Carbon Emissions Reduction Project in the Forest Corridor Ambositra-Vondrozo

Distinctive features

The Ambositra-Vondrozo Forest Corridor (COFAV) is located in the southern half of the Madagascar. It encompasses 285,800 ha of primary forest. The corridor lies on Madagascar's eastern escarpment and links the Ranomafana National Park in the north and the Andringitra National Park in the south. The COFAV is critically important for biodiversity. Over 800 species of plants and 300 species of animals have been identified in these forests.

Forty-three communities live in and around the COFAV. They use the forest for collecting timber and non-timber forest products, grazing their cattle, and in cultural and spiritual ceremonies. The causes of deforestation include shifting agriculture, illegal small-scale mining, illegal logging, and infrastructure extension.

This project aims to reduce deforestation, conserve biodiversity, and enhance well-being of local communities. The proponent is the Ministry of Environment and Forests. Conservation International provides technical and financial support. The total project area, including non-forest land, is 663,936 ha and consists of the main management areas of the COFAV protected area (strict conservation zone and a surrounding buffer zone), managed forest areas contiguous with the protected area, and non-forest land adjacent to the project boundary. The project activities are to stop unplanned deforestation from villages in and around the project area.

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 slash and burn agricultural practices, increase revenue-generating activities compatible with forest conservation, increase effectiveness of community management of the protected area, build capacity of local social organizations, and increase the provision of forest products and services.

	Heading	Explanation
Locational factors		
	**Location**	Located between Ronomafana National Park to the north and Andringitra National Park to the south in south-eastern Madagascar
	Spatial boundaries	Project area: 135,212 ha Reference area: 3,963,886 ha (encompasses the project area and the leakage belt and is approximately 29 times larger than the project area) Leakage monitoring area: 121,073 ha belt Leakage management area: 528,723 ha; the leakage management areas include all non-forest land within the community-managed areas.
	Land cover	Evergreen rain forest, herbaceous wetlands
	Agents and drivers of forest cover change	**Agents:** Small scale, subsistence farmers **Underlying drivers:** Lack of alternative livelihoods to subsistence agriculture; Lack of road infrastructure to support economic development; Population growth rate of Madagascar in rural areas of 2.4% **Proximate causes:** Shifting agriculture is the major threat to forests. Artisanal logging, mining, and charcoal production for local use are also causes of deforestation in the country, but are not evident in the project area.
Basic project features		
	**Objectives**	▪To enhance of the wellbeing of local communities through sustainable development, conserve biodiversity, maintain ecological connectivity, enable the sustainable use of natural resources and maintain ecosystem services ▪To ensure the forest stakeholders gain economic benefit from the establishment of the protected area
	Proponent/s	Government of Madagascar-Ministry of Environment and Forests (MEF) represented by the Direction Générale des Forêts (DGF)
	Tenure and Carbon rights holder/s	Government of Madagascar
	Actors involved in project design and implementation and their roles	▪ Conservation International (CI): Technical and financial support to project development and implementation, and carbon monitoring (Management of the protected area with the objective of reducing deforestation has been delegated by the DGF to CI.) ▪Village Level Associations and Federations: Implementation of project activities

