



Sanga Reforestation and Carbon Project, Mozambique



Project Idea Note (PIN)

February 2010

Basic Information

PIN Date

February 2010

Participants' information

Address: Strandveien 35, 1366 Lysaker; Oslo, Norway

Website: <http://www.greenresources.no>

Company's core business: Green Resources is a Plantation, Carbon Offset, Renewable Energy and Forest Products Company. The company was established in 1995 and is a private Norwegian company with 60 shareholders operating in Mozambique, Sudan Tanzania and Uganda. It employs more than 3,000 people and has invested NOK 300 million (USD 55 million) in its African operations since its inception.

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Project Characteristics

Scale of Project

The proposed CDM project is an A/R CDM project activity (reforestation) on 8,267 hectares (ha) of degraded land, of which approximately 3,500 ha will be reforested for carbon sequestration, and the remaining 4,767 ha maintained for conservation and agricultural purposes. The project will be implemented across two discrete parcels of land; a 4,767 hectare parcel located adjacent to the Malula community in Sanga District, and a 3,500 hectare parcel located adjacent to the Nconda and Malica communities spanning the Sanga-Lichinga district boundary

The reforestation project will utilise the CDM approved methodology AR AM0004 "Reforestation or afforestation of land currently under agricultural use" (Version 04)

Project type

The project is a land use/forestry project that will fall under the CDM's A/R category. In particular, the project entails the reforestation of degraded land that has been deforested prior to 1990.

Brief Description

Present Situation at Project Site

The project area is located in the Sanga district, Niassa province, Mozambique. The project boundaries have been delineated and approved by both local and regional authorities, and the involved communities. The total area of approximately 8,267 ha at Unango is divided into three blocks, two of which are on either side of the Miala road, just east of the Village of Miala, between the Chidindime and Luchimua rivers. The area is predominantly flat with an average altitude of 1,000 m although there are two peaks within the project area, Zuvi in the southern portion at 1,185 m and Maaze, in the northern block at 1,310 m.

The mountainous areas are predominantly covered by woodlands. All such areas that meet the requirements necessary to be classified as forest within Mozambique's definition of "30% canopy cover with trees of 5 m or more" have been designated by Malonda Tree Farms as areas to be set aside as conservation areas. In addition any area where deforestation has occurred post 1991 will be included within these conservation areas, with enrichment planting of indigenous species occurring.

Therefore planting activities will occur in the flat lowlands. These areas are predominantly grasslands, with some scattered area of shrubland. This analysis indicated areas that were deforested pre July 1990, and their current vegetation cover, as well as areas that have undergone deforestation post 1990 (based on satellite imagery from 2003).

Satellite imagery from July 1990, combined with historical data and local informants from the surrounding communities indicates that these areas were deforested in the 1980's as part of a government plan to carry out large scale agriculture. However, this agricultural development has never occurred, and the land has become characterised by abandoned grasslands and small scale shifting machambas (agriculture plots).

The majority of the Nconda / Malica parcel totalling approximately 3500 hectares is made up of grass and shrub land with only small pockets of forest and wetland areas. It is anticipated that approximately 2,000 hectares of plantation can be established within this parcel.

Project objectives

- To sequester carbon dioxide through the planting and maintenance of commercial forests in areas of grassland and shrubland that meets the requirements for CDM eligibility. This primary activity shall generate efficient greenhouse gas (GHG) reductions that can be measured, monitored and verified. The project participants shall demonstrate that carbon capture and storage through the development and sustainable management of commercial forest plantations is a viable instrument to encourage private investment in the forestry sector, with a particular emphasis on degraded lands.
- To establish and manage commercial plantations to meet the growing demand for quality wood products emanating from sustainable forest management. This will be achieved through certification of the project plantation by the Forest Stewardship Council (FSC).
- To promote environmental protection, through the conservation of soil resources, the protection of water sources and the enhancement of biodiversity and indigenous species.
- To develop a commercial scale nursery for the provision of indigenous species, to reduce the reliance on exotics, and promote the transfer of local knowledge.
- To facilitate socio-economic development of the local communities through:
 - The creation of direct and indirect employment opportunities
 - Income generation from the sale of carbon credits. Malonda Tree Farms will commit 10% of carbon funds to community development projects, to be decided upon by village committees
 - The promotion and development of community forest plantations by provision of free seedlings and technical advice, thus reducing pressure on existing forestland
 - Supporting infrastructure development within the region, including the construction of roads, bridges and the provision of clean water sources

Proposed Activities

Conversion of degraded grass and shrubland to managed forest ecosystems involving the use of latest available technology and knowledge.

