6. Areas that are critical for the traditional cultural identity of local communities

Local communities maintain certain remnants of primary forest in their natural state because they are of high cultural significance. These forest patches are the sites of tombs, or are sacred or taboo (*fady*).

Perceptions and uses of the forest are inherited from the ancestors of the local people. They consider the forest as the land of their ancestors, a place that holds a wealth of resources that their ancestors have handed down to them; above all a resource of fertile land, as well as a source of medicinal plants, food (honey, eels, shrimp, bushmeat), and materials for making important household utensils and farming tools.

In addition to being a gift from their ancestors, the forest is also sacred to the local people in that it is the haven of spirits. For both the Tanala and the Betsileo, certain areas of the forest are '*fady*' or taboo and are the sites of tombs or ancient villages. These *fady* originate from the experiences of the ancestors who lived in the forest. Respect of the *fady* is a way of honouring the ancestors and the spirits of the wild world. They are also a means by which local people can exercise control over the access of outsiders to the forest.

G2. Baseline Projections

G2.1. Most Likely Land-use Scenario in Absence of Project

Based on current existing land uses and those that have existed in the historical period (10 years prior to the project start date) and taking into account relevant national and sectoral policies, the most realistic and credible alternative land use scenarios in the absence of the REDD project activity would be forest coversion to other land uses due to tavy. Such practice is mainly done by small-local farmers who are dependent on subsistence farming as their principal livelihood.

Alternatively the project area could be protected and alternative livelihood to the farmer could be provided by the network of national parks and reserves. However, without the carbon financing from REDD project, is very unlikely that forest protection and conservation would happen as there is a lack of financial resources to manage protected areas effectively and/or provide economic alternatives to farmers and long term financing is not secured (MacKinnon et al., 2009; World Bank 2010).. Although the practice of tavy does not meet the relevant regulations and would not be permitted, this practice is widespread in the region and throughout Madagascar and shows that the laws and regulations governing them are systematically not enforced. (ANGAP 2001; MINENVEFT et al., 2009; MEF, 2010a).

These scenarios have been identified through a participatory consultation process and following the steps of the methodology approved by the VCS Standard VM0015: "Methodology for avoiding unplanned deforestation" (see section 2.4 and steps VM4-5 of VCS PD available in the VCS project database at http://v-c-s.org/). The detailed description and rationality of the range of potential scenarios of land use are presented in the analysis of additionality (see section G.2.2), deviation of the methodology is described in section G.1.4.

G2.2. Documentation that Project Benefits Would Not Happen in Absence of Project

The activities of the project are highly additional since the benefits for climate change mitigation, biodiversity conservation and sustainable development of local populations would not occur without the project. To demonstrate additionality, the project has applied the most recent version (3.0) of the VCS Tool VT0001 "Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities". Results of this analysis demonstrated that due to economic, institutional and knowledge barriers, it would be unlikely that the project would happen without the financial support from carbon benefits.

In addition, the project is in compliance with the national and local laws applicable to the land-use, notably:

The Madagascar Environmental Charter;

> This law defines 'environment', sets down fundamental principles and responsibilities and identifies the mechanisms for implementation, including establishing the 15-year2 National Environmental Action Plan (NEAP).

The MECIE decree on environmental impact assessment (Mise en Compatibilité des Investissements avec l'Environnement (MECIE));

> This decree defines zones to be considered as 'sensitive', and thus subject to mandatory Environmental Impact Assessment for all investment projects

The Protected Area Code (Code des Aires Protégées (COAP));

> The *Code des Aires Protégées* (COAP) or Protected Area Law, describes the various types of protected areas of the Madagascar Protected Area Network (*Système des Aires Protégées de Madagascar* (SAPM)), and specifically prescribes zoning categories that each protected area manager in Madagascar must comply to in the early stages of project identification and implementation. The COAP law also defines a set of governance principles to which the protected area manager must comply

The local management of renewable natural resources (Gestion Locale Sécurisée des ressources naturelles renouvelables (GELOSE));

This legislation enables the devolution of natural resource management to local communities. The law allows the delegation of limited tenure and sustainable use rights of renewable natural resources to a legally-recognized local community institution (a *Communauté de Base* (COBA)), in exchange for a contractual obligation vis-à-vis the government to conserve the transferred natural resources. Decree 2001-122 governs the implementation of devolved forest resource management to local communities (Decree 2001-122, *Décret fixant les conditions de mise en oeuvre de la Gestion Contractualisée des Forêts de l'Etat* (GCF)). It allows forest specific community management contracts.

Customary local law (Dina).

Dina are traditional laws established by the community through broad consensus. For COFAV, local communities established *Dina* for the community management of their forest resources in fulfilment of the GELOSE/GCF.

The detailed assessment of additionality and results were submitted to the validators and are available upon request. .

G2.3. Calculation of Estimated Carbon Stock Changes in Absence of Project

The carbon stock for the forest class and the most-likely post-deforestation land-use in the absence of the project was estimated based on field measurement and literature review. A long-term (20 y) average carbon stock was calculated based on the *tavy* cycle for the post-deforestation land use. Only above- and, below-ground biomass and dead wood were considered in the carbon pools, totalling 701 tCO_2,for forest class and 39 tCO_2 for post-deforestation land use. Since mos the forest is cleard by slash-and burn prectices (*tavy*), non-CO_2 emissions from biomass burning were accounted. The total baseline carbon stock change in the project area is summarized on Table 11.

The deforestation rate applied in the baseline period, precisely 1.26% y^{-1}, was estimated based on the historical average for the period of 1990-2005 and the analysis of the agents and drivers of deforestation. Forest convertion to *tavy* by small-cale subsintence farmes was identified as the major cause of deforestation in the region and is expected to be dominant cause in the coming decade. Other drivers of deforestation were identified during the workshop and literature review, however their contribution to the forest loss is way less than tavy's. The evidences from the workshop were also supported by a remote sensing analysis of the fire occurency in the region for 2002-2010.

The project used the Land Change Modeler (LCM) tool of IDRISI to model the spatial distribution of deforestation in the region, and therefore estimate the amount of forest loss inside the project area. The model accounts for the spatial correlation between historical variables and a set of variables (biophysical, social and economic factors). The model oputput

was validated according to the requirements described in the VCS VM0015 methodology, namely Methodology for Avoided Unplanned Deforestation, v1.1

Details of the GHG emissions, including non-CO2 emissions are described in Step VM 06 of VCS PD available in the VCS project database at http://v-c-s.org/ deviation of the methodology is described in section G.1.4

Table 11. Total baseline carbon stock change in the project area

Project year	Total baseline carbon stock change in the project area	
	$\square$ $C\ BSLPA_{icl,t}$	$\square$ $C\ BSLPA_{icl}$
	annual	cumulative
	tCO_2-e	tCO_2-e
2008	-705,006	-705,006
2009	-848,109	-1,553,114
2010	-892,653	-2,445,768
2011	-885,020	-3,330,787
2012	-884,554	-4,215,341
2013	-885,905	-5,101,246
2014	-885,272	-5,986,518
2015	-871,722	-6,858,240
2016	-887,484	-7,745,725
2017	-863,287	-8,609,012

G2.4. Description of How the 'Without Project' Scenario Would Affect Communities

Without the project it is likely that many communities will increasingly lose control over their community forests, as the land could be assigned to concession for instance. These communities depend on these forests for a wide range of products including food, animal fodder, fuel-wood, timber, honey, and fibres. Most rural families face seasonal food shortages that are often met through forest resources including edible leaves, bamboo shoots, tubers, fruits, etc. In addition, many families engage in non-timber forest product (NTFP) collection.

COFAV is also a vital source of freshwater for much of the population located in the center of the country as the headwaters of 25 rivers begin within this forest corridor.

A number of underlying drivers shape the present and future socio-economic conditions of the communities within the project zone:

- High population growth.
- The scarcity of productive agricultural land in the vicinity of the existing villages. This includes forested land for the practice of *tavy* , *tanety* land, and valley floors suitable for conversion to irrigated rice.
- Water - a critical dependence on timely rainfall and natural watercourses in cropping systems, the lack of systems to manage water, the vulnerability of crops to heavy rain, and changing rainfall patterns in the area.
- A lack of access to credit, extension services (technological know-how), fertilizer inputs and tools necessary for diversifying and intensifying agriculture practices.
- Few alternative livelihood strategies that are not based on farming or forest resources.
- A scarcity of natural forest areas that local people can still freely access for products to meet their basic needs

The agro-ecological conditions and favoured production systems differ from the east to the west of the corridor and this would alter the course of predicted 'without project' land use change.

Farmers would convert all suitable, available land to *tavy,* leaving remnants of forest that are sacred / taboo, or unsuitable for cultivation. After the conversion of available forest areas to *tavy*, farmers would convert suitable valley floors to paddies and terrace the lower parts of suitable hillsides. Increasing population pressure and the decrease of available land would force farmers to increase the intensity of *tavy*, making this unsustainable. Decrease in productivity and increasing population with no new forest land available would increase poverty and the levels of degradation of the land.

Under these conditions, the 'without project' scenario is therefore one of continued *tavy* on existing *savoka* fallows with an intensification of the *tavy-savoka* cycles. Local knowledge and empirical science show that this leads to soil loss through erosion, depletion of soil nutrients and succession to unproductive "sour lands". Not only are these lands unproductive, but they also make surrounding cultivated lands more vulnerable to fire, as well as to the loss of crops through flooding and erosion.

Under this scenario communities would experience three major impacts:

1. Agricultural decline

   This would involve a continuing decline in yields and a reduction in the availability of productive land. Consequently food insecurity would increase, incomes would decline and the people would become poorer. Poverty forces farmers to focus on meeting their most immediate needs, locking them into short term, unsustainable production patterns. It

gives them no margin to diversify to more sustainable alternative practices and plan for longer time horizons. This is observed elsewhere in Madagascar and is already partially the case within the project zone.

The continued increase in the local population will exacerbate pressure on the land and economic decline. This could eventually lead to irreversible damage to the natural resource base. It would also be anticipated that the traditional rules of land use and land rights would disintegrate, leading to conflicts over land.

2. Loss of forest products and services

   In addition to the decline in agriculture and the consequent impacts on the community, any remaining secondary and degraded forest that the communities can still presently access (that which is not within protected areas) would be lost. Forest areas provide households with a variety of essential products, services and opportunities to earn income that is essential to meeting their basic needs. The loss of remaining forest areas would have two important impacts on the community:

   a. Households would no longer be able to meet certain basic needs that forests presently provide. For example, medicinal plants, honey, construction materials, grasses for weaving and fuel wood. Section G1.5 sub-section "Livelihoods and Production Systems" details the importance of forest products to community wellbeing.

   b. Deforestation of still accessible secondary and degraded forest would mean the provision of forest ecosystem services would be diminished. The section of G1.5 entitled "Water" presents the critical role this resource plays for local people. It is not clear exactly how deforestation leading to conversion to grasslands will impact local water patterns. Given the critical role that rain and natural watercourses play in agricultural input, the lack of systems to manage water, the vulnerability of cultivation practices to shortages and excess rain, and changing rainfall patterns, suggest that is very possible that these changes would be highly detrimental to the livelihoods of the local community.

In summary the "without project" scenario would see continued forest loss, causing a decrease in agricultural production and the availability of productive land. Loss of forest products and ecosystem services would leat to deterioration in the wellbeing of the communities manifested by decreased household incomes and living standards, and increased food insecurity and malnutrition. The impact of these factors would most likely be very detrimental to populations in which poverty and food insecurity is already widespread and the ability to adapt limited.

G2.5. Description of How the 'Without Project' Scenario Would Affect Biodiversity

In the absence of the project it is likely that forest habitat in the project area would be reduced significantly in the next 10-30 years while forest degradation will reduce the density of the understory vegetation and disrupt the natural age distribution of trees, leading to a substantial loss of habitat. The reduction of natural habitat and refugia will place pressure on already-stressed flora and fauna.

Without the project, community efforts to control poaching and regulate hunting will not be implemented, resulting in widespread reductions in the populations of a significant number of endangered animal species, a pattern that has been widespread in areas of Madagascar where no effective protection is in effect. High market prices and growing demands for luxury hardwoods (often originating from endangered and slowly growing tree species) would continue to drive unsustainable harvesting.

A further impact which is also seen widely in Madagascar would be the occurrence of severe erosion as forest cover is lost, a process that has accelerated over the past decade (Zavada et al. 2009). Forest conservation is a key element in any strategy to preserve COFAV's complex hydrological systems and avoid further loss of soil through erosion.

In summary the 'without project' scenario would negatively affect biodiversity in a number of ways:

- Significant soil erosion and permanent loss of soil fertility. With the intensive use of land and shorter fallow periods, there is a high loss of topsoil through erosion and soil nutrient depletion (Styger et al, 2007; Styger et al, 2009).Traditional agriculture leaves steep slopes open to the heavy rains, spurring the rapid loss of soil, soil fertility and land productivity. This is particularly true of the project zone, which has very steep topography, ferric soils that are particularly prone to erosion and high rainfall (1,825 mm per year) that can fall intensively. The resulting siltation is an important threat to local stream ecosystems.
- Succession to a landscape dominated by grasses and ferns favoured by fire: With a shortening of the fallow cycles, tree species are unable to regenerate and are displaced by pioneer shrubs and grasses favoured by fire. The loss of woody re-growth and the dominance of grass fallows are associated with a permanent lowering of soil fertility. The frequent use of fire further prevents regeneration of native woody-species and makes the wider landscape more vulnerable to fire. The sum of these impacts will be a treeless landscape of minimal biodiversity value and landscape degradation that is difficult to reverse.
- Fragmentation and isolation of natural habitats: Population pressure and the scarcity of productive land would lead to the eventual loss of the remnants of secondary and degraded primary forest that still exist in the vicinity of the project area. This will leave any remaining natural habitat outside of the protected areas and the species that they harbour isolated within a hostile landscape matrix. This means the permanent loss of natural habitats and of species outside of the protected areas.

- Complete isolation of existing protected areas: On a landscape level the protected areas within the project zone (Ranomafana, Andringitra and Pic d'Ivohibe) would become isolated from one another. In the long term this would severely diminish the viability of the small populations of threatened species isolated within the individual protected areas.
- Fragmentation of an ecoregion forest corridor: At a larger scale, the without project scenario would result in the fragmentation of the forest corridor. This would prevent the movement of species along this regional forest corridor and remove a mechanism by which the species of this biogeographical zone can adapt to climate change. It will also perturb the broadscale ecosystem functioning of the forest ecoregion. Such fragmentation is widely known to result in a loss of species diversity

G3. Project Design and Goals

G3.1. Summary of Project's Major Climate, Community, and Biodiversity Objectives

A participatory process, guided by the Open Standards for the Practice of Conservation, was used to establish the management plan for the project, in which the global management objective that the stakeholders defined in order to achieve this long term vision is:

> *"Ensure the long term protection and maintenance of the biodiversity and other values of COFAV so as to improve the quality of life of the local population"*

To achieve this vision the following climate, community and biodiversity objectives have been identified:

- Prevent the emission of approximately 14 million tonnes of CO_2e through protecting the forests in COFAV to reduce deforestation over the thirty year crediting period;
- Ensure conservation of critically important biodiversity of COFAV to help support the long-term survival of Madagascar' globally important biodiversity with its exceptional numbers of endemic species;
- Create a continuous forest corridor to improve species gene flow within the corridor, reduce species loss and improve the potential for adaptation to climate change ;
- Maintain the critical ecosystem services provided by the COFAV forests to local communities;
- Generate carbon revenues to provide long-term sustainable funding to support the activities related to the protection of COFAV and support for communities
- Effectively engage local communities in the management of the project

- Improve the long-term economic well-being of local communities within the project zone through maintaining the ecosystem services that the forest provides, implementing sustainable farming practices and providing funding to support a range of community needs

G3.2. Description of the Project Activity

The foundation for the project activity is the creation, implementation and management of a protected area that encompasses the project area and a wider buffer zone in which local communities are supported to develop sustainable practices to minimize deforestation in both the buffer zone and the core protected area. . COFAV is an IUCN category VI protected area - an area managed mainly for the sustainable use of natural resources (a *Réserve de Ressources Naturelles* in Madagascar's national legislation).

The creation, management and zoning of the protected area is presented in this section. Local forest-stakeholders must gain a net benefit from the implementation of the protected area if it is to stop deforestation. To achieve this, the project is using the protected area as a framework to provide local people with viable alternative livelihoods to deforestation using carbon revenues to provide work opportunities and to fund community development projects. To fulfil these objectives the project principally uses the following measures (which are also presented in detail below): **conservation agreements and a small grants programme to develop alternative livelihoods**.

Protected area creation

The creation of a new protected area in the Ambositra-Vondrozo corridor is the overarching strategy for reducing deforestation in the corridor. However protected areas are extremely variable in how they are established, what their objectives are and how they function. This protected area will be very different to a state run national park in that local communities will play a prominent role in the management of forests they have traditionally used within the corridor. Furthermore, they will be able to use forest resources under a sustainable management regime. This approach is based on CI's long experience of conservation in Madagascar and its conviction that this is the most effective way halt deforestation.