	Upfront financing	Funding for the project activities is secured by the Government of Madagascar from 2013 to 2015
	Start date	1 November 2007
	Crediting period	30 years
	Baseline emissions	
	**Methodology**	VCS VM0015 REDD Methodology, Methodology for Avoided Unplanned Deforestation v1.1
	Reference data (unplanned deforestation/degradation)	Reference period: 1990-2005 Imagery: Landsat 5 TM and ETM+ images were used to create land cover maps for 1990, 2000 and 2005 over the entire reference area. To assess the accuracy of the forest cover map for the 2005 data, a set of 250 points was sampled, randomly distributed across the reference region. A visual interpretation of the land use land cover of each point using high resolution images available on Google Earth (Quickbird, 5m spatial resolution) was performed, and the results were compared with the supervised classification.
	Reference data (planned deforestation/degradation)	Not applicable
	Stratification of project area	Only one forest class
	Deforestation/degradation rate and location	**Historical (unplanned deforestation/degradation)** 1.23% deforestation per year **Projected** 1.23% per year; 13,896 ha deforested in the project area from 2008-2017 **Likely baseline scenario** Deforestation initially caused by shifting agriculture, followed by population growth leading to increased demand for agricultural land and forest resources. **Modelling or other procedure to establish baseline** ▪The project applied the historical average rate of 1.23% deforestation per year of the entire reference area to the project timeline. ▪The portion of the annual areas of baseline deforestation for each forest class within the project area and leakage belt was determined using GIS. To predict future deforestation, the proponent developed and tested a model using IDRISI Land Change Modeller (LCM). The proponent prepared spatial data on driver variables, produced a map of locations' "potential" for deforestation, and produced a map of projected locations of future deforestation

	▪LCM uses a neural network approach for modelling the "risk" map. Neural network is a multilayer perceptron in which a first set of known areas of change (historical deforestation) are used as training areas to develop a relationship with factor maps using an activation function. Once the development of the relationship is complete a second set of known areas of change is used to test the relationship and confirm the activation level maps. For the geographical analysis, the model calibration was done using data on deforestation from 1990 to 2000, and the model was confirmed/validated using data on deforestation from 2000 to 2005. ▪A heuristic approach was used to create the factor maps. The categories of drivers identified for this area are the rural population that is dependent on farming, access to the forest, and terrain. Various combinations of the driver variables and the deforestation between 1990 and 2005 were used to produce maps of deforestation risk. The technique assessment - Figure of Merit (FOM) - was applied to assess the accuracy of the model in each forest stratum in a statistical manner.
Carbon pools	**Carbon pools included** ✓ × ▪Aboveground tree biomass ✓ ▪Belowground tree biomass ✓ ▪Non-tree woody biomass × ▪Litter × ▪Dead wood ✓ ▪Soil × ▪Wood products × **Estimation method** ▪The project adopted a semi-randomized/clustered sampling design in which predetermined general areas known to be accessible were identified and then sample plots were located randomly within them; 60 plots are located on the eastern side and western side of the corridor ▪At each sampling location biomass measurements were taken within a circular nested plot (4 circular sub-parcels with 2, 4, 14, and 20m of radius) using the standardized methodology provided by Wintock International; Minimum diameter for trees included is 30 cm at breast height (DBH) ▪Above ground biomass of the forest classes was calculated using allometric equation: [AGB]est = exp(-1.159+2.297 log (D)+0.83 log(p)) Where, AGB = Above ground biomass (kg); D=Diameter at breast height (cm); p=Wood density (g/cm^3); a regional default value is 0.61

	▪Below ground biomass and deadwood were derived from the above ground biomass estimates using published conversion factors
Carbon stock changes	▪Shifting agriculture assumed to be the post-deforestation land cover, holding 30% of the average forest carbon stock ▪Above ground biomass: Forest class immediately releases 100% of the carbon stock at the end of the year of the deforestation; Post-deforestation class observes a linear function increasing from 0 tCO2/ha at the year of the deforestation to 100% at year 10 after the deforestation event ▪Below ground biomass and deadwood: Forest class immediate releases 1/10th annually of the initial carbon stock from year of the deforestation event; Post-deforestation class observes a linear function increasing from 0 tCO2/ha at the year of the deforestation to 100% at year 10 after the deforestation event
GHG emissions:	Non-CO2 greenhouse gas emissions from forest fire are included
Net emissions without project	8,731,419 tCO_2-e