Geographic information and positioning systems have been used to identify the areas of current grassland and shrubland, where deforestation occurred prior to 1990. Ground surveys have been carried out to confirm the extent of these areas. This plantable area

accounts for approximately 5,500 hectares however due to existing agricultural activities of the local communities in this area approximately 3,500 hectares will be reforested. This area under commercial plantation will be planted with predominantly *Pinus spp.* and *Eucalyptus spp.* in a ratio of 7:3. A nursery was created in 2006, which has the capacity to supply the planned planting area. Planting activities began in January 2007 in the Unango parcel, with 87 ha planted in the 2007 planting season. In 2008 a total of 486 ha was planted and in 2009 a total of 469 ha. Land preparation is currently underway for the 2010 planting season in which it is expected that 400 ha will be planted. Planting has begun in the Nconda / Malica parcel this year with 600 hectares of planting expected.

Planting occurs in January as close as possible to the start of the main rains, ensuring adequate soil moisture for optimal growth. These species are currently planted at 3 x 3m spacing. However from January 2009 this spacing will change as the result of pilot studies to 4 x 2m for *Eucalyptus spp.*, with the spacing of *Pinus spp.* remaining at 3 x 3m. The majority of planting activities within the MTF plantations are carried out by hand minimizing the usage of fossil fuels within the project site however in selected sites strip ploughing is undertaken under a strict regime to minimize soil disturbances.

MTF will plant the 700 hectares where deforestation has occurred since 1990 with indigenous commercial species, and, where appropriate enable natural regeneration of existing vegetation. The existing natural forest along rivers and valley bottoms will also be expanded with indigenous species aimed at enhancing the biodiversity in the area. Wetlands and other valuable natural vegetation will be identified, protected and kept intact. Carbon credits will not be gained for the areas planted with indigenous species. As there are currently low levels of local knowledge or use of indigenous species for commercial purposes, MTF is in the process of creating a fully trained team to implement the creation of an indigenous seed supply and nursery. Trial plots have been established in 2008.

Community Development

Successful long-term carbon sequestration through land management requires not only innovative plantation management, but also improved conditions and economic development of communities surrounding the project area. These communities have been involved in the process since prior to planting activities, giving their written agreement for the land to be used for such purposes.

As an integral component of all project activities, MTF works closely with the communities surrounding the plantation areas and is in the process of formulating a detailed plan for long term economic development, in conjunction with appointed village committees. To reduce anthropogenic impact on surrounding areas, and facilitate the move from shifting subsistence agriculture to sedentary production, MTF started to provide suitable land within

the areas adjacent to the communities, technical assistance and capacity to promote long term and intensive agricultural development. In addition MTF has begun a process to create community forests, aimed at providing free seedlings and technical expertise to local communities.

As part of Green Resources' company policy, MTF is committed to reinvest at least 10% of carbon revenues into improving the infrastructure of the surrounding villages, including the building of schools, dispensaries, water supply and roads. Prioritisation of inputs will be carried out through community councils, which are already in the process of being formulated. These councils also provide an ongoing mechanism for communication between communities and project staff.

Applied Technology

Malonda Tree Farms utilises the latest available technology during all aspects of project development. Specific silvicultural technologies are tested through trial periods, with those found to be most efficient continuing to be employed during forest establishment and development, plantation monitoring and verification.

Global positioning systems (GPS) and global information systems (GIS) are being utilised for the assessment of land eligibility. These techniques will continue to be used for verification and continued monitoring of the proposed A/R CDM project activity. A combination of satellite imagery and field observations are going to be used for the stratification of ecosystem types, and intensive field work and sampling will be combined with laboratory analysis for the determination of baselines and project scenarios.

