Community Land and Natural Resource Management in Mozambique: Experiences of Pilot Community Based Project: The case of Gondola, Manica Province.

By César Tique
(Draft- Not for Cotation)

Introduction

The Mozambican development in short, medium and long terms require the adoption of new measures, including policies, adjusted to the new political, economic and social framework. This framework is grounded into the "new paradigm" in which local communities, private groups, civil society and the state have to work together, as partners, in the management of natural resources. This is reflected in the new governmental policies and recent legislation approved, by the national parliament in 1997/8, in particular the new land and forest and wildlife laws and their regulations that clearly support communities participation in natural resources management in order to achieve their sustainable use and social and economic equity.

Current data illustrates that the use and management of natural resources in Mozambique is developing quickly after sixteen years of civil war, particularly after the political transformation occurred, with introduction of a Structural Adjustment Program. Although, most recently dada shows that Mozambique economy has grown at impressive rates, in which recent estimates indicates a GDP growth of 14% in 1997, the transformation from subsistence to market oriented production has been creating dramatic changes in the socio-economic relations of the resources users in community areas of Mozambique. Although those changes in the use of natural resources, including land and forest resources reflect the overall ongoing challenges in other sectors of the economy, towards a reallocation of productive resources from the traditional channels to the open market. Therefore, this paper looks to the breakdown of socio-economic customary units as a result of the introduction of competitive market oriented policies within community management of resources, using examples of community land resources management in Mozambique.

The central argument is that post-independence economy policies, particularly after the civil war and first democratic elections, have dramatically altered customary production systems and caused large gender imbalances in access, use and exploitation of land resources among local community members. This paper uses examples of communal management of natural resources in Nhambonda, Gondola.

The literature on land tenure systems, however, has established a positive link between land tenure security and investments in the communal land, both in agricultural production and resource conservation. This suggests that social factors have a role to play, in determining resource conservation practices. Nonetheless, recent studies suggest that there is no direct relationship between tenure security and investment, since investment in the land is also related to other factors such access to credit, labor and in-puts. Watts [1987], and Blaikie and Brookfield [1987], argue that local communities only invest in resource conservation when the socio-economic and political context favors their control over resources, as well as access to markets; for instance through commercial networks, favorable pricing policies and land tenure security.

These observations suggest that gender differences in access to and control over resources may a further factor, influencing the application of natural resource conservation techniques, as well as other types of investment on the land. Yet the gender dimensions of natural resource conservation have been very much neglected in the relevant literature.

Thus the main objective of this study is to contribute towards an investigation of the gender dimensions of natural resource conservation, through the means of a case study. The study was conducted in Nhambonda

area, Gondola District of Manica Province, central Mozambique, in July 1999. This area has suffered intense problems of deforestation, animal slaughter and soil erosion, resulting in loss of soil fertility and resulting negative impact on agricultural production and income generating activities for the local community in the area.

The study investigates the livelihood strategies adopted by local communities, most of whom are peasant farmers. It investigates the problem of deforestation and soil erosion in Nhambonda, its main causes and consequences, and attempts to compare the advantages, disadvantages and relative effectiveness of the different resource conservation techniques that people have adopted. It draws out the gender dimensions of agricultural practice and resource conservation in the area: who chooses which techniques and why. Based on the field study findings, I shall argue that gender difference in access to land, labor and resources, as well as the gender division of labor, have a significant impact on the practice of resource conservation, the methods used and implications.

Methodology

Nhambonda was chosen for the case study as this area has high levels of deforestation and erosion, due to inappropriate cultivation on its steep, hillside slopes, the practice of monoculture with wide spacing between crops, and indiscriminate felling of trees. It was further chosen because the area is experiencing pressure on the land, sometimes translating into conflicts over land. This allows one to study the relationship between tenure security and investments in resource conservation. Conflicts over land have mostly occurred between peasant farmers themselves and between these and private sector farmers [Shumba 1995]. Within the peasant or 'family sector', a number of conflicts have occurred between people returning after war-time displacement, and other war-displaced people who had meanwhile settled on their lands. Finally, Nhambonda was chosen because people here employ a variety of forest and soil conservation techniques, allowing one to study the motives for choosing a specific technique the advantages and disadvantages of one or other practices.

Data was gathered using semi-structured interviews with 66 peasant farmer's members of community, of whom 36 were women. Interviewees were selected according to the following criteria: sex of the household head, type of production system, practice of resource conservation and household location. Questions concerned the local forms of access to and control over land, land use practices, forest resource management, cultivation methods and resource conservation techniques employed, including those, which were locally developed.

The interview data is supported by information from secondary sources. Meetings with NGOs working in the area, namely Concern, Africare, SG2000 and Redd Barna were also carried out and provided a general overview of the socio-economic and political situation in the area. Further interviews were held with the Régulos[1] Nhambonda and Chipanela as well as other land chiefs in Gôndola and with the administrative authorities, namely with the 'Chief of Post' for Nhambonda administrative post, the District Director of Agriculture and officials from the local farmers' associations.

In the rest of this chapter, I briefly describe the historical and current context for agricultural production and forest utilization in Nhambonda, including the gender division of labor and income distribution. I look at current norms and practices for gaining access to and control over land in the study area, as well as the main causes of deforestation and soil erosion and

[1] Régulos refers to land chiefs who were formerly paid by the Portuguese colonial state.

the resource conservation methods adopted. Finally I draw some conclusions about who adopts which method, why and with what implications.

