

Additionality

Nhambita Community Carbon Project

Envirotrade's Carbon Livelihoods Programme addresses poverty alleviation, sustainable development and biodiversity conservation while also tackling global warming in conservation areas recovering from protracted conflict. It is a new way of doing business which offers a new way of life for individuals, forest communities, and the natural environment. The Carbon Livelihoods model has been developed from the world-wide trade in carbon offsets pioneered by the Kyoto treaty on Climate Change and growing recognition of the valuable role that Payments for Ecosystem Services (PES) can play in development and conservation. Local farmers and forest communities manage the planting and growth of trees in return for proceeds from the sale of CO₂ offsets to customers in the developed world using the Plan Vivo methodology developed by the Edinburgh Centre for Carbon Management. The Carbon Livelihoods Programme in Mozambique enables individuals and companies to effectively invest in new forests and agroforestry that will absorb the carbon dioxide generated by their business activities. Envirotrade works with forest farmers to change the way their land is used and help them to boost their crop yields by the cultivation of nitrogen-fixing trees and plants, which enrich the soil and slow down deforestation. Communities manage fire and forest resources in a sustainable way.

The Nhambita Project is a Land Use, Land Use Change Forestry (LULUCF) project situated in the Chicare Regulado in the central Sofala Region of Mozambique that uses Payments for Environmental Services (PES) to fund land-use change, poverty alleviation and biodiversity conservation. The project was launched in 2003 by a consortium led by the University of Edinburgh, implemented and co-funded by Envirotrade Ltd with technical support provided by the Edinburgh Centre for Carbon Management. The project has been financed by a combination of donor funding from the European Commission and private finance from Envirotrade and has successfully traded 80 000 tCO₂ in Voluntary Emissions Reductions (VER's) to-date. The project which at present involves approximately 1000 participants or systems, makes use a combination of agroforestry,



reforestation, forest and fire management and soil conservation to sequester CO₂ and the Plan Vivo registry system to record and quantify sequestration.

The issue of additionality is central to the validity of climate change mitigation projects and their eligibility for consideration in voluntary market in carbon offsets. In looking at the additionality issue in the context of the Nhambita Community Carbon Project, the basis for establishing additionality is identifying what “a business as usual position” in the absence of the range of land-use change interventions introduced by the project would be. As additionality tests are always to some extent subjective, (the assumptions that underlie additionality tests are determined by the objectives that the additionality test is trying to fulfil) and the fact that many of the outcomes are difficult to quantify in terms of a scientific methodology or test, the Common Practise test is broadly applied to the project.

In LULUCF projects such as Nhambita the emphasis is therefore on developing a credible “without project” baseline scenario and this document makes use of studies and research conducted in the project area prior to commencement of activities that provide evidence of land-use practices and natural resource utilization prior to the commencement of the project to develop a “business as usual” scenario.

The project also makes use of monitoring of Permanent Sample Plots (PSP’s) throughout the range of the project area to establish the impact of interventions on the forest environment. Analysis of satellite and other data allows the project track changes in forest cover prior to the commencement of the project and monitor ongoing human impact on the forest in the managed project area and in adjacent areas.

In examining a hypothetical “business as usual” scenario the project developers identified a range of interventions in land use in the Nhambita community that would address unsustainable resource use and lead to significant increases in woody biomass and conservation of existing forest cover. The Plan Vivo system and methodology are used to record and register the baseline for individual participants and to quantify the contribution the additional activities make to land-use change.

The Plan Vivo protocol assumes additionality – it does not require evidence for certification as it is taken as given that any project of this nature working in an environment such as this is essentially additional. The project focuses on the following activities to sequester and manage carbon stocks in the Chicare Regulado:



1. Agroforestry – the existing shifting agriculture practices of the forest community rely on a combination of fallow and new forest clearance to maintain food production. Studies of the existing agricultural practices in Nhambita in the 1989 GERFFA study suggest that these are unsustainable in the face of increasing population, environmental damage caused by deforestation and the rather extreme range of rainfall that the community receives from year to year. This paper will argue that agriculture as extensively practiced in Chicare Regulado (Nhambita) prior to the project was unsustainable and that the extreme poverty and absence of food security that the GERFFA study revealed (reflected in malnutrition and seasonal vulnerability to a range of illnesses) would have continued unabated without a change in agricultural practices. The project uses a combination of carbon revenues and donor aid to bring extensive changes to agriculture using agroforestry techniques and sustained extension support to change the productivity of existing land. In the absence of this intervention it will be argued, falling fertility would have led to ever increasing forest clearance for agricultural purposes. Forest rehabilitation and conservation measures would therefore be ineffectual without a change in the manner in which existing agricultural land was used.
2. Forest rehabilitation – research conducted in the community into perceptions of natural forest resources suggest a lack of awareness of the finite nature of such resources and evidence in neighbouring communities where deforestation has advanced unchecked suggests that forest resources are consumed until they collapse. This is evident in neighbouring areas where charcoal production is central to livelihoods and production continues long after all of the economically viable trees have been removed and a combination of fire and extreme weather reduces these formerly forested areas into severely degraded landscapes. Research conducted in the community prior to the project indicates that there is no tradition of replanting indigenous tree species and that no tradition of seed collection and germination of new trees exists. In a business as usual scenario it would seem that reforestation would not have taken place in any meaningful way. The paper will also explore the lack of support from government institutions for social forestry and the complete absence of any extension support for social forestry from the existing institutions.
3. Forest and fire management – the research conducted into the management of the community forest resources suggests that communities lacked the capacity to use both timber and non-timber forest products in a sustainable manner as pressure on the land grew due to increasing population and environmental degradation. In a “business as usual” scenario it is unlikely that this would have happened. Uncertainty over land ownership and an absence of community “ownership” over land and resources compounded this problem and the disintegration of the institutions of civil society in communities like the Chicare Regulado during the protracted civil war exacerbated the poverty of social capital. This translated in the Chicare Regulado into a fragmented civil authority with competing centres of authority and a lack of legitimacy.