Furthermore, within the proposed A/R CDM project activity, modern plantation technologies available for forest management and the latest silvicultural practices will be used. In addition to the requirements laid out under the Clean Development Mechanism, the approved methodology and associate monitoring plans, the following standards will be adhered to, and certification sought, where appropriate:

- Forest Management Plans
- Forest Stewardship Council's Principles and Criteria
- Environmental and Socio-Economic Impact Assessment reports
- Monitoring Plans in line with the approved methodology
- ISO 9001 and 14001 approaches will be introduced corporate wise

The A/R CDM project activity will rely on the company's own trained staff and professionals, as well as collaboration with local and regional forestry departments. Local NGOs will be involved in providing technical consultation and guidance, including training courses, quality

control checks. MTF's shall also seek advice from local, national, and international forestry, sustainable forest management and climate changed experts where required.

Greenhouse Gas (GHG) Emission Reduction (ER)

The estimated total removals by sinks are 102,000 tCO₂e up to 2012. The annual average storage during the crediting period of 20 years is estimated to be 26,200 tCO₂e.

Major GHG Abated

Carbon dioxide (CO₂)

Crediting period

The project has chosen a crediting period of 20 years, which will be twice renewable. The expected operational lifetime of the proposed A/R CDM project is expected to be 99 years, in line with the lease agreement for the land area.

Methodology

The methodology is approved and is titled as follows: **“Reforestation or afforestation of land currently under agricultural use”**

It is identified by the reference number: AR-AM0004, version 4

Justification and applicability of the choice of methodology

The areas selected for project development are applicable under this methodology for the following reasons:

- The project site is largely covered by unmanaged grassland vegetation smaller areas of shrubland. Satellite imagery indicates that the area underwent deforestation prior to June 1991, and since this time has continued to degenerate into dense grassland.
- The majority of the area underwent deforestation for conversion of agriculture and was later abandoned, giving way to grasslands, which were managed by local communities through the use of fire.
- Current land use has resulted in low soil organic matter resulting from frequent burning of vegetation making it unsuitable for profitable agriculture.
- The natural regeneration of miombo woodland has not occurred despite the majority of the land being abandoned over 20 years ago, with only small pockets of shifting

agriculture. Such regeneration is not expected to occur due to the absence of seed sources.

- Site preparation will not lead to significant longer term net decrease of soil carbon stocks.
- Soil drainage and disturbances are minimal, thus non-CO₂ GHG emission are likely to be insignificant.

Identification of the baseline scenario

The approved baseline and monitoring methodology AR-AM0004 version 4 is applied to the proposed A/R CDM project, **“Reforestation or afforestation of land currently under agricultural use”**. The following steps are followed in selecting the baseline scenario:

- Demonstration of the most likely land use at the time the project start:

Satellite imagery combined with extensive field visits indicates that the most likely land use at start of project is unmanaged grassland. Detailed ecological assessments carried out by local experts indicate that these areas were converted to grassland through a combination of fire and land use practices. The colonisation and competitive properties of the major grass species has resulted in a stable grassland ecosystem with small remaining patches of shrubland. Field visits and assessment confirm the area classified as grassland as a mosaic of abandoned agricultural land with small patches of areas of less than one hectare each currently under subsistence cultivation.

- Assessment of national and sector policies and legislation:

There are no existing plans to change the land use of the project area and Malonda Tree Farms has legal right to the land for a period of 100 years. This includes the consent of the involved communities, regional and national authorities.

- Assessment of demand and supply of wood resources for industrial and commercial purposes:

Current assessments show that current demand is greater than supply, placing considerable and increasing pressure on natural forest resources.

- Assessment of land-use practices and the prevailing land uses in the project region:

A combination of satellite imagery and historical data from local stakeholders has been used to indicate the prevailing land uses within the project area. Land use change occurred in the lowland areas as part of the governments 'State Agriculture Scheme', involving approximately 50,000 hectares that were cleared for large scale agriculture. This scheme, known in Portuguese as the 'Empresa Agrícola de Unango' (EAU) constituted the driver of deforestation in 1980. Small scale agricultural programs were begun for the production of

maize, soybeans, wheat, potatoes, and vegetables, although no irrigation scheme was established. However, in 1985, civil war forced the abandonment of this large agricultural scheme and closure of the EAU. Following the abandonment of the agricultural activities, plant succession took over and tall grasses covered most of the former agricultural land.

