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SOCIO-ECONOMIC SPECIAL STUDY
Report No. 12

BUHINGU

Participatory Rural Appraisal in Buhingu Ward, Kigoma Region, Tanzania

Dar es Salaam
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National Socio-Economics Co-ordinator

Pollution control and other measures to protect biodiversity in Lake Tanganyika (RAF/92/G32)
Lutte contre la pollution et autres mesures visant à protéger la biodiversité du lac Tanganyika (RAF/92/G32)

The Lake Tanganyika Biodiversity Project has been formulated to help the four riparian states (Burundi, Congo, Tanzania and Zambia) produce an effective and sustainable system for managing and conserving the biodiversity of Lake Tanganyika into the foreseeable future. It is funded by the Global Environmental Facility through the United Nations Development Programme.	Le Projet sur la Biodiversité du Lac Tanganyika a été formulé pour aider les quatre états riverains (Burundi, Congo, Tanzanie et Zambie) à élaborer un système efficace et durable pour gérer et conserver la diversité biologique du lac Tanganyika dans un avenir prévisible. Il est financé par le FEM (Fonds pour l'Environnement Mondial) par le biais du Programme des Nations Unies pour le Développement (PNUD)

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CONTENTS

1 BACKGROUND

Conservation of biodiversity is complex in that it involves walking a tight rope while balancing human interests and the interests of nature. The balancing act is further compounded by the fact that human interests are never homogeneous. They often manifest themselves in conflicting self interests resulting in interest groups locked in mortal contest for control of nature and its resources. It is imperative, therefore, that conservation of biodiversity is lodged in a socio-political framework which identifies and respects all legitimate levels of rights, responsibilities and obligations (cf. Vane-Wright, 1996). It is in line with this reasoning that the Lake Tanganyika Biodiversity Project is developing a Strategic Action Plan (SAP) for the conservation of Lake Tanganyika. In preparation for this, the Project is undertaking a series of Special Studies of biodiversity, sedimentation, pollution, fishing practices, and socio-economics. The Socio-Economic Special Study (SESS) aims to identify ways in which the Project can promote:

- participation in fisheries and wider natural resource management by local communities;
- improved, more sustainable fisheries and resource utilisation practices;
- alternative livelihood and income earning opportunities outside of fisheries, especially where lake biodiversity is threatened; and
- environmental education work, to facilitate the above, and to promote general awareness of the importance of the lake resource, especially amongst local people and local government.

1.1 Objectives of the study

The SESS is undertaking in depth participatory action research at selected sites in each of the riparian countries with the objectives of improving understanding of:

- livelihood strategies of local communities, as a basis for informed intervention by the Project;
- patterns of natural resource utilisation, and the threats to natural resources and biodiversity;
- the socio-economic make-up of lakeshore communities and key stakeholder groups; and
- institutional mechanisms whereby improved resource management and local development initiatives might be introduced.

Since January 1997 PRA investigations have been carried out in various villages in Tanzania and Zambia. The first investigation which involved a multidisciplinary approach was carried out at Mtanga village in the vicinity of Gombe Stream National Park. Results of that work are reported in Lwoga, 1997. A second comprehensive PRA was undertaken in August 1997 in four villages in Kirando Ward, Nkansi District, Rukwa Region; results are reported in Mung'ong'o (Ed.) (1997). This report contains the results of a third comprehensive PRA done in December 1997 in three villages in Buhingu Ward, Kigoma Rural District, Kigoma Region, in the vicinity of the Mahale Mountains National Park (MMNP).

Further to the general objectives, this study also sought to investigate the nature of the relationship between the communities living near the MMNP and the park itself.

1.2 Methods and materials

The study was carried out by a multidisciplinary team of 11 people:

- Dr. Claude Mung'ong'o, Environmental Sociologist, University of Dar es Salaam;
- Mr. Bartholomew Tarimo, National Environmental Education Co-ordinator, NEMC;
- Mr. Omari Kashushu, Research Officer, TAFIRI;
- Mr. Hamza Mabochi, Community Development Officer, Kigoma;
- Mrs. Beatrice Marwa, Fisheries Officer, Kigoma;
- Mr. Aristides Kashula, Forestry Officer, TACARE;
- Mr. Fredrick Malisa, Community Conservation Warden, Mahale Mountains National Park;
- Mrs. Eunice Salamba, Community Development Officer, Kigoma;
- Mr. Vissa Magige, Regional Agricultural Officer, Kigoma;
- Mr. Malore Shaaban, District Agricultural Officer, Kigoma; and
- Mr. Enock Mwamfupe, Ward Executive Officer, Buhingu.

