

Participatory process for conservation: Implementing a socio-ecological baseline in Mt. Chipirone, Mozambique

Final Report, June 2016



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Índice

1.	Introduction	1
1.1.	Problem and Rationale.....	1
1.2.	Study area	2
2.	Overall goals.....	4
2.1.	Main project objectives	5
3.	Methodology.....	5
3.1.	Participatory observation and informal conversations	5
3.2.	Semi-structured interviews and informal conversations.....	6
3.3.	Focus groups	6
3.4.	Participatory mapping.....	7
3.5.	Public consultations	7
4.	Main findings	8
4.1.	Social Characteristics of the Communities	8
4.2.	Resource exploitation activities.....	9
4.3.	Status of resources on Mount Chiperone.....	14
4.4.	Strategy for resources management by the communities	16
4.5.	Challenges for on sustainable resource exploitation.....	16
4.6.	Conservation project proposals.....	17
4.6.1.	First project	Error! Bookmark not defined.
4.6.2.	Second project	19
4.6.3.	Thirdproject.....	21
4.6.4.	Selection of projects by communities.....	23
5.	Final considerations	24
6.	ANNEXES	26

1. Introduction

Mount Chiperone, located in Zambézia province district of Milange, highlights its relevance as an ecosystem that hosts an important biodiversity that is representative of inselberg ecosystems with high endemism. Mount Chiperone's importance is also stressed considering its strategic location within the Afromontane region and its relevance for the structural and functional connectivity of the ecological corridor formed by different regions in East Africa that make up the Eastern Afromontane Biodiversity Corridor.

The baseline project was conducted in order to develop natural resources conservation strategies that are focused on active participation and empowerment of local communities, thereby promoting sustainable use of resources and social and economic development of local communities. To achieve this, Verde Azul team, through a participatory rural appraisal process, sought to understand local practices, the perception of the communities on natural resources and their interaction with them. This information was capitalized to create conservation alternatives that were developed and approved by the community for natural resources conservation as well as for alternative livelihood strategies.

1.1. Problem and Rationale

Mount Chiperone is part of an ecosystem which encompasses an important biodiversity representative of an ecological system housing many species that are found nowhere else. However, its biodiversity has been threatened, and most of these threats come from anthropogenic actions.

Around Mount Chiperone, similarly to most rural areas in Mozambique, there are communities that are strictly dependent on natural resources, exerting great pressure on them, thus compromising the conservation of the biodiversity. Much of the threats come from anthropogenic actions such as land conversion, extraction and unsustainable use of resources causing biodiversity loss. These different threats may remain and may become stronger over time if there is no clear understanding of man-nature relationships which sustain local livelihoods, especially if the low or no degree of protection being applied currently in the area is considered.

Therefore, taking into consideration that the community at the local level depends completely on the biodiversity of the area for their livelihood strategies, it is of paramount importance that any

conservation strategy directly engages the community. Strategies should consider local needs and livelihood forms together with the conservation of biodiversity of the area. Externally imposed conservation formulas are unlikely to succeed, especially in the social context in where the community depends on the surrounding environment as livelihood strategies.

Understanding in detail what the current status and interpretation of the environment in the area can lead to different conservation possibilities of the local landscape. Therefore, to be able to evaluate Mount Chipirone conservation possibilities, we need to understand in detail how the community engages with their natural environment. Thus, the project presents an opportunity to evaluate and understand the socio-ecological relationship and its links with the current environmental degradation and future conservation strategies. On the other hand, few ecological studies were conducted in Chipirone (only one known study), creating a huge gap in terms of available data. This research also aims to counteract this lack of information about the area.

1.2. Study area

The project was conducted in Zambézia province, Milange district in the Sabelua locality. Sabelua has by four communities namely: Marrega, Sabelua (central community), Nhacama and Mungola. These communities border each other and are located around Mount Chipirone. Nhacama and Sabelua are great importance for the conservation of the mountain area due to its proximity and natural resources use patterns.