The project has worked to build social capital through democratisation of social structures, education and training, provision of resources and infrastructure and establishing legal instruments for community management such as land registration, bank accounts, venues for meetings and other key requirements for growth and development. The role of uncontrolled fire in the business as usual scenario in the Chicare Regulado is central to the traditional management of land and resources. Fire is used for hunting, land clearance,

boasting fertility in newly cleared fields and for smoking bees from traditional hives. The project has a range of interventions designed to address the issue of fire in a meaningful way that involves the community and brings direct benefits on various levels. Research suggests that without the project little or no regulation of uncontrolled burning would take place and the community would lack the capacity and resources to manage fire.

4. Soil management – research in the Chicare Regulado suggests that unsustainable use of natural resources including forest clearance, planting of riverine areas, uncontrolled burning, burning of agri-residues in an environment characterised by a cycle of drought and floods leads would lead to a rapid decline in soil fertility and the loss of top soils to erosion and nutrients to leaching. Given that soils in this region are very poor and that existing forest cover survives due to significant adaptation to the harsh conditions, without intervention soils remain largely unsuitable for sustained agriculture and would contribute to poverty and an absence of food security. Activities that manage, conserve and increase soil carbon in the area are therefore additional.

This paper examines the “business as usual” scenario for the Regulado against the back ground of these four broad areas of intervention that are designed to enable the community to access global markets in carbon offsets through the sale of VER’s.

Economic barriers to sustainable resource management and food security in Mozambique

Mozambique is one of the world’s poorest countries; although economic progress is being made and the government is committed to reducing poverty, 90% of the population lives on less than US\$1 per day (GDP per capita was estimated at US\$90 in 1996). In the Sofala region it is estimated to be as low as US\$45. The majority of poor households live in rural areas where improvements in the standard of living are restricted by a low level of agricultural development. This low level of development is due to limited access to agricultural inputs, markets and technical information.

A shortage of draft power due to tsetse fly infestation restricts the amount of land that each family can use; 29% of households cultivate less than 1 ha and yields are in general far below potential. The alternatives available to subsistence farmers are limited for most rural communities. The Miombo woodland contains a number of commercial timber species and licences can be obtained to harvest timber. However despite the fact that local people are given priority in National Park buffer zones most land concessions are given to large outside investors. The 1997 Mozambique land law allows smallholders to register their land rights, however few communities have taken advantage of this opportunity, largely due to a lack of accessible information and support.

The rural economy and social infrastructure of the Regulado was severely disrupted during the protracted civil war. Sofala province and the Gorongosa region was at the epicentre of the war and fighting in the Regulado and the activities of various armed forces and groups forced the majority of people off their land and into refugee camps along the Beira corridor. A study of the project area conducted in 1989 prior to the commencement of the project provides an insight into the historical factors influencing land use practices in and resource consumption in this community; in a section of the report entitled “Economic Systems” the research team found that:

“During Portuguese occupation the colonialists created a demand for agricultural products that determined economic activity in rural areas. *Regulo Chicari* reported that “shops that existed during colonial times were run by colonialists. Maize was exchanged at the shops for sugar, salt and children’s clothes. Maize was also sold and money was used to take children to hospital and pay for treatment. Honey, wax, sorghum, sunflower oil, peanuts, and beans were also traded or sold”.

With the end of colonialism this economic activity ceased. The onset of the civil war and closure of the National Park disrupted the regeneration of any economic activities and eventually prevented agricultural and gathering practices from taking place. When the civil war ended and people returned to their *machambas* agricultural activities resumed and in some cases excesses of food are now produced. In terms of economic activity, the community is, however, thwarted mainly due to lack of local demand and lack of infrastructure to transport produce to other areas.

Livelihood Activities : Of the families interviewed 100 % gained their livelihood from *machamba* activities. Though individuals were sometimes employed in other occupations, farming and food production was still undertaken by other members of the family. Agricultural production was found to be completely for subsistence purposes. Though some excesses were sold, this was reportedly never more than was kept for the household.”

(GERFFA – Social Forestry Component, Concept Paper: Local Communities and Concession Management; Debra Howell and Ian Convery, 1989)



Figure 1. Deforestation in Nhambita is drive by unsustainable "slash and burn" agriculture.