The manual compiled for the work in Kirando (Evison and Mung'ong'o, 1997) covering the basic PRA tools that the team would need was used in this study also. Team members were given copies of the manual to study before briefing sessions at Kigoma and Buhingu. Since most team members were already familiar with PRA techniques, no comprehensive training sessions were required before embarking on the actual fieldwork, which saved the team a lot of time.

The manual subdivided the issues to be addressed into five groups, each of which was tackled by specific members of the team:

- fisheries and fishing practices: Mr. Omari Kashushu;
- land tenure and agricultural practices: Mr. Bartholomew Tarimo (Leader), Mr. Vissa Magige, and Mr. Malore Shaaban;
- the socio-economics of the household: Mrs. Beatrice Marwa (Leader), and Mrs. Eunice Salamba;
- institutions, infrastructure, markets and business: Mr. Hamza Mabochi (Leader), and Mr. Enock Mwamfupe; and
- forestry and wildlife: Mr. Aristides Kashula (Leader) and Mr. Fredrick Malisa.

Dr Claude Mung’ong’o looked at the relationship between the communities living near the MMNP and the park itself.

Data were collected using mapping, transect walks, timelines, seasonal calendars, daily timetables, and semi-structured interviews. Data collection took place between 8 and 12 December (see Appendix A for fieldwork schedule). Each evening after dinner the team met to review the day's work and plan for the next day. Information gaps were identified and ways of plugging them were decided upon.

Table 1.1 shows the number of people who attended the various village meetings where mapping, timelines, and seasonal calendars were undertaken. Note that the count given for Buhingu village is smaller than the others as bad weather delayed the PRA team, and many people had dispersed.

Table 1.1 Number of people attending PRA meetings

	Kaliani	**Nkonkwa**	**Buhingu**
Men	250	159	55
Women	50	46	12
Children	0	25	30
TOTAL	**300**	**230**	**97**

Source: Field Data, December, 1997

The whole team spent three days in Kigoma after the fieldwork to analyse the data and write up group reports, which form the basis of this report.

2 THE STUDY AREA

2.1 Location and accessibility

Buhingu Ward is located between 06˚00'S and 06˚15'S and 29˚43'E and 29˚50'E, and is one of eighteen Wards in Kigoma Rural District in Kigoma Region. It is situated on a hilly peninsula protruding into Lake Tanganyika, with an altitude of between 800 and 1,700m. To the north and west it is bounded by the lake which links it to the Democratic Republic of Congo (formerly Zaire) in the west, the Republic of Burundi in the north, and the Republic of Zambia in the south. The Ward had no road connection inland to the east, and depends on lake transport using local outboard engine boats and the weekly services of the MV Liemba owned and operated by the Tanzania Railway Corporation.

2.2 Physical features

Most of the Ward is on the Ufipa Plateau. It ranges from Kaliani's complex of gently undulating plains and plateaux with steep hills, footslopes and valleys developed on schists, acid volcanics, gneisses and sandstones between 1,200 and 1,700m, to the lower lakeshore alluvial complexes of Nkonkwa and Buhingu characterised by flat plains covered with riverine alluvia which are regularly flooded with homogeneous sediment. The soils of the Ward belong mainly to the Lake Tanganyika lacustrine terraces and range from loams on high, well-drained terraces and floodplain benches, to clays on low floodplain benches. To the south, the Mahale Mountains rise steeply to 2,462m at the Nkungwe summit, while the Kabogo Range dominates the north-eastern part of the Ward.

The climate is humid with mean annual rainfall ranging between 1,000mm on the plains and 1,200mm in the Mahale Mountains. Rainfall is unimodal, with the wet season lasting from November to early March, and a prolonged dry season. Precipitation is reliable allowing a wide range of crops to be grown, with some double planting of short season crops such as beans. Lowland areas are warm for most of the year, except around June when the nights can be cool. The Mahale Mountains experience comparatively high temperatures during the day and cool temperatures during the night, particularly during the dry period from June to early September. It is during this period that high winds and dangerous storms are experienced (BRALUP, 1981:4-6). Local traditions hold that they are a result of the mating antics of the Spirit of Nkungwe and his spouse, the Spirit of Kabogo, and that anyone travelling through the area during these times must offer sacrifices in the form of money and maize flour to appease the spirits.