With the end of the civil war in 1994, and the return of displaced residents, small patches of smallholder household agriculture were placed within the former area of EAU creating scattered patches of cultivated land under itinerant subsistence agriculture. In 1998, commercial farmers, part of the Mosagrius initiative, farmed 10 ha for maize, but abandoned this area in 2000. Since then, only smallholder farms have been cultivating small scattered patches of no more than one hectare each.

The mountain areas (Maaze and Zuvi), as well as the northern area of the northern block, and the water streams (currently classified as woodlands) have never been cleared, therefore, maintained the native vegetation. Although these areas were not converted in large scale, local residents have been using intensively to collect different products for own use.

- Identification of plausible and credible land use alternatives:

The plausible land use alternatives are unmanaged grassland, small scale shifting subsistence agriculture, small A/R and large scale A/R. The first two are most likely as they bear little or no financial implication. The high initial investment costs and perceived high market risks and short term economic unattractiveness of private investment in forestry generally in Mozambique make large scale afforestation/reforestation very unlikely as plausible and credible land use alternative.

Description of the baseline scenario

Since no natural regeneration of trees can be identified within the project activity boundary, the sum of net carbon stock change in biomass carbon pools of all strata included within planting activities shall continue to be in steady state. Areas that are currently classified as forest, or on which deforestation has occurred post 1990 are maintained as conservation areas and thus excluded from carbon analysis.

For the remaining project area, dominated by grass and shrubs, the sum of carbon stock change in biomass carbon pools can be estimated based on the current biomass and carbon stocks in this vegetation, and the total sequestration by the planted species. The projected growth rate of these pools is assumed to be constant for the project lifetime.

In summary, the area is defined as grassland with scattered areas of shrubland, and has been found to be in a steady state. Areas classified as woodland or forest, as well as patches of riverine vegetation with trees and shrubs will be protected by the existence of the project,

however the project area as per CDM definition is limited to plantable areas of non-forestland only.

Documentation of the baseline scenario

Satellite imagery from June 1991 was combined with field observations to stratify the current land use into the following classifications:

- Grassland
- Shrubland
- Woodland

A time series of satellite imagery from 1991 through to 2003 (will be updated to 2009 images are available) indicates that the trend in land use change has been a gradual degradation from shrubland to grassland. To be conservative baseline scenarios have been developed based on the most recent imagery available (2005) for 2 different vegetation types: grassland and shrubland.

The baseline for each strata was developed using systematic sampling. Twenty sample plots were created, and the following procedures carried out within each plot.

Tree and shrub layer: A 20x50m plots was established in each sampling point where trees and shrubs were found. Open grasslands, in general, did not have a shrub or grass layer. However, there were areas where few scattered trees or shrubs within the open grassland. Within this plot, all trees and shrubs dbh > 5 cm were identified to species and measured dbh using a diameter tape. Height was estimated by an experienced forester to the nearest meter by a visual comparison with an object of known height. Total height was estimated for all trees and shrubs, while commercial height was estimated only for trees or shrubs with dbh > 10 cm. Trees and shrubs with 5 > dbh > 2 cm were identified to species, measured the dbh and total height in a 20x20 m subplot.

Grass and herbaceous layer: One square 1x1m was used within each sample plot to measure the above and below ground grass and herbaceous biomass using destructive methods. Fresh weight was measured in the field using a digital 0.001kg precision scale and root and shoot samples were taken for over drying in the lab. Grass and herbaceous species within the sample plot and in the surrounding area were identified to species by an experienced botanist, and specimens were collected for further identification in the herbarium in case of doubt.

A complete baseline survey should take place on land pre-planting. This is been carried out on some of the land, but an additional survey will be needed on new parcels of land.