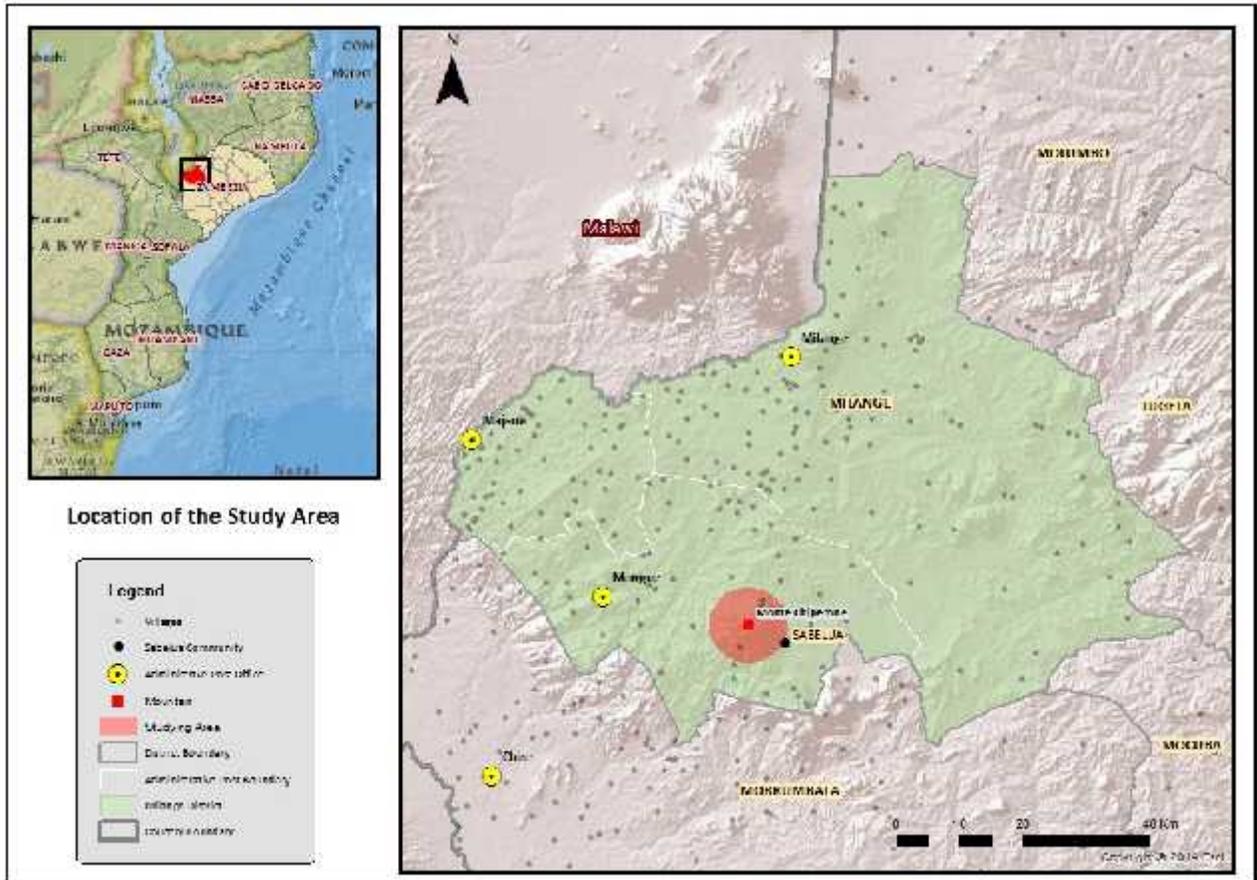


Figure 1: Study area.

These two communities host around 2,700 inhabitants. As there are few alternative livelihoods, almost all households (7 people is the average per household, equivalent to 385 households) depend on agriculture as well as exploitation of resources on Mount Chiperone to ensure their livelihoods. However, out of this number it is estimated that about 70% of the inhabitants (approximately 250 households) establish their farms and exploit resources such as firewood, wood for construction, game, honey and others in mountain area. Other individuals mostly the elderly, widows and newcomers to the locality exploit the low-lying area for the practice of agriculture.

Around the communities these rivers delimit the borders between the communities and are a source of various resources necessary for the communities. The main rivers are: Marrongane River that separates the Mungola community from the Nhacama community, Natchambu River that separates the Nhacama community from the Sabelua community and finally the largest

river- Namaraca into which others flow and separates Sabelua community from the Marrega community.