Context in Nhambonda

Nhambonda is situated some 3km from the main road linking Chimoio and Beira cities and covers an area of 143.36 km2. It has an estimated population of 12,031 inhabitants, from some 2,400 families. According to the national census of 1997, the average number of people per household is 4.7, being 5.7 in those where the head of household is male and 3.6 in those headed by a woman [INE 1998]. Approximately 55% of the population are over 15 years old. Most people belong to the Sena population group, although there are also a number of Ndau and Matewa people who usually speak chi-manica. Marriage is generally patrilocal, and a symbolic, lobolo payment is made. Polygamy is frequent in the area.

Nhambonda is densely populated, with around 78 people per km2, equivalent to 6 hectares per family or 0.84 per person. Due to its topographic characteristics, however, with steep slopes, rivers and other areas that are uninhabitable and unsuitable for cultivation, the actual available area per household is much lower.

Despite these limitations, the District has a high potential for agricultural production. The vast majority of the Nhambonda population is principally engaged in agriculture. The current status of peasant production and the existing gender division of labor within households and the community may be better understood by a brief look at the area's economic history.

From the early 20th century and for much of the colonial period, the area was dominated by the 'Companhia de Moçambique', which administered some 99,000 km2 of land in the central region of the country. After 1926, the Company held a monopoly on marketing cash crops and collecting taxes. It built roads and made out land concessions, principally to Portuguese emigrants. The colonial Government held some 10% of shares in the Company and received an additional 7.5% of profits, which the company made from rubber, timber extraction, sugar, sisal and sugar exploration[2]. The *Companhia de Moçambique* further controlled labor exports to the mines and plantations of Southern Rhodesia (Zimbabwe), where in 1945 some 27% of the labor force (11,022 people) was Mozambican [Government of Portugal 1946].

During the colonial period, much of the male labor force of Nhambonda was recruited to work on construction of the railway lines linking Beira and Tete cities, in central and northern Mozambique, linking Lourenço Marques (Maputo) with Salisbury (Harare) and on the road linking Beira to Salisbury. Construction on the road began in 1937, but was only completed in 1960 [Newitt 1995]. As elsewhere in Mozambique, the local population was meanwhile obliged to pay the so-called 'hut tax'. After 1940 a new taxation system was introduced, where taxes paid by the indigenous rural population were linked to the quantities they produced of, principally, cotton and tobacco [Bettencourt 1945]. The objective was to ensure that peasant farmers would continue to produce cash crops. Also in this period, women were

[2] Ibid 13

made eligible to pay taxes, seen as a means of imposing forced labor obligations on women, as well, since much of the male labor force was being exported to Rhodesia.

Between 1943 and 1946, a long period of hunger occurred, which was associated with drought and environmental degradation. According to interviewees, this period of hunger was due to the fact that the peasant labor force, women as well as men, were obliged to work on the large plantations, meaning that local people, particularly women, had neither the time nor resources to work on their own fields, producing food.

After national Independence in 1975, further problems in agricultural production arose in Nhambonda. The new, Frelimo Government created communal villages, partly in an attempt to "socialize the countryside"[3], to centralize agricultural planning and, eventually, as part of efforts to protect the rural population from Renamo rebel incursions [Hermele 1991]. Around 90% of interviewees for this study, however, considered the creation of collective fields and communal villages as among the most negative aspects of change after Independence; mainly because people were obliged to leave their original homes (abandoning their ancestral lands) to work and live with strangers. In practice, Frelimo put most investment into ill-managed state farms and very little at all into either co-operative or 'family sector' production. With drought in the early 1980s and intensifying war, production here, as elsewhere in the country, declined dramatically.

During the war between Frelimo's Government and Renamo, (from the late 1970s until 1992), Nhambonda was largely under exclusive, Government control. The so-called 'traditional authorities' (former Régulos and their sub-chiefs, whom Frelimo deposed at national Independence in 1975), thus had little room for maneuver. There was no dialogue between the administrative and the 'traditional' authorities. The Régulos Nhambonda and Chipanela, and other traditional chiefs of the area, argue that deposing traditional leaders, after Independence, had negative repercussions for the life of local communities, provoking lack of rains and successive droughts.

Currently, the local economy of Gôndola is principally dominate by agricultural, timber, poles and charcoal selling's, comprised of three sectors, namely the co-operative, private and family sectors of production. The co-op sector, however, is disappearing or, in some cases, transforming into a sector of common-interests groups, linked or not to Peasant Associations[4]. The private sector is expanding, yet so far it has failed to significantly influence local production processes. The main private enterprises have begun by developing cash crops, charcoal bought from local people and timber extraction, which are generally marketed outside the District.

---

[3] 'Socializing the countryside' was part of the Frelimo plan, following its Marxist-Leninist ideology of the time, aimed to achieve efficient agricultural growth through collective production, whilst avoiding the creation of a rural bourgoisie.

[4] O sector anteriormente considerado cooperativo, hoje está a ser considerado associativo. A grande diferença resulta nos mecanismos de produção e divisão dos produtos finais. Enquanto que no cooperativo todos produziam na mesma machamba, no associativo cada indivíduo produz na sua parcela e somente junta a associação a produção que vai comercializar. Mas benefícios finais de comercialização também são individuais.