The process of creating the COFAV protected area has been inclusive and participatory since its inception. To begin, a regional technical committee was established to plan and coordinate all activities to establish the protected area. The initial protected area boundaries were proposed based on biodiversity data. Consequently several iterations of dialogue and consultation over five years guaranteed that corridor residents and authorities of the surrounding sixty communes understood fully the implications of designating these forests as a protected area; that they were able to provide input on the delimitation process (eliminating some areas from the boundaries and adding others of particular cultural or ecosystem service value); and that consensus was reached regarding the rules of natural resource use. A

continuous and targeted campaign of communication and consultations was undertaken to ensure the participation of stakeholders at multiple levels and in diverse sectors. Communication tools and messages were deployed through meetings, radio, presentations, and other outlets. Consultations were held at the regional, district, and local levels. The outcome of this process of communication and consultation is agreement on the objectives, boundaries, zoning, and management of the COFAV protected area. Temporary protection status was obtained in September 2006, early in this process, and as of June 2009 detailed agreement was reached with the majority of the population involved. All public consultations were finalised in the second half of 2010 and the Government is expected to definitively gazette COFAV as a new protected area in 2013.

The creation of the protected area brought to light the need for tangible socio-economic benefits for local people, many of whom have been neglected by traditional rural development projects because they live in remote areas. During public consultations, people highlighted the need for economic opportunity throughout the region, an issue that is addressed in the management plan and also by the conservation agreements and the community small grants programmes implemented by CI.

The objectives of the protected area are to: enhance the wellbeing of resident communities through sustainable development, conserve biodiversity, maintain ecological connectivity, enable the sustainable use of natural resources and maintain ecosystem services.

To ensure that forest stakeholders gain economic benefit from the establishment of the protected area, the management plan includes measures such as:

- Promoting farming alternatives to *tavy*;
- Providing technical support for improved agriculture techniques (feeding, transport, commercialization, etc.)
- Constructing dams, irrigation and drainage systems
- Establishing new revenue-generating activities that don't cause deforestation (ecotourism, nursery management for reforestation activities, etc.)
- Marketing the products of revenue-generating activities;
- Streamlining of the management transfer process for natural resources
- Supporting communities to establish partnerships and funding for development projects;
- Preventing infectious diseases and promoting local health;

Governance

COFAV is being developed as a co-managed protected area. As such, its management involves power-sharing between state actors and local communities. The management structure and function of the various levels of the management structure have been developed and have been approved by the Ministry of Environment and Forests.

In this structure, presented in Figure 9 **Error! Reference source not found.**, local communities are responsible for managing areas that have been termed local management units. The legal rights to manage the natural resources within a given local management unit are transferred to a community management association using *Gestion Locale Sécurisée* (GELOSE) / *Gestion Contractualisée des Forêts* (GCF) contracts (see the description beneath for details of GELOSE/GCF). Currently, 101 such local forest management transfer agreements exist in COFAV. The associations that manage these agreements correspond to the local management units in the management structure. Communities with management agreements are currently grouped into four federations, which correspond to the sectors in Figure 7. The project plans to divide COFAV into community-managed areas that will be organized into ten sectors: Fandriana, Ambositra, Lalangina/Ambohimahasoa, Vohibato, Ifanadiana, Ikongo Nord, Ikongo Sud, Ambalavao, Vondrozo and Ivohibe. These sectors were defined on the basis of socioeconomic, ecological and administrative criteria.

The central management of COFAV has two main parts: a strategic orientation group and a delegated protected area manager. The Ministry of Environment and Forests gives responsibility to the strategic orientation group, which together with the Regional Orientation and Monitoring Committee, serve to define strategic priorities for management. The delegated protected area manager includes central management staff, ten sector managers and managers of the local management units. Together they manage the protected area daily. Each group's roles and responsibilities are outlined in

Table 12.

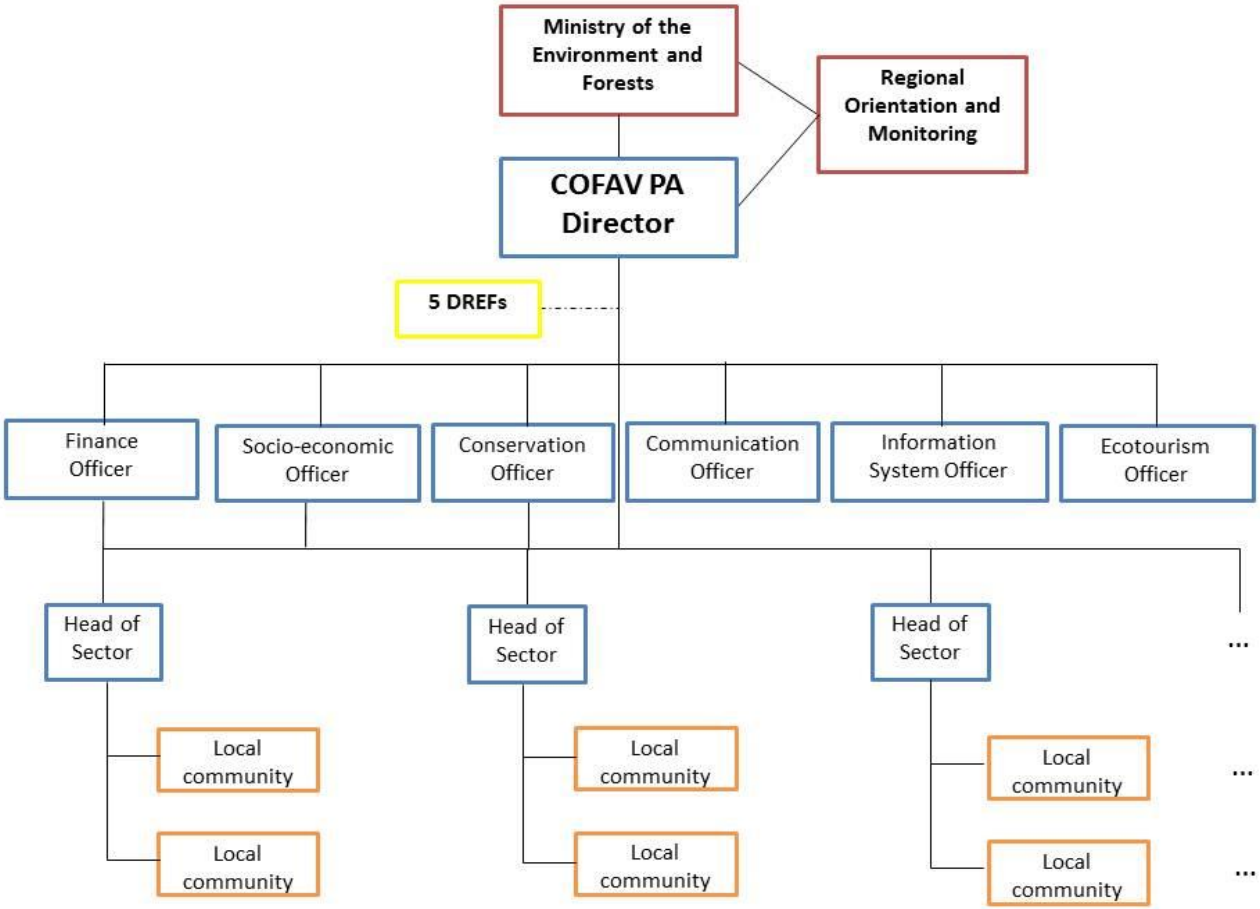

Figure 6. COFAV co-management governance structure

Table 12. Roles and responsibilities of the members of the COFAV co-management structure

Structure	Composition	Responsibilities
Ministry of Environment	The Ministry of Environment and Forests, represented by *Direction du Système des Aires Protégées* (DSAP)	Supervision Functions: • Promote general protected area management policies • Apply laws and regulations for good management • Secure funding • Interface with other ministries • Approvea strategic orientations • Support the delegated protected area manager
Orienting Group/ Board of Directors (Inter-regional level)	• Representatives of Regions • Representatives of DREFs • Representative of CMP • Representative of Regional Secretariat • Representative of Mining-Forests Commission • Representatives of donors, promoters	Decision-making Functions: • Ensure coherence of strategic orientations for good management • Monitor the implementation of strategic orientations • Provide strategic orientation for management of COFAV as a whole • Secure technical and financial support • Conflict resolution • Approve activity plans/ work plans
Regional Orientation and Monitoring Committee (Regional level)	• Region • DREFs from each region • Representatives of technical ministries such as mining, topography,	Orientation Functions: • Monitor the activities at the manager, sector and local management unit level • Secure technical and financial support

Structure	Composition	Responsibilities
	etc. • Inter-communal organizations • Representatives of the private sector • Representative of community federations • Representatives of civil society organizations	• Monitor implementation • Align actions with the regional frameworks • Strategic decision making
COFAV Delegated Manager (Inter-regional level	Protected area manager and staff	Execution Functions: • Coordinate activities • Compile annual work plans developed at the sector and local management unit levels • Operational decision making • Contribute to fundraising • Ensure implementation, monitoring, an devaluation of activities/ work plan • Evaluate activities in regions • Assess performance of co-managers and implementing partners • Submit proposal for actions/activities for approval by the Orientation Group and Ministry • Execute decisions • Develop general and detailed management plan • Develop business plan

Structure	Composition	Responsibilities
Sector-level Managers (District or inter-communal level)	Federations of community associations	Execution Functions: • Implement annual work plan • Manage protected area and the local level • Ensure control/surveillance of the protected area • Submit reports to protected area Manager • Submit proposals for improved protected area management to Manager
Local Management Units (Commune level)	Community associations	Execution Functions: • Develop and implementation of management plan and local "*cahier des charges*" • Develop and agree conservation agreements with the protected area manager • Develop and apply *Dina* • Implement annual work plan: control and surveillance, awareness building • Reporting • Guarantee application of "cahier des charges" and of technical norms for sustainability • Guarantee respect for cultures and traditions • Community mobilization • Identify and implement small development projects with Fokontany heads

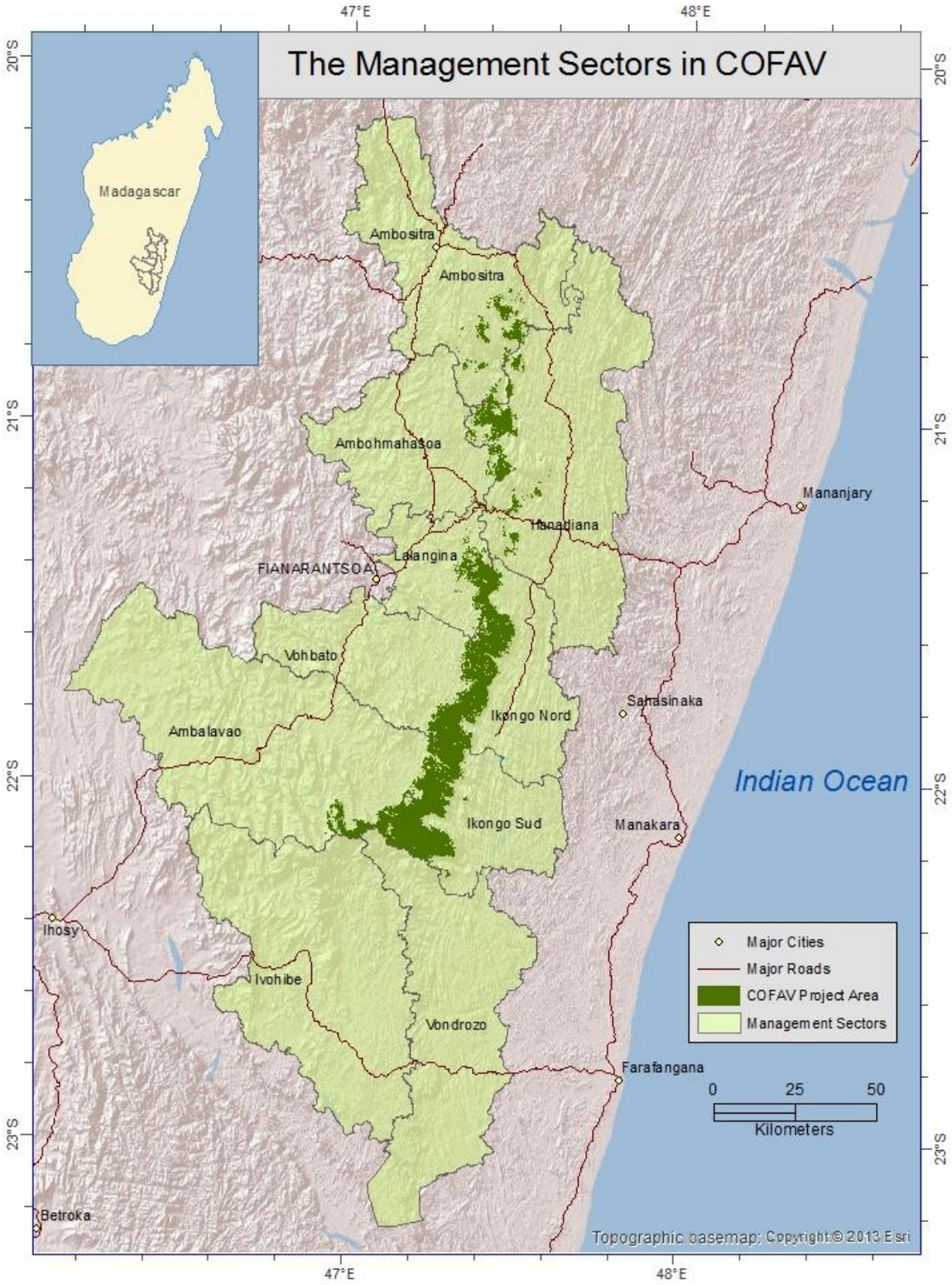

Figure 7. The ten management sectors of COFAV

Zoning of the protected area

In order to conserve natural forest while supporting the sustainable development of the local people, the COFAV protected area is divided up into different management zones. These are presented Table 13, **Error! Reference source not found.**, and Figure 9. There are two main management areas: a strict conservation zone, and a surrounding buffer zone.

1. The **strict conservation zone** constitutes the inner sanctuary of the protected area and encompasses the areas of highest conservation value. All activities and entry to the area are strictly regulated. This area is largely under the direct management of the delegated protected area manager, but also includes forest areas that are community-managed.
2. The **buffer zone** is comprised of settlement enclaves and sustainable use zones. It includes forest and non-forest land.
    a. **Settlement enclaves** are areas of traditional settlement/farming which are located within the strict conservation zone and were settled before the creation of the protected area. Here the resident populations will remain living and farming as they did before the creation of the protected area, but their use of forest within the neighbouring strict conservation zone is restricted.
    b. The **sustainable use zone** surrounds most of the strict conservation zone and separates it from the areas peripheral to the protected area.
        i. It is largely comprised of sustainable use forest, which local communities will use to meet their subsistence timber, non-timber forest products and fuel wood needs according to quotas defined in their management contract. The level of harvesting will be sustainable and the forest will be maintained over the long term.
        ii. Restoration areas, where natural forest will be restored to establish full ecosystem functioning.
        iii. The sustainable use area also includes non-forest service areas that are planned for tourist, education and protected area infrastructure.

Communities neighbouring the sustainable use zone manage it under renewable natural resource management contracts with the government of Madagascar. These community managed areas extend around the entire protected area. The extent of the community-managed areas is well defined in the natural resource management contracts. They extend from within the protected area boundary (the sustainable use zone, as well as some parts of the strict conservation zone) to traditional community lands that are outside of the protected area.

The delimitation and zoning of the protected area was done according to Malagasy law with the full consultation and participation of the local communities. The zoning takes into account the local communities' customary use of forest and land, as well as their expressed needs for forest resources over the next 50 years. The lengthy consultation on the delimitation and zoning of the protected area, together with its formal validation by the resident people, ensures that there are adequate land and forest resources for the resident communities.

Table 13. Zones of the protected area and neighbouring community-managed areas

Zone	Corresponding CCBS spatial boundaries	Area (ha)
Protected Area		
1. Strict conservation zone		
Strict conservation zone	Project area (Cat. A)	68,084
2. Buffer zone		
Sustainable use forest	Project area (Cat. B)	49,416
Settlement enclave	Project zone	183,618
Managed Forest areas contiguous with the Protected Area	Project area (Cat. B)	17,712
Non-forest land within Fokontanys adjacent to the project boundary	Project zone	345,106

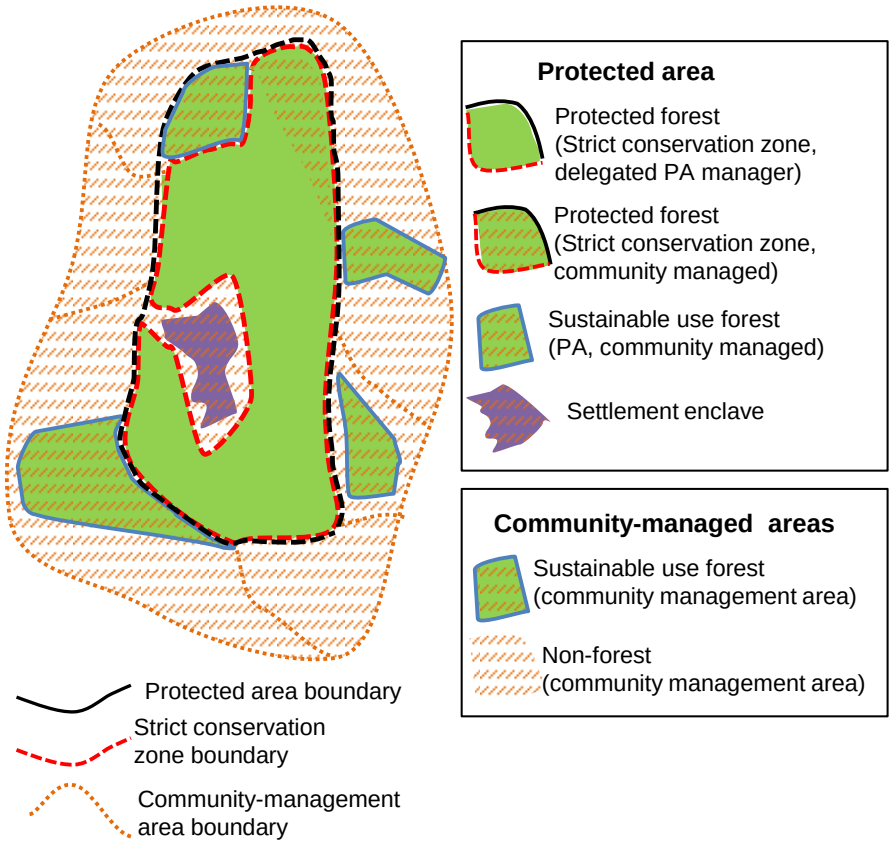

Figure 8. Simplified representation of the zoning of the COFAV protected area

Community Forest Management

As noted in the description of the zoning of the protected area above, the management of the buffer zone of the protected area will be transferred to the local communities through natural resource management contracts. The delineation of some of the management contract areas is still under way. The community management contracts are based on the 2001 "Gestion Contractualisée des Forêts" legislation that provides the basis for community-based management of natural resources. The project makes use of two instruments based on this law, namely Gestion Locale Sécurisée (GELOSE) and Gestion Contractualisée des Forêts (GCF).