2.3 Buhingu Ward in profile

2.3.1 History

Buhingu Ward is one of the earliest settled areas in Kigoma Region. The Ward was probably first settled by Tongwe people, and was known during the British colonial era as Tongweland (Mwamfupe, pers. comm.). Later, Bembe fishermen from the Kalemie area of the present day Congo established a fishing camp at Kaliani, and their descendants still form the majority of the population there.

The first non-African influences probably reached the area in the middle of the 19th Century when Arab slave and ivory traders established a provisioning post at Kirando to the south. German occupation of the area dates from 1890 when a boma was built on Manda Island in Kirando. Later the Mgambo sub-village of Buhingu became a major port for boats travelling between Kigoma, Kalemie, and Rumonge in Burundi.

The successive invasions by outsiders introduced new socio-economic and cultural strands. For example, the coming of the Bembe marked the beginning of fishing and the cultivation of such crops as cassava and groundnuts. The coming of the Arabs introduced Islamic culture, particularly to the Mgambo sub-village, and influenced the planting of permanent tree crops such as coconuts, mangoes, and oil palms, which are characteristic of the area to this day. The coming of the pastoralist Tutsi from Burundi during the middle of the 18th Century introduced cattle keeping to the area. However, the rinderpest epidemics of the late 19th Century decimated herds and reduced the influence of cattle in the economy (URT/Kingdom of Norway, 1982:2-5). In the past two decades there has been a larger westward expansion of the agropastoralist Sukuma people and their herds from Shinyanga and Tabora Regions in the drier parts of the Central Plateau. However, in contrast to Kirando, the effects of this in Buhingu are minimal.

2.3.2 Demographic characteristics and settlement patterns

Field data indicate that in 1997 the Ward had an population of 10,161 people distributed in 1,694 households in three villages. This represents an average annual decrease of 6.5% since the 1988 census (Table 2.1). This dramatic decline is primarily due to the recent repatriation of Congolese, although there is also evidence that in recent years there has been considerable out-migration of people in search of arable land in Wards such as Kalya and Ilagala.

Table 2.1 Population in Buhingu Ward 1988-97

	1988	**1997**
Male	12,330	4,786
Female	12,117	5,375
Total	**24,447**	**10,161**

Source: 1988 Census and Field Data, December, 1997

The villages are located on the lakeshore on bays: Kaliani on Bilenge Bay; Nkonkwa on Sitolo and Katobelo Bays; and Buhingu on Kabogo Bay. The settlement pattern is a result of an economy based on fishing and valley cultivation, but the characteristic concentration of households is most probably a legacy of the Villagisation Programme of the 1970s.

2.3.3 Ethnic composition and migration patterns

Table 2.2 illustrates the ethnic groups represented in the Ward. Buhingu village is by far the most cosmopolitan community in the Ward. Its population includes most of the ethnic groups resident in the other villages plus, minority groups such as Tabwa, Sukuma, and Bwali, confirming that it has in the past been a major focus of immigration. Generally, however, the Ha and the Tongwe form the majority in both Nkonkwa and Buhingu, while Kaliani is exclusively inhabited by people of Congolese origin.

Table 2.2 Ethnic composition of Buhingu Ward

	Kaliani	**Nkonkwa**	**Buhingu**
Ha		x	x
Tongwe		x	x
Tabwa		x	
Sukuma		x	
Bwali		x	
Goma	x	x	
Bembe	x	x	x
Kalamba	x		
Rundi			x

Source: Field Data, December, 1997

3 FISHERIES AND FISHING PRACTICES

Omari Kashushu

3.1 Introduction

This section presents the main findings of the fisheries and fishing practices component of the PRA team.

The aim of this part of the study was to:

- identify all the fishing techniques used in the Ward;
- collect technical information on the fishing gears;
- identify the fish species caught by these gears;
- identify the local fishing techniques threatening biodiversity in the lake; and
- survey the fish trade on the beaches and at the markets.