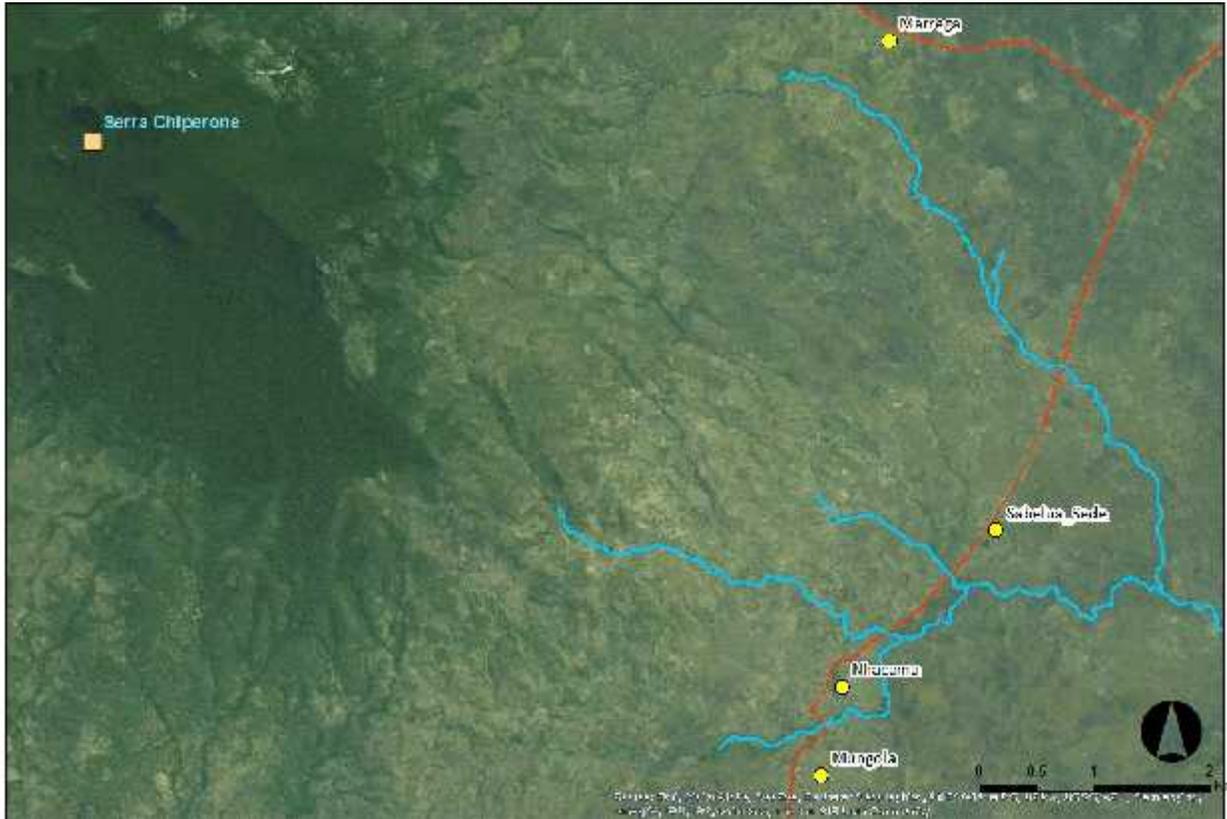


Figure 2: Location of communities in Sabelua

2. Overall goals

-) Conservation of Mount Chiperone Afromontane Biodiversity;
-) Contribute to the connectivity of the Afromontane ecosystem;
-) Support the local community to engage in conservation activities;
-) Promote sustainable livelihoods in the community;
-) Promote conservation activities conducted by the community;
-) Empower and organize the community;

2.1. Main project objectives

-) To understand the relationship between the community and the natural resources in the area;
-) To integrate all farmers (men and women) of the community into participatory processes;
-) To assess and validate different projects in collaboration with the community and relevant stakeholders;

3. Methodology

The work took place over eight months. The activities were according to the short-term objectives set by the project. The first three months were devoted to understand the relationship between the existing communities in the study area and the environment through participant observation and interviews. In the fourth month, consultative processes started where public consultations, resource mapping and seasonal diagram were conducted in order to identify and visualize resources spatially as well as to understand the variation over the year of environmental phenomena, environmental resources used and the events that are directly related to the livelihoods of the communities.

During this period in the field, the researcher was involved with the farmers, living and interacting with the communities. This allowed to gain trust and collect the necessary information through tools of the participatory appraisal method.

3.1. Participatory observation and informal conversations

During the time in the communities the researcher observed the day-to-day activities taking into account the livelihoods, activities practiced, traditional beliefs, among others. In this activity the researcher participated as much as possible in the all aspects the population engaged with, keeping the details of what he saw, heard and felt about it, i.e., the researcher was a member to some extent of the community.

The idea of his incursion into the communities was to gain the trust of the population, better engage with members of the communities and at the same time raise awareness of the importance of the research. Therefore, the participant observation was a key part of the work and allowed to fully understand the relationship between the community and the environment in

Mount Chiperone. Additionally, the information obtained during this time allowed to better develop further methods employed. The first two months in the field were fully dedicated for this method, later the researcher continued with participant observation together with the other methods employed.

3.2. Semi-structured interviews and informal conversations

For semi-structured interviews, guides containing issues that served as the basis for interviews to collect the different perceptions around the main reasons for the use of resources (biodiversity), extraction modes, impact on livelihoods and management strategies, and obtain data on the efforts of local authorities to allow community integration into or participation in the resources management process. These techniques encouraged bilateral communication, and provided an opportunity to know about and obtain sensitive issues from the communities and especially helped the researcher to be more familiar with community members and allowed greater spontaneity of the communities.

3.3. Focus groups

The identification of members to be part of focus groups was based on some information gathered during participatory observation. Thus, community members were stratified into different classes namely: Local authorities' members, farmers, practitioners of other activities and finally women's group. Then members were grouped according to these classes to ensure their representativeness.

Additionally, other factors such as socioeconomic status, religious affiliation, and selection of individuals with different ways of living were taken into account to obtain wider variation of views and ideas of group members.

The discussion in groups was around socio-economic characteristics that influence the interaction between the communities and biodiversity elements (natural resources) such as: livelihoods (house and food), community location, beliefs, religious aspects and relevance of certain areas. Thus, pre-elaborated topics were put at the center of the meeting and they were left open at the discretion of all members who were present to contribute. Each focus group was constituted of 6 to 8 members with no "link" between them, i.e., all belonged to different families. In total we conducted around 20 focus groups.

3.4. Participatory mapping

This technique consisted mainly in identifying and drawing maps of existing resources. During the development of this technique each member presented their ideas regarding: Location and area of resources, relationship between them, communities that exploit them, their point of view regarding its conservation and their experience managing the resources.

We aimed to engage all group members in drawing the maps. However, in some cases some participants could not expose their contributions because of fear, shyness or difficulty in presenting their points of view to paper. Due these limiting factors, alternatives such as oral participation of to describe the content of the maps were used.

Group members did not always agree on what was mapped during a certain session. Thus, other additional methods such as participatory observation and informal conversations filled some gaps encountered in this method.

In total we conducted around 17 participatory mapping sessions.

3.5. Public consultations

Open meetings (about one contact hour) were conducted in places where there was a greater agglomeration of people at the time (e.g. agricultural areas during harvesting). Projects to be implemented in the future were suggested by the community to improve their living conditions while conserving the mount biodiversity. Later, after the most feasible project had been assessed for implementation, it was presented to the community, including its rational, means of implementation, community engagement, possible expected results, and others. In this method there was a significant participation of individuals in terms of numbers and contributions.

It is worth noting that in all activities conducted visual aids were used to better illustrate and clarify to the participants. This included use of cardboard sheets and markers.