In 1996, the Government of Madagascar passed legislation (Loi No 96-025) establishing the authority to devolve natural resource management control to local communities. This legislation (Gestion Locale des Ressources Naturelles Renouvelables - GELOSE) has permitted a process, referred to as Transfert de Gestion des Ressources Naturelles Renouvelables or simply Transfert de Gestion in the legislation, that allows for the delegation of limited tenure and sustainable use rights to a legally recognized local community institution (Communauté de Base - COBA), in exchange for a contractual obligation with the Government of Madagascar to conserve the transferred natural resources. The transfer of management rights of natural resources is for a defined period. The 1996 legislation was amended in 2001 to allow for forest specific community management contracts (Gestion Contractualisée des Forêts de l'Etat (GCF)). GCFs are designed to be less onerous to implement than GELOSE. The Communauté de Base (COBA) must be a legally recognised community association with an 'elected' management committee (Comite de Gestion (COGE)) – which signs time bound contracts with the forest service to take charge of forest management.

The project has made use of both GELOSE and GCF to transfer management rights of natural resources to the local communities. The limits of the management contracts, the land-uses within the community management area and the rules governing the management of the natural resources are defined by the community themselves and formalised in the management contract.

Building successful partnerships is a cornerstone of the approach. To work effectively in three regions, over twenty communes, and countless villages, CI Madagascar has partnered with local NGOs, other donor-funded projects, the private sector, and community associations. This tactic, which is the foundation of the successful model that CI has adopted for Madagascar, has allowed us to expand our reach to the entire COFAV corridor.

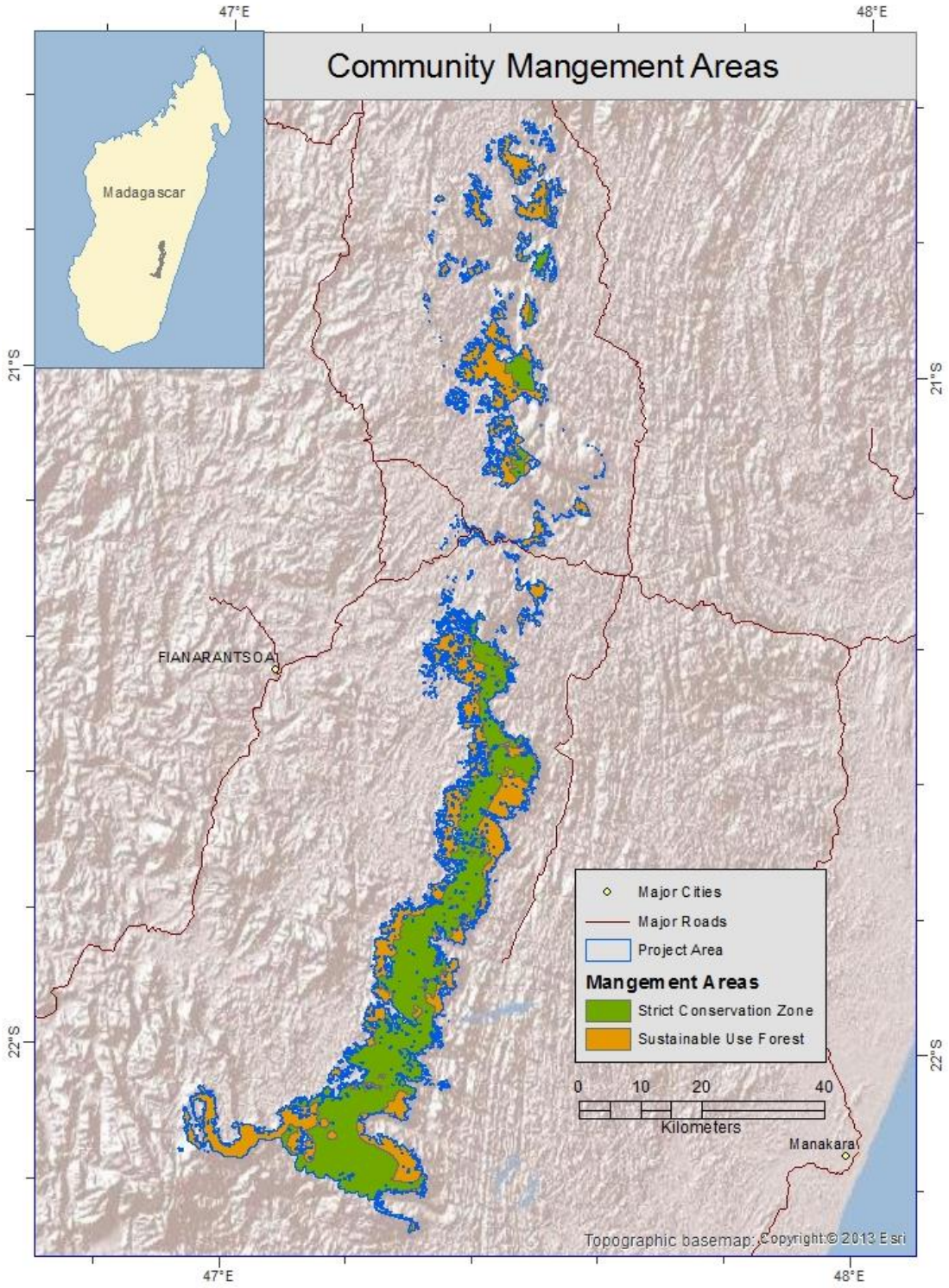

Figure 9. Areas for community management that have been identified to date in the protected area

Conservation agreements

These are a key part of the project's approach. The agreements are established between CI Madagascar and local communities of COFAV with the support of governmental authorities. The purpose is to

engage communities in a commitment to achieve measurable forest conservation results while offsetting the forgone benefits that they would have otherwise gained from use of the forest.

The conservation agreements are established with the involvement of the respective Local Management Units of COFAV's governance structure so that there is a direct link between the conservation actions communities perform and the overall management of the protected area. Indicators of natural resource management effectiveness and the status of key resources, such as economically beneficial trees or water sources, are tracked. The information generated will guide land-use planning at the community level and provide information on local biodiversity and land-cover changes. Communities are compensated with micro-development projects that they have defined. Key to the success of this project is that communities choose incentives that best meet their development needs, but priority is given to activities related to sustainable livelihoods.

Small grants programme

Another means that the project is using to create economic opportunities for local people and so reduce deforestation in COFAV is through its Node Small Grants Programme. Here the project provides the grants to local community associations so that they are able to undertake activities that provide income and also contribute directly to forest conservation outcomes. Importantly, the projects are defined by the communities themselves. Examples of micro-projects already carried out include small irrigation dams, rehabilitating schools, community granaries, community pharmacies, rural electrification, provision of farming tools and materials, bee keeping and small animal husbandry.

The Node Small Grants Programme uses an innovative mechanism to disburse funds. Rather than centralized grant-making controlled by CI Madagascar, the project has partnered with Malagasy NGOs – the "Nodes" – working in district-level towns to receive and review proposals, issue grants, and monitor activities. CI Madagascar has provided strong technical support to these local partners. This mechanism provides these Malagasy NGOs with an opportunity to build their grant management skills, as well as their expertise in supporting conservation.

The existence of the project also provides the possibility of adding opportunistic short term projects that are not the core activities of the project but that are of interest to donors and that are compatible with the objectives of the REDD project. Two such projects have been carried out to date and we anticipate that over the life of the project there will be additional opportunities for projects that will help to preserve biodiversity and improve the livelihoods of people living around COFAV. The two projects to date have focused on developing small scale community-based tourism opportunities and an Integrated Population Health and Environment project.

Tourism

The project focuses on developing sustainable tourism that provides economic opportunities without resulting in negative environmental or social impacts. Tourism serves as a response to slash-and-burn agriculture, hunting, logging, and other threats. With the support of CI, the project is establishing a

tourism programme that complements the other initiatives being implemented at COFAV in that it increases sustainable economic activity. The project aims to use tourism development to finance conservation through high-end tourism concessions and by creating jobs linked to tourism. To achieve the aims of the tourism programme, the project is developing partnerships between protected area management, local communities, the private sector, the National Tourism Board and the Tourism Department. Through collaboration with such stakeholders, a tourism management and monitoring plan for COFAV is being developed.

Integrated health, population, and environment programme (PHE)

Many people living in and around COFAV do not have access to health clinics, doctors, and medications because of the remoteness of the area. Their health is closely linked to the state of the ecosystems they live in. They are vulnerable to waterborne parasites and a number of other diseases common to the poor in tropical developing countries.

CI Madagascar is addressing these ecosystem-related health problems by improving access to health services, as well as by building capacity to deliver these services. These activities have been implemented with local NGOs and communities participating in COFAV's governance structure. CI Madagascar is training community-based agents who are able to provide assistance on health, including improved nutrition, water, sanitation, hygiene and family planning. The agents are also certified to issue vaccinations.

Fire alerts and real-time monitoring of forest loss

The University of Maryland, NASA and CI run a MODIS satellite based fire monitoring system which provides daily fire alerts for the region. This enables the timely location of fires from slash and burn agriculture in forest areas. CI also carries out systematic monitoring of forest loss in the COFAV corridor using Landsat imagery. Both of these monitoring tools allow pinpointing of problem areas and the focussing of project activities within them.

G3.3. Map Identifying Location of Project Areas and Leakage Areas

The spatial boundaries of the project area which will contain the project activities are described in Sections G.1.1 and G.1.3 and are shown in the maps of Figure 4. The leakage belt was delineated using mobility analysis and represents the most likely areas to be impacted by project activities. Further information on the leakage areas can be seen in the section CL2.

G3.4. Definition of Project Lifetime and GHG Accounting Period

The project activities to reduce deforestation started in November 2007 with the first public consultations and agreements related to the protection of the site. The project has an atecipated GHG

accounting period of 30 years, subject to renewal under the rules of VCS. The project expected to maintain the activities on the ground during the entire project lifetime, also set as 30 years. The validation under VCS and CCB Standards will be completed by the end of 2013, as well as the first VCS verification. It is anticipated that monitoring of emissions reductions for VCS verification, will be every 2 years or at most 10 years as required by VCS. The baseline will be reviewed every 10 years according to the rules of VCS.

Project activities are guided by an ongoing adaptive management approach and the management plan that has been developed using the open standards for conservation planning. This management plan will be revised and updated every 5 years. The first management plan was produced in 2010 and therefore the next revision is planned for 2015. Table 14 summarizes key milestones in the project and the future implementation schedule

Table 14. Key milestones in the project and implementation schedule

Date	Activities
2005-2007	Preparation phase: Preparatory biodiversity and socio-economic surveys, creation of regional steering committee, national meetings regarding protection of the site, publication of temporary protection order for COFAV to stop allocation of mining and forestry concessions, preparation of project plans, communication activities, testing and initiation of small grants programs to support livelihood activities and fundraising for project activities
November 2007-December 2009	Public consultations and negotiations on project/protected area boundaries and regulations regarding access and use of natural resources within the project area.
2008	Renewal of temporary protection order for COFAV (l'Arrêté n018633/2008/MEFT/MEM)
2007-ongoing	Node small grants program expanded to provide grants to communities within the project zone.
Nov 2010-ongoing	Expansion of Conservation Agreements approach to increase incentives for community associations to participate actively in the management of the sustainable use zone of the project.
November 2010	Approval of the COFAV management plan
December 2010	Approval of the Environmental and Social Safeguards Management Plan
December 2011	Environmental Impact Complaince permit delivered. Conservation International designated as the delegated manager of COFAV (Arrêté n045329/2011 du 14 decembre 2011)

2012	Training for improved participatory biodiversity and threats monitoring system provided and new monitoring system launched
January 2013	Contract for 2 year funding from the Government Environment Program phase 3 to invest in improving management systems of COFAV to achieve management and financial sustainability
Annually for each future year	Annual workplan developed for approval at the beginning of every calendar year. Core activities will be to maintain community-led patrol activities, essential enforcement activities, community development projects and project monitoring.
December 2014	Renewal of management contract for a delegated manager for COFAV. Period of subsequent renewals of the contract to be delegated manager are still to be determined.
2015 abd every 5 years thereafter	Revision of Management Plan

G3.5. Identification of Natural and Human-Induced Risks and Mitigation Strategies

The VCS Non-Permanence Risk Report provides a detailed assessment of risks to the permanence of carbon pools. In addition, the following are considered as factors which could pose risks to the community and biodiversity benefits of the project:

- Land/population pressure
- Inadequate funding (carbon price and market issues) to support protection and community activities
- Political/security risk

Land/population pressure:

The existing levels of poverty in the project zone, the increasing population, and the shortage of productive land available to local subsistence farmers has been presented in section G1.5. These issues are key drivers of deforestation and will remain a threat to the project. To mitigate this risk the project has been designed with a strong participatory management approach through which local communities are fully involved in managing and the protecting the site themselves. An important part of the project design has been to formalize local people's rights of access to the forest by establishing sustainable use zones. This ensures that local people have access to necessary forest products (within agreed limits) and gives them more of a stake in protecting the forest from outside interests. In addition, the project has invested heavily in ensuring that the project area is legally protected as a protected area. This provides the legal protection necessary to enforce regulations banning deforestation, mining and hunting in the project area.

Insufficient Funding:

Depending on the price of carbon and payment schedule for carbon payments, this cash flow may need to be augmented with additional grants in the early years of the project. This has already been recognised by the Government of Madagascar who are investing in this project during 2013-2015 to ensure that necessary capacity is in place at all levels of the project management structure. However, as previously stated, for the long term this project would be impossible without carbon funding and it will be reliant on the existence of a functioning carbon market.

Political/security risk:

Madagascar has a long history of political "crises" that have impacted on the country's economy, its people and donor programs. However the project has demonstrated its resilience as the development of this project has mostly occurred during one of the worst and most sustained of these political crises –from January 2009 until 2013 at the time of submitting this document for validation. This has been possible because the project has been designed at the local grassroots and regional levels rather than being driven by top-down political decisions. Similarly the project is dependent on local people for its implementation and this minimises the security risks that can occur when project staff from outside the project zone have key roles.

G3.6. Measures to Ensure the Maintenance or Enhancement of High Conservation Value Areas

The most significant reason for initially selecting the project area was because of its significance for biodiversity in a country designated as a "biodiversity hotspot". The design of the project activities outlined in Section G3.1 all have an ultimate goal of protecting the High Conservation Values of COFAV, recognizing that improving the well-being of the communities and maintaining the ecosystem services provided by the natural forests are integral to this goal as well as broader moral and socio-economic goals for poverty alleviation in Madagascar and across Africa.

During the development of the management plan, habitats and species of exceptional importance for conservation were identified and this was the basis of defining the area to be conserved and the regulations for the protected area.

The project seeks to ensure the maintenance of the cultural HCV areas by supporting traditional forest-dependent lifestyles through (1) clarifying the land-tenure and stewardship of the local communities over the forest they have been living in for centuries, and (2) by supporting the community's livelihoods through the various measures that are being financed from the carbon credits.

G3.7. Description of Measures that will be taken to maintain and enhance benefits beyond project lifetime

The long term maintenance of the carbon benefits and the biodiversity value depends on the implementation of effective protection of the forest habitat and ongoing monitoring. Through its participatory engagement with the communities and the provision of technical support by CI and other institutions, the carbon values will be maintained.

The project plans to maintain the support for communities and households as described in the project activities section. This includes ongoing employment of community members for protection and monitoring of the forest, improving agricultural practices to increase yields, diversifying food crops, and supporting the development of small-scale business enterprises through micro-finance. The project also provides support for health programs, education and training. Through its participatory governance structure, the project also seeks to ensure that communities have access to forest resources that can be used on a sustainable basis. All of these benefits provide both immediate support for households and communities as well as providing a trajectory for the long-term.