It is, however, the family sector, which occupies most of the cultivated land in Gôndola District. This sector is mainly engaged in the production of food crops for home consumption, whilst marketing a small surplus from the family farm and charcoal to sell to private operators. In this sector, the family farm is considered to be the basic unit of production, where the household produces food for own consumption as well as some crops for sale. Farm size would appear to vary according to household size. Data desegregated by sex of the household head suggests that male-headed households (which almost always include one or more women) have an average of 2,0 Ha each. The average land holding for female headed households (not usually including an adult man), however, is only 1,2 Ha. Meanwhile, the average size of land holding around the city is declining, but is increasing in areas more than 5km from the town center. Trees used for poles and charcoal production can be roughly found around the main village. In general there are found at large distance, approximately 5 km from the main village, since there have been overstocked in the area.

Generally speaking, men in this sector are involved in clearing trees and burn them for charcoal production or to be sold as poles, preparing the soil and in sowing, with the assistance of women. It is mainly men who construct buildings such as huts and granaries. In the late planting season, when vegetables and tubers are grown, it is women who clear the fields. Vegetable plots, managed by women, are generally $100m^2$ in size and are situated in the damp valleys. Women and children, mainly girls, mainly carry out weeding as well as harvesting. At harvest time, adult men are not much involved. They do not usually participate in scaring the birds, harvesting the crop or storing the harvest.

Most peasant sector farmers use low cost tools such as hoes axes and scythes. Labor is mainly family labor and few of them are hired into timber extraction. The fields are tilled by hand and the vegetation is burned. Very few peasant farmers use fertilizer or pesticides of any kind. The exception is when local development projects or private companies have provided small-scale farmers with this type of in-put.

The main income source for local households comes from the sale of agricultural, poles and charcoal products. Timber is completely sold outside of the district. According to discussion with local leaders and other stakeholder during the field work all timber and other wildlife exploiters are extracting the resources and sold them in the outside markets. Nothing remains in their areas, including the income generating from selling these resources. A community leader stressed that they have large amount of timber, but their kid's school has no chairs. The absence of a sawmill in the area contributes to this situation in the area. Apart from the sale of food crop surpluses, poles and charcoal, some families grow cash crops, particularly cotton and oilseeds. These are sold to the *Moçambique Comercial* company. District reports show that the area under cotton cultivation, in the family sector, increased by some 700% (from 536 Ha to 3,750 Ha) between 1995 and 1996. However, due to a drop in cotton prices on the international market, and associated with the high costs of cotton production, many farmers were planning to abandon this venture, in the 1999/2,000 season.

Furthermore, due to the pressure on fertile soils, many families have little surplus to sell. Lack of markets, the low price of agricultural products (maize and sorghum), which are

determined by the buyers, and transport difficulties, are amongst further factors which limit the sale of agricultural products in Nhambonda.

Alternatively, some people add to their income from re-selling goods in Nhambonda, bought in the major towns of central Mozambique, including such things as rice, flour, edible oil, fuel and alcoholic drinks. According to the field data, married women mainly carry out this activity, although their husbands generally control the income. Another source of income for some households, principally those headed by women alone, is through selling traditional drinks. Dealing in second-hand clothes is mainly an activity of young men. Women and men are both involved in selling game meat and domestic animals, such as fowl and goats.

In spite of high unemployment in the formal job markets, there is still some incidence of emigration to the main urban centers, where people go in search of work, particularly to Beira and Chimoio. Nonetheless, generally the men of Nhambonda leave for relatively short periods, two to three weeks, and mainly to sell wood products, such as poles and charcoal. Women's journeys away from the area tend to be shorter still, for just two or three days, mainly to sell or exchange agricultural goods for other food or consumer products.

This picture of production clearly shows the significance of land, in the local economy and of forest and agricultural production, for the well being of local households. It also suggests, however, that there are significant differences in the roles of women and men. Men appear to be relatively more mobile than women, with a wider range of income sources. A look at land tenure and current production practices makes gender difference in Nhambonda more salients still.

Land tenure in Gôndola District

Land in the peasant sector is generally managed according to customary land tenure norms, where individual membership of the community gives that person the right to use community land, with the local leaders' knowledge. Land tenure security is acquired through community membership, though planting trees on the land may strengthen it.

The most common channel for the transmission of lands is via inheritance, which in this area is patrilineal. Generally, women do not inherit land since, according to local perceptions, a woman should leave the family land when she marries. She will then have the right of access to her husband's land, though in the case of divorce she would lose that right.

Most peasant households in the area cultivate two or more fields, situated slightly distant from each other to take advantage of different soil types and precipitation. Normally, a husband and wife / wives have their own, separate fields.

Table 1: Profile of access and control at household level

Culturas	**Control**[5]	**Responsible**[6]		**Working**[7]		
			O	P	S	C
Charcoal	H	M				
Poles	H	H				
Cotton	H	H	H	H	Hh	F

[5] Controla, refere-se a quem toma a decisão sobre a utilização do recurso a nível do agregado familiar.
[6] Responsável, Quem tomas as decisões de maneio a nível da machamba.
[7] Quem executa a actividade.