In total we conducted around 4 public consultations.

4. Main findings

4.1. Social Characteristics of the Communities

The communities depend heavily on traditional and cultural aspects to manage almost all everyday matters. Therefore, leaders make use of traditional and cultural aspects to help maintain the organization of the communities. Local leaders (traditional chief, community leader, and others) are chosen considering factors such as their family connection between the predecessor and successor. This whole process must be conducted using particular traditional beliefs such as healers, gods and dogmas. Thus, the leadership is fully connected to traditional aspects.

These traditional and cultural aspects are also used to control and regulate the exploitation of resources in certain areas in the mountain given that there are points in Chipirone Mountain which are considered as sacred forest. Unfortunately, due to the invasion of these areas for the practice of livelihood activities these cultural/traditional values have been losing weight gradually. Additionally, certain mountain areas are also used to conduct rituals for thanking God when babies are born and for acceptance requests regarding aspects of sexuality.

The exploitation of resources has generated social problems. There have been land conflicts between communities members mostly related to how land boundaries are defined. Typically, to delimit areas different elements are used such as rivers, trees, roads. However, small alterations that affect these elements (e.g. cutting down trees, dry rivers, extinguishing tracks) has been a potential aspect for the development of conflicts between community members. Similarly, uncontrolled fires used by game hunters (small mammals) has generated spread of fire to certain farms destroying crops and generating conflict between the respective owners.

There are also other conflicts related to issues of leadership in the communities. These conflicts are generated when there is a lack of understanding between community members and community leaders. This case is most often associated with use and exploitation of land, i.e., when someone occupies an area to establish farms and houses without the permission from local leaders. However, some community leaders have been opportunistic, for example, when someone establish a cultivation area, leaders let harvest season approach and request an illicit payments (to get part of their production), a factor that generates confusion between the affected parties.

4.2. Resource exploitation activities.

a) Agriculture

Agriculture is the major source of livelihood for all communities in the study area. New agricultural areas are often opened in the communities. There are extensive cultivation areas located in Chiperone Mountain and in a lesser proportion in the plain areas around the mountain (Figure 3). The main reason for the largest farm areas being located in the mountain area is related to the weak capacity of soils in the low-lying areas to produce expected agricultural product volumes in relation to the areas located on the mountain. Although the low-lying areas also have had satisfactory production potential for the communities, due to production techniques and mechanisms, the soils have been impoverished.



Figure3. Cultivation areas on the mountain (on the left) and in the low-lying areas (on the right).

One of the factors influencing soil infertility is associated with non-diversification of crops. This is not practiced because they do not know the technique, certain crops such as vegetables, oilseeds and pulses are not known. Additionally, there is difficulty in identifying areas with suitable soils for such crops, as well as difficulty in selling them in the local markets. About three to four days after harvest, some crops such as cabbage, tomato, pumpkin leaves, and others quickly become spoiled.

After the fertility reduction of soils, some farmers have used agricultural inputs purchased in Malawi. However, due to the high purchase price of these, associated with the size of production areas, farmers have used fertilizers only to produce tomatoes and onions because these crops are not established in large quantities and areas.

Another reason for establishing farms in the mountain areas is related to the absence of continuous extensions of land to establish farms in the low-lying areas due to the great pressure on the use of land for house construction as well as further development and growth of pigeon pea, a crop in the mountain area with higher income in the market.

Mount Chiperone is an area characterized by having a dense and diverse vegetation composition. Therefore, to establish farms you need to deforest some areas every year (during the agricultural season) due to the type and agricultural technique used. To this end fire is used as the main tool (Figure 4). After use of fire, other tools such as hoes, saws and axes, are used to complement the clearing of the plot. The use of fire to open agricultural areas reduces time devoted for this activity, in addition to helping eliminate hard to remove obstacles. This practice also works for them as a protection tool, since it drives away some animals such as snakes and scorpions.



Figure 4. Chiperone forest areas being converted into agriculture.

The main crops grown by the communities are maize, pigeon peas, butter beans, cassava, pumpkin, onion and tomato. Pigeon peas are for sale while maize, tomato and onion, the main crops, are produced to meet basic food needs. However, in some cases, farmers have sold most

of their production to buyers coming from Milange village endangering their stock for personal consumption. It worth noting that Milange village is located 93 km from Sabelua locality. Therefore, buyers take about 8 hours to travel by car and 3 hrs by motorcycle to buy products in Sabelua, a fact that dramatically reduces the purchase price of products. These products have also been sold in the local market (Sabelua, Marrega and Mongola) or exchanged for other basic need products as well.

Typically, a single area is cultivated for 6 to 7 years, a period after which due to loss of fertility, the area is abandoned. This area is fallow for 2 to 4 years, to recover the soil, and later be reused, this does not necessarily happen because there are no restrictions on opening new farm areas in the low-lying/plain area and high-lying area of the mountain.

b) Timber and non-timber forest resource exploitation

The communities are largely dependent on the resources obtained in Mount Chipirone to meet their basic needs. The resources exploited more often and in larger quantities are trees with high potential to be used as woodfuel (local names: *rotho*, *lombwa*, *baliça*, *tero-tero*, *tchitembe*, *Marondxo*, *Cabo raso*, *Tulipa*, *Goruguro*, *Messassa*) for household use and also to burn and harden homemade bricks (Figure 5).