Techniques used included sampling of fish catches to evaluate catch composition, and interviews with fishermen and other stakeholders to gauge technical aspects of the fishery, its catches, history, and trends. Data were triangulated by observation and reference to earlier studies elsewhere. The catches of the various gears were observed to identify the ones likely to be destructive.

It is often difficult to check on the mesh size of a net as fishermen normally land the fish and leave their nets at home before coming to market to sell their catches. Another problem is that fishermen often use the measurements “inch” and “centimetre” interchangeably. Petit (1995) states that the declarations of littoral fishermen about equipment are only reliable if they are the owners of the gear.

3.2 The fishing community

The fishing skills currently used in the Ward were introduced to the area by Congolese (Bembe) and Rundi fishermen two decades ago, and the majority of the population of Kaliani today are of Congolese descent. Nonetheless, the Tongwe, Ha, and other local ethnic groups also engage in fishing to a considerable extent. Traditional scoop nets (*kawesulo*) were abandoned when lift nets were introduced.

3.3 Fishing gears and techniques

3.3.1 Lift nets

Twenty percent of fishermen at Nkonkwa and Buhingu use lift nets (*kipe*) to catch *Stolothrissa tanganicae* (*dagaa*) and/or *Lates stappersii* (*migebuka*). A crew of four works a catamaran with four lamps, but unlike other catamarans, these tend not to use engines for fear of Congolese pirates. However, good fishing grounds can be reached within an hour’s paddling, so this is not a major constraint.

Lift net fishing is carried out year round, although with a marked peak between October and April and a slacker period between May and July as the fish move to great depths to escape the cool waters which lie on the surface during this period. Fishing is done every night except for the nine nights around the full moon. Two to three hauls are made per night. As well *Lates stappersii* and *Stolothrissa tanganicae*, *Lates mariae* (*sangala*), and *Limnothrissa miodon* (*malumbu*) are also often caught.

This type of fishing is relatively sustainable and environmentally friendly and very lucrative for the owners of the gears, and even the hired fishermen (thought to a lesser extent!). Its development was supported in the 1980s when the former Co-operative and Rural Development Bank offered loans to fishermen to cover the high investment costs, but is now in decline as a result of piracy, increased costs of gear, and lack of credit, which are encouraging more fishermen to take up beach seining.

3.3.2 Sardine beach seines

These are used primarily in Kaliani to catch sardines (Clupeids) during the day close to the shore. The nets are about 64m long and 20m wide, with four 50m ropes on each side, and approximately 60 buoys and 40 anchor stones. Two boats are used, one carrying the net and the net-pullers, and the other (the *kabelele*), which is smaller, carrying one man who looks for the schools of sardines. When the latter sights a school he calls the crew of the bigger boat to come and set the net. This activity takes place between about 15.00 and 18.00. Rarely do the fishermen go for a second trip, suggesting that the fishing grounds are still fairly rich. Before it is sold the catch is normally spread on specially prepared sandy areas on the beach to dry, usually by women and children, who are paid a bucketful of for their work. The sardines regularly caught are *karumba*, *kahuzurumba* or *babu kati*, and *kahuzu*.

3.3.3 Fish beach seines

These are used in Nkonkwa and Buhingu during the day and at night to catch larger inshore fish. The nets are about 100m long and 10m wide, with two 150-200m ropes on each side, and approximately 50 buoys and 40 anchor stones, and are used by teams of six fishermen in a single boat. Fish species regularly caught include *Oreochromis tanganicae* (*ngege*), *Tilapia reudalli* (*kayaba*), *Astatotilapia burtoni* (*kijole*), *Limnotilapia dardenei* (*kungura*), *Brulengerochromis microlepis* (*kuhe*), *Lamprologus* spp. (*nzonzole*), *Xenotilapia* spp., (*kapopo*), *Trematocara* spp., (*masembe*), *Limnothrissa miodon* (*lumbu*), and *Chrysichtehys brachynema* (*kibonde*).

The main problem with beach seining is thought to be destruction of fish habitats and breeding grounds by dredging. In addition, many fishermen use nets with very small meshes which catch juvenile as well as mature fish, and fish species such as *Xenochromis hecqui* (*mbeta*) and others know locally as *mbaza*, *kibebe*, and *mangwa* are reported to be locally extinct.