Under-development in Northern and Central Mozambique is linked to the central role which it played as a focus of conflict and violence during the civil war. It was ravaged by the war, its infrastructure largely destroyed, its social cohesion fragmented and it has retained a “Cinderella” status due to its political composition and the strength of opposition to the central government. The GERFFA study found that the *Regulado* was able to sustain itself in the immediate aftermath of the

war but pointed to the future scenario as the bulk of people returned and pressure on resources increased.

A study conducted in 2005 established that agro-forestry practices were not widely used and that deforestation linked to the clearing of agricultural land was often linked to a lack of information about the role of trees in relation to crops grown.

“About 70% of the Mozambican population live in rural areas (INE, 1997) where employment opportunities are limited. The people are largely dependent on forestry resources and shifting agriculture for their livelihoods. Shifting agriculture is characterized by a rotation between a short period of cropping and fallow periods. In this system of cultivation, fields are cleared, burnt and cropped for a few years, and then they are fallowed (Peters & Neuenschwander, 1988) for some years in order to recover from the nutrient loss caused by agricultural exploitation.

Most of the fields in Nhambita are around the homesteads. The agriculture system as in any African rural area is basic slash and burn. There are no cases reported on the use of fertiliser in Nhambita. Areas along Púngué River are considered as more fertile and can be cultivated during 15 consecutive years, while areas around the homestead are cultivated for a maximum of seven consecutive years. The main crops are maize, sorghum, millet, groundnut, cassava, beans and pigeon pea. Firstly, maize and beans are planted in the same hole, next sorghum or millet is planted in the same field three weeks later to avoid competition as sorghum and millet grow faster than maize. Cassava and pigeon pea are planted around the field. Some fruit trees are also planted in the field and other native species are left in the field during the land preparation. Fallow lengths vary from 5-15 years, after that the area is cleared and burnt again ready for a new cropping period. Fields in fallow are a source of fuel wood and making poles for construction.

Some trees such as *Kigelia africana* (Muvunguti), *Albizia glaberrima* (Tanga-tanga), *Lonchocarpus capassa* (Phacassa) and Nsavu are left in the field when the area is first opened. Farmers believe that these species do not have leaves which contain poison that may otherwise drop into the crops during rainfall and poison the crop. In fact, what happens is that these species have special crown architecture, not dense as the mango tree for instance, and it is possible that this crown architecture does not allow crops to compete with the tree for light. The leaves of these species are small and the throughfall does not damage crops because each drop of water has a low mass.

Above-Ground Biomass Accumulation In Fallow Fields At The Nhambita Community- Mozambique, Evelina Catarina Da Costa Sambane, A dissertation presented for the degree of Master of Science, University of Edinburgh, 2005

The Nhambita Community Carbon Project identified areas of activity that would contribute to national and regional government objectives that were not being realised due to a lack of resources. These include:

- Provide rural communities with access to alternative means of income generation
- Diversify smallholder production systems
- Support communities in registering their lands with relevant authorities
- Provide appropriate technical information and support to farmers to help them improve the productivity and sustainability of agriculture
- Provide data related to Miombo forests as carbon sinks and greenhouse gas mitigation resources

Baseline conditions and barriers to adoption of sustainable land use practices including agroforestry, reforestation and forest and fire management.

Specific problems identified in the Chicare Regulado include:

- Unsustainable use of forest resources
- Insufficient data and predictive outcomes of the unsustainable use of forest resources
- A lack of technical expertise relating to the use of agro-forestry techniques to improve agricultural production
- A lack of technical expertise relating to forestry activities to provide local incomes
- A lack of finances with which to implement tree planting and forestry activities

These problems were identified based on the review of existing research in the community, extensive meetings and interviews and available literature on the dry Miombo biome. The GERFFA study found the following “Potential Negative Aspects of Local Activities”

The main negative aspects associated with local activities are associated with charcoal and timber activities, uncontrolled deforestation for agricultural purposes and uncontrolled burning.

Illegal charcoal and timber production are perceived by local people to be the main causes of deforestation. This activity is carried out both by local and outsiders, though-large scale exploitation is mainly by outsiders. In these cases areas of forest may be completely cleared as opposed to selectively cleared, and rather than allowed to regenerate, may then be taken over by local people as agricultural land.

Slash and burn types of agriculture also require constantly new areas of land due to the fallow system which is required to maintain soil fertility. Increasing population numbers and decreasing soil fertility can result in larger and larger areas of forest being taken to meet agricultural needs.

Excessive numbers of fires are also problematic in the forest area. These occur for several reasons, for example burning may be used as a method of clearing agricultural land or as a method of flushing out small mammals, such as rats when hunting. Such fires may not be correctly supervised, resulting in uncontrolled burning.

Each of these practices may negatively affect the forest area; therefore pose a threat to the resource base.