Cashew	M	Hm				hm
Sorghum	H	M	H	HMm	Mhm	Mm
Maize	H	HM	HM	HM	Mhm	Mm
Oleoseeds	H	H	H	HM	HM	HMm
Peanuts	HM	HM	H	HM	Mm	HMh
Cassava	HM	HM	HM	HM	Mm	HMh
Cowpea	HM	M	H	M	Mm	Mhm
Beans	HM	M	HM	M	Mm	Mhm
Beans boer	H	M	HM	M	Mm	Mhm
Horticulture	M	M	M	M	M	M
Sweet potatoes	M	M	M	M	M	M
Sugar cane	H	HM	H	-	-	H
Banana	H	HM	H	-	-	H
Storage	H	HM	-	-	-	-

Legend: H= Men: M= Women: m= Girl; h= boy: F= Family: O= Open; P= Ploughing; S= weeding; C= Harvesting.
Source: Interviews in Gondola (1999)

Although some households have a specific areas allocated to pasturage, mainly for goats, pasturelands are generally shared across common areas that are unoccupied or lying fallow.

Given a general shortage of labor power in the peasant sector, capacity to use the land is one of the key determinants of land holding, at household level. However, the increasing land shortage in the area has meant a tendency to parcel out family land ever more frequently, creating constraints on the ability to practice fallow or crop rotation. Despite this pressure, not a single, official request has been made by local peasant farmers, for the Government to title their land. All requests for land have been made informally, via the traditional authorities, and principally to Régulo Nhambonda.

By contrast, a number of private farmers in the area have recently requested the Government to issue them with land-use title deeds, mainly since the Peace Accord was signed, ending the war, in 1992.

Some Nhambonda residents obtain land through borrowing. During the fieldwork, however, it was not clear exactly how people distinguish between renting and lending. Some interviewees considered 'renting' to be when a monetary value was charged and 'borrowing' to be when a payment was made in kind.

Renting land generally occurs after the land has been cleared. The landholder may chose to rent, due to lack of sufficient labor power, seeds or other inputs to work it. Land may be rented out by women or men, and is often rented to elderly people, or others who simply wish to expand production. Renting (or 'borrowing') also takes place between relatives and friends, wherein a payment in kind is made. Two widows interviewed said they had turned to this means of increasing their fields. This practice, however, is normally secretive and only involves members or close friends of the family.

Lending out one's plot of land normally happens when somebody, usually a man, leaves the area, probably looking for work, either in Beira, Chimoio or even in South Africa, and thus opting to leave his land with a relative or friend. This form of access to the land also occurs within families or between close friends, with no involvement of the local authorities.

A number of urban residents seeking land, to cultivate, have obtained this through purchase. Sales have principally occurred in the post-war period, after the return of war-displaced people. Through lack of alternative resources, such people have sometimes ended up selling their land [Shumba 1996]. During the fieldwork, interviewees confirmed that a land market still exists, but that people buy and sell in great secrecy and without the knowledge of the traditional leaders. All interviewees claimed to believe that land sales are a negative thing, since this means that land is lost to the local community and given over to strangers.

In another development, some local residents, mainly young men, clear the trees from unoccupied land within the community, some four to five kilometers distant from the town center, and 'sell' them to people who want to farm. This new field is occupied by the buyer, generally someone who has abandoned their previous fields due to loss of fertility. The price varies, according to the seller's offer, the buyer's ability to pay, proximity of the land to the main national highway no 1 (EN1), or to residential areas, and the size of the field. In 1999, the price varied between three and seven million Meticais (US$230 to US$550) per hectare. Sales also occur when a local resident moves out permanently from the area, normally to an urban center.

In sum, it appears that customary tenure norms still operate widely in Nhambonda. According to these norms, men have privileged access to and control over land, through inheritance. They have greater security of land tenure, at household level. Customary norms are changing, however, through increasing pressure on the land, land conflict and the emergence of a land market. The capacity to access new and fertile land is increasingly linked to the ability to pay and to mobility. In both these respects, it would further seem that men are advantaged, relative to women. The links between these factors and soil conservation are further explored in the following section.

Causes and consequences of land degradation

Nhambonda region is considered to have a high risk of erosion, given its location in a zone of undulating hills, with frequent and heavy rainfall, and also due to inappropriate practice in the management of natural resources. These include uncontrolled burning, high incidence of tree felling for timber, poles and charcoal and cultivation on the steep slopes [Wambecke 1988][8].

With improvements to the 'Beira corridor' road, in the late 1980s, Gôndola district and Nhambonda in particular became major marketing points for the sale of poles and charcoal, mainly to people coming in from Chimoio or Beira. With this development, an increasingly large number of people have engaged themselves in charcoal production and this, in turn, has contributed heavily to deforestation and consequent soil erosion.

The demand for charcoal for domestic purposes increased largely in the main urban cities of the central part of Mozambique. This results from the rising of prices of gas and electricity. According to Fernandes et al [1997] 60% of urban population rely only on charcoal for they daily fire needs. Nhambonda is one of the most important charcoals producing areas in the central part of Mozambique. Although, charcoal is sometimes produced from wood remains after clearing agricultural fields, most people extract

[8] Este elevado índice de erosão, também foi referenciado no planeamento participativo do uso de terra efectuado na região de Gôndola[8].

charcoal for commercial purposes from the forest resources. Brachystegia spiciforms, Dlyplorhyncus condylocarpon, Periscopsis angolensis, Combretum fragrans (Chiwanga) and Erythrophleum lasianthum (Missanda) are the most important species used for charcoal production. From 1996 to 1997 there was an increase on charcoal production in Nhambonda from 1.224 to 4.490 bags of 50 kg. Consumption trend shows a huge increase in approximately 37% (from 28.225 to 44.596 and 50.021 to 70.015, respectively) in charcoal consumption in Manica and Sofala province [DPAM 1998]. Tree felling for charcoal production is mainly practiced by men, whilst mainly women are responsible for putting the charcoal in sacks and selling it on the market. Data from the District Directorate of Agriculture in Gôndola [1999] show that 210 people were registered as charcoal burners, of whom fourth were women[9].