In the mountain there are small clusters composed of bamboo forest. These are mainly exploited for the construction of houses, fences and corrals (Figure 5). Regarding timber trees, some species have been exploited like ironwood and mesasa to make doors, tables and chairs.

In addition, some trees are also exploited to make everyday tools such as hoe handles and crooks. Despite the reduced number of species often cut down, the way they are exploited is not sustainable. That is because it is not respected a minimum size for cutting them down, and there is no selection of species. This leads to forest degradation that reduces the connectivity of the forest. On the other hand, the increasing deforestation and forest degradation are also associated with low efficiency of use of fuel woods.

The exploitation of the resources in the mountain are restricted depending on the destination and beneficiary. There is an abundant timber species called *Swartzia madagascarienses*, which in recent years has been exploited by some community members and sold to Chinese buyers. The discovery of this business imposed rules for its exploitation by the district authority. So from that

moment onwards the exploitation is only be done if it is for household use by the community. However, illegal exploitation is increasing due to the absence of control and supervision.



Figure 5. Burning bricks using tree obtained in Chiperone Forest (on the left) and a house roof made of stakes and bamboo exploited on the mountain (on the right).

The exploitation of timber resources are linked with the location agricultural areas, this is the largest areas of exploitation of forest products are located near cultivation areas.

In Chiperone forest there are also non-timber forest products in abundance. These resources are used as alternative livelihoods for the communities. The main non-timber products exploited are wild fruit (massala, banana and sugarcane), honey and also some plants used in traditional medicine.

c) **Hunting**

This activity is conducted on a small scale by community members. It is practiced more often on the mountain near the rivers and in areas with rock (small mammals). The main game animals are mice, rats, boars and guinea fowl. The hunting technique that is used is rudimentary and characterized by using traps made of metal and sometimes with dogs help.

This activity is more practiced during dry season, a period of increased incidence of fires, taking place mainly in the period from September to November. Fires reduce vegetation density, destroy some burrows of underground animals, reducing their ability to camouflage. This makes

it easy for hunters to identify some indirect signs of animals such as footprints and feces increasing their probability of being caught.

a) Fishing

This activity is more practiced by younger age groups in the communities. In order to get fish resources, the main tool that is used are logs obtained in Chipirone forest and in some riverine forests. This activity has extinguished part of the riverine forest at certain specific points that are used for fishing. The logs are placed on the river and are used as a barrier so that the flow of water will not cross the other side. With the help of buckets, five to six people reduce the amount of water in the obstructed area. Therefore, the ability of fish to move reduces and with hands they are caught without discriminating their sizes, and small-sized fish are the most abundant. When the activity ends barriers are not sometimes removed from water conditioning poor water circulation that sometimes diverts rivers silting up and increasing their degradation (Figure 6).



Figure 6.A secondary river, sometime after being used for fishing.

b) Domestic animal farming

Among the various alternative activities such as beekeeping, poultry farming and livestock (goats and cattle), some are known and practiced, but they have not generated considerable income due to the low volume of production and weak ability to control pests, diseases, reproduction and seasons. Nevertheless, there was a small training from a Ministry of Agriculture and Food Security project that potentiated diverse activities including goat farming

for sale at the district level. These provided technical assistance (pest control methods) and an extension (to identify suitable forage, grazing periods, gestation, etc.). However, the project was not targeted at that locality and just some community members participated in the trainings. However, the project was not successful. Some reasons for its failure were related to the difficulty in acquiring on their own services provided by the Ministry of Agriculture technical assistance (e.g. vaccines), short training offered (one week for all the locality), as well as delay in getting results because of short-term planning habit.

Poultry farming (production of chickens and pigeons) is carried out in small coops built with local materials such as stakes, bamboo and local wood. The failure of these activities has occurred due to the difficulty in managing them and use of poor coops especially during low temperatures and rain seasons. Most of the production is intended to meet basic food needs due to the low flow of local markets.



Figure 7. Pig farming (on the left) and chicken farming (on the right)

4.3. Status of resources on Mount Chiperone

The mountain area is where the main productive activities are practiced by the communities. To fulfill their basic needs the communities have reduced considerable part of forested areas that are interconnected. Opening farms reduces the area covered by the forest resulting in open fields which easily become erodible by rain. Besides this main influence on the mount degradation,

other activities such as forest extraction, hunting and fishing also exert pressure on the conservation of resources on Mount Chipero.

Figure 8 (on the right) is a representation made in a participatory mapping process, showing side view of Chipero Mountain taking into account the use for agricultural cultivation (opened farms). The lowest part of the mountain, where the mountain begins (darker marks above surface) represents deforested areas which is used as cultivation areas.

Later, over time due to misuse of agricultural areas (monocropping) they became almost unproductive. Eventually, they are discarded and abandoned because there are other unexploited (pristine) areas on Mount Chipero that are considered more productive (on the mountain slope). The areas which have already been abandoned now show regeneration characteristics of vegetation (presence of bushes) because they are not being used for any activity (sometimes only for building houses) (Figure 8, on the left).



Figure 8. Representation of a forest side view on Mount Chipero (on the left) and top view of different land use systems in the forest of Mount Chipero.

However, the areas more used for the practice of agriculture, where the slope begins, (Figure 8 on the left) has already been cleared. There is a tendency of expansion of agricultural areas reducing other type of native vegetation and forest.

In Figure 8 (on the right) the area in small triangles represents forest areas that were converted into cultivation areas in the Chipero Mountain. The area in circles represents exploitation in

recent years (wood extraction and hunting) and it is considered a potential area to be converted into agricultural fields soon because the communities are increasingly approaching to these areas.