(GERFFA – Social Forestry Component, Concept Paper: Local Communities and Concession Management; Debra Howell and Ian Convery, 1989)

The 1989 GERFFA study found that:

There is no Poste de Saude or Health Post within the Nhambita Regulado. The nearest Health Post is situated within a neighbouring Regulado. It is a well maintained, clean, concrete building that was constructed by GTZ in 1995. It has two rooms, one for consultation and one for examination and is open daily from 6 a.m. until 8.30 p.m. Treatments is mainly of minor problems and involves consultation and the distribution of medication. Operations are not performed. Consultation costs MT 5,000.

Though responsible for the building work, GTZ has no responsibility for the funding, medical supplies or functioning of the Health Post. The Health Post is funded by the Department of Health and medicines are provided by Gorongosa District. Medicines that are available are presented in Appendix 6.

The Health Centre offers a vaccination programme for BCG and polio, though this is only performed within the Health Post as there is no outreach vaccination programme. Measles vaccinations are only available in Villa de Gorongosa.

An outreach programme does exist in which health workers work with local communities offering health education and advice. Pregnant women are offered monthly examinations at the Health Post and a Traditional Birth Attendant is available to help during childbirth. Reaching the Health Centre involves a long and difficult walk to the banks of the Pungue River and along the river into the next Regulado. Distance to the Health Centre from Nhambita Base Camp and back is approximately 18Km (15Km direct from point to point).

The time taken to walk to the Health Post is 2 hours and 30 minutes in each direction. It should, however, be taken into account that this trial walk was undertaken by three healthy individuals, walking at a fast pace, without rest. Sick people, especially if attending with small sick children and babies would take considerably longer. It is feasible to estimate that attendance by a sick person or family from the Nhambita Zone, including the waiting and treatment time at the Health Post would occupy a full day from sunrise to sunset.

School: the school within Nhambita Zone was constructed by the German NGO, AAA in 1994. The school is built with bamboo and mud walls and a corrugated iron roof and although in a state of repair, is still being used. The building is still used though it is now in a state of disrepair. There is one teacher and children of all ages are taught, together though there are different textbooks for juniors and seniors. Female children had mostly left the school by the time they were 12 years old, though some older boys stayed on longer. The teacher is employed by Gorongosa District.



Figure 2. Water borne disease is linked to traditional wells in river beds.

The GERFFA study found in 1989 that resources were beginning to be used in an unplanned and unsustainable manner in the post-war period. This was yet to impact on resources due to the regeneration of forests during the war when the majority of the members of the community fled their lands. A significant increase in population (from a couple of hundred to over 10 000 people)

during the intervening period is now reflected in the destruction of forest that is now evident in recent satellite images. Pressure on the community forest resources is also increasing as large numbers of people who have no historical link to the community or the land are entering the area.

Evidence of this influx of outsiders into the community is to be found in the extraction of resources from taboo areas such as sacred groves including species that have traditionally been preserved because of their perceived value in traditional medicine or for other spiritual reasons. Clearly significant barriers exist to the implementation of land-use transformation based on reforestation and conservation of existing forest in the Chicare Regulado. The traditional use of uncontrolled fire for short term land regeneration, in hunting and other practices such as harvesting honey from traditional bee hives and the tradition of burning agri-residues are all barriers to the practices the project seeks to introduce in the target community. The study provides an insight into the use of natural resources and draws conclusions about the consequences of continued unsustainable use of these resources.



Figure 3. Uncontrolled burning in Nhambita.

Forestry resources are probably more abundant at present (1989) due to the out-migration of families during the civil war. This allowed the regeneration of the natural forest resources to take place and has consequently led to the absence of conflict in terms of resource allocation and use. This would also explain the higher than average daily fuelwood use. As resources are not scarce they are utilised freely rather than with caution. This does not appear to be problematic at present; however, in the

future such activities could have serious implications in terms of the sustainability of the forest resource base. This is for several reasons:

- Initially, in terms of demography, displaced families have returned to the area and new families are moving into the region from urban centres. The end of the war has created a stability in rural areas that has been absent during recent decades. These issues each have implications in terms of population growth and consequently pressure that is exerted on the natural resource base as more of each resource is required to meet the needs of a larger population.
- Secondly, in terms of machamba extension, there is no system at present controlling extension of existing machambas into forest areas. In conjunction with population expansion this could possibly lead to the clearance of large areas of forest for agricultural purposes. This will again threaten the existing standing forest resource base and therefore the sustainability of forest resources.
- Thirdly, the only trees that are presently being planted by the local community are fruit trees such as mango, papaya and banana. Forest resources are therefore being used as sources of fuelwood and construction material but are not being replaced by newly planted trees. This activity may be sustainable if natural forest regeneration exceeds the rate of exploitation. However, if population growth and therefore additional resource use is sustained there is a danger that exploitation of resources will exceed the natural regeneration rate. The resource base will therefore be overused and become degraded.

The study also found that even traditional agricultural practices that used fallow rotation systems were uniformly implemented and that certain families in the community were simply clearing more and more forest:

“Shifting cultivation is a form of agriculture in which soil fertility is maintained by rotating fields rather than crops. A piece of land is cropped until the soil shows signs of exhaustion or is overrun by weeds. The land is then left uncultivated (to fallow) in order that it can regenerate naturally while cultivation is carried out elsewhere. New sites are usually cleared by firing (slash and burn). This is the traditional farming technique in Nhambita.