The income from charcoal production could reach some three million Meticais (US$250) a year between 1990-96, particularly in the rainy season when firewood is scarce due to the rain season. In this period, from March to September, production and distribution are relatively easy, but during intensive rains period, October to February, make transportation impossible and therefore the supply becomes unpredictable. At these times, transportation costs are very high from the extracting areas to the selling points. The household stock in cities is very low, while in the extracting area is high. The demand and prices increases dramatically in the urban areas for more than 100%. In general a prices of bag of 50kg in the dry period can cost 35.000 MT, while during the rainy season it can cost up to 90.000 MT, varying with its appearance and quality.

While, the woodland is rapidly disappearing, especially along the EN1 and in the proximity's of Nhambonda, charcoal extraction pursue large markets in the cities of Beira and Chimoio and, it leads to some environmental problems if appropriate measures are not followed. For example Saket [1995] shows a reduction of forest areas in 4.12% annually (deforestation rate) in the province of Manica, including Gondola district, although large part of this reduction in forest results from itinerant agriculture and frequency of bush fires. This is supported by the fact that in Nhambonda, to find sufficient wood for charcoal, local people have to travel at least five kilometers away from town.

The people interviewed for this study showed considerable knowledge as to the effects of land degradation including erosion on the soils. Some 90% of interviewees affirmed that rain water was removing nutrients from their fields. When asked about the major change in their areas over time, 37% of men and 26% of women interviewed said there had been a decrease in forest. Some 20% of men and 35% of women, respectively, said that fallow time had been reduced, 20% men and 20% women said the soil was being washed away, whilst 10% men and 3% women said termite activity had increased. Some 7% of men and 15% of women said plant diseases had increased. Meanwhile, 70% of peasant farmers interviewed, especially men, replied that decreasing soil fertility has been particularly sharp in fields planted with cotton, compared to those planted with food crops.

[9] Esta situação é contrastante com a zona sul (Matituine-Maputo e Mabalane-Gaza), onde a maioria de carvoeiros são mulheres, tendo em conta que grande parte dos homens estão no mercado de estacas.

Although only 20% of interviewees had specific knowledge of the causes of degradation, 85% of women said they had watched their soil being carried away by the rainwater. According to most of these women, this happens when the soil is being tilled, particularly after the first rains and particularly on the slopes.

The choice of area for cultivation and the type of crop grown vary with topography, soil type, and availability of water and per family. In general, inter-cropping is common on the high and middle grounds, with multiple cropping system most found in the lowlands. Although the main objective of inter-cropping is to guarantee a higher agricultural output, it also has the advantage of ensuring better plant cover of the soil. This in turn reduces the impact of rain in eroding the soil.

Women dominate food crop cultivation. However, some men also grow food crops, especially in households with a plentiful labor supply. The choice of area for growing these crops depends on the location of the *catena* - soils located along a topographical sequence. Some crops, such as maize, sweet potato and banana are grown in lowland areas know locally as *matoro*. Due to flooding of the lowlands during the rainy season, local farmers prefer to plant on the high and middle grounds. However, in the late planting season, the valleys get preference, since these areas are the ones, which still retain water. The main late-season crops in Nhambonda are maize, beans, and vegetables. The least easily conserved vegetables, such as tomato and cabbage, are mainly produced for consumption, whilst onions, carrots, garlic and lettuce are also marketed. Women generally grow all these crops except banana.

Inter-cropping is common on both the high and middle grounds, with an increase in the planting of leguminous plants in the middle ground fields. Legumes have the advantage of fixing nitrogen in the soil, thereby increasing its fertility. The type of intercropping chosen depends on the soil type, household food needs and the need for soil conservation.

A few crops (e.g. sorghum**,** cotton, sunflower and sesame) are usually grown as monocultures, since, according to local farmers, such crops are very demanding and require a great deal of labor. Sorghum, meanwhile, doesn't allow other crops sufficient access to the soil. The monoculture of sorghum, cotton and oilseeds, with large spacing between the lines, greatly reduces plant cover of the soil and thus favors erosion. Lack of cover means that rain impacts heavily on the soil, destroying its structure and allowing the rain to carry it away. Erosion is also facilitated by the fact that these fields are tilled in the direction of the slopes, a traditional practice in the area.

One of the main factors people mentioned as causing erosion was the late availability of seeds, meaning that farmers delay tilling the soil until mid-November, by which time there are already heavy rains. Another factor mentioned as causing erosion was the number of weeding's that have to be performed, mainly by women. Successive weeding often has to be carried out in the months of heavy rainfall.

Due to the lack of new areas for cultivation, local people have meanwhile been obliged to reduce fallow periods and to cultivate the same land for several years running. Women interviewed mentioned this as another factor contributing to soil erosion. Land shortage close to residential areas as well as the small size of land-holdings held by women, especially those heading households alone, means that they are not able to put any of their land out to fallow. Some 30% of women interviewed said they were unwilling to leave part of their land fallow, for fear that - given the recent experience of land appropriations and conflict over land - fallow lands could be usurped by male neighbors. This suggests that perceived tenure security - or the lack of it - have a significant impact on conservation.