CI is working with the Government of Madagascar and the governance structure of the project to develop a legal framework for distribution of the future carbon revenues to ensure that funding is available for the forest protection activities and supporting the community programs. The creation of an endowment or trust fund would also provide long-term financing after the initial emissions reduction crediting period.

G3.8. Involvement of communities in project design and provisions for stakeholder consultation during project implementation

In early 2005, CI Madagascar organized a meeting to identify the most important areas for biodiversity conservation within the forests that have now become known as the Ambositra-Vondrozo forest corridor - COFAV. On the basis of meetings with regional government authorities and local mayors; the site received temporary protection in September 2006 from the Ministry of Environment and Forests (MEF). This was only the start of a process of extensive public consultations and negotiating agreement on exact limits and resource use rules within a protected area.

Most of the preparatory work to designate the COFAV protected area has been undertaken by CI (with funding from a variety of sources), but for 13 communes (out of 60 of these administrative units where consultations were done) this process was financed by the World Bank and led by the Ministry of Environment and Forests (MEF).

From November 2007, the project started the process of public consultations regarding plans to protect COFAV. Information about the project was disseminated by radio and through village meetings directly in the villages in the project zone. The objectives of these meetings were to present the project and initial proposals for the protected area boundaries, receive input from the local communities on setting realistic boundaries, internal zoning (specifically defining the sustainable use zones), regulations for the protected area, identifying people that would be affected by the project and to discuss options for governance of the protected area. Feedback from the public consultation meetings was used to refine the proposed boundaries of the protected area and the sustainable use

zones. The information collected was used to try and design a project that would preserve the forest (and its carbon stocks), protect biodiversity but have minimal negative impact on local people while ensuring their long term access to forest resources. As such areas that were already being lived in and cultivated were excluded from the protected area boundaries or included within special enclaves known as "Controlled Occupation Zones" under Malagasy protected areas legislation. The information collected from the public consultations was used to develop the management plan for the area.

Once the boundaries, zoning and regulations had been defined in the management plan a social safeguards study and plan was developed following the methodologies and standards of the World Bank's Operational Procedures 4.12. The principle of this approach is that no household should be worse off due to the existence of the project. The study therefore identified individual households that were expected to lose some access to resources. Projects were then identified that would compensate for the loss of access to resources. For example, for households that were identified as potentially losing income from honey collecting activities, a project was designed to provide training in modern beekeeping. Full details of the social safeguards study and plan are included in the Environmental and Social Safeguard Management Plan.

The social safeguards study was conducted around the entire protected area, including the whole project zone. In total, surveys were conducted in 167 Fokontany and 12,501 households were identified as being affected by the project. Of these, 7,982 households were identified as likely to suffer major impacts (Major People affected by the Project – Major PAPs) and 4,512 (Minor People affected by the Project – Minor PAPs) were considered to be only slightly affected by the project. Following usual World Bank practice, for Major PAPs the compensation projects were identified and designed to specifically compensate directly for potential losses due to the project whereas for Minor PAPs the projects were intended to provide more general benefits to the community.

Based on discussions with the communities during the project's public consultation phase, a co-management approach has been adopted. Under this governance approach, the communities establish associations to manage the forests in the immediate vicinity of their villages. These community associations are (or will be in some cases) organised into federations that correspond to the management sectors of COFAV. Representatives of the Federations then participate along with the COFAV manager in developing annual workplans, reports and representing the interests of their members during COFAV's annual meeting to approve plans and budget details. Approximately 90 of the local community associations in COFAV have been formally created and have individual community forest management contracts based on the GELOSE and GCF legislation.

G3.9. Procedure to publicize CCB Public Comment Period

As described in G3.8 above, the CCB PD and overall project itself has been developed based on a lengthy and extensive process of public consultation and participation by local people in determining the boundaries, regulations and governance structure of the project. People living in the project zone

have had multiple opportunities to comment on the project design and these comments have been fully documented and have continually influenced the design of the project itself. Communiti

Regarding the CCB project document itself, before starting the validation field visit, the PD will be posted on the CCB website for public comments by stakeholders. The project has informed key stakeholders with internet access of the opportunity to comment on the document. For people living in the project zone without internet access, information regarding the content of the document was communicated via local radio along with information on how to submit written comments. Hard copies of the document were available for public viewing and comment during the public comment period at Conservation International's offices in Antananarivo and Fianarantsoa to allow local, regional and national stakeholders to provide feedback on the document. The PD document and summaries of the key points in Malagasy of the document were available for consultation at the project sector offices and project staff will be available in each of these offices to explain the content of the document. A register for recording written comments were provided at each sector office, the project office in Fianarantsoa and in Antananarivo. After the validation field visit it was observed that the knowledge regarding the project design documents was more evident among the elderlies and community associations' members. To guarantee that the majority of the community was aware, a series of activities was performed followed by a second 30-day public comment period was held. These activities include: mettings in all villages in the project zone, redesign, and distribution of posters summarizing the key points of the PDD in Malagasy, focal group discussion with key stakeholders. These written comments were collected and submitted to validators at the end of the public consultation period via CCBA.

G3.10. Process for Handling Unresolved Conflicts

There are multiple mechanisms for resolving conflicts within the COFAV project and different levels at which conflicts can be resolved. First, the fact that community associations are responsible for the local management of the forest means that many conflicts will be resolved at that level. In addition, local people are familiar with the process of raising issues regarding conflicts or social issues with the communal and regional authorities. Both of these are represented in the management structure of the project, and are well placed to broker conflict resolution on an ongoing basis.

However the formal mechanism for conflict resolution was established as part of the Environmental and Social Permitting process overseen by the National Environment Office and is determined in the "Cahier des Charges Environnementales". This document recognises that various conflicts could occur such as over community management of natural resources, distribution of land in the periphery of the project, or socio-economic and cultural issues arising from management of COFAV. To mitigate these, the project has to continue strengthening the institutional and technical capacity of project stakeholders, support efforts to respect local traditions and customs and to adopt a participative approach to planning and management of the project. These are all principles that the project has fully integrated into its design, as outlined in previous sections of this document.

To ensure conflict resolution, conflict resolution committees are to be created within each sector. These are to be collegial, impartial and composed of community elders, representatives of people affected by the project (as defined by the social safeguards plan) and local authorities. This role has been played by exisiting "Monitoring Committees" that have been created in each commune and the project is in the process of reviewing future arrangements due to recent field staffing increases that can facilitate the creation of new committees in each sector. The cahier des charges encourages the use of traditional bylaws or *dina* in conflict resolution and the project is to support their development and ensure that they are approved by regional law courts.

To facilitate and formalise the complaints process, a complaints register for the project was placed in each commune. The format for the register includes the date, description of the complaint, name and national identity number (or other form of ID) of person making complaint, expectations, observations and signature/mark of the person making the complaint. These registers were used particularly for the collection of comments from the public during the delimitation consultation process. The information collected was used to guide the delimitation and to help the National Environment Office to formulate its recommendations regarding the Environmental Impact Assessment. The project will continue to use these registers but will also place them in the new offices being created for the project in each sector. This will ensure that complaints are passed to the project manager in a timely fashion as the current system relies on the Commune to communicate with the manager that a complaint has been made. With the new investments in each sector, the project will also improve communication of the existence of these registers. Through the life of the project will also regularly review the use of paper-based registers and seek ways of making the complaints procedures more accessible. For example in countries with better internet access such procedures are now commonly done online. While internet is not going to be a viable option in the near future, mining companies in Madagascar are experimenting with mobile telephone text and message-based conflict resolution procedures that could also serve as a model for future improvements for the protected area if there are improvements in mobile telephone coverage.

Since the collection of feedback using the registry system during the consultation period, no new complaints have been passed on to the project manager through this system. The project manager is therefore currently undertaking a review of how improvements can be made as part of the current investment in management systems of COFAV. The aim of the project manager is to ensure that a written response to all official complaints is provided within 30 days.

G3.11. Demonstration that Financial Mechanisms are Adequate for Project Implementation

In its initial phases, project activities have been funded from a variety of sources, notably USAID, the Betty and Gordon Moore Foundation, the World Bank and by a 5-year commitment from the Dell Corporation, beginning in 2008. These funds have been used to begin project implementation and to pay for the development of the VCS and CCBS PDs and the costs of initial validation and verification.

For the 2013-2014 period, the Government of Madagascar has also allocated some funding from the third phase of its Environment Program to strength the management of COFAV.

For the financial viability assessment in the Non-Permanence Risk Report presented as part of the VCS PD, a comprehensive financial model has been developed, which shows income to the project and associated expenses from December 2007 through the 30 year crediting period.

The model has been run for four different scenarios using carbon prices of $3, $5, $7, and $9 USD per VCU (see Non-Permanence Risk Assessment of VCS PD for further details). And under the scenarios modelled, the project generates fairly significant surpluses over the long term, allowing for future allocation of these funds to community support, increased project activity or the creation of an endowment or trust fund to support the provision of the climate, community and biodiversity benefits over a long-term horizon.

G4. Management Capacity and Best Practices

G4.1. Identification and Roles of Project Proponents

The project proponent is the Government of Madagascar, through the Ministry of Environment and Forests (MEF) represented by the Direction Générale des Forêts (DGF), having overall control and responsibility for the implementation of this project.

Management of the protected area with the objective of reducing deforestation has been delegated by the DGF to Conservation International. In addition, CI is the main project developer, providing technical and financial support to the project development and implementation, and is responsible for carbon monitoring. CI is also responsible for overseen the implementation of workplan and assess the performance of local partners and community organizations. Any irregularities or poor performances will be discusses and addressed with communities. The protected area is collaboratively managed (co-managed), with village level associations and federations of these groups playing an important role in implementing activities. The COFAV management structure detailing roles and responsibilities of each institution involved is described in detail in Section 3.2.

G4.2. Identification of Key Skills and Experience of Management Team

Large scale conservation projects are inherently complex endeavours that require a range of skills and competencies to be successfully implemented. All such projects require a multidisciplinary approach that involves specific technical expertise, administrative, business and management skills, and political engagement at various levels of government from national to local. The following skills are required for the implementation of the COFAV project:

- Political engagement
- Community Engagement

- Biodiversity Assessment
- Carbon Measurement and monitoring
- Fundraising
- Conservation Finance
- Administrative functions (financial management and accounting, legal, planning and project management)
- Carbon marketing

The management teams with day to day management responsibilities include individuals with the necessary skills and experience (over 5 years) to successfully undertake all the project activities. These teams will be overseen by CI-Madagascar Director of Field Program, who has over 15 years of experience in managing large conservation and community-management natural resources projects, including a similar REDD project in the Ankeniheny-Zahamena Corridor.

CI-Madagascar's regional office, responsible for implementing the COFAV project, is based in Fianarantsoa and is headed by Rejela Razakanjoelina. He has 13 years of experience with the National Park Service, including as director of one of Madagascar's largest national parks and has a broad range of protected area and natural resource management experience. He has particular expertise working with local communities to promote rural development and wealth creation and to integrate local people in protected area management decisions. Rejela's team also includes specialists responsible for biodiversity conservation and monitoring, community relations/ development support, community forest management, GIS and data management.

COFAV is collaboratively managed (co-managed), with village level associations and federations of these groups play an important role in implementing activities. Below is a list of the partner organization in the field and their expertise:

- *CMP-Tandavanala*: communication and advocacy, environmental education, biodiversity monitoring and database management, ecoregional planning, and community and political engagement.
- *Ny Tanintsika Fianarantsoa*: design and implementation of community development plan, environmental and natural resources management (including environmental planning and environmental impact assessments), management of risks associated with food security and financial vulnerability, socio-economic assessments, community and political engagement, and technical support of health-related and development projects.
- *Ny Tanintsika Ambositra*: afforestation and reforestation projects, natural resources management, alternative livelihood projects, and communication and environmental education.
- *CEDII:* communication and information management, socio-economic assessment, community and political engagement, and dialogue and mediation.

- *ACCADEMIS:* rural development assessment (including agricultural production feasibility analysis, and production management) data collection, analysis and monitoring for agricultural production, renewable forestry and natural resources management, community and political engagement, training and capacity building on rural production and community-lead projects, and participatory monitoring and evaluation.
- *MIARADIA:* environmental impact assessment, implementation of sustainable management of natural resources, socio-economic monitoring and evaluation, community engagement.
- SAHALA: technical support of forest resources management and community development projects; capacity building, communication, community engagement, and implementation of sustainable management of natural resources.
- *ASITY:* biodiversity inventory and monitoring, ecological and biological research, development and implementation of biodiversity action plans, establishment and management of protected areas, participatory approach on biodiversity conservation projects, design and implementation of sustainable ecotourism programs, environmental impact assessment, capacity building, community and political engagement.

In addition, the team benefits from technical assistance on specific matters from experts within Conservation International, both in the Antananarivo office (support on REDD policy issues, protected area management policy/strategy, GIS and remote sensing) and at CI's HQ in Arlington Virginia (on all matters related to Reducing Deforestation, development and implementation of carbon projects including legal aspects).

CI has extensive experience in the development and implementation of forest carbon projects, including REDD-plus and A/R, projects and is building a diverse global portfolio of site-level initiatives, with five projects already validated under the Verified Carbon Standard (VCS) and/or the Climate, Community and Biodiversity Standards (CCBS) in Peru, China, the Philippines and Brazil, and several more ongoing in Madagascar, Kenya and the DRC. At the national level, CI advises numerous countries on REDD-plus policy and UNFCCC negotiations, as well as on REDD-Readiness and Measuring, Monitoring, Reporting and Verification (MRV) issues and is testing the development of nested approaches to REDD-plus in order to link its ground activities with national REDD frameworks, including with the Government of Madagascar. Finally, CI has conducted extensive capacity building efforts on REDD that have involved more than 1,300 stakeholders, including government officials, representatives from NGOs, indigenous leaders, rural communities, the corporate sector, and academia.

G4.3. Plan to Provide Orientation and Training to the Project's Employees

The project's emphasis is on working directly with the local management units and their federations to strengthen their role in protected area management. In addition, there is a small full-time staff of project employees working for the COFAV manager. All employees receive a standard orientation based on Conservation International's internal procedures. This orientation covers providing

workspace and demonstrating how to use any equipment needed by the employee, establishing and demonstrating IT systems for office based staff (email address and access to CI's intranet and other internet-based tools), introductions to other staff and partners and explanation of inter-relationships, showing employee where to find key policies and procedures, reviewing HR policy and providing relevant project documents to the employee. Specific training for project employees is then tailored to each staff member based on the tasks they are expected to perform. All staff with responsibilities for managing finances undertake an intensive training on CI's financial management systems at CI 's office in Antananarivo immediately on starting of employment. Training needs are reviewed on an annual basis with each employee as part of the annual evaluations process but training is also regularly arranged for relevant staff as needs are identified and when a new phase of work or a new management tool is introduced into the project. For example, over the life of the project, the relevant technical staff have received training in conducting public consultations, development of management plans, conducting social safeguards studies, protected area co-management, and participatory ecological monitoring. To improve training for staff in all protected areas in Madagascar, CI has worked with the Wildlife Conservation Society (WCS), Durrell Wildlife Conservation Trust (Durrell) and the American Museum of Natural History (AMNH) to identify training needs and to develop training materials that can be used in taught courses or as self-teaching guides. These materials are available to all project employees and many were tested in training sections with COFAV staff.

Although not project employees, 50 representatives of the existing management units have undergone training sessions to clarify their roles and responsibilities in the co-management arrangement. We are already seeing the results of this approach with improved communications between the communities, forestry agents and CI so that we are able to be proactive when management problems arise. For example several illegal logging and mining operations were quickly stopped during 2012 because we were contacted immediately by the local management units and were able to react swiftly. As with project staff, CI has worked with WCS, Durrell and AMNH to develop training materials for community based organizations involved in protected areas c0-management. Trainings have been organized with COFAV community organizations on general principles of protected area management, participatory ecological and threat monitoring, and community forest management.

Improving communications between the different stakeholders involved in the corridor's management is essential to our long term success and a major challenge in this remote area of Madagascar. To do this we have been working with a local partner organization, the Comittee Multi-local de Planification (CMP). With CMP we have created a network of 56 "relay communicators" who are members of local management units and local authorities. These communicators are the local contact points for communicating information about the protected area and they have received training in several subject areas including the protected area creation process, good governance principles, forest carbon projects and the importance of ecosystem services. In addition to the communicators network, the CMP has been using regional and local radios to transmit messages to keep the local population up-to-date on progress and issues related to COFAV.

G4.4. Equal Opportunity of Local Community Members for Employment

Procurement processes, including recruitment of new CI employees or consultants, are set forth in CI Madagascar's procedures manual.

Conservation International is committed to the recruitment, staffing, and promotion of qualified individuals and does not discriminate based on sex (including pregnancy and childbirth), race, ethnicity, color, religion, national origin, age, disability, marital status, personal appearance, sexual orientation, gender identity, family responsibilities, or political affiliation.

Every position must have a job description that explains the duties and requirements of the position and forms the basis for employment conditions and compensation. The job description is reviewed and placed into the appropriate pay band by Human Resources. Pay bands are derived from market surveys and establish the minimum and maximum level of payment.