Additionality

Key assumptions and rationale for demonstrating additionality

The lands to be reforested within the project boundary are unmanaged grasslands with areas of shrubland. Due to the multiple barriers in establishing commercial forests plantations in Mozambique, the only realistic alternative land use is to continue the current use/cover.

In this scenario, natural regeneration is not expected to occur due to the poor fertility status of the soils, the lack of seed sources capable of dispersing within the project boundary, and the ecological advantage of the current grass cover. This grass exhibits high competitive advantage for light and resources, and prevents the survival of any emerging seedling. Evidence for this includes the fact that regeneration of natural woodlands across the project area has not occurred over the past decades since forest clearance.

The continuation of the current situation therefore represents the “business as usual” scenario. Within this scenario, barriers to commercial plantations, not expressly for the purpose of carbon storage are numerous and have been identified as follows:

Investment barriers: Commercial forestry operations require significant upfront capital, while revenues do not begin to occur until several years after the start of the project. It is therefore hard for local people to finance the investment required, particularly as commercial local loans are not easily available due to the perceived high market risks and short term economic unattractiveness of reforestation projects. Such loans, if available, will not be possible for financing the additional requirements for success, including sustainable development objectives. Only with the anticipated additional support from carbon financing, as a potential CDM project, can the project developers raise the necessary short term financing needed and commit to the long wait for timber revenues.

Technological barriers: Good quality seedlings are virtually unavailable, particularly for indigenous species. Creation of own seed nurseries requires high silvicultural ability and capacity, and is costly and therefore only viable if the plantation area is to cover a large area, and is therefore difficult for local people to achieve.

Institutional barriers: These exist at every step of the way for local people who do not have the knowledge or access to information on how to manage the different aspects of a multi-faceted business such as commercial forestry, from finance, to silviculture and plantation management, to harvesting, timber production and finally sales.

Market risk: Timber prices are highly volatile and the investment period is typically 25 to 30 years. The guaranteed fixed element of income from an A/R CDM project reduces the perceived investment risk by providing a steady and upfront income stream. This provides

the project with an element of independence from having significant amount of capital tied to global and local timber markets.

Documentation of additionality

The A/R CDM tool for the assessment of additionality has been applied to ensure the proposed reforestation activity is additional. During the course of the project, additionality will be documented through the use of satellite imagery, cadastral information and official land use and land cover maps.

Emission reductions

Key inputs

$C_a = A * I * BEF * D * CF$ (for above ground carbon pool)

$C_b = C_a * R$ (for below ground carbon pool)

C = carbon content (t C)

A = Area of land under forest (m^2)

I = mean annual increment (m^3/ha)

D = basic wood density (t/m^3)

BEF = biomass expansion factor

CF = carbon fraction

R = root-to-shoot ratio

Assumptions in determining ex-ante calculations

- No significant displacement of activities within the project boundary
- Village afforestation is enhanced and supported
- Greenhouse gas from baseline scenario remains at a steady state
- Soil disturbance is minimal

Methodological choices

Due to the degrading nature of the project site from shifting agriculture and grazing, the baseline net GHG removals by sinks are expected to be neglected following guidelines from CDM EB 50, Annex 21. Leakage is also expected to be minimal, and thus classed as insignificant, inline with guidelines from CDM EB 51, Annex 13.

Estimated Amount of GHG Abated (CER/ERU)

Year	Estimation of baseline net GHG removals by sinks (tonnes of CO ₂ e)	Estimation of actual net GHG removals by sinks (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO ₂ e)
2007	0	0	0	0
2008	0	0	0	0
2009	0	0	0	0
2010	0	0	0	0
2011	0	0	0	0
2012	0	12,240	0	12,240
2013	0	115,671	0	115,671
2014	0	191,628	0	191,628
2015	0	217,924	0	217,924
2016	0	318,899	0	318,899
2017	0	290,155	0	290,155
2018	0	250,536	0	250,536
2019	0	237,936	0	237,936
2020	0	207,797	0	207,797
2021	0	194,312	0	194,312
2022	0	128,653	0	128,653
2023	0	96,160	0	96,160
2024	0	-382,704	0	-382,704
2025	0	-375,582	0	-375,582
2026	0	-155,859	0	-155,859

Average over crediting period (2007-2026) (tCO ₂ e)	0	67,388	0	67,388
Total for crediting period (2007-2026) (tCO ₂ e)	0	1,347,765	0	1,347,765

Expected Schedule and Host Country Approval

Feasibility Study

Has been carried out. Project has started.