The high level of erosion is resulting in land degradation. To maintain current production levels, peasant farmers argue that the soil should not be worked for more than four to five consecutive years. After this, alternatives would include applying fertilizer, using improved seed varieties or rotating the crops. However, the use of fertilizers or improved seeds implies a high increase in cost, especially when one considers the poor capacity for selling sorghum and maize on local or regional markets. At current production levels of around 800 kg/Ha for maize and 500 kg/Ha for sorghum, with marketing of some 60% of the surplus, and average prices for maize of only 2,000 to 3,000 Mt/kg (US$0.30 to US$0.40) [1999], the cost of using fertilizers is generally higher than the benefits from their application.

The alternative to fertilizers would be crop rotation. Yet all peasant farmers interviewed claimed that this is only possible in fields that are five kilometers or more away from the town. Given the other, domestic based tasks which women generally have to carry out, access to such fields is particularly problematic for women.

With the high-density occupation of agricultural land in the area and intensive use of existing fields, local farmers have adopted a number of soil conservation techniques.

Strategies for resource conservation

A number of recent studies suggest that locally devised conservation methods tend to be better suited to local conditions than imported methods [Richards 1986, Watts 1987, Chambers 1987 and Lewis & Berry 1988][10]. Fairhead and Leach [1996][11] for example, in a study of production systems used in Kissi em Sierra Lion**,** showed those indigenous conservation practices (tree planting, intercropping, mulching, mixed cultivation) greatly reduced soil loss. Regarding women's involvement in resource conservation, taking an example from Nyanga in Tanzania, Sutton [1989][12] showed that the success of soil conservation techniques resulted from well organized work, at both family and community level, where each member knew their responsibilities.

[10] Richards, P. (1985): Indigenous Agricultural Revolution. Colorado Boulder, Westview.
Watts M. (1987): "Conjectures and Crises: Food, Ecology and Population and the Internationalization of Capital," Journal of Geography 86.
Chambers, R. (1987): Sustainable Livelihoods, Environment and Development: Putting the Poor Rural People First: Brighton:University of Sussex, Institute of Development Studies, Discussion Paper 20.
Lewis, L. and L. Berry (1988): African Environments and Resources. London: Unwin Hyman Ltd.

[11] Fairhead**, j.** and M. Leach (1996): Misreading the African Landscape: Society and Ecology in a Forest-savanna Mosaic: African Studies: Ccambridge University Press.

[12] Sutton, J.(1989). "Towards a History of Cultivating Fields," Azania, Vol. 24

In Nhambonda, peasant farmers have adopted a number of conservation practices suited to local conditions. Some of these are low cost and demand little extra labor as, for example, with 'mulching', tree planting, ploughing stubble back into the soil, inter-cropping and cultivation on ridges. However, other locally used techniques require a large labor investment, as with maintain the roots after tree clearance and planting sugar cane or banana on the lower slopes next to drainage channels. Meanwhile, NGOs in the area have introduced a number of new techniques such as, forest reserves, intercropping using imported fruit and other indigenous trees, the planting 'vertiver' grass, the practice of 'minimum tillage', using herbicides and terracing. Some of these practices have been introduced via local farmers' association known as Dzimutse Upenho[13], meaning 'Look to the future'.

In general terms, there is no 'best' conservation practice. Local methods are better adapted to fields smaller than one hectare, whilst others may be more suitable for extensive fields. The efficiency of the method chosen depends on its correct application, on the slope, availability of labor power, type of soil and production system, and on the time and resources available.

'Mulching' (the application of a residual cover) is much used with food crops, in the area, to maintain a plant cover between the lines. This reduces the impact of rain on the soil, whilst decomposition of the vegetable matter increases the organic content of the soil. This is similar to the practice of ploughing in stubble. Apart from reducing the impact of rainfall, this practice also helps to concentrate some amount of water in the soil, guarding against periods of shortage. These methods break down the superficial crust of soil, caused by the rain, and are highly efficient in reducing the impact of rainfall. Little extra labor is required, since the residue is collected during tilling and weeding of the land. The main disadvantage lies in the fact that the vegetable matter, mixed in, may prevent the crop from taking root. This practice is commonly found in women's fields, given that it is suitable to small areas, and is undertaken during the periods of agricultural work (tilling and weeding) that are mainly carried out by women.

[13] Esta associação nasceu por iniciativa de alguns camponeses em 1995. Tem 16 homens e 14 mulheres membros (4 são viuvas, 3 tem os maridos fora da área, 2 divorciadas e 5 casadas). Contribuíram com um valor inicial de 700 mil Meticais ($55.00 USD) para o arranque das suas actividades. Inicialmente a associação esteve completamente virada para a actividade agrícola, particularmente na defesa das suas terras, criação de banco de sementes e procura de mercados fixos para a colocação da sua produção e solução do problemas de degradação de terras que estas famílias estão enfrentando. A designação da associação de camponeses *Dzimutse Upenho* significa *Pense no futuro.* Posteriormente, a associação viu a necessidade de colmatar os problemas de degradação de terras em que estavam votadas as suas áreas. Após reconhecimento de uma forma geral, por alguns membros desta comunidade dos problemas de erosão e das vantagens da introdução de medidas de conservação de solos, na qual poderão a curto prazo resultar no aumento da produção e, com o auxilio dos Serviços Distritais de Extensão Rural estabeleceram a ligação entre esta associação, a GTZ e o Projecto SG2000 para a introdução de práticas de conservação. Sob recomendação destas instituições os camponeses introduziram o capim vertiver, "zero tillage" e a construção de terraços.