3.3.4 Gillnets

There are only about 25 gillnet (*makila*) fishermen in the Ward, who target large individuals of high value. The size of the nets varies, but the majority are 3-ply nets 1,000m with a 26cm mesh. Others are 650m long with a 13cm mesh, although there are a use 9-ply nets 1,500m long with a 28-30cm mesh. The nets are normally laid each evening and lifted in the morning.

3.3.5 Lines

Line (*kachinga*) fishermen are usually MMNP staff who fish in the exclusion zone off the park. The catch is usually consumed, although a surplus may be sold. The lines are 100-150m and the hooks are baited with sardines or earthworms. One or two fishermen work from a small paddled canoe, usually in the mornings, but sometimes in the late afternoons as well. Fish species regularly caught include *Tropheus* spp. (*kiongo*), *Lepidiolamprologus* spp., (*kindurwa*), *Malapterurus* spp.) (*nyika*), *Mastacembaelus* spp. (*mrombo*), and *Synodontis* spp. (*nkonko*).

3.4 Factors affecting fishing

3.4.1 Winds

The effects of winds are much more pronounced in Buhingu than in Kirando, which is protected by islands. The westerly *lukuga* which blows between December and April is the most harmful, and can blow for two weeks continuously, keeping fishermen off the lake for many days. The northerly *kaskazi*, which blows between September and April, also poses a great danger to the catamarans which fish in the deep waters offshore. The southerly *kusi* blows during the dry season between April and August and can also disturb fishing activity, although it generally does not last long. The gentle *mwela* blows off the land every morning throughout the year, and it is used by day fishermen.

3.4.2 Piracy

Piracy on the open waters is a major concern of fishermen at Buhingu, as elsewhere. Theft of nets and engines has been reported in the Ward throughout the last few years. The obvious result has been reduced lift net activity and hence reduced catches and incomes. As noted in Kirando, the gangs which attack the fishing units comprise six to eight men armed with machineguns. All sources indicate that they come from Congo, possibly deserters or renegades from the Mobutu regime's army. With the coming to power of the Kabila regime things have improved; there is exchange of information between the two countries, and stolen gear is sometimes recovered. However, the gangs have changed tactics. As reported in Mtanga, Kirando, and in Zambia, groups of 20 or more armed men have started to land on the shore and attack houses, specifically targeting rich gear owners or traders who are likely to have large amounts of cash on the premises as a result of a lack of banking facilities.

3.5 Markets and trade

The catches landed fall into two groups. The littoral fish caught by the beach seines are normally sold fresh on the beach for local consumption. The sardines and *Lates stappersii*, however, are usually processed and sold to middlemen who transport them to large fish markets in the four riparian states and beyond. Lake Tanganyika sardines are reported to be in high demand in urban centres as far as Lusaka in Zambia, Harare in Zimbabwe, Rumonge in Burundi, and Bukavu, Goma, Kisangani, Lubumbashi and Kinshasa in Congo. Within Tanzania they are popular in Dar es Salaam, Tabora, Dodoma, Mbeya and other smaller towns. The growth of modern poultry industries in many of the urban centres of East and Central Africa has increased the demand for sardines and small fry. Such varied sources of demand complicate attempts to regulate fishing activity, as there are simply too many stakeholders at too many levels, many of whom are too far from the lake to have any knowledge of and/or concern for it.

3.6 People's perception of the fishery and the environment

People's perceptions of the long term sustainability of the fishery in the study area differ from village to village. In Nkonkwa and Buhingu, , informants were unanimous that some species of fish are disappearing, although they do not know why. However, in Kaliani people believe that fish is so plentiful that there is no need for restrictions, such as the MMNP exclusion zone, and clearly do not understand that this abundance may be a result of the exclusion zone acting as a refuge.

4 LAND TENURE AND AGRICULTURAL PRACTICES

Bartholomew Tarimo, Vissa Magige and Malore Shaaban

4.1 Access to land

Much of the land in the Ward is held communally. The land that people cultivate has usually been cleared from the bush, and it the property of the man who cleared it. It is inheritable asset to be passed over to a his dependants after his death. The majority of cultivated land in the area has thus been inherited. However, after the Villagisation Programme and the coming of new systems of local administration, some land was also allocated to immigrants by village governments. The team was further told that if a man dies the land is kept by the widow unless she remarries, in which case it is passed to the children.

An alternative way of acquiring land is through borrowing money and purchasing it from people who have become involved with other economic activities such as fishing or business. Renting of land is very rare.