Environmental Impact Assessment

Has been carried out for the entire Lichinga area by the Malonda Foundation. A detailed Environmental and Socio-Economic Impact Assessment for the whole project area, 4,760 ha must be done.

Social Impact Assessment

Pre-social Impact Assessment was made in August 2008.

Stakeholder Consultations

Preliminary consultations have been carried out, as well as mechanisms via which the community can voice concerns.

Throughout day to day activities the project continuously interacts with the local communities. Some villagers are full time employees of the company and many work as casuals during the planting season and large scale operations in the project. The company also participates in community and district meetings and identifies areas where the company may assist the local communities with improving their livelihoods and social status.

Schedule of CDM Related Pre-Investment Procedure

Designated Operational Entity (DOE)

Name of DOE responsible for validation: TUV-SUD.

Project Design Document

As soon as Green Resources secures funding for it, work on the development of a PDD will begin. The work required is envisaged to approximately 6 months and so will be completed mid 2010.

Validation

Usually takes about 4 months after PDD is submitted.

Registration

The Registration Process at the Executive Board of the UNFCCC is expected to be closed by the end 2010.

Host Country Approval Procedure

Designated National Authority (DNA)

Is already in existence and Green Resources has already had significant contact with it. Contact details are:

Ministério para a Coordenação da Acção Ambiental (MICOA)
Av. Acordos de Lusaka nº 2115, P.O. Box nº 2020, Maputo, Mozambique
Ms. Marília Telma António
Phone: +258-21 46 5849/46 6245 ; Fax: +258-21 46 6495

Start of Crediting Period

2007

Environmental impacts and impact on local stakeholders

- Change of land cover type from grassland to plantation forest of exotic species may change the natural habitat of some wildlife species. Mitigation measures include the planting of 700 hectares of indigenous species, as well as the conservation and protection of the remaining pockets of woodland, wetlands, streams and river banks.
- Nutrient export through forest harvesting has the potential to lead to soil nutrient depletion potentially threatening the sustainability of forest plantations. This will be mitigated through minimizing site disturbance, the use of manual techniques for land

preparation and planting, and the retention of litter and foliar biomass on site during harvesting and land preparation.

- Accidental forest fires may result in air pollution, release of green house gases, and exposure of soil surface to erosion and soil degradation. This threat is minimised by the creation and maintenance of significant fire belt and the establishment of effective fire fighting systems. Such mechanisms, along with a detailed fire prevention plan are already in place.
- The forest plantation of monoculture stands serve as breeding and spreading points for pests and disease causing agents. The use of a variety of tree species, the interspersing of commercial plantation with indigenous species, and the compartmentalization and blocking system of plantation management will limit the spread of diseases and pests.
- The establishment of forest plantations would necessitate the use of pesticides and herbicides to control certain pests and diseases that might endanger other faunas and human. Care will be taken to use only recommended and possible selective chemicals to control diseases and pests in plantation. To further reduce the risks of human exposure, the strict use of appropriate gears by plantation workers dealing in dangerous substances will be enforced. Also workers will be given appropriate trainings for handling dangerous chemicals and equipments. The project will adhere to the guidelines laid out by the Forest Stewardship Council (FSC) on the use of such chemicals.

Expected positive impacts on local stakeholders / stakeholders

- Promotion of community development through direct or indirect support
- Creation of employment opportunities for the local communities and qualified nationals
- Income from salaries and wages will contribute to improved living standard of the local population
- Creation of economic gain to local companies dealing in goods and services pertaining to the project activities
- Revenue boosting for the host country through various taxes, levies and royalties

Other Standards

In addition to its carbon capture and storage capacity, the proposed project activity advocates the highest quality credentials in the support of biodiversity and socio- economic



improvements. Furthermore, the proposed plantation is currently working towards FSC certification to ensure the production of high quality timber.