Inter-cropping is mainly used in food production. Generally, this is a good conservation practice, given that it ensures good cover of the soil. It also gives the peasant farmer some security, against possible crop failure. It doesn't demand much extra labor, since it is carried out as part of normal farming practice. The main disadvantage of inter-cropping comes from the fact that shorter plants may be blocked from the sunlight.

Ridging is also used, but this requires considerable extra work in soil preparation. The ridges used are small, at a height of 20-30 cm, and are spaced at around 50-100 cm from each other. However, these are not much oriented according to the curve of the hills. Apart from reducing erosion, ridges increase the infiltration of rainwater. They are used in the cultivation of tubers (sweet potato) and vegetables, which are usually grown by women. The maintenance of live roots and planting of sugarcane on the slopes are exclusively practiced by men. This is associated with the facts that considerable physical force is required (locally associated with men) and that it is generally men who clear the trees to open fields.

The establishment of vertiver grass, or pineapple plant barriers along the contour curves, on steep and medium slopes, was introduced by GTZ, a German NGO. This is generally used with cash crops and it means that sediment carried by the rainwater is concentrated around the plant hedge, forming a terrace. In general, this method is efficient, but requires a great deal of work as well as space around the fields. Men from the Farmers' Association, as means to benefit from regular visits by the GTZ field staff and to access other agricultural inputs, mainly seeds, are applying this method. Generally, the work is carried out jointly by husbands and wives, during tillage, at the start of the agricultural season. The main disadvantage comes from the fact that *vertiver* grass is best used around large fields, so that it doesn't compete with the crop.

Tree planting is occurring in the areas most dominated by man, and located in the slopes, since is in these areas were the land degradation occurred. This practice is introduced by some of the NGO's working in the area in exchange with some input, such as seed, tools and some credit. Those farmers are required to plant trees intercroped with some crops, in orders to conserve the soils and to introduce reforestation measures. This practice is required for areas large than 2 hectares.

Another practice recently introduced is that of 'zero tillage', in which the farmer sows without clearing the land. This was introduced by SG2000, an American NGO, which distributed credits in the form of seeds and other inputs to every member of the Farmers' Association, to the value of 380,000 Mt (US$30.00). The condition for receiving this credit, however, was that the farmer must use this technique for their crops, especially on the medium slopes. Later on, farmers who adopted this method were provided with herbicides which were entirely subsidized by the NGO, in a first phase, and in the following season (1997/98) were paid for in maize, the main crop in this area. Though this technique does not require any labor, the disadvantage is that it greatly increases costs, given those farmers now have to pay for the herbicide. Thus it would appear that, although the demand for farmers to adopt this technique is partly related to soil conservation, it also has something to do with marketing American produced herbicides. Most of the women in the Farmers' Association

did not agree with this method, given that they are not producing cash crops whilst they need their surplus maize to use for exchange or sale.

Terracing is another recently introduced practice. This requires a great deal of work as well as technical knowledge in order to identify the contours. Although SG2000 has engaged in some training, using traditional methods (*'pé de galinha'* or 'chicken's foot') to identify the contours, few peasant farmers, and particularly few women, have opted for this method. This is linked to the fact that additional labor is required and also that terracing is suited to the steep slopes, where monoculture cash crops are usually planted. This practice is almost exclusively used by men, given that they control the cash crops. However, in nominally male-headed households, women participate in the construction of terraces, to make up the labor force.

Gender relations and resource conservation

This study has shown that the problems of land degradation, including deforestation, soil erosion and loss of soil fertility in Nhambonda are directly linked to competition for the most fertile lands and for those closest to settlements, to the way in which natural resources are managed and to the satisfaction of basic food needs. To minimize land degradation, peasant farmers have adopted a number of different conservation strategies. However, difficulties related to the shortage of land and labor power have limited the take up of new methods, introduced by NGOs. This in turn has limited people's access to the inputs and technology, which the NGOs can provide. Women have faced these problems particularly sharply, given their specific role in cultivation and the greater demands on their labor time than that experienced by men. This means that women, especially those heading households alone, do not have the same opportunities and are poorly placed to compete with male-headed households.

Given that the inheritance of land in this area is generally patrilinear and that unoccupied lands can now only be found at five kilometers or more distant from town, women's fields have been particularly prone to loss of fertility. However, women have adopted low cost conservation techniques, appropriate for the size of their fields, less demanding in terms of labor and which occupy less space and time.

Women's adoption of these particular methods is directly linked to the fact that they often have to cultivate the same plot of land for several years, since no other land is available to them in the vicinity. Yet, the relationship between investments in conservation and land tenure security is not clear, particularly for women in nominally male-headed households. Male however, more often have sufficient access to labor and resources to be able to take up the new conservation techniques introduced by NGOs in exchange for inputs and other benefits.

The choice of particular conservation practices is also linked to the division of labor within the household. For example, it is common to find men employing the live roots, since it is they who are responsible for clearing the fields, whilst women more often use mulching, since it is they who work more in tilling and weeding. Men appear to control forest extraction and farming on the steeper slopes, where the cash crops are grown, but where conservation costs are high. Women generally occupy the low lands, where they adopt less costly conservation methods, which are more closely integrated in the existing production system. These methods are also less time consuming - an advantage for women, considering their reproductive labor load.

The livelihood strategies adopted by women interviewed for the study, include participation in the Farmers' Association, even though this is dominated by men. In participating, women aim to access the inputs and other benefits offered by the NGOs, even though in their view, the conservation practices being introduced by these NGOs are not appropriate to their needs.