New, or vacant positions for the project are advertised in local newspapers, and any relevant media to allow for wide dissemination, transparency and equal opportunity for potential candidates. The selection process includes objective assessment (i.e. evaluation of career history and qualifications provided in candidate VCs, phone and/or in person interviews) by a recruitment committee. Final candidates are recruited based only on their skills, experiences and capacity to perform the work. In that way, women and other underrepresented groups are provided with an equal opportunity to be selected for the positions. Likewise local people have opportunities to access all jobs related to the project, with the only restriction being the need to meet the technical qualifications required for the type of work specified in the terms of reference. Partner organizations recruit their staff according to their own procedures which must be consistent with the Labor Code and follows anti-discrimination policies. Communities working in the project are organized in associations whose members voluntarily engaged themselves for the cause of conservation and the local development regardless of their sex, age, ethnic group or any other criteria.

The majority (16 of 22 staff) of the staff currently working on the project are from the project region. All of the field-based staff are local. All community members involved in the project are all also obviously local.

G4.5. Compliance with Regulations Covering Worker Rights and Plan to Communicate Regulations

Worker's rights are described in the Labor Code "Loi N°2003-044 portant Code de Travail". The Labor Code comprises 268 articles grouped in ten Titles. As part of the hiring orientation, employees and contractors are informed about their labor rights. During the selection process, applicant are provided with information about the characteristics of the contract, their rights and obligations in the employment relationship as well as the main aspects of the work. Employees and consultants are encouraged to fully understand their rights and obligations described in their contracts, including benefits, compensation and compliance with all regulations dealing with work, before signing it. The

Human Resources Department ensures that employees' rights from are protectedthe time of recruitment.

CI Madagascar's procedures manual is accessible to all CI employees in an electronic format put in a public folder. Hard copies are available for consultation at the Human Resource Department and in the Fianarantsoa office for employees who do not use computers. Employees can also ask their supervisor to provide the document or have it printed. The manual contains an adapted version of the Labor Code that governs the work environment in the country, focusing on the relevant sections that apply to the conditions of work at CI.

Messages are sent to employees to provide information about changes in regulations related to work. Subsequent training or orientation meetings are called when necessary. The HR department makes itself available for any request to clarify employee labor rights.

In addition, all CI employees are requested to become acquainted with CI global procedures, which are available on the intranet.

G4.6. Assessment of Risk to Worker's Safety and Plan to Communicate and Minimize Risks

Safety measures are prescribed by regulations and CI operational procedures available on the intranet (for CI global) or in a local CI office. Memos are sent to the staff regarding changes in procedures. Some of the project activities do involve risks and staff or people working on these activities are provided with relevant safety training. CI also requires general safety precautions , such fastening seat belts when traveling by car or wearing a life jacket when onboard a boat.

Office staff are trained on the evacuation procedure in case of fire and exit signs are installed to direct staff in case of fire orother emergency. In addition, a phone tree system is set up to ensure fast transfer of information and decision-making in case of emergency. To facilitate their job both in terms of technical and safety issues, community rangers working with CI are provided with the necessary equipment and tools appropriate to the local practice and local conditions: raincoat, shoes, camping gear, GPS units, etc. Updates of these practices are carried out as needed.

G4.7. Financial Health of Implementing Organization

Conservation International is a large financially stable organization operating globally since 1987 with annual operating budgets of around $150 M USD. Its audited financial statements are available on its website. For details, see section "Financial Viability" of "Non-Permanence Risk Assessment" in the VCS PD.

G5. Legal Status and Property Rights

G5.1. List of Relevant Laws and Assurance of Compliance

The project is in compliance with the national and local laws applicable to the project, notably:

- The Madagascar Environmental Charter;
- The MECIE decree on environmental impact assessment (Mise en Compatibilité des Investissements avec l'Environnement (MECIE));
- The Protected Area Code (Code des Aires Protégées (COAP));
- The local management of renewable natural resources (Gestion Locale Sécurisée des Ressources Naturelles Renouvelables (GELOSE));
- The local management of forest resources (Gestion Contractualisée des Forêts (GCF)) – a complement to GELOSE that is specific to forests; and
- Customary local law (Dina).

For description of these laws, see section 1.11 and Appendix 3 of VCS PD.

Madagascar has ratified a number of international conservations agreements and treties, notably:

- The African Convention on the Conservation of Nature and Natural Resources
- Charter for Nature
- Convention on Biological Diversity
- Convention on the Conservation of Migratory Species of Wild Animals
- Convention Concerning the Protection of the World Cultural and Natural Heritage
- Convention on International Trade of Endangered Species
- Montreal Protocol on Substances that Deplete the Ozone Layer
- New York Convention on Climatic Change
- RAMSAR Convention
- Rio Declaration, 1992
- United Nations Convention to Combat Desertification
- United Nations Environmental Program Declaration on the Human Environment, Stockholm, 1972
- United Nations Framework for Climate Change Convention
- Vienna Convention for the Protection of the Ozone Layer

G5.2. Demonstration of Approval from Authorities

The project is in compliance with the national and local laws applicable to the project, notably:

- The Madagascar Environmental Charter;
- The MECIE decree on environmental impact assessment (Mise en Compatibilité des Investissements avec l'Environnement (MECIE));
- The Protected Area Code (Code des Aires Protégées (COAP));
- The local management of renewable natural resources (Gestion Locale Sécurisée des ressources naturelles renouvelables (GELOSE));
- The local management of forest resources (Gestion Contractualisée des Forêts (GCF)) – a complement to GELOSE that is specific to forests; and
- Customary local law (Dina).

Please refer to the VCS PD Section 1.11 for a description of relevant governmental approvals.

The traditional leaders, village presidents and local government authorities of the areas where the project is taking place have given their approval for its implementation. This is documented in the minutes of meetings held with the community leaders that will be provided to the validators.

The project is also explicitly included in the communal development plans for the communes in which it is taking place (for those plans developed since the conception of the project), and forms an integral part of the development actions of these communes. Consequently, the project has the full support of the leaders of these communes.

The formal Regional Development Plans for each of the administrative regions encompassing the corridor make the protection of the corridor a priority in their development plans. The important natural capital that the corridor represents has been built into the vision for the development of each region.

An example of this is the Région of Vatovavy Fitovinany, which has three pillars of development that will enable economic growth of the region: the forest corridor, the economic corridor (points of communication and collection along the railway line), and transport corridors (the RNT 14, RN 25, and the port of Manakara) that will open up the communes presently isolated by the escarpment.

The development priorities of the Region of Ihorombe include the protection of the environment of the corridor and the promotion of ecotourism based on the corridor. Specific objectives include the protection of forest resources and the implementation of an overall management system for its protected areas.

The Region of Haute Matsiatra, has formulated a spatial development strategy that accommodates different economic activities. The elaboration of the Regional Development Plan clearly defines the protection of the corridor and its role in the development of the neighbouring communities.

G5.3. Guarantee that Project Will Not Result in Property Encroachment

The project will not encroach uninvited on private property, community property, or any other government property. Identification of private property was one of the objectives of the public consultation meetings. As demonstrated by the minutes of these meetings, no private land exists within the project area. All the land included in the project area is state land. The communication campaign regarding the project, the public consultation meetings and the social safeguards process were all part of ensuring free, prior, informed consent by the population affected by the project. The minutes of the public consultation meetings demonstrate the participatory nature of the design of the project and the overwhelming support it received from the local population. Through the project local people actually strengthen their formal rights to access and manage the forest resources. In addition the project is designed to provide a modest but steady flow of funds to the local communities in the form of payments for project work and small scale development activities.

Through the social safeguards study, individual households perceived to suffer negative initial impacts due to putting the project in place were identified based on surveys in all the Fokontany in the project zone. The methodology used followed the World Bank's Social Safeguards Operational Procedures (4.12) and were approved, along with the results by the Bank's Social Safeguards specialists. This demonstrates that the project has followed the most rigorous standards available for such work.

Mitigation/compensation measures were agreed with the people affected by the project, further demonstrating their informed consent. In addition, various aspects of the project include additional more specific agreements related to the management of the project. For example the negotiation of both GELOSE/GCF forest management contracts and conservation agreements as tools in the project provides further opportunities for local people to influence local management decisions and for the project to ensure that people remain well informed and give free, prior and informed consent to project activities.

G5.4. Demonstration that Project does not Require Involuntary Relocation

The project activities will not involve the resettlement of any communities or households, since project goals include stopping settlements before they happen. Resettlement is not a component of the project design and this was a guiding principle from the outset of the project.

The project has been designed with the strong participation of the local communities; it is also being implemented by the local communities themselves. Subsistence farmers participating in the project chose to do so of their own free-will. Human settlements within the forested areas of COFAV are excluded from the protected areas as Controlled Occupation Areas (ZOC). The project therefore has not required involuntary relocation. The project activity has not led to the relocation of members of the local communities living adjacent to the project area, nor has it caused the relocation of activities important to their livelihoods and culture.

As mentioned in previous sections, the project applied the World Bank's Social Safeguards procedures (OP 4.12). These procedures were specifically designed by the World Bank to identify people suffering negative impacts from relocation and to ensure that appropriate compensation is provided in such

cases. As demonstrated by the Social Safeguards Management Plan (PGESS) that was developed by a third party with no stake in the project, no-one was identified in this study as having been physically relocated or being required to do so because of project activities.

The formulation of clear land use plans with large format maps posted in public places will clarify tenure status for land in the project area. This will enable the community to explain new land and forest policies to migrants visiting the area. As the tenure situation is publicly and transparently clarified, word-of-mouth communications will inform prospective migrants and help discourage migration into the area.

G5.5. Identification and Mitigation of Illegal Activities

The project is designed to combat all illegal activities within the project boundary. The most common illegal activities are illegal logging, intentional fires, and agricultural encroachment in the strict conservation areas.

Intensified agriculture will help mitigate agriculture encroachment in forested areas. Local farmers will be trained to improve productivity and maintain the soil fertility of existing cultivated areas instead of moving to new land. Additionally, the project will consider the use of irrigation and other agricultural water distribution technologies, as both decrease the amount of water needed for agriculture and improve the productivity of farmland. For more information on how the project will stop illegal activities see Section G3.2.

The clearing of land by fire severely harms the forest ecosystem and is often the first step toward agriculture encroachment. The project will facilitate the implementation of fire prevention techniques in forest lands. These would include the construction of fire breaks, the creation of volunteer fire brigades of village youth, removal of downed woody debris, stronger enforcement against setting fires, and regular forest patrolling.

Cooperation between local communities, police, and Forestry Administration staff and the distribution of equipment to aid in patrols should be able to reduce most of deforestation associated with illegal logging. Frequent patrols will eventually dissuade illegal loggers from continuing their operations in the project area.

G5.6. Demonstration of Land Tenure Status and Title to Carbon Rights

All the forest in the project area is owned by the Government of Madagascar, which through the Ministry responsible for forests is the project proponent and owner of the VCUs generated by the project activity. In order to ensure an equitable and transparent distribution of the carbon revenues, a benefit sharing agreement will be established between the project proponent and all legitimate stakeholders in the project. The delegated project manager of COFAV (currently CI) and local community associations are all part of the management structure and will therefore share responsibility for deciding how the revenues will be used to achieve the project objectives.

Please refer to the VCS PD Section 1.12.1. for further details.

Climate Section

CL1. Net Positive Climate Impacts

The net positive climate impact due to project activities is estimated based on REDD methodology VM0015 (version 1.1) approved by the Verified Carbon Standard (VCS), entitled: "Methodology for Avoided Unplanned Deforestation. The actual carbon stock changes and GHG emissions will be measured and reported through the VCS verification process, deviation of the methodology is described in section G.1.4.

CL1.1. Net Change in Carbon Stocks due to Project Activities

The calculation of net change in carbon stocks due to project activities is based on same parameters used to estimate the baseline carbon emissions. Under the project scenario, the project considers that:

- there is no planned deforestation or degradation in the project area;
- harvesting activities allowed in the sustainable use forest areas are sustainable and will not decrease carbon stocks;
- deforestation would follow the same trend as observed historically;
- project activities will not generate GHG above the baseline, rather will decrease deforestation;
- ex-ante deforestation under project scenario is based on the effectiveness index, which is related to the project activities implementation timeline Table 15.

Table 15. Net change in carbon stock change in the project area under the project scenario

Project year	Net Change in Carbon Stock change in the project case	
	annual	cumulative
	$\Delta CPSPA_t$	$\Delta CPSPA$
	tCO_2-e	tCO_2-e
2008	-163,341	-163,341
2009	-208,925	-372,266
2010	-242,010	-614,277

2011	-263,976	-878,253
2012	-291,942	-1,170,195
2013	-358,793	-1,528,988
2014	-443,712	-1,972,700
2015	-539,986	-2,512,686
2016	-666,003	-3,178,690
2017	-722,915	-3,901,605

CL1.2. Net Change in Emissions of Non-CO2 Gases

Since most of the forest in this region is cleared by *tavy* (slash-and-burn), a significant amount of non-CO2 emissions (specifically CH4) result from the burning of felled trees. Parameters and assumptions are the same used in the baseline scenario – refer to section VM 6.2 and VM 7.2 of the VCS PD for details. Results are summarized on Table 16.

Table 16. Net Change in Emissions of Non-CO2 Gases

Project year	**Net Changes in Emissions of Non-CO2 Gase**	
	annual $\Delta EBBPA_t$ tCO_2-e	cumulative $\Delta EBBPA$ tCO_2-e
2008	-2,498	-2,498
2009	-3,151	-5,648
2010	-3,594	-9,243
2011	-3,854	-13,097
2012	-4,191	-17,288
2013	-5,066	-22,354
2014	-6,161	-28,515
2015	-7,359	-35,873
2016	-8,948	-44,821
2017	-9,509	-54,330

CL1.3. Other GHG Emissions from Project Activities

The project does not intend to promote or increase livestock production nor make any use of fertilisers in promoting improved agricultural practices above the baseline.but the intent is to improve forest protection and promotethe sustainable use of forest resources. Therefore we do not expect any increase in emissions or other GHGs from project activities.

CL1.4. Net Climate Impact of the Project

The net climate impact of the project is estimated as 3,955,936 tCO_2e over 10 years, by adding the net change in carbon stocks due to project activities and net change in emissions of non-CO2 gases. Results are summarized on Table 17.

Table 17. Net Climate Impact of the Project

Project year	Net Climate Impact of the Project	
	annual tCO_2-e	cumulative tCO_2-e
2,008	-165,839	-165,839
2009	-212,075	-377,914
2010	-245,605	-623,519
2011	-267,830	-891,350
2012	-296,134	-1,187,483
2013	-363,859	-1,551,342
2014	-449,873	-2,001,215
2015	-547,345	-2,548,560
2016	-674,951	-3,223,511
2017	-732,425	-3,955,936

CL1.5. Specification How Double Counting is Avoided

The project has not been registered under, is not seeking registration by, nor has been rejected by any other GHG program or any GHG-related environmental credit. The project will be seeking registration

under the Verified Carbon Standards in addition to CCBS. In addition, Madagascar has no national or international binding commitments to reduce GHG emission.

CL2. Offsite Climate Impacts ("Leakage")

CL2.1. Determination of Leakage Type and Extent

Based on the analysis of agents and drivers of deforestation, the most significant cause of unplanned deforestation is slash-and-burn agriculture by local farmers. Given the nature of the project activities and that the drivers and agents of deforestation are for subsistence farming, no leakage related to commercial harvesting of natural resources is foreseen. Therefore the project will consider only activity-shifting type of leakage.

The most likely areas where unplanned deforestation would be displaced due to project activities - called the leakage belt - were delineated using mobility analysis in accordance with VCS Methodology VM0015 (see section VM 1.1.3 of VCS PD and section G.1.4). The project estimated the baseline, and will measure and monitor deforestation within the leakage belt using the same methodology and process used in the project area (see sections 2.4 and 3.1 of VCS PD). Areas deforested above the baseline in the leakage belt will be discounted from the credits generated by the project.

CL2.2. Documentation and Quantification of How Leakage will be Mitigated

The project has undertaken the following measures to fully mitigate displacement leakage. The project has delimited areas within the Fokontanys adjacent to the project boundary that fully encompass the area of activity of all of the agents of deforestation as well as their places of residence. Within these areas a concerted and long term programme of activities has been put into place to address the long term livelihood needs of the agents of deforestation and to stabilise land-use. These actions are described in Section 1.8 of the VCS PD and include:

- Conservation agreements, where local people are directly paid for forest conservation actions;
- Development projects and technical support to provide alternative livelihood options for the community members that have traditionally depended on slash and burn agriculture;

In addition, the boundaries of the zoning of the protected area was done with the full participation and agreement of the local stakeholders. Communities defined the boundaries of the community use areas, the sustainable use forest and the protected forest areas according to their anticipated needs.

Subsequent to boundary delineation. a detailed social impact assessment was established to identify households that might incur losses due to the management rules of the project. This assessment followed the methodology of the World Bank's operational procedures 4.12 except that it was more conservative because only potential losses were considered rather than net losses. During the

assessment, mitigation measures for those households that might be negatively affected were defined and put in place.

CL2.3. Subtracting Project related Leakage from Carbon Benefits

Actual leakage will be monitored by estimating the area defrosted in the leakage belt, and discounted from the CO2 credits that the project would generate. Estimation of the ex-ante carbon stock changes in the leakage belt is based on the assumed effectiveness of the leakage prevention activities. The project conservatively assumed that 20% of the baseline in the project area would be displaced to the leakage belt (see section VM8 of VCS PD). The carbon benefits after discounting leakage are summarized in Table 18.