On Mount Chiperone there is a major tendency in relation to human occupation. In Figure 8 (on the right) the top boundary, in pink, is the area that has never been exploited due to its altitude and because it is in an area which requires a traditional ceremony to be ascended. However, due to the requirements for conducting such a traditional ceremony, sacrifice an animal and offer drinks to local leaders, its exploitation has been limited. This “law” can have positive aspects for conservation. Unfortunately, many times population reject the requirements from local leaders to reach these areas and sometimes they disrespect them and go without such ceremonies.

4.4. Strategy for resources management by the communities

The main rivers have been used as indicators in the management of resources in the community. These rivers were used to delimit exploitation areas depending on where the communities are located. Therefore, each community had its specific area to exploit certain resources. However, at the moment this strategy does not take place due to the lack of control, absence of resources in certain areas, and also because housing disorganization in the communities.

Natural resources obtained in the mountain are the only sources of income for the subsistence of the communities. Therefore, the lack of alternative livelihoods (e.g. jobs and other livelihood strategies) creates a strong tendency and dependence on the exploitation of natural resources to maintain the immediate well-being of the communities. Therefore, the community has not made natural resources management plans covering long periods, given that there is an urgency to meet other basic needs.

On the other hand, the lack of knowledge of sustainable natural resources management practices makes it difficult to preserve the resources sustainably. The high illiteracy level in the community also creates an impediment in the adoption of natural resources management strategies, given that it is more challenging to explain certain conservation aspects.

4.5. Challenges for on sustainable resource exploitation

One of the main factors that was considered to have a negative influence on the mountain conservation is the absence of particular areas (inside each limit marked by the rivers) for

resources exploitation. Resources are exploited at any point as long as they are available, there are no specific exploitation seasons or restrictions in the types of resources that can be exploited, creating multiple exploitation points over time.

Additionally, tradition beliefs to access areas in Mt Chipirone are not credited anymore In the past, there were areas not exploited because the communities believed the existence of dwarfs in certain areas that prevent them from returning from the mountain (when there was not traditional ceremony conducted). These beliefs are less valid because of the need of exploitation given the reduction in resources on the low-lying areas. As an example, hunting has been moving higher up the mountain due to the lack of vegetation cover in lower areas. These causes clearing plots in vegetated areas which has not been used for agriculture and could be considered pristine.

4.6. Conservation project proposals

The participatory process developed provided clear guidance for the proposal of projects for conservation and wellbeing of the communities. These projects appear as a way to implement measures that will reduce the pressure on natural resources use and exploitation in the mountain area. On the other hand, they will support alternative livelihoods for community members ensuring engagement in the conservation process. These projects considers environmental, social and economic factors. Therefore, it is expected that these projects will help in forest restoration, protection and conservation on Mount Chipirone to ensure the permanence of biodiversity that directly benefit the community.

4.6.1. First project

Title:

Organizing and training communities in agricultural production techniques such as conservation agriculture, agroforestry systems and storage alternatives that reduce loss of harvest volumes in the communities and contribute to the management and conservation of natural resources on Mount Chipirone.

Problem:

There is potential to produce large quantities of agricultural products (maize, beans, sesame, etc.). However, there is a need to enhance the sustainability of agricultural production considering the conservation of the natural resources in the area. Additionally, due to the

inability to store the harvest volumes obtained they have lost large volumes due to pathogenic agents such as rain, heat, disease, therefore, they produce small quantities.

Project rationale

There is a need to provide alternative agricultural methods such as conservation agriculture and agroforestry systems that improve agricultural production and preserves natural resources in the area. Including alternatives that can be adapted in the communities to overcome the production storage problem. In addition, there is a need to increase sources of income (livelihoods) in order to improve the living conditions of the communities and reduce the degradation of Mount Chipirone due to opening new areas for cultivation in the mountainous area.

Overall objective

To contribute to improving the well-being of the communities through the provision of alternative mechanisms that ensure the existence of resources (agricultural production) over long periods (annual seasons) contributing to the reduction in deforestation (opening new farms) potentiating biodiversity conservation on Mount Chipirone;

Specific objectives

-) To train the communities in conservation agriculture techniques and agroforestry systems;
-) To condition and improve agricultural production storage in the communities;

First specific objective

Activities

-) Participatory processes to create management committees;
-) Training in conservation agriculture, agroforestry systems and establishing nurseries;
-) Establish demonstration areas for CA and AFS.
-) Participatory mapping to identify implementation areas.
-) Establishment of nurseries.
-) Transplantation of seedling to field.

Indicators

-) 30 farmers (men and women) integrated into conservative agriculture and agroforestry systems;
-) Considerably improved (over 40% increase) production and productivity in the cultivation areas in the communities;
-) 30 community members engaged in the seed collection to raise seedlings;
-) 30 community members engaged in the production of seedlings in nurseries;

Second specific objective

Activities

-) Training in transforming agricultural products into better conservable sub-products;
-) Training in techniques for identifying and controlling pathogenic agents during production conservation;
-) Training in techniques for constructing improved granaries to protect production;
-) Training in techniques for storing production in granaries;

Indicators

-) Reduced loss of production (agricultural crops) due to storage conditions;
-) Continuous supply of production for long periods(even beyond the season);
-) Improved living conditions of the communities (increased household income) because they market increased quality products;

4.6.2. [Second project](#)

Title: Training the communities to adopt means of conserving watercourses in the locality.