However, though this is a traditional farming method within Nhambita, the level of knowledge in terms of fallow systems and the length of time that families left areas of their machamba to fallow appeared to vary. This was thought to be a result of different farming techniques and traditions that had been adopted during periods of absence as a consequence of the civil war. In addition certain families who had returned to their machambas recently had returned to fertile soil which had already been rested for a long period in their absence so were unsure how long they would cultivate their land before leaving it to fallow.

Other families, especially those comprising young siblings appeared to have little knowledge or experience of fallow so had not yet established a fallow routine. However, the rotation system was typically as follows: one area of land on the machamba is cultivated for between 5 to 10 years, or until the soil appears to decrease in fertility. After this time cultivation ceases completely and the area is left fallow for 5 to 10 years. The second area is then cultivated for the same period and then again left fallow.

Agroforestry activities have the potential to reduce workloads for agriculture. Although the implementation of the systems can be more labour intensive due to the time taken to raise and plant seedlings, when the systems are in place the time taken to clear forest for new agricultural land will be reduced. “

Prior to planting however, the dead vegetation was cleared, gathered and burned in small piles. There was no evidence of composting of waste. Composting is a preferable practice to burning as burning provides only a temporary nutrient input into the soil and has the associated risk of forest fires. Gathering of waste and composting, however, provides a high quality, natural fertiliser for fields in which the nutrients are released in a sustained manner into the soil and soil structure is improved. Danger associated with forest fires is also avoided. However, this represents a greater work-load for farmers in comparison to burning as waste must be gathered and turned and watered at intervals, then re-applied to the cultivation area.”

A number of by-products including fuelwood will be generated, which will have the potential to reduce collection time. The introduction of fruiting trees has the potential to increase household nutrition and possibly income levels". I

The GERFFA study found that members of the community were not widely involved in the planting of trees.

"37% of the survey were found to plant trees. These were virtually all fruit trees that were planted around the homestead. A number of people planted around the field margins and fewer still in the machamba fields, as trees in this area led to shading which was thought to reduce machamba productivity. Agroforestry methods and benefits were relatively unknown practices.

Planting fruit trees was reported to be a traditional activity, whereas planting trees for fuelwood was virtually unknown. All trees requested from the project were fruit trees, including tangerine and orange (*Citrus spp.*) and advocado (*Persea americana*) trees. Coconut (*Coco nucifera*), Mango (*Mangifera indica*), Banana (*Musa spp.*) and cashew (*Anacardium occidentale*) were also requested. Improved varieties of seeds that produced quality fruit for commercial purposes were requested.

Tree planting was mainly the responsibility of men and was mostly carried out using young wildlings that were transplanted onto the homestead or machamba. The wildlings were found growing on common land or given by a neighbour rather than purchased. Various methods were used to care for wildlings including clearing the area, giving water and in some cases giving manure and using fencing. 37% of people did not give any care to wildlings. A paradox was identified in that men are responsible for planting trees and requested fruit trees, whilst women are responsible for fuelwood collection and must endure the difficulties associated with this activity. As men are responsible for tree planting, women are limited in their ability to address any problems of fuelwood shortage."

GERFFA : A pilot socio-economic study of Nhambita regulado, completed during August – September 1997. Nhambita regulado is located in the buffer zone of Gorongosa National Park, Sofala Province, Mozambique



Figure 4. Unsustainable charcoal production in Nhambita.

Clearly tree planting as a component of land-change was not widely practiced in the community prior to the commencement of the project. Planting was restricted to a narrow band of species that excluded replacement of the indigenous species that were being lost to unsustainable land-use activities.

The Department of Agriculture was not actively involved in the region in the promotion of social forestry. A GERFFA study conducted in the neighbouring region found that :

“There are no social forestry activities currently carried out in the district. The 1997 FHI/M survey showed that of the total number of people in the district receiving extension support, only a very small percentage were reached by the DDA extensionists. This was reportedly due to lack of logistical necessities, such as transport needed to access communities which are situated in widely spread areas.”

“Trees were planted by individual families, however, these were usually planted on the homestead and were, in the vast majority of cases, fruit trees. Agroforestry was not practiced by many families, in fact trees were, for the most part, regarded as a threat to machamba productivity rather than a benefit.

Planting fruit trees was regarded as a traditional activity – knowledge of which was passed on through generations. Planting trees for fuelwood was an unknown practice – no doubt because such an activity was not needed in the past as forest resources were abundant and perceived as infinite. The introduction of tree planting for fuelwood may therefore be met with resistance from the local communities. However, planting fruit trees would undoubtedly be welcomed and would additionally lead to an increase in standing biomass in each area. Planting fruit trees initially may, through further discussion and activities, lead to increased interest in planting trees for fuelwood.”