Table 18. Ex ante net anthropogenic GHG emission reductions

Project year	Net Climate Impact of the Project		*Ex ante* leakage - carbon stock changes		*Ex ante* leakage - non CO2 emissions		*Ex ante* net anthropogenic GHG emission reductions	
	annual tCO_2-e	cumulative tCO_2-e	annual tCO_2-e	cumulative tCO_2-e	annual tCO_2-e	cumulative tCO_2-e	annual tCO_2-e	cumulative tCO_2-e
2008	-165,839	-165,839	-141,001	-141,001	-2,156	-2,156	-22,682	-22,682
2009	-212,075	-377,914	-169,622	-310,623	-2,558	-4,714	-39,896	-62,578
2010	-245,605	-623,519	-178,531	-489,154	-2,652	-7,365	-64,422	-127,000
2011	-267,830	-891,350	-177,004	-666,157	-2,584	-9,950	-88,242	-215,242
2012	-296,134	-1,187,483	-176,911	-843,068	-2,540	-12,489	-116,683	-331,926
2013	-363,859	-1,551,342	-177,181	-1,020,249	-2,502	-14,991	-184,176	-516,102
2014	-449,873	-2,001,215	-177,054	-1,197,304	-2,458	-17,450	-270,360	-786,462
2015	-547,345	-2,548,560	-174,344	-1,371,648	-2,376	-19,826	-370,625	-1,157,086
2016	-674,951	-3,223,511	-177,497	-1,549,145	-2,385	-22,210	-495,070	-1,652,156
2017	-732,425	-3,955,936	-172,657	-1,721,802	-2,271	-24,481	-557,496	-2,209,652

CL2.4. Inclusion of Non-CO2 Gases in Calculations

The non-CO2 emissions from forest fires were estimated for the baseline in the leakage belt, using the same parameters applied in the project area. Leakage mitigation activities will not introduce or significantly increase livestock, nor plan to burn or clear significant areas of biomass. Rather they will promote environmentally sustainable activities, such as improving agriculture practices, alternative income generation and community development activities. Therefore the project does not foresee any increase of CO2 or non-CO2 emissions from the leakage mitigation activities.

CL3. Climate Impact Monitoring

CL3.1. Plan for Selecting and Monitoring Carbon Pools

The following carbon pools and sources of GHG emissions are considered in this project: above-ground biomass, below-ground biomass, deadwood, and CH_4 from biomass burning. All carbons pools and sources of GHG emissions considered in this methodology were assessed for their significance using the latest approved EB-CDM "Tool for testing significance of GHG emissions in A/R CDM project activities" and contributes to more than 5% of the total CO_2 benefits generated by the project (see section VM 9.1 of VCS PD).

CL3.2. Development of a Full Monitoring Plan

A complete monitoring plan was developed to assure that GHG benefits are estimated with accuracy, precision and reliability. The plan lays out the rules and responsibilities, data to be collected, parameters and default values to be used, plans for data management and storage and legal and ethical issues. The plan also provides the guidelines to monitor land-use and land-cover change, carbon stocks and non-CO2 emissions from forest fires, impacts of natural disturbances and other catastrophic events, leakage and the total carbon benefits. Baseline projections will be revised according to VCS VM0015 methodology rules, which require revision every 10 years from the project start date.

Climate monitoring results of COFAV will be publicly available through the websites of Conservation International, VCS and CCB Standards, and communicated widely to all stakeholders.

Community Section

CM1. Net Positive Community Impacts

CM1.1 Estimate the Impacts on Cummunities Resulting from Project Activities

This section describes the net positive community impacts, particularly focusing on the socioeconomic benefits that will be created for communities involved in the COFAV project.

The COFAV project was set up to develop a multiple benefit community-based project that will ultimately enable local communities to benefit from job creation and improved livelihoods, while maintaining forest cover in the core zone of the project area. Targeted beneficiaries were identified as the communities living in the districts of Ambositra, Lalangina Ambohimahasoa, Ambalavao, Vohibato, Ikongo Nord, Ikongo Sud, and Ifanadiana as described in G1.5.

The main forum through which the 'with' and 'without' project scenarios were discussed was the landuse planning workshops that were held in the various districts. Together with the socio-economic surveys, these served as a baseline to record the socio-economic conditions of local communities within these jurisdictions. They were also the main guide to develop alternative livelihood interventions that that will help provide additional sources of revenue and increased food security.

The exercises carried out during the workshops were developed based on the Open Standards for the Practice of Conservation, which is a tool developed by the Conservation Measures Partnership to support the design, management and monitoring phases of conservation projects.

The main steps of the Open Standards are (Figure 10):

- **Conceptualize** what the project is trying to achieve within its geographic location.
- **Plan** both **Actions** and **Monitoring**.
- **Implement** both **Actions** and **Monitoring**.
- **Analyze** the data to evaluate the effectiveness of the activities. **Use** the results to **Adapt** the project to maximize impact.
- **Capture** and **Share** the results with key external and internal audiences to promote **Learning**.

As a result of the discussions, key issues linked to community development and existing socio-economic constraints were identified, including *tavy*, illicit small-scale mining, logging, fire, footpaths, hunting, conversion of valley floors and lower slopes to croplands, and over-exploitation of forest products. Project interventions to address some of these issues were then assessed. In summary, the project will enhance and maintain the natural resource base of the communities and improve their overall well-being, as manifested by: increased household incomes, an improvement in material style of life, and increased food security and nutrition.

Figure 10. Diagram of the main steps of the Open Standards for the Practice of Conservation

The following are the key expected impacts of the project on community socioeconomic well-being throughout the project lifetime:

Enhanced well-being of resident communities:

Improved, sustainable agricultural production financed with long term carbon revenues will increase household incomes in comparison to the baseline scenario. The project will directly increase household income and enhance communities through the establishment of conservation agreements, and provision of small grants. Through the conservation agreements CI will provide direct incentives for communities to be involved in conservation. These agreements include direct and in kind payments for activities such as forest patrols or ecological monitoring. Small development projects that are of wider benefit to the community will also be financed through carbon revenue. These projects are identified and proposed by the communities themselves but are usually linked in some way to promoting alternatives to slash and burn agriculture by promoting more intensive agricultural techniques or alternative income generating activities. The exact details of the agreements vary from community to community depending on the local context and needs.

Improved food security and nutrition:

Through the conservation agreements, local communities will be able to acquire financing to address the most urgent needs of local residents. The needs of the communities are best assessed by the communities themselves and the structure of the conservation agreement allows for the communities to decide where best to allocate this funding. This autonomy will allow communities to use available funding from the conservation agreements to enable farmers to increase the productivity of their farms, and recoup higher value for their products. These important outcomes also contribute to the reduction of food insecurity and enable farmers to provide adequate nutrition and caloric intake.

Increased adoption of farming alternatives to *tavy*:

The project provides farmers with extension services and material inputs necessary for them to break their dependency on *tavy* and change to more sustainable agricultural practices. Improved farming techniques will enable farmers to maintain or increase their agricultural production and overcome the problems posed by the shortage of productive land. Promotion of the sustainable intensification of rice cultivation and crop diversification are key project interventions which will allow farmers to realize the maximum productive potential of their lands. By adopting these practices farmers will be able to meet their subsistence needs and generate income through marketing high value crops. These outcomes will allow farmers to cultivate continuously on the same lands without having to open up new lands for *tavy* cultivation. Farmers will be able to practice a viable alternative to *tavy* that enables them to enhance and maintain the productivity of their land. The new practices will also increase production per unit area. The ultimate result will be to increase productivity while decreasing land-pressure compared to the baseline scenario.

Improved local infrastructure (roads, dams, irrigation, water, energy systems):

The lack of basic infrastructure in rural areas around COFAV is a main constraint to the economic development of the area. This challenge has resulted in low efficiency agricultural systems and unsustainable resource use by local communities. In order for farmers to optimize yields a variety of irrigation systems has and will be constructed through the Small Grants Program and or Conservation Agreements. This program will allow farmers who face particularly acute water challenges to access funding to construct suitable water control infrastructure that will enable them to increase their rice yields. Additionally, through the Small Grants Program, efficient stoves, solar energy, water, and sanitation systems appropriate for rural communities will be developed to meet the basic needs of the population.

Increased revenue-generating activities compatible with forest conservation:

Maintenance of the rich biodiversity and natural beauty of the landscape provides the basis for developing eco-tourism in the region. This has the potential to bring investment and create jobs for the local communities. In some places, the project aims to use tourism development to finance conservation through community-based tourism concessions and by creating jobs linked to tourism.

To achieve the aims of the tourism programme, the project is developing partnerships between protected area management, local communities, the private sector, the National Tourism Board and the Tourism Department. Additionally, sustainable management of forest areas with controlled extraction of timber, as well as fire management, will bring about a progressive restoration of degraded forest areas. A sustainable supply of high quality wood will be available to meet essential community needs and economic activities.

Increased effectiveness of community management of protected area:

Community co-management of the PA will provide an opportunity for local communities to create a public forum for discussion of PA management issues, adopt rules and means of compliance, and establish a transparent political process for the resolution of conflicts of control and access to natural resources. For example, during the public consultation on the delimitation of the PA the limit of the Tanala and Betsileo territories was long debated; the limits of community control do not coincide with the formal limits of the administrative commune and still remain unclear. However, the authority that will be given to the community co-management council will allow for the establishment of mutually agreed terms for conflict resolution. The implementation of the project will increase social capital by developing and sustaining new networks and partnerships amongst the PA stakeholders. This will build institutional, technical and scientific support within the region, and so greatly facilitate development in the corridor.

Increased establishment of partnerships and funding for development projects:

Through the formation of the NODES, NGOs will create a variety of partnerships with local entrepreneurs, governments, and individuals. These NODES will provide the mechanism to deliver funding to projects identified by community members. They will also provide a level of organization which will facilitate fundraising, capacity development, and technical support. As NGO's become more deeply involved in the administration of community projects they will also play a role in ensuring the durability of the NODES.

Increased capacity building for local civil society organizations:

The Small Grants Program is innovative in that it achieves two major objectives simultaneously: (1) supporting local conservation action, and (2) contributing to increased capacity of national NGOs to administer and manage grants at the local scale. The first objective is achieved through the small grants themselves, and the important local-level conservation activities that are completed with these resources. The second objective is achieved through the innovative mechanism CI is using to disburse funds. Rather than having a centralized system of grant-making controlled by CI employees in the capital city, CI has partnered with Malagasy NGOs working in regional centers (i.e. Nodes) to receive and review proposals, issue grants, and monitor activities. This provides Malagasy NGOs with an

opportunity to hone their grant management skills as well as build their expertise in supporting conservation.

Increased provision of forest products and services:

Improved forest management of degraded forest areas and preservation of primary forest of the watersheds within the corridor will maintain and possibly improve the watershed services that are vital to local farmers while also maintaining a steady flow of non-timber forest products. The restoration of functioning natural forest habitat, as well as decreased pressure on the remaining forest fragments, will have a number of positive results in comparison to the baseline scenario:

Improved hydrological services – the restoration of functioning forest ecosystems should enhance the provision of hydrological services over those that would be provided in the baseline scenario. This is an ecosystem service that is critical to the wellbeing of local people as it includes the enhanced provision of water for drinking and farming. The regulation of water flows provided by natural forest will diminish erosion and loss of crops from intense rainfall and flooding. By helping to maintain soil water content and a consistent flow in natural watercourses, these hydrological services should also improve agricultural production and make farmers less vulnerable to extreme weather events and changes in rainfall patternsand soincrease the resilience of local people to climate change.

Fire control – fire is a key cause of environmental degradation and its control is a prerequisite to regenerating the natural resources in the broader landscape. The broader landscape will be less prone to fire than in the 'without project' scenario. This will enhance the possibility of landscape regeneration and abate the trend towards irreversible natural resource damage caused by fire, which ultimately reduces the value that communities currently attain.

Increased supply of non-timber forest products – the improved management of forest areas will provide a sustained yield of goods that are fundamental to the livelihoods of local communities (e.g. food, fodder, medicinal plants and building materials). This enhanced provision of forest goods will improve the overall wellbeing of the local people, particularly in terms of diet, medicines, artisanal and building materials, and more diversified earning opportunities.

Small business development:

A particular focus of the Small Grants Program is to encourage the formation of small enterprises within communities affected by the project. These small businesses provide revenue which will aid farming communities to diversify income streams, provide local services, and ensure a continuous flow of benefits over the long term.

Forest ecosystem services in Madagascar are significant in terms of production of food, water for irrigation and consumption, medicinal plants, fuel, raw material for construction and craft; regulation of hydrological function in terms of timing and volume of freshwater flows, flood regulation, water catchment, and ground water recharge; and meaning in terms of aesthetic, cultural, spiritual, and

scientific values. The economic benefits of conserving protected areas and classified forests over fifteen years are estimated at about $57 million for ecotourism services, and $80 million for water services (Carret, 2003). The exploitation of the conservation site through project development, networking, and mediation, ensuring local access and benefit sharing provides multiple positive impacts. The increased investment into the local economy through carbon revenue, small grants, and conservation agreements will generate direct and indirect benefits that are accrued by local communities. The results of these actions will mean that under the 'with project' scenario there will be a net positive impact on communities compared to the 'without project' scenario.

Increased access and quality of local health and education:

Local communities are vulnerable to a range of diseases common to the poor in tropical developing countries. As mentioned in earlier sections, the project has been addressing common health problems by improving access to health services, as well as by building capacity to deliver these services. These activities have been implemented with local NGOs and communities participating in COFAV's governance structure. CI Madagascar has trained community-based agents who are able to provide assistance on health, including improved nutrition, water, sanitation, hygiene and family planning. The agents are also certified to issue vaccinations. CI will continue to seek funding opportunities for such projects but these require funding levels beyond those that can be provided from the regular and long term sales of carbon emissions reductions.

The long-term income from carbon revenues will provide a critical uplift to poor households, bringing a new revenue source and allowing them to pursue longer time horizons and invest in education, rather than focusing on just trying to meet their immediate food needs. Additionally, as part of the incentives for behavioral change included in the conservation agreements, educational facilities will be upgraded per the community prioritization exercises that identified education as a key area for investment using carbon revenues.

CM1.2. Demonstration that no HCV Areas are Negatively Affected

The following HCVs have been identified for the COFAV project:

- Globally significant concentrations of biodiversity
- Globally, regionally or nationally significant large landscape-level areas with viable populations of most if not all naturally occurring species existing in natural patterns of distribution and abundance
- Threatened or rare ecosystems
- Areas that provide critical ecosystem services
- Areas that are fundamental for meeting the basic needs of local communities
- Areas that are critical for the traditional cultural identity of local communities

The project is specifically designed to protect all the areas within it and the biodiversity within it. As such no negative impacts due to project activities will occur to the biodiversity, habitats or the ability of COFAV's natural ecosystems to provide important ecosystem services. In addition, the project has been designed with the local community to specifically allow them continued access to sustainable use areas within the project area that help them meet their basic needs. Similarly, areas of traditional cultural importance are being protected by the project and they remain accessible for use by the local population.

An Environmental and Social Impact Assessment (PGESS) has been completed for the project by an independent third party and concluded that no negative environmental impacts would result from the project. The Assessment document has been made available to the auditors.

CM2. Offsite Stakeholder Impacts

CM2.1. Identification of Negative Offsite Stakeholder Community Impacts

As outlined in earlier sections the main drivers to deforestation and threats to the biodiversity of COFAV are extremely local and so are the solutions. As such, the overwhelming majority of impacts (both positive and negative) will be within the project zone. This conclusion was also reached in the Environmental and Social Impact Assessment for COFAV that was conducted by an independent third party. The assessment only identified impacts within the project zone.

Any negative impacts from the project offsite are likely to be due to restrictions to illegal trade in timber and wildlife and illegal mining. These may have some negative impacts on the incomes of some individuals involved in such trade and costs to intermediaries and end users along the supply chain. However we believe that these are not relevant negative community impacts in the sense intended by CCBA.

CM2.2. Offsite Impact Mitigation Strategies

As no offsite negative impacts have been identified, there are no mitigation strategies as part of the project

CM2.3. Demonstration that Well-being of Other Stakeholder Groups has not been Negatively Impacted

The project is not expected to generate negative impacts on offsite stakeholder groups.

CM3. Community Impact Monitoring

CM3.1. Selecting Community Variables to be Monitored

The main objective of the project is to develop an integrated multiple benefit forest carbon project that will benefit the communities in both the short and long term. Project activities are guided by community aspirations through the use of socio-economic surveys and landuse plans at the Fokotany level. Project activities are therefore directly linked to community development objectives. The full project monitoring plan is currently being developed. It is envisioned that monitoring will occur at the community level through a variety of data collection processes (e.g. household surveys, key informant interviews, field verification) on a multi-temporal (e.g. quarterly, annually, quadrennially) basis. An initial list of potential community indicators to be monitored over time is shown in the Table 19.