4.2 Crop cultivation

4.2.1 Crops grown and yields

Crop production is currently second to fishing in importance, although its importance has increased with the perceived decline in fishing,

Cassava and oil palms are the main crops. Cassava is grown by almost every household as a subsistence crop and is depended upon by women as a source of cash. An acre of cassava can produce between 30 and 45 bags which fetch between 4,000 and 6,000 TSh per bag. Oil palms are controlled by men primarily as a cash crop. An acre of oil palms can produce between 2,000 and 3,600 litres of oil, which fetch between 150 and 200 TSh per litre, i.e., oil palms are approximately 2.5 times as profitable as cassava as a cash crop. The common varieties of cassava include *Bunganabuto, Ifakara, Mguu wa kwale, Binti Athumani, Kihonyi, Kirisi, Kalulu,* and *Kikunde.* The last three types are bitter varieties. The main varieties of oil palms include *Hote, Jiwe* and *Bengeza.*

Rice and beans are also grown. The most common varieties of rice are *Supa, Kihogo, Piwa,* and *India.* Those of beans include *Kigoma yellow* and *Canadian wonder.* Other crops grown primarily for home consumption as a supplement to the diet include maize, sweet potatoes, and groundnuts. Maize is usually grown as a secondary crop. In fact, much of the maize consumed in the area is imported from other parts of Tanzania, or Congo across the lake. Prices fluctuate between 6,000 and 12,000 TSh per 100kg bag. Table 4.1 illustrates approximate yields of the major crops.

Table 4.1 Yields of major crops in Buhingu Ward (bags or litres/acre)

	Kaliani	Nkonkwa	Buhingu
Cassava	30	20	45
Oil palms	2,100	2,000	3,600
Rice	15	25	23
Beans	5	7	7
Maize	5	7	16
Potatoes	15	15	18

Source: Field Data, December, 1997

The main horticultural crops are tomatoes, (mainly *Moneymakers*), cabbages, and onions. Coconut and mango trees are common in Nkonkwa and Buhingu, but only a few households have other fruit trees such as bananas, pawpaws, oranges, lemons, or guavas. Some households grow some sugar cane.

4.2.2 Storage

Many people do not store much of their harvest. Cassava, which is the main staple food, is harvested as it is needed directly from the fields. Women typically collect some every few days, and leave the rest in the ground. Rice is usually sold after harvesting, although some is stored in *vihenge* (storage huts). The *vihenge* observed were built with mud but without dung, which helps the mud to harden and reduces weevil and other pest damage. Maize is stored in small quantities in the roofs of houses where smoke helps to reduce pest damage. Larger quantities are stored in other ways, including in gunny sacks.

Major crop pests include termites, aphids, Rhinoceros beetles, rodents, monkeys, warthogs, and birds. Major crop diseases include mosaic viruses, which attack cassava and tomatoes, and cassava mealy bugs (*Phenacoccus manihoti*).

4.2.3 Cropping patterns, methods and seasonal calendar

The fields are generally in the areas surrounding the villages, but may be up to two hours walk away. The rice fields for all three villages are in the Katobelo valley of the River Kabezi and the Bulimba valley of the River Buhingu.

Limited but fertile alluvial soils in Nkonkwa and Buhingu have made permanent cropping possible. Crop residues and other vegetation are usually not burned but are incorporated into the soil as green manure. Nobody interviewed knew about nitrogen loss due to the sun, although moisture loss was appreciated by some. However, nobody interviewed practised mulching, except on horticultural crops, and then only for seed germination. There is no discernible use of manure as there is little cattle keeping in the area, nor artificial fertilisers, which are only available in Kigoma, but this is not a problem as soils are intrinsically fertile enough to produce good yields for some time

Planting is done on ridges approximately 1m apart. Maize, beans, and cassava are usually planted together, the dominant crop being cassava. Cassava is planted on top of the ridge or on the sides. Usually this is done alternately, but it depends on personal preference and the width of the bank. Very occasionally maize was seen planted on its own. The maize seed is usually selected from the previous year's harvest. While some people select the best seed, the majority are less discerning, and may plant many seeds in one hole to ensure a harvest. These are not always thinned out and thus the best harvest possible is not always achieved. Sometimes beans are planted as a sole crop during the off-season locally known as *njela*. The seeds are usually selected from the previous short rains crop.