SOCIO-ECONOMIC STUDY: NHAMATANDA JULY 1998 Completed by: Debra Howell (GERFFA/ETC)

These conditions were largely unchanged in 2003 when research for a dissertation published in 2004 found that :

“The study has conducted a detailed analysis of the local community, which was divided into two groups – a target community of Nhambita and the control communities of Boa Maria and Munhanganha. As per the socio-economic profile compiled by the present study, there is a widespread deprivation in the area. The major problems in the area include:

- There is no investment by the government or any private organisation in the area except for sporadic effort by some NGOs to organise local communities and initiate some income generating activities. Otherwise, the local infrastructure is poorly developed with no access to electricity, transportation and without any means of communication. On the positive side, the rehabilitation of the Gorongosa National Park after the end of the civil war seems to provide some fringe benefits to local communities in the form of employment opportunities and possibility of ecotourism etc.
- Most households are very poor with no regular source of income. This is indicated by low levels of ownership of durable items and by visual observations of the living conditions in the area. In order to have some cash in the household, most people depend upon casual labour, which may either be available in nearby towns or in bigger villages in the area. Agriculture is subsistence in



nature with hardly any excess production to sell. In case a household does have some extra production to sell, it is constrained by absence of any transportation facilities.

- The major problem in case of agriculture is low productivity, which is further exacerbated by frequent failure of crops in the dry season. Most farmers still follow the slash and burn system, with no use of any manure or fertilisers. With no access to irrigational facilities except for growing crops on residual moisture in floodplains, most farmers do not produce enough from their farms and have to buy food grains from the market.
- Apart from agriculture, most households share a close relationship with forests and utilise many edible (particularly in times of low food availability) as well as non-edible products. However, only a few households are able to add any value to these products so as to be able to sell them in the market, e.g. making mats from bamboo sticks etc. Charcoal production is not a common activity in the study area as it is located far away from the main road.
- The use of forests and other natural resources is mainly regulated by local leaders who constitute the traditional institution of Regulado, which is generally respected by most people in the area. However, there is a general perception amongst local people that there is abundance of forests which translates into total clearing of all vegetation when new machambas are set up.
- All natural resources are managed as common property resources, although once a piece of land has been allotted for agriculture, it is de facto privatised. However, due to the traditional system of shifting cultivation, most people do not have a long-term stake in any particular piece of land except when it lies in the floodplains of local streams and rivers. Movement from one piece of land to another is relatively easy and frequent with most households farming on more than one agricultural field.
- Malaria and water borne diseases such as cholera and diarrhoea are major threats to human health in the area. Since the local clinic does not have the required facilities to diagnose AIDS, its prevalence could not be ascertained. However, in general, about 1 in every 10 adults is infected with AIDS in Mozambique, which is a huge threat to human welfare in the entire region.
- Literacy levels are extremely low and in single digits for some communities such as Munhanganha. In case of women, the literacy levels are still lower and there is a significant gap between the literacy rates for men and women respectively. On the other hand, all communities have a positive sex ratio in favour of women. However, it could not be established as to whether this positive sex ratio was a result of low mortality of women or because of widespread polygamy.

Finally, as per the ranking exercises taken up separately with women and men, the women ranked the following problems in decreasing order of priority:

- Lack of employment opportunities
- Poverty
- Food insecurity and hunger
- Lack of health facility in the community
- Absence of a shop

The men ranked the following problems in decreasing order of priority:

- Lack of employment opportunities
- Frequent dry spells which had an adverse effect on agricultural productivity
- Absence of health facility
- Absence of a shop
- Lack of transportation facilities “

“Measuring The Socio-Economic Impact Of Carbon Sequestration On Local Communities: An Assessment Study With Specific Reference To The Nhambita Pilot Project In Mozambique : Rohit Jindal : University of Edinburgh, 2004

Conclusion regarding the baseline:

1. Financial Test

Economic and political conditions in the Sofala Province of Mozambique have prevented significant Land Use Land Use Change Forestry (LULUCF) activities taking place. The revenues from the sale of carbon offsets are significantly larger than the resources available to the community through any other source including from the central government. Research conducted in the project area has demonstrated that conditions required for economic development and livelihood creation are largely missing in this region. The income generated by the activities of this project is therefore additional to that which would be generated by the normal subsistence activities of the community. Payments for Environmental Services to individual farmers over a seven year period provide a subsidy or bridging finance to offset the short term opportunity costs associated with land-use change.

2. Barriers Test

It is clear that significant barriers exist to the land use-change program undertaken; these include local resistance ie charcoal burners, lack of know-how, extreme poverty, lack of surplus labour, health constraints and institutional barriers. The project has a clear track record of overcoming these barriers.

3. Common Practice Test

The project has introduced a wide range of innovative land-use change measures that are transforming the way in which resources are used by the community. The research conducted in the community prior to the commencement of activities clearly indicated that very different practices were commonplace from those implemented by the project.

4. Legal Test

The activities of the project in the Chicare Regulado are not conducted to fulfil the official policies, regulations, or industry standards of any organisation or institution.

Beyond the baseline - project interventions designed to move away from the “business as usual” scenario.

The project has embarked on a program of land-use change with the following interventions that contrast with the business as usual scenario in the target community. The three main objectives are to

- develop sustainable land use systems,
- produce research outputs relating to carbon sequestration potential
- build capacity to manage carbon assets)

These are designed to contribute towards a solution to the identified problems.