Table 19. List of community indicators

Impact/ Objectives	Sector	Indicator	Definition	Methods	Frequency	Means of verification
Enhance the wellbeing of resident communities	General	Direct Beneficiaries	Sum of all supported organization's members, permanent, temporary employees, and project participants	Key Informant Interview/Field Verification	Annual	Project Records
	General	Improved livelihoods	Number of people with increased economic benefits derived from sustainable natural resource management and conservation as a result of carbon benefits assistance	Key Informant Interview/Field Verification	Quadrenial	Household Survey
	Employment	Permanent employees	Number of jobs created on a permanent full-time or part- time basis	Key Informant Interview/Field Verification	Annual	Project Records

	Employment	Temporary employees	Number of temporary jobs created on a fixed term or seasonal basis	Key Informant Interview/Field Verification	Annual	Project Records
	Economics	Household revenue	Revenue resulting from all household activities during the reporting period.	Household Survey	Quadrenial	Socioeconomic Study
Improve food security and nutrition	Food Security	Coping mechanisms	Number and type of coping mechanisms implemented in the last year	Household Survey	Quadrenial	Socioeconomic Study
Promote farming alternatives to *tavy*	Forestry	Sustainable forestry: timber production	Cubic meters of sustainably harvested wood per year	Key Informant Interview/Field Verification	Annual	Project Records
	Forestry	Income from sustainable forestry	Value of harvested timber	Key Informant Interview/Field Verification	Annual	Project Records
	Production	Production: focal crop	Volume of product in the final presentation that the company commercializes. Should be express in kilograms. Focal crop is the main activity been financed by Carbon Fund	Key Informant Interview/Field Verification	Annual	Project Records
	Production	Yield: focal crop	Average volume of product produced per hectare dedicated to focal crop production. (kg/ha)	Key Informant Interview/Field Verification	Annual	Project Records
	Production	Farms engaged	Number of farms that produce the focal crop. Could be different to the number of organization's members	Key Informant Interview/Field Verification	Annual	Project Records
	Economics	Value ($) of all crops produced	The annual sum total value (based on market price at the time of calculation) of all crops harvested on farm	Household Survey	Quadrenial	Socioeconomic Study

	Economics	Value ($) of focal crop produced	The annual sum total value (based on market price at the time of calculation) of focal crop harvested	Household Survey	Quadrenial	Socioeconomic Study
	Training/Capacity Building	Technical Support	Number of hours of technical assistance in improving agricultural practices provided to producers at their own farm	Key Informant Interview/Field Verification	Annual	Project Records
	Management Practices	Land under improved technologies	Number of hectares under improved technologies or management practices as a result of carbon benefits	Household Survey	Quadrenial	Socioeconomic Study
	Management Practices	Farmers applying new technologies	Number of farmers and others who have applied new technologies or management practices as a result of carbon benefits	Household Survey	Quadrenial	Socioeconomic Study
Improve local infrastructure(roads, dams, irrigation, water, energy systems	Infrastrucuture	Beneficiaries: infrastructures	Number of beneficiaries receiving improved infrastructure services due to carbon benefits	Key Informant Interview/Field Verification	Annual	Project Records
	Infrastrucuture	Roads constructed or improved	Kilometers of roads improved or constructed	Key Informant Interview/Field Verification	Annual	Project Records
	Agriculture	Small-hydro projects	Number of hydro projects	Key Informant Interview/Field Verification	Annual	Project Records
	Agriculture	Postharvest storage	Total increase in installed storage capactiy (m3)	Key Informant Interview/Field Verification	Annual	Project Records
	Energy	Renewable energy projects	number of renewable energy or energy efficiency projects implemented	Key Informant Interview/Field Verification	Annual	Project Records

	Water	Water projects	Number of water projects implemented	Key Informant Interview/Field Verification	Annual	Project Records
	Sanitation	Sanitation projects	Number of sanitation projects implemented	Key Informant Interview/Field Verification	Annual	Project Records
Establish new revenue-generating activities compatible with conservation	Ecotourism	Ecotourism Clients	Number of tourists visiting the reserve in the last reporting period	Key Informant Interview/Field Verification	Annual	Project Records
	Ecotourism	Income from ecotourism	Value of entrance fees and guiding fees paid in the last reporting period	Key Informant Interview/Field Verification	Annual	Project Records
	Restoration	Nurseries constructed	Number of nurseries in the area built	Key Informant Interview/Field Verification	Annual	Project Records
	Restoration	Income from nurseries	Value of sales from nursery production in the last reporting period	Key Informant Interview/Field Verification	Annual	Project Records
	Restoration	Income from reforestation	Value of wages paid for reforestation services	Key Informant Interview/Field Verification	Annual	Project Records
	Economics	Income from alternative economic activities	Household income from alternative economic activities	Household Survey	Quadrenial	Socioeconomic Study
	Green Economies	Private sector engagement	Number of private sector enterprises investing in low emissions development strategies	Key Informant Interview/Field Verification	Annual	Project Records

	Green Economies	Consultative processes	Number of consultative processes with private and public sectors as a result of carbon benefits	Key Informant Interview/Field Verification	Annual	Project Records
	Economics	Producer Price Premium	Price premium obtained, for the producer of goods, through product marketing/differentiation. This is relative to the average price that would otherwise be obtained in the local area for a similar good during the reporting period.	Key Informant Interview/Field Verification	Annual	Project Records
	Economics	Purchase Contracts	Number of contracts/purchase agreements that the organization holds for purchase of its products or services. Report contracts outstanding as of the end of the reporting period.	Key Informant Interview/Field Verification	Annual	Project Records
Increase effectiveness of community management of protected area	Governance	PA Budget operability	Annual Budget ($) of PA	Key Informant Interview/Field Verification	Annual	Project Records
	Governance	Resource Management Committees	Number of Resource Management Committees established in project zone	Key Informant Interview/Field Verification	Annual	Project Records
	Governance	Management committee participation	Percentage (%) of the members of the Management Committee that participate in the General Assemblies	Key Informant Interview/Field Verification	Annual	Project Records
	Governance	Public Forums	Number of public forums resulting from Carbon Fund assistance in which national legislators and members of the public Interact	Key Informant Interview/Field Verification	Annual	Project Records

	Conservation Agreements	Conservation agreements signed	Number of conservation agreements signed	Key Informant Interview/Field Verification	Annual	Project Records
	Conservation Agreements	Conservation agreements renewed	Number of conservation agreements renewed	Key Informant Interview/Field Verification	Annual	Project Records
	Conservation Agreements	Conservation agreements canceled	Number of conservation agreements canceled	Key Informant Interview/Field Verification	Annual	Project Records
	Threats	METT Score	Aggregated score from Management Effectiveness Tracking Tool Survey Instrument	Key Informant Interview/Field Verification	Annual	Project Records
	Threats	Fire frequency	Number of fires that are reported or witnesses in the project zone	FIRECAST Monitoring System	Quarterly	Project Records
	Threats	Patrol Findings: smuggling of flora	Number of reports findings of illegal flora smuggling in the area	Reserve patrols	Quarterly	Patrol Reports
	Threats	Findings: illegal logging	Number of reports findings illegal logging in the area	Reserve patrols	Quarterly	Patrol Reports
	Threats	Findings: illegal hunting	Number of reports findings illegal hunting in the area	Reserve patrols	Quarterly	Patrol Reports
	Threats	Other findings	Number of reports other findings in the area (dump wood, new road, new house, etc..)	Reserve patrols	Quarterly	Patrol Reports

	Land Tenure	Land tenure conflicts	Number of previously existing land and natural resource-based conflicts	Key Informant Interview/Field Verification	Annual	Project Records
	Land Tenure	Land tenure conflicts resolved	Number of previously existing land and natural resource-based conflicts resolved	Key Informant Interview/Field Verification	Annual	Project Records
Support communities to establish partnerships and funding for development projects	Governance	Partnerships with local governments	Number of partnerships established by the project with local authorities	Key Informant Interview/Field Verification	Annual	Project Records
	Governance	Partnerships with national governments	Number of partnerships established by the project with national authorities	Key Informant Interview/Field Verification	Annual	Project Records
	Governance	Partnerships with civil society organizations	Number of partnerships established by the project with local civil society organizations	Key Informant Interview/Field Verification	Annual	Project Records
	Finance	Grants made	Number of grants awarded to community development projects	Key Informant Interview/Field Verification	Annual	Project Records
	Finance	Grant financing provided	Quantity ($) of grants made	Key Informant Interview/Field Verification	Annual	Project Records
	Finance	Investments in Social Benefits	US dollars paid to project beneficiaries through social benefits packages	Key Informant Interview/Field Verification	Annual	Project Records
	Finance	Funds leveraged	Amount of funds leveraged in US dollars, from private and public sources for community development	Key Informant Interview/Field Verification	Annual	Project Records

Promote local health and education	Health	Medical Professionals Employed	Number of Medical Professionals employed by the organization at the end of the reporting period.	Key Informant Interview/Field Verification	Annual	Project Records
	Health	Healthcare Facilities	Number of healthcare units/facilities under management at the end of the reporting period.	Key Informant Interview/Field Verification	Annual	Project Records
	Health	Household illness related to malnutrition and poor hygiene	Households reporting having had illness related to malnutrition and poor hygiene in the prior two weeks	Household Survey	Quadrenial	Socioeconomic Study
	Water and Sanitation	Population with improved drinking water	Number of people using an improved drinking water source	Household Survey	Quadrenial	Socioeconomic Study
	Water and Sanitation	Population with improved sanitation facility	Number of people using an improved sanitation facility	Household Survey	Quadrenial	Socioeconomic Study
	Education	Teachers Employed	Number of teachers employed by the organization at the end of the reporting period.	Key Informant Interview/Field Verification	Annual	Project Records
	Education	Education Facilities	Number of education facilities under management at the end of the reporting period.	Key Informant Interview/Field Verification	Annual	Project Records

	Education	Household members enrolled in school	Number of household members currently enrolled in school	Household Survey	Quadrenial	Socioeconomic Study
Capacity building for rural associations	Training/Capacity Building	Workshops, training events, seminars, conferences, etc. conducted	Count workshops, training events, seminars, conferences, etc., held with significant contributions from Carbon Fund. Do not include advisory services events, stakeholder consultations and meetings of project partners.	Key Informant Interview/Field Verification	Annual	Project Records
	Training/Capacity Building	Beneficiaries Trained	Number of project participants that were trained through programs provided by the organization (both internally and externally) during the reporting period.	Key Informant Interview/Field Verification	Annual	Project Records
	Cooperative/Civil Society Organizations	Civil Society Tracking Tool Aggregate Score	Aggregate score of Civil Society Tracking Tool	Key Informant Interview/Field Verification	Quadrenial	Organizational Survey
Provision of forest products and services	Water	Water quantity	Number of farmers who perceive that water quantity has improved as a result of sustainable land use practices and other project activities	Household Survey	Quadrenial	Socioeconomic Study
	Soil	Soil fertility	Number of farmers who perceive that soil fertility has improved as a result of sustainable land use practices and other project activities	Household Survey	Quadrenial	Socioeconomic Study
	Non-timber Forest Products	Volume of major NTFPs harvested	Volume (kg) of major NTFPs harvested	Household Survey	Quadrenial	Socioeconomic Study

	Non-timber Forest Products	Value ($) of major NTFPs harvested	The value ($USD) (based on market price at the time of calculation) of major NTFPs harvested from reserve	Household Survey	Quadrenial	Socioeconomic Study
Small business development – micro-finance	Finance	Loans disbursed	Number of micro loans provided by nodes and community associations	Key Informant Interview/Field Verification	Annual	Project Records
	Finance	Value of loans disbursed	Value of all micro loans provided by nodes and community associations	Key Informant Interview/Field Verification	Annual	Project Records
	Finance	Businesses supported	Number of businesses receiving grants or loans	Key Informant Interview/Field Verification	Annual	Project Records
	Finance	Businesses created	Number of businesses created through micro finance	Key Informant Interview/Field Verification	Annual	Project Records

CM3.2. Monitoring of the impact on High Conservation Areas (community values)

As part of the monitoring framework presented in sections CM3.1 and B3.1, a number of socioeconomic and biodiversity variables related to the High Conservation Values of COFAV identified in CM1.2, will be monitored. Baseline studies carried out previously through the environmental and social impact assessment (PGESS) required for the creation of the protected area will be used to assess changes in status and the effectiveness of the management plan. In close collaboration with the project team, monitoring is currently being implemented in a participatory manner by community members trained in data collection methods. Based on the results of this monitoring, management plans will be assessed on a quarterly basis and adapted in order to ensure the persistence of the identified high conservation values.

Additionally, as the protected area is co-managed by local communities, mechanisms are in place to detect site level impacts (positive or negative) on local communities. The flow of information from the communities to the project team will be facilitated through this management structure allowing the project team to quickly respond to issues as they arise.

CM3.3. Community Impact Monitoring Timeline

Conservation International is currently monitoring a subset of the indicators outlined in the monitoring frameworks in sections CM3.1 and B3.1 and is committed to developing a full monitoring plan as stipulated by Madagascar's Protected Areas Code (COAP). It is expected that full roll out of the monitoring system will be in place by the end of 2013. In addition to the indicators presented in the aforementioned sections it is expected that a number of new indicators will be included due to the nature of the project, which allows communities to determine the way in which carbon revenues will be allocated among a variety of initiatives.

Monitoring results will be communicated to local communities and all stakeholders through written reports and public forums held in the communities affected. These results will be used to inform the stakeholders and communities of project activities and to engage them in tailoring management activities and distribution of benefits so as to achieve maximum impact.

Biodiversity Section

B1. Net Positive Biodiversity Impacts

B1.1. Changes in biodiversity as a result of the project in the project zone and in the project lifetime.

In the without-project scenario continued and intensified *tavy* agriculture will continually decrease the biodiversity of the farmed lands to a treeless landscape dominated by unproductive fallows. This would increase the susceptibility of the landscape to fire. Remaining patches of degraded primary and secondary forest would thenl come under increasing pressure from *tavy* agriculture. Present HCV forest areas will become completely isolated within a landscape that is hostile to the movement of natural species and the regeneration of natural forest. In the long term this wouldl lead to the demise of the small and isolated populations within these forests. The Madagascar east forest bioregion will be split in two, diminishing the capacity of this region to adapt to climate change.

The project will bring about a number of positive net changes in biodiversity compared with the 'without project' biodiversity scenario. Within the project zone and project lifetime, the following biodiversity changes are anticipated:

1. **Restoration of natural forest habitat**: Under the with-project scenario natural forest will be restored in areas that are presently biodiversity impoverished grasslands or fallows overgrown by invasive shrubs.
2. **Linking of natural habitats**: Forest restoration will provide links between existing remnants of natural habitat outside of the protected areas, ultimately forming a landscape mosaic that is hospitable to native biodiversity.
3. **Formation of corridors between presently isolated protected areas**: Restoration of natural forest throughout the project zone will eventually enable the formation of continuous corridors of natural habitat between areas of HCV. Connectivity will increase the effective size of all the protected forests, especially the small vulnerable Analamazaotra Special Reserve and Vohimana reserves, and so enhance the survival of many species in the long-term. The connectivity will also incorporate currently unprotected species and narrow range endemic species that currently occur only outside the protected areas. An example of this is the palm *Ravenea louvelii*, only found on a single ridge top within the protected area.
4. **Formation of a regional-scale forest corridor**: It will contribute to the establishment of corridors between the Zahamena, Mantadia and Ankeniheny forest blocks and so maintain vital linkage along the Madagascar East Wet Forest Ecoregion. In doing so the project will contribute to maintaining what is an exceptional biodiversity at a regional level.

Together, the results 1 – 4 will bring about an increase in the biodiversity of what are presently biodiversity-poor areas (*savokas*), increase the extent of natural forest habitat and the populations

and ranges of a number of endangered species. It will enable gene flow between populations that are presently isolated in forest remnants and so increase the long-term population and genetic viability of these species.

Another obvious benefit to providing connectivity, particularly along the regional forest corridor, is to improve the opportunity to respond to climate change.

Forest restoration will bring considerable benefits to the ecological functioning of the landscape over the status quo of *savoka*. Several aspects of ecological functioning have already been mentioned above, but in essence the difference will be between a habitat with poor ecological function and a natural, local-type forest ecosystem, with all the huge range of ecological functions occurring within this habitat.

Beyond the project boundary, the project aims to re-establish natural forest links to re-create an intact band of over 300km of native forest and will thus have benefits over a far greater area than that of the direct project activities. In addition to mitigating climate change through reducing emissions, the project will also provide opportunities for species adapt by altering their ranges in response to changing

B1.2. Demonstration that High Conservation Value Areas will not be Negatively Affected

As stated earlier and concluded by the third-party Environmental Impact Assessment, no negative impacts due to project activities have been identified. Measures of deforestation will be conducted as part of the carbon monitoring, which will also serve to identify any forest loss in the HCVs.

B1.3. Identification of Tree Species to be Planted by the Project

No tree species will be planted by this project in the project area.

B1.4. Adverse Effects of Non-Native Species in the Project Area

No non-native species will be used as part of project activities in the project area.

B1.5. Guarantee that No Genetically Modified Organisms (GMO) will be used in the Project

The project does not make any use of genetically modified organisms in the project activities.

B2. Offsite Biodiversity Impacts

B2.1. Identification of Potential Negative Offsite Project Impacts

The project activity will not generate any negative offsite biodiversity impacts that can be clearly linked to the project activity. It will bring about a clear and positive impact on biodiversity within the project area but the project is not expected to result in significant leakage outside the project zone as documented in earlier sections. This is largely because drivers of deforestation and threats to biodiversity are local and almost all the forest within the region is included within the project area. Therefore activities driving deforestation or biodiversity loss will either stop or will continue within the project area in which case they will be measured as part of the project area monitoring

B2.2. Mitigation Strategies for Negative Offsite Biodiversity Impacts

As stated in the section B2.1, no negative offsite impacts on biodiversity are likely due to the project and so no mitigation measures are envisaged by the project. Nevertheless, the project is being conducted in the context of Madagascar's overall strategy for biodiversity protection and climate change mitigation. There are several other conservation activities ongoing in areas immediately to the north and south of the COFAV project area that will help to mitigate any displaced illegal activities that would impact negatively on biodiversity. Immediately to the south of the project area are the existing protected areas of Andringitra and Pic d'Ivohibe as well as the southern section of the COFAV protected area. To the north of the COFAV carbon project area, the new Marolambo national park is being created. In addition, the existence of such a large and important conservation project in this part of Madagascar has already and will continue to raise the profile of the importance of environmental protection with regional authorities, regional government services, local business and the general population. Over time we expect this to help change attitudes and improve general environmental stewardship in the regions around the project zone.