Rationale: The increase in the population in the communities associated with the low number of fixed water sources (fountains) has created an unsustainable use of water resources due to lack of rules or laws established for their exploitation. Therefore, the absence of rules on activities to be exploited has fomented the degradation of the same compromising continuous supply of water resources.

Overall objective

Conservation of rivers in the locality of Sabelua in order to allow greater connectivity between them ensuring continuous supply of water and other associated resources to most of the communities.

Specific objectives

1. To train the community in sustainable techniques for using resources in the rivers (fishing, household use, etc.) and to identify specific points for certain purposes;
2. To disseminate knowledge of and techniques for restoring riverine forests to conserve the rivers to the benefit of the ecosystem as well as population itself;

First specific objective

Activities

-) Open meetings with the communities to disseminate the benefits of the rivers;
-) Participatory processes to deliberate on the areas for exploitation of rivers (multiple uses);
-) To restore/adjust small bridges on the rivers;
-) Training in sustainable artisanal fishing techniques;
-) Lectures on sustainable use of resources to reduce river pollution;

Indicators

-) Reduced rate of river pollution (washing motorcycles, making bricks, etc.);
-) Reduced effort of the communities to obtain resources (fishing) and increased agricultural crops in the communities;
-) 30 farmers engaged in reinforcing the small bridges on the rivers;
-) Increased number of individuals in the communities (30 households) supplied by river water;

Second specific objective

Activities

-) Workshops on river and community protection to disseminate the benefits of riverine forests;

-) Participatory processes to deliberate on the areas to reforestation of riverine areas;
-) Pilot inventory of the forest and further training in identifying parent trees;
-) Training in seed collection methods to establish nurseries;
-) Training in seedling production methods in recyclable plastic;
-) Demonstrations of establishing plantations in a definitive field.

Indicators

-) Identify potential forest plantation areas;
-) 30 community members engaged in elaborating a plantation management plan;
-) Reduced rivers erosion
-) 30 community members engaged in collecting seeds for plantations;
-) 30 community members engaged in producing seedlings in nurseries;

4.6.3. Third project

Title

Training communities in forest resource conservation techniques on Mount Chipero.

Rationale

Mount Chipero is the main source of resources for the communities, However, since there are gaps in sustainable resource exploitation (absence of rules/laws), it has been exploited through unsustainable techniques which has cause damage to the environment, contributing to its degradation especially due to the gradual increase in logged forest extensions.

Overall goal

To conserve Mount Chipero by introducing and developing sustainable resource exploitation alternatives (especially woody fuels) and by these being used by the communities contributing to improving the living conditions of the population.

Specific objectives

1. To disseminate sustainable forest conservation alternatives (fire management, forest and non-forest sub-product management and exploitation, etc.) and encourage the use of

improved ovens and stoves in the communities reducing forest degradation on Mount Chiperoone;

2. To disseminate knowledge and techniques to establish pilot forest plantations for energy, wood and conservation to be used and benefit part of the community.

First specific objective

Activities

-) Workshops to disseminate fire management techniques in line with Chiperoone Forest;
-) Training in techniques for extracting forest sub-products that do not compromise the continuous development of the forest;
-) ;
-) Lectures to disseminate and raise awareness for the adoption of efficient technologies (improved stoves and stoves) consuming firewood and charcoal;
-) Training in production techniques and demonstrations of use of improved stoves and stoves;

Indicators

-) Community members engaged in managing fires;
-) Reduced rate of forest logged for use as combustible material;
-) Reduced occurrence of uncontrolled fires due to anthropogenic causes;
-) Increased availability of forest products;

Second objective

Activities

-) Focus groups with the community to disseminate the benefits of forest plantations;
-) Participatory processes to identify and select areas to establish plantations;
-) Training in identifying and collecting seeds from parent trees;
-) Training in techniques for establishing forest nurseries;
-) Demonstration of establishing seedlings produced in a defined field;

Indicators

-) Identify potential forest plantation areas;
-) Community members engaged in elaborating a plantation management plan;
-) Community members engaged in collecting seeds for plantations;
-) Community members engaged in producing seedlings in nurseries;

4.6.4. Selection of projects by communities

The project with greater acceptance among the members participating is:

Organizing and training communities in agricultural production techniques such as conservation agriculture, agroforestry systems and storage alternatives that reduce loss of harvest volumes in the communities and contribute to the management and conservation of natural resources on Mount Chipirone”

Rationale for the choice by the community

-) The project has a direct influence on the improvement livelihood strategies;
-) Results may positively influence agriculture with soil improvement, water retention, erosion, increased nutrients, etc.
-) Increased productivity and effort for planting season.
-) Time reduction to access mountain areas for agriculture.
-) Agroforestry systems for food diversification and alternative incomes.
-) Improve soil fertility and avoid erosion in mountain area.
-) Increase in fruit and wood species for exploitation.
-) Increase in resources that can be used and exploited.
-) Storage allow for reduction in constant production losses (repeated in all seasons/years) for lack of storage techniques;
-) The activities provided by the project are somehow already related to the activities they already engage, agriculture and forest exploitation.

5. Final considerations

Overall, almost all short term objectives for which the project implementation was proposed were achieved. We were able to understand the relationship between the community and the biodiversity in the area, integrating mainly men, 85% the rest were women. Local cultural customs and habits limited the participation of women.