- The project provides technical expertise in relation to land-use diversification and sustainable economic growth such that on completion of the project the local community will be equipped to overcome land management problems.
- The research component relating to regional and local carbon sequestration capacity and baselines is required to lever carbon finance into the project.
- The technical capacity of local Mozambique organisations and the local community to manage a land-use and carbon related project will provide investor and institutional confidence in future economic investment

The project is designed to facilitate the sale of carbon assets from community forestry activities, which provides income to cover the costs of implementing the activities and extending the technical support to communities.

For the sale of carbon credits from the projects to be viable, research information and data concerning the local and regional carbon offset potential is required in conjunction with enhanced technical capacity within local institutions, thus enabling them to manage the sale of credits in a fully accountable manner. This is successfully done through the Plan Vivo system.

Although there are other initiatives generating verifiable carbon offsets in Africa these often do not explicitly aim to promote rural development, indeed some activities involving large-scale plantations have been criticised for creating negative social impacts. This project are innovative in the way that it has succeeded in harnessing the opportunities presented by carbon management to provide tangible benefits to rural communities and biodiversity conservation. The project has encouraged co-operation between communities, state authorities and private interests in the region.

It is providing a system that is being extended to other areas in the region acting as a flywheel to attract further private sector investment into the region. Through the pilot project in Gorongosa, there is now a proven track record in producing and most importantly selling VER's into the market and delivering a significant proportion of the proceeds of those sales back into the communities participating in the project.

Financial sustainability

The aim of the projects is to develop income producing activities through sustainable management of natural resources and through the sale of carbon offsets generated by these activities. The forest management and timber utilisation elements of the land-use have the potential to generate long term community income. The financing of these elements of the projects are carefully controlled to avoid subsidising commercial activities which could lead to financial problems once funding has stopped.

All commercial elements of the projects produce financial projections for costs and incomes once the project phase is over to ensure financial viability is achieved. Part of the funds raised from the sale of carbon sales is invested in the community association which will work with the trust fund to determine how community carbon funds should best be used.



Figure 5. Building social capital in communities.

The project builds various types of capital:

1. Increased technical capacity: a key component of the project is training: training farmers in agroforestry and forestry techniques and training technicians in the use of carbon management systems

2. Management systems: The project has developed a system for managing the sale of carbon credits
3. Data and technical information: The project has produced datasets and developed technical documents required for the management of carbon assets
4. Institutions: the project has led to the empowerment and development of a community association with responsibility for the management of community resources and regional institution with the responsibility of managing carbon assets from the pilot project and other areas
5. Material: tree nurseries and planted seedlings, reforested areas have the potential to provide long-term social and economic benefits to the community and through tree nurseries established in the project this area may be expanded.

Institutional sustainability:

The forestry operations (sustainable harvesting and timber utilisation) component of the project has been set up as community owned businesses. The community association owns all company assets. The community association is responsible for the investment of all incomes generated and the aim of the project is to strengthen the community association to ensure transparent accounting and adequate stakeholder consultation.

The Carbon Livelihoods Trust Fund operates as a independent entity. The trust fund has a number of trustees on its board representing stakeholders, WWF as well as representatives of project management and financing bodies.

The project has been structured in such a way as to provide capacity building and support to Mozambique Government departments such as Agriculture, Forestry, Health and Education.

Sustainability at the policy level:

The project has the support of officials at all levels of government. High profile visits by Cabinet Ministers and other senior government officials have been important in raising the profile of the project. The project works closely with local government to advise on how current legislation affects sustainable land use by communities in the region and to highlight opportunities and problems for this type of project.

The projects work with both provincial and national government to demonstrate how carbon offset projects can provide a range of benefits to rural populations and provide a framework through which rural development projects can register resulting carbon offsets in a way that will facilitate either the sale of such offsets if international agreements allow or for such offsets to be included in the national carbon balance once international treaties are extended to include Annex one countries.

Co-Benefits:

The project has promoted sustainable resource use and income generation in the target communities. The profits from timber extraction and utilisation have been invested in the community association and used by the community to fund community level projects. The profits from a wide range of activities linked to project activities including vegetable production,

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manufacture of furniture, honey production, sale of crafts and tourism support have all contributed to a community fund.

These have been defined in participation with the community and have included investments into schools, infrastructure and health services (health posts).

The Community Association has invested revenues from the sale of VER's and other project related activities in the building of a new school and a health post.



Individual community members have benefited from employment in the community forestry operations including nursery work, harvesting operations and carpentry. In addition to forest management and timber utilisation, income has been generated by community members through the promotion of bee keeping and improved honey marketing. In this way the spread of benefits through the community has been facilitated by involving a range of individuals in project activities and ensuring that profits are invested in activities that will benefit the community as a whole. Income generation within the community is recorded and tracked as part of the project.

Community members are provided with training for all activities. A key part of

assessing activities for carbon offset potential is the production on management plans by community members. These plans are used by the management of Envirotrade Lda to assess land use activities. Community members are given training in the production of simple management plans in the form of annotated maps. These plans serve to help community members plan their time and monitor their own results as well as facilitate carbon verification. Certain key community technicians have been given further training in monitoring methods for carbon verification in conjunction with the trust fund technical team.