B2.3. Unmitigated Negative Off-site Impacts on the Biodiversity Benefits of the Project

There are no likely offsite negative biodiversity impacts of the project and therefore no unmitigated ones.

B3. Biodiversity Impact Monitoring

B3.1. Biodiversity Monitoring Plan

The core of the biodiversity monitoring plan is provided in the COFAV management plan written in 2010. The plan has been developed based on the Open Standards for Practice of Conservation approach. Local experts (local and national biologists and conservationists/foresters with good knowledge of the site and local community members) identified the conservation targets for the protected area as well as the main threats to these conservation targets. The plan includes an initial assessment by these experts of the condition of each of the biodiversity conservation targets and the

level of the main threats to biodiversity. This expert assessment will be repeated with every update of the management plan (every 5 years) and will therefore be one form of ongoing monitoring.

However the plan also notes the need to have more monitoring for the conservation targets and main threats. Table 20 below summarises how this information is or will be collected. As can be seen from the table, the main source of information will come from participatory monitoring conducted by community associations. To collect this information, community associations have been trained to collect information on a selection of the most important species and on threats to biodiversity. Information is collected on a monthly basis by teams of community rangers that record sightings and detection of threats and map them. Data is collected from both fixed transects and during patrols along pre-planned routes that vary each month. Data from community monitoring will also be verified by and supplemented with information collected in exactly the same by professional biologists. This will allow us to either validate or identify problems with community-collected data and to focus training efforts if data collection problems are identified. The first of these "validation" studies using the new monitoring system was done in 2012 and this will be repeated annually during the project lifetime. The project is building the database and data management systems to automate the storage and display of this information so that it can be an effective tool for adaptive management. Detailed project manuals on the monitoring methodology have been made available to the auditors.

Table 20. Conservation targets and biodiversity threats to be monitored

Conservation Targets	Method/source of Information	Frequency
Lemur species	Community participatory monitoring based on direct observations. Data can be used to give an index of population trends	Ongoing monthly data collection
Commercially collected animal species	Community participatory monitoring based on direct observations. Data can be used to give an index of population trends	Ongoing monthly data collection
Commercially collected plant species	Community participatory monitoring based on direct observations. Data can be used to give an index of population trends	Ongoing monthly data collection
Rainforest	Satellite image-based deforestation monitoring	Every VCS monitoring (usually 2-5 years)
Wetland areas	Specific assessment of species diversity and habitat condition by biodiversity professionals. Methodology to be developed	Every 5 years

Biodiversity Threats	Method/source of Information	Frequency
Deforestation	Satellite-image based deforestation analysis	Every 2 years
	Threat reporting from community patrols	Ongoing monthly data collection and reporting
Collection of plant species	Threat reporting from community patrols	Ongoing monthly data collection and reporting
Signs of hunting (snares/traps)	Threat reporting from community patrols	Ongoing monthly data collection and reporting
Fire	Satellite-based fire alerts	Daily analysis; data can be compiled for different time periods according to need.
Illegal mining	Threat reporting from community patrols	Ongoing monthly data collection and reporting
Illegal forestry	Threat reporting from community patrols	Ongoing monthly data collection and reporting

B3.2. Assessment of the Effectiveness of Measures to Enhance High Conservation Value Areas

The project has started to use the Protected Areas Management Effectiveness index to obtain regular measures of the overall effectiveness of management of the project (Hockings et al, 2000). An initial score for this index was measured in 2010 and the measure will be made annually from 2013. This index is already widely used in Africa and Madagascar and allows a basic comparison of management effectiveness across different conservation sites.

The project also used the Open Standards for the Practice of Conservation for developing its management plan and this includes monitoring of the effectiveness of the conservation targets identified as part of the conservation planning process for the site. In the case of COFAV, all of the HCV areas have been included as conservation targets and are therefore the subject of monitoring. An expert assessment of the condition of these conservation targets will be made at the time of each management plan update, every 5 years. This will be the primary system that allows the project to track changes in the condition of conservation targets over the course of the project.

In addition, deforestation monitoring for all of the forest HCVs will be done during the deforestation monitoring that is needed for tracking changes in GHG emissions. This monitoring will therefore provide regular updates on the extent of HCV areas.

The project also uses two main monitoring tools to identify threats to HCVs on a near- real time basis and has a third system in development:

The project already uses the Fire Alerts system developed by Conservation International in collaboration with the University of Maryland (see www.firealerts.conservation.org). This system takes daily information provided by the University of Maryland's identification of fire events from MODIS satellite imagery and sends project specific information to subscribers. This information allows the project team to identify fire events within COFAV. Such information can be used to rapidly initiate investigations as to the cause of such events and to build up a picture of parts of the forest that are particularly threatened. Such information is useful for planning enforcement activities and to prioritise conservation efforts within the corridor.

The project has developed a system of participatory community monitoring through which species and threats are recorded and mapped every month. This system is based on patrols and therefore does not cover the entire area every month. However over time we anticipate that this will help to identify particular problems at a very fine scale. In addition it has clear benefits in engaging the local community associations in regular conservation activities. This system has been tested already and used on a small scale but its use will be expanded during 2013-2014 as part of efforts to build local management capacity. Ultimately the project aims to have this community monitoring in place throughout the project area.

Conservation International is currently in the early phases of developing a near real time forest encroachment alerts system that will work on the same principles as the existing fire alerts system but will provide information more specifically targeted at deforestation. We anticipate this system will become available and deployed early on during the project lifetime (probably in 2016-17).

B3.3. Commitment to Biodiversity Monitoring Plan Timeline

Management plan monitoring is implemented, and the first assessment was complete in 2010, future assessment will be conducted and renewed every 5 years.

The next national land cover change, which cover HCVs will be analysed by 2013, updating the mapping of 1990-2000-2005 to 2010. Deforestation within project and leakage areas will also be analysed at every VCS monitoring report,

The fire alerts, which provides daily information on fire occurrence to subscribers, is being used since the start of the project. The fires system will continually be used in the monitoring of deforestation. The forest encroachment alerts are expected to be implemented by 2017, after technical training and depending on funding availability. The system will provide monthly or bi-monthly alerts of recent deforested areas.

Golden Level Section

GL1. Climate change Adaptation Benefits

GL1.1 Likely Regional Climate Change and Climate variability scenarios and impacts in the absence of the project

A national assessment of the impacts of climate change on Madagascar's Biodiversity and livelihoods concluded that the projected changes in climate for Madagascar show warming across the island and areas of both increased and decreased precipitation (MEEFT, 2008). Based on analyses by Tadross *et al.* (2005) that used downscaled Global climate Models, the lowest expected changes are in the north of the country and along the coastal regions where increases are expected in excess of 1.1 °C. Expected warming increases inland and in the south where it is in excess of 1.5 °C. Around the coast the maximum expected change is in excess of 1.8 °C, which rises to more than 2.6 °C in the south. The projected median changes in rainfall suggest that rainfall will increase throughout the summer months of January to April. Throughout the winter months of July, August and September the southern half of the east coast is projected to be drier by 2050, while the rest of the country is projected to be wetter. While any projections should be used with caution, these results suggest that COFAV will experience higher minimal and maximal temperatures in the future, with increased precipitation during summer but a drier period in winter. As noted in earlier sections, there can be considerable differences in local climate within different parts of COFAV and so a wide range of micro-climates is likely persist in the forest as a whole.

Studies of national deforestation rates (e.g. Harper *et al.*2007, MEFT, 2009) from recent data reveal a rapid loss of forest and paint a bleak picture for the future of Madagascar's forests outside of protected areas. The role of large areas of forest in driving local weather patterns is widely recognized as is the role of forest in hydrological processes (e.g. Millenium Ecosystem Assessment, 2005). The protection of forests is also increasingly being recognized as an important ecosystem-based adaption measure by global development institutions (e.g. Dave et al. 2010; World Bank, 2010). As argued in earlier sections of this document and in greater detail in the Project Description submitted for validation under the Verified Carbon Standard, large areas of COFAV's forest would be lost in the absence of the project to protect it. It is extremely likely that this would result in exacerbating the local impact of climate changes that are already predicted. Studies of similar areas to COFAV have shown that they provide an array of ecosystem services, notably in the form of local climate regulation and hydrological benefits that are of great value to local people, regional and the national economy (Portela et al., 2012). The loss of forest cover in COFAV would almost certainly result in changes and losses to many of these ecosystem services.

GL1.2 Identify any risks to the project's climate, community and biodiversity benefits resulting from likely climate change and climate variability impacts

The anticipated climate changes described in GL1.1 are likely to significantly impact on community and exacerbate the threats to biodiversity in the absence of the project. However, through the project, mitigation will be feasible due to the proposed project activities.

Climate change will not in itself create significant risks for the implementation of the project. However communities will be under greater strain to deal with agricultural risks associated with climate change and this creates an even greater need for the project to be able to fund activities from carbon revenues.

The biodiversity benefits of the project are unlikely to be affected due to the size and variability of altitude and micro climates within COFAV. Therefore most of the species should be able to adapt to climate changes within the time frame of the project and as long as the project is successful at maintaining large areas of suitable habitat and the forest connectivity necessary to allow species movement.

GL1.3 Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of communities and/or the conservation status of biodiversity in the project zone and surrounding regions

An evaluation into the risks to livelihoods due to climate change at COFAV was undertaken as part of the preparation for the 2008 national assessment of the impacts of climate change on biodiversity and livelihoods (MEEFT, 2008; USAID 2008). The results of this evaluation highlighted that many farmers in the region already perceived that there were changes to climatic conditions and that these were already having an impact on farming. Losses of environmental services such as erosion of valuable topsoil and seasonal water shortages were highlighted as problems. Participants at the national assessment recommended that rural development activities in the region should pay strong attention to activities that restore or improve environmental service provision, in particular encouraging agro-forestry systems, planning agricultural development using an eco-agricultural approach, improving the management of fallows, increasing farmer to farmer sharing of best practice and helping to develop livelihood activities such as beekeeping, fish farming and promoting small scale animal husbandry. These discussions and recommendations were important inputs into the design of the small grants program that was developed for the project.

Climate change impacts on biodiversity are expected to force changes in current species distributions in Madagascar (Hannah et al., 2008). Modelling using MAXENT and downscaled Global Climate Models to investigate future species distributions suggests that the ability of species to shift through forest habitat will be essential for species survival (Conservation International, 2011; Busch et al., 2012). Two separate climate change assessments have highlighted the importance of maintaining and improving forest habitat connectivity in Madagascar to mitigate for such changes by allowing greater natural movement of species in response to changing conditions (MEEFT, 2008; Conservation

International, 2011). The Conservation International (2011) assessment identifies COFAV as being one of the key areas needed to conserve forest connectivity to allow species movements. Further fragmentation of forests in COFAV that leads to cuts in the forest corridor is likely to restrict the ability of species to shift their distributions in response to climate change.

GL1.4 Demonstrate that the project activities will assist communities and/or biodiversity to adapt to the probable impacts of climate change

A recent study shows that communities in Madagascar living in areas near natural resources such as those in COFAV, live in extremely difficult circumstances and have very few options for coping mechanisms for agricultural risks caused by climatic events and variability (Harvey et al., in press). Typically most families experience several months a year with insufficient food. To mitigate for this, improving food security is absolutely essential to increase community resilience in the face of climate change. There are very few opportunities for remote rural communities such as those at COFAV to access agricultural extension services and funding to invest in the basic necessities for improving agriculture. The types of activities described in section CM1 and options that the modest funding that the COFAV project will be able to provide for communities based on stable, long-term revenues from the sale of carbon credits are essential to improve the livelihoods of the communities. As already described in sections GM3.2 and CM1, the great majority of projects that have already been funded and that communities request are those that help to improve food security and/or household revenues so that families can buy more food. As such, these are exactly the types of activities that need to be done to assist local people in the phase of climate change.

The project aims to maintain the forest corridor and ensure that it is protected into the future. Maintaining optimal habitat for the forest biodiversity of COFAV is the essential activity that is needed to help ensure large and healthy populations of plants and animals. As such the project activities are exactly those needed to help biodiversity to adapt to future climate change.

GL2. Exceptional Community Benefits

GL2.1 Demonstrate that the project zone is in a low human development country

Madagascar is classified as a low human development country in the latest UNDP Human Development Report and is ranked 151 of 186 countries (UNDP, 2013).

GL2.2 Demonstrate that at least 50% of households within the lowest category of well-being (lowest quartile) of the community are likely to benefit substantially from the project

Many of the households in the project zone are classified as vulnerable and have extremely low income levels. Defining the lowest category of these extremely poor people as the lowest quartile is therefore extremely difficult and not useful in context of COFAV. Instead people in the project zone considered to be vulnerable were identified through the process to develop the social safeguards plan (BIODEV, 2010). Households were classified as vulnerable and affected by the project if they used the forest and one or more of the following conditions applied:

- Food insecurity with a families having less than three meals a day
- Basic house of small size and built of basic materials
- Inability to pay for children to go to school
- Difficulty for the household to access/pay for medical services
- Problems with access to potable water
- Lack of good quality clothing
- No land holdings

As described in section CM1, the project expects to provide substantial benefits to the majority of the vulnerable population both directly from employment opportunities, development activities and indirectly through ensuring that these people have access rights to natural resources, that the resource continues to exist and that land is not appropriated for other interests. The project has already undertaken projects that have benefitted all of the 12,501 households identified as vulnerable in the context of the social safeguards work. The small grants program has also benefitted vulnerable households and over the project lifetime this number is expected to greatly exceed 50% of the vulnerable population affected by the project.

GL2.3 Demonstrate that any barriers or risks that might prevent benefits going to poorer households have been identified and addressed

As noted above, the great majority of the households in the project zone are extremely poor and therefore categorising those that are the very poorest is not feasible or useful. Instead the project works to ensure that people from all households have equal opportunities to benefit by participating in project activities and from development activities provided by the project. The project has identified all the vulnerable households in the project zone that are affected by the project and therefore these individuals are well known to the project and can be involved in activities more easily. Targeted project activities to address development needs of these individuals have been organised through the social safeguards process (BIODEV, 2010).

The project encourages all members of the community to become members of the associations responsible for the management of the forest. This ensures that they are involved in decisions regarding the local use of forest resources and that their views are represented within the project.

Continued efforts to encourage participation of these associations by all households and particularly by women will be essential throughout the course of the project.

GL2.4 Demonstrate that measures have been taken to identify any poorer and more vulnerable households and individuals whose well-being or poverty may be negatively affected by the project

As explained in section G5.3, the project has identified the vulnerable people affected by the project following the World Bank's Operational Procedures 4.12. The results of the study are provided in the Social safeguards plan along with the actions that have been taken to mitigate and compensate for any negative impacts due to the project (BIODEV, 2010). Mitigation projects were designed specifically for 12,501 of these households and were implemented in 2011. These projects were designed with the objective of ensuring that no household would be worse off due to the start of the project. Some of the households have also already benefitted from projects delivered through the small grants programs and conservation agreements which will continue over the course of the project.

GL2.5 Demonstrate that community impact monitoring will be able to identify positive and negative impacts on poorer and more vulnerable groups

Section CM3.1 provides detailed information on the monitoring plan and indicators that will be used to monitor community benefits for the project as whole. This monitoring will be used to identify the positive impacts brought by the project. In addition, a specific monitoring plan has been developed related to the social safeguards plan that is targeted at the vulnerable people affected by the project that have been identified in the project. Reporting the impacts of the project on these people is an ongoing requirement of the project for its environmental and social permit as defined in the "*cahier des charges Environnementales*" and will ensure that ongoing monitoring of any negative impacts is done.

GL3. Exceptional Biodiversity Benefits

The project proponent is using the vulnerability criteria to assess biodiversity importance.

GL3.1 Vulnerability: Regular occurrence of a globally threatened species (according to the IUCN Red List) at the site

As explained in section G1.7 of the document, the Fandriana-Vondrozo corridor has been identified in many conservation priority setting analyses as being of exceptional importance for the protection of global biodiversity. This biodiversity includes numerous threatened species as defined by the IUCN threat categories and listed on the IUCN Red list, all of which are resident species within COFAV (Table 21).

Table 21. Flagship threatened species found in the Project Area

Mammals	Threat category
Eulemur cinereiceps	Endangered
Prolemur simus	Critically endangered
Hapalemur aureus	Endangered
Cryptoprocta ferox	Vulnerable
Limnogale mergulus	Vulnerable
Fish	**Threat category**
Ptychochromoides vondrozo	Endangered
Paratilapia vondrozo	Critically endangered
Bedotia sp Vevembe	Critically endangered
Birds	**Threat category**
Sarothrura watersi	Critically endangered
Neodrepanis hypoxantha	Critically endangered
Amphibians	**Threat category**
Mantella bernhardi	Endangered

Source: MEF, 2010

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