Project GHG emissions reduction strategy

Scope	Avoided unplanned deforestation
Activities	▪To stop the unplanned deforestation from villages in and around the project area, the project activities include: ▪Create sustainable use zone: sustainable forest use areas by local communities, restoration areas, and non-forest service areas for tourism, education and infrastructure ▪Provide training to communities to improve farming techniques ▪Create nurseries for reforestation activities
Leakage mitigation strategy	▪Leakage management measures include a suite of improved agriculture and alternative income development, including: ▪Improved water management and the construction of systems and small reservoirs ▪Promoting biological anti-erosion measures and the planting of hedges ▪Adopting zero-or low-tillage cultivation techniques ▪Putting in place agroforestry ▪Reforestation and enrichment planting of degraded natural forest ▪Establishing community activities for fuelwood, charcoal production and timber

		▪Improving the long term sustainability of savoka fallows through the use of native species
	Non-permanence risk mitigation strategy	▪Risk of leakage will be mitigated by building strong partnerships with communities surrounding the project area ▪The project activities and leakage prevention will be carried out with all of the deforestation agents inside and around the project area
	Additionality	▪Investment analysis: Simple cost analysis is applied including costs of establishment and management of the protected area and the leakage prevention activities ▪Barrier analysis: 1) Investment barrier-Long time funding is not available for this type of project activity ; 2) Institutional barrier- Lack of enforcement of forest or land use related legislation; 3) Barrier relating to local tradition-Traditional slash and burn farming presents a barrier to land use change practices necessary to implement the project activities; and 4) Barrier relating to land tenure, ownership, inheritance and property rights. Common practice analysis: Preserving forest not common practice as it is not viable
With-project emissions		
	**Effectiveness of measures**	Effectiveness level changes each year, starting at 20% in Year 1 and reaching 84% by year 10
	Carbon stock changes	▪Increase in carbon stock in strict conservation zone conservatively ignored. ▪Local resident harvest of some timber and fuelwood for household use according to defined sustainable quotas in Forest Land (Cat. B) will not decrease carbon stocks in comparison to the baseline ▪Under the assumption of project effectiveness and following the methodology, the ex ante carbon stock changes within the project area are estimated by multiplying the annual total baseline carbon stock change by an Effectiveness Index
	GHG emissions	Emissions from forest fire included
	Leakage	**Types** Activity shifting: Deforestation from unplanned slash and burn agriculture by communes living in and around the project area Market leakage: none **Deduction** 24,481 tCO_2-e
	Non-permanence risk	**Buffer:** 10%
	Ex-ante estimated net greenhouse gas	**Total over crediting period:** 2,209,652 tCO_2 over the first 10 year fixed baseline period

	emissions reductions	**Annual average:** 220,965 tCO_2 **Annual average per ha:** 1.63 tCO_2
	Monitoring of carbon stock changes and emissions	**Parameters** ▪Land cover **Methods** ▪Remote sensing analysis with ground trothing using GPS ▪GIS processing **Frequency** ▪Depending on parameter, but aiming at every verification
Stakeholder identification and engagement		
	**Stakeholders identified**	▪Community members affected by the project ▪Other stakeholders include national organisations (Local and regional authorities, CI)
	Identification process	▪Public consultation was held in every village within the communes concerned by the protected area to identify people that would be affected by the project
Full and effective participation		
	**Access to information and consultation**	▪The information about the project was disseminated by radio and through village meeting directly in the villages in the project zone ▪The project has informed key stakeholders with internet access of the opportunity to comment on the project documents
	Participation in design, implementation and monitoring	▪The project organized a meeting with local and regional government authorities to identify the most important area for biodiversity conservation within the forests ▪ Local communities and authorities were involved in the designation of the protected area boundaries ▪Community members will be invited for consultation and participation in establishing the boundaries of protected areas, the protected area management plan, & land use planning ▪Feedback from the public consultation meetings was used to refine the proposed boundaries of the protected area and the sustainable use zone, and development of management plan for the area
	Feedback and grievance redress procedures	▪To facilitate and formalise the complaints process, a complaints register for the project was placed in each commune for the collection of comments from the public during the delimitation consultation process ▪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 ▪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 (e.g. available internet access, message based mobile phone)
	Worker relations and safety	▪Safety measures are prescribed by regulations and CI operational procedures available on the intranet (for CI global) or in a local CI office ▪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 as fastening seat belts when traveling by car or wearing a life jacket when on board 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 or other emergency; 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.
Communities		
	**Without-project scenario**	▪Deforested land will increase over time due to population growth and increasing demand for both land and forest resources
	With-project scenario	**Expected net benefits** ▪Enhanced well-being of resident communities ▪Improved food security ▪Increased adaptation of farming alternatives to slash and burn agriculture ▪Improved local infrastructure ▪Increased revenue-generating activities compatible with forest conservation ▪Increased effectiveness of community management of protected area ▪Increased establishment of partnerships and funding for development projects ▪Increased capacity building for local civil society organizations ▪Increased provision of forest products and services ▪Small business development ▪Increased access and quality of local health and education