The projects include monitoring systems as an intrinsic part of their design. Monitoring is carried out by community technicians with support from the Envirotrade Lda technical team. Carbon verification requires an assessment of tree growth, soil fertility and deforestation. Part of the research component has generated simple-to-measure indicators of these attributes that are recorded by community technicians and project technical staff. Monitoring indicators are also being developed to assess the social impacts of project activities in the community.

This covers:

- Experiences with land use activities

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- Skills and experiences
- Income generation
- Organisation and communication

Key indicators of project impact are based around:

- The number of community members involved in the project
- The area of various land use activities implemented
- The income generated by various activities
- Activities funded by project income
- GHG emissions avoided
- Carbon asset value realised

Envirotrade Lda in conjunction with the Edinburgh Centre for Carbon Management has developed the capacity to assess land use activities for carbon offset potential. This includes the management of the Carbon Livelihoods Trust Fund and the use of Plan Vivo administrative systems.

The projects are explicitly designed to provide possibility of replication of activities. Research carried out has regional significance, the results of which may be applied to land use projects throughout the Miombo ecosystem. Technical specifications specify the carbon offset potential for land use systems with the potential to generate local benefits. These specifications may be used for any land use project in the region to assess the offset potential of community land management.

The capacity building at the provincial level provides the necessary institutional structures and technical capacity to replicate the activities in the pilot project area in other communities. The choice of the Nhambita community as the target for pilot project activities reflected not only the suitability of conditions in the community to implement sustainable land use practises but its representation of many communities in the area.

The Gorongosa National Park buffer zone contains many communities with similar social and environmental conditions as those found in Nhambita and the whole area requires development assistance because of the biodiversity value of the nation park. The Nhambita community has the potential to act as a seed for similar projects in the park vicinity and in the buffer zones of other national parks. The methodology and systems are also being used in the conservation areas of other national parks in Mozambique through Envirotrade's Carbon Livelihoods program.



Ownership:

Envirotrade Ltd contracts with both individual farmers and the community according to the guidelines set down in the Plan Vivo manual. Each transaction is based on a separate contract.

Although the land is owned by the state, the community in the project areas have legal title to the land and as such are entitled to sell the products arising from their use of the land (including carbon products). This is entrenched in law in Mozambique, so for example a person/community with a gold mining licence owns the gold they legally extract under entitlement or a timber producer the trees that they have planted. The community have taken management of the land under contract from the government and as such are selling a “product” of their labour.



July 1997 Land Law (Lei de Terras) - under the law, the state owns all land but grants use rights to individuals, communities, and companies in the form of leases that can last up to 100 years. These leases can be transferred, but not sold or mortgaged. Use rights emerge either through occupancy or by a specific grant through the state. The government can issue use right title documents to individuals, companies, or entire communities and groups, although those who occupy the land for more than ten years acquire permanent use rights

without the need for title documents. This particularly benefits peasants and returnees who often do not possess actual title documents to prove their occupancy of land. One of the land law's mechanisms for improving the rights of those who lack title documents is the requirement that courts accept verbal evidence from community members regarding occupancy of land. This acceptance of verbal evidence is particularly important because of the high level of adult illiteracy among Mozambican peasants and returnees.

The law also protects the rights of small landholder returnees against the often conflicting claims of large landholders by creating requirements for development plans before the issuance of title. The government will grant 100-year use rights two years after issuing title, only when there is evidence that the development plan is actually being carried out on the land. By requiring a development plan, the law diverts the intentions of high officials who registered land speculatively in the past with the expectation that they would sell the land for high profits when the government eventually submitted to foreign investment pressure and privatized land.

The land law also improves land access rights by decreasing the bureaucracy and cost of registering land titles, therefore encouraging peasants to register titles for their land. Increased use of title documents offers further security to occupiers of land and offers an easier way for courts to determine which claims over a piece of land are legitimate. Also, one way of ensuring that peasants have the ability to carry out the development plans required to gain title is to allow small

landholders to seek titles for their lands in the name of their local community, rather than making them undertake the expense and bureaucracy as individuals.

One of the most important provisions of the new law is the increased role of local communities and traditional leaders. Local communities exercise considerable discretion in the management of natural resources, resolution of conflicts, the implementation of titling processes, and the definition of the limits of land they occupy. This provision allows the use of local customary law in determining local land rights policies. Furthermore, to determine whether the land in question is occupied, the state must consult local authorities before granting leasehold titles that last up to 50 years. However, the July 1997 Land Law contains a provision that seeks accountability from local authorities by requiring that they give a legal statement that specifies "the representation mechanisms" of their local communities.

Conclusion

The farmers within the project area have virtually no access to capital that would be required to undertake the forestry / agroforestry activities organised and financed through the project. Carbon finance provides the main source of capital income to cover the direct costs of establishment (and some of the opportunity costs). This demonstrates the financial additionality of the project.

The sequestration activity of the farmers would not be possible without the technical assistance that is necessary for the activities to be completed successfully that have been provided by the project. Other material inputs provided by the project - such as nurseries, tools and water have been essential for the activities to be completed successfully.