Taking into account the population in the study area, a larger number of participants was expected, however the degree of engagement was around 60 % at along the process but in a constant basis only 12 % participated. Participating member engaged actively during the processes and contributed to the project by sharing their knowledge, frustrations and needs. They also participated in the design of projects to be implemented in the future.

The methodology used was effective to achieve project objectives. The active participation of the field researcher established ties with the community allowing greater openness to matters that were brought to light.

One of the major difficulties faced during the project was to get community members to understand the importance of natural resources management and conservation for socio-ecological benefits and economic benefits. This was due to the strong dependence on fulfilling their immediate, basic and day to day needs.

Additionally, during the permanence in the study area, the field researcher had the opportunity to verify information encountered in the limited literature about the continuation and extension of unsustainable resources exploitation practices in the mountain area. It was also confirmed the use of fire to clear vegetated areas for agriculture and hunting. Additionally, there was an absence natural resources management strategies, which is putting a constant pressure on the biodiversity in Mt. Chipirone. The characteristics of these communities do not differ from the characteristics of Mozambican rural communities in relation to their dependence on nature for their survival.

The research allowed to fill socio-ecological gaps in the community and better understand its relationship with the natural resource in the area, its exploitation pattern and local needs. The selection and validation of the proposed projects underscores the need for technical support and training to improve their livelihoods and consequently their wellbeing and living conditions.

This assignment was a step forward in rising awareness for the community members about the importance of conservation and sustainable use of natural resources. At the same time the information obtained contributes to knowledge gaps regarding important conservation areas in Mozambique and the wider Afromontane region, thus opening possibilities for future conservation strategies in similar contexts in Mozambique.

Despite the participation and cooperation of the community, there is still a huge need for awareness on the sustainable use of natural resources to preserve the biodiversity in Mt Chiperone. Therefore, it is recommended that projects incorporate this awareness raising process, taking into account the need to improve the living conditions of the communities so that biodiversity conservation will become a viable and in a way natural process incorporated into new forms of management and use of natural resources.

Although our work helped to understand the community and its relationship with the natural resources in Mt. Chiperone, we need immediate actions to overcome the unsustainable use of resources and actively engage the community in long term strategies for conservation of the resources they highly depend for their survival. All conservation actions implemented in the community have to have social elements which benefit the local community that uses the natural resources in the area. At the same time funding has to be secured to be able to implement long term strategies (around 4 years), short term strategies can begin to help changing practices, create pilot areas and engage some members of the community so positive results can influence other users in the community. Current exploitation patterns have to be changed into sustainable practices and any small effort to do so see progress in the future.

6. ANNEXES

1. Most exploited species on Mount Chipirone



Figure 1. Local species names: *rotho* and *tchitembe*;



Figure2. Local species names: *lombwa* and *bambu*;



Figure 3. Local species names: *tero-tero* and *balica*

2. Main resources used for the community subsistence

Main and most exploited forest species (Local names)	Game animals existing in the Mountain (Source: communities)	Farmed domestic animals
Lombwa (<i>Treculia Africana</i>)	<i>Common duiker;</i>	<i>Chickens;</i>
Baliça (<i>Berchemia zeyeri</i>)	<i>Rats;</i>	<i>Ducks;</i>
Tero-tero (sp. não identificada)	<i>Mice;</i>	<i>Turkey;</i>
Tchitembe (sp. não identificada)	<i>Rabbits;</i>	<i>Pigs;</i>
Messassa (<i>Brachystegia boehmii</i>)	<i>Porcupine;</i>	<i>Goats;</i>
Pau-ferro (<i>Swartzia madagascarenses</i>)	<i>Guinea pigs;</i>	<i>Cows.</i>
Goruguro (<i>Strombosia scheffleri</i>);	<i>Guinea fowl;</i>	
Delfinpi (<i>Khaya anthotheca</i>)	<i>Turkey.</i>	
Muanga (<i>Pericopsis angolensis</i>)		
Cabo raso (<i>Lonchocarpus capassa</i>);		
Mafuti (<i>Brachystegia boehmii</i>)		

3. Questions used during semi-structured interviews

- i) Community values in relation to ecosystem services;
 - a) What are the direct and indirect (priority) benefits obtained by the Sabelua community from the ecosystem on Mount Chiperoone?
 - b) How does the continuous change in the use and covering of land due to the practice of agriculture on Mount Chiperoone influence the Sabelua community?
 - c) How does the continuous change in the use and covering of land due to timber and non-timber forest resource exploitation on Mount Chiperoone influence the Sabelua community?
 - d) What are the main benefits and disadvantages of changing the use and covering of land on Mount Chiperoone for the Chiperoone community?
 - e) What is the provision of services (fuel, food, water) like on Mount Chiperoone after farm areas have been opened?
 - f) What are the main impacts of the subsistence techniques that are used by the community?
 - g) What are the subsistence practices that are adopted in the Sabelua community to ensure the existence of resources at present?
 - h) Cutting down trees for the practice of agriculture influences the availability of other resources? How?
 - i) How are uncontrolled fires managed?

- ii) Resource preservation in relation to subsistence practices;
 - a) What are the main impacts of the subsistence techniques that are used by the community?
 - b) What are the subsistence practices that are adopted in the Sabelua community to ensure the existence of resources at present?
 - c) Cutting down trees for the practice of agriculture influences the availability of other resources? How?
 - d) How are uncontrolled fires controlled/combated?