		Possible negative impacts on other stakeholders and mitigation strategy None
	Impact monitoring	**Indicators** Community income; community well-being; food security and nutrition; local infrastructure **Methodologies** ▪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 ▪The monitoring results will be communicated to local communities and all stakeholders through written reports and public forums **Frequency** Quarterly; Annually; Quadrennially
Biodiversity and ecosystem services		
	**Without–project scenario**	Without the project, the biodiversity in the project zone will continually decrease
	With-project scenario	**Expected net benefits** ▪Restoration of natural forest habitat ▪Linking of natural habitat ▪Formation of corridors between presently isolated protected areas ▪Formation of a regional scale forest corridors **Possible negative offsite impacts and mitigation strategy** None
	Impact monitoring	**Indicators** ▪High Conservation Values (HCV) of COFAV (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) **Methodologies** ▪Detailed project manuals on the monitoring methodology are provided ▪Main source of information will come from participatory monitoring conducted by community associations; Community associations have been trained to collect information on a selection of the most important species and on threats to biodiversity; Species and threats are recorded and mapped every month to identify particular problems at a very fine scale

	▪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 ▪Use the Protected Areas Management Effectiveness index to obtain regular measures of the overall effectiveness of management of the project to enhance HCV areas ▪Use the Fire Alerts system to identify fire events within COFAV **Frequency** Monitoring for the conservation targets and main threats includes 1) monthly data collection for Lemur species, commercially collected animal species and plant species; 2) every 2-5years for rainforest; 3) every 5 years for species diversity and habitat condition of wetland areas; and etc.

Progress

Validation	VCS validation report issue date: 7 October 2013 CCBA validation report issue date: 2 January 2014
Verification	No verification as of 02 December 2015
Number VCUs issued	Number: 0 As of: 02 December 2015

Further information

▪VCS Project Database:
http://www.vcsprojectdatabase.org/#/project_details/1047
▪CCBA Projects
http://www.climate-standards.org/?s=Madagasca

Documents reviewed

CCBA project design document:
https://s3.amazonaws.com/CCBA/Projects/Reduced_Emissions_from_Deforestation_in_the_Ambositra-Vondrozo_Forest_Corridor_(COFAV)-Madagascar_Project/Validation/Update/COFAV+CCBS+PD+2014_01_07_validated.pdf

CCBA validation report:
https://s3.amazonaws.com/CCBA/Projects/Reduced_Emissions_from_Deforestation_in_the_Ambositra-Vondrozo_Forest_Corridor_(COFAV)-Madagascar_Project/Validation/Update/CCB_CI_COFAV_FinalRPT_Validation_122913.pdf

VCS project description:
http://www.vcsprojectdatabase.org/services/publicViewServices/downloadDocumentById/15355

VCS validation report:
http://www.vcsprojectdatabase.org/services/publicViewServices/downloadDocumentById/15357