Implications of the study in terms of community based management of natural resources policies

Although the area, have all these remarkable forest species, their economic value is no yet available. Most of the communities living along these resources have-long established relationships with them, particularly in use them for their subsistence while protecting and conserving them for generations. Most recently, some of these areas are concessioned to private investors and other are undergone illegal hunting processes that reduced wildlife population leading to several species be near extinction and untangled to reserve for poaching pressure. There has been little attempt to achieve a more integrated approach to manage and conserving coastal areas. Introducing community approaches will lead to community to manage in a sustainable form avoiding this mismanagement. These effort will cost resources by producing a base-line information on levels of hunting and forest cut, indication of preferable species, time and finances, with expected return of this investment coming from use and marketing these resources according to sustainable principles. As result there is a need to access the economic and social value of the resources in order to verify if they are economically viable to manage them.

Community awareness of the environment and the importance of sustainable use of natural resources are growing in the region, but it is in the early phase, after the introducing the community management o f natural resources. Economic hardship has stepped up pressures to develop such resources and faced with the need to provide short-term relief to economic problem, particularly due to the fact that the government seem unable to carry out the necessary research or to implement sound management practices required for long-term resources sustainability. In short, lack of environmental information available, habitat degradation and bush-fires forces the government to bow to the pressure to use resources before proper resource management is in place, jeopardizing the care and protection of species along the northern district.

In general the community does not participate in planning for the use of resources, a back for commitment to sustainable use programs. Community participation and commitment is essential for planing and maintaining sustainable use of resources.

Conclusions

The choice of conservation methods in Nhambonda is linked to the impact of deforestation and soil erosion, to the size of fields and type of crops, availability of labor power and also to gender relations within and between households. Land degradation is exacerbated by deforestation, as well as monoculture cropping on the steeper slopes and

planting along the line of descent - practices mainly encountered in the cash crop fields controlled by men. Yet men have been advantaged in the uptake of new conservation methods introduced to the area. In exchange for adopting these new methods, farmers receive regular visits from extension workers and technicians, credit and other inputs.

I am thus drawn to conclude that there is a tendency to perpetuate men's greater control over resources, since the NGOs, with the aid of the local authorities, are introducing conservation practices better suited to the type of production dominated by men, in exchange for inputs, credit and other benefits.

Women, meanwhile, with their small fields dedicated to food crops, have generally found it more feasible and practical to stick to local conservation methods such as inter-cropping, 'mulching' and building ridges. Yet these methods do not have the benefit of bringing access to the resources and services offered by the NGOs. This situation may reinforce a dependency of women, on men, for access to resources.

Nonetheless, some women adopt strategies for gaining access to credit and other inputs, through participation in the Farmers' Association. This participation may also give them a stronger voice in public decision-making.

In the light of this study, it is recommended that, in future, the definition of resource conservation policies should not only rely on new methods introduced by outside agents. Local practices should also be studies and the relative advantages and disadvantages of each method should be investigated, given the existing socio-economic and political context and the likely impact on gender relations, which these practices might have.

References

Bettencourt, J. T. (1945) Relatório do Governo Geral de Moçambique: Portugal: Divisão de Publicações e Biblioteca, Agencia Geral das Colonias Vol. 1.

Blaikie, P. and Brookfield (1987): Land Degradation and Society. New York: Methuem &

Chambers, R. (1987): Sustainable Livelihoods, Environment and Development: Putting the Poor Rural People First: Brighton: University of Sussex, Institute of Development Studies, Discussion Paper 20.

Fairhead, J. and M. Leach (1996): Misreading the African Landscape: Society and Ecology in a Forest-savanna Mosaic: African Studies: Cambridge University Press.

First, R. 1971: Portugal Wars in Africa: London: The International Defense and Aid Fund and Christian Action Publication LTD.

Governo de Portugal (1947): Anuário Estatístico 1946:

Hermele, K. (1988): Land Struggles and Social Differentiation in Southern Mozambique: A case study of Chokwe, Limpopo 1950-1987. Uppsala, Sweeden: Scandinavian Institute of African Studies.

Howard, J., J.Jeje., D. Tschirley et al. (1998): What Makes Agricultural Intensification Profitable for Mozambican Smallholder ?: An Appraisal of the Inputs Sub-sector and 1996/97 DNER/SG2000 Program.

INE (1998): Censo Populacional

INIA (1996): Zonas Agro-ecológicas e Sistemas de Produção. Ministério da Agricultura e Pescas.

Lewis, L. and L. Berry (1988): African Environments and Resources. London: Unwin Hyman Ltd.

Newit, M. (1995): A History of Mozambique. Indiana University Press. Bloomington

Richards, P. (1985): Indigenous Agricultural Revolution: Colorado Boulder: Westview.

Santos, S. (1997): Urban Woody Biomass Energy in the Developing Country: The case of Beira, Mozambique. Msc Thesis, University of Oxford. London

Shumba, M. (1995): Participatory Land Use Planning for Gondola District: Serie Terra e Agua, Comunicação, n°. 28b.

Sutton, J.(1989). "Towards a History of Cultivating Fields," Azania, Vol. 24

Wambecke (1988): Erosion Hazard Mapping of Mozambique. INIA, Maputo

Watts M. (1987): "Conjectures and Crises: Food, Ecology and Population and the Internationalization of Capital," Journal of Geography 86.