Although some farmers broadcast rice directly on to the main fields, rice is usually first grown in a nursery and then transplanted to the fields. Some people germinate the seed in their homes before planting into a nursery. There is no large scale irrigation, even along the main rivers, and all of the rice is rain-fed. Rice farmers and village leaders in Nkonkwa requested outside assistance for the control of seasonal flooding in the Katobelo valley but there seem to be no local efforts being made towards this.

The main farm implements used in crop cultivation are hand hoes and a variety of machetes. Hand hoes have been used in this area from time immemorial. Long before the arrival of the factory made *Jembe Ulaya* (European hoe), people in the area developed their own hoe manufactured by traditional blacksmiths. Ox-ploughs are rarely used in the area.

Figure 4.1 illustrates a general seasonal calendar for the study area. Note the concentrated demand for agricultural labour between December and April. This demand is compounded by a peak in fishing activities during the same period. Fishing impacts on farming activities by reducing the area cultivated, the timing of planting and the intensity of the cultivation methods used.

Figure 4.1 Seasonal calendar for Buhingu Ward

	Cassava	**Oil palms**	**Rice**	**Beans**	**Maize**	**Fishing**
September	Field prep.	Field prep.	Tilling	Field prep.	Field prep	><> ><>
October	Field prep.	Planting	Tilling		Field prep.	><> ><>
November		Planting	Tilling		Planting	
December	Planting	Planting	Planting	Planting	Weeding	><> ><>
January	Planting	Planting	Planting		Weeding	><> ><>
February	Planting	Weeding	Weeding	Field prep.	Weeding	><> ><>
March	Planting	Weeding	Weeding	Planting	Harvesting	><> ><>
April	Planting	Weeding	Weeding	Weeding	Harvesting	><> ><>
May			Harvesting			
June			Harvesting			
July						
August						><> ><>

Source: Field Data, December, 1997

Division of labour between the sexes varies from one household to another. Generally, however, harvesting of palm oil tends to be done by men, cultivation by both sexes, and planting, weeding and harvesting of all other crops primarily by women.

Extension services are as they are throughout the country as a result of retrenchments and low wages. All of those interviewed reported little or no contact with agricultural officers.

4.3 Livestock keeping

4.3.1 Types and number of livestock kept

Large scale livestock keeping is a very recent phenomenon in the Ward, and is not at the level recorded in Kirando. Sukuma agropastoralists from the Central Plateau searching for water and more and better and pastures for their herds have brought only between 100 and 150 heads of cattle to Nkonkwa. The other villages have no cattle at all. However, there are approximately 2,000 goats and sheep in the area. Most keepers own between eight and twenty shoats, although a few have as much as 30. The shoats are generally kept under a free range system, being tethered only during the cropping season. The animals are comparatively well kept in terms of feeding and are generally free from worms. Other animals kept in small numbers include chickens, ducks, and rabbits.

4.3.2 Grazing patterns, seasonality and methods

During the dry season cattle graze freely throughout the area, feeding on any remaining crop residues, as well as the little grass available. During the wet season they are taken up into the surrounding hills each day. Some cattle herders set forest fires to encourage fresh growth. At night the cattle are kept in a corrals made of thorny branches and bushes, with a guard.

Cattle keeping is primarily a male activity, while other smaller animals are cared for by both men and women. Boys are generally responsible for herding, with one herdboy typically responsible for taking the herd of 100 to 150 cattle to pasture. Women are usually responsible for milking and the processing and marketing of milk.

4.3.3 Livestock diseases

Common cattle diseases include East Coast Fever (ECF) and Black Quarter. ECF is the most dangerous, and kills a lot of animals. There is no dipping station in the area, and vaccines and veterinary drugs are in short supply. The more well-to-do order medicines from Kigoma and administer them themselves. Use of traditional herbal medicines was not recorded.

4.4 People's perception of land resources and the environment

There has been a significant problem of flooding in recent years in Nkonkwa and Buhingu, leading to the loss of crops in the Katobelo valley. There is some recognition that this is due to over-harvesting of trees, particularly upstream in the catchment, and that the effects are exacerbated by farming right to the edge of rivers, but this comprehension was not universal. There are no local bylaws to control such practices at present; farmers want the government to send external experts to organise a solution.

Farming is expanding as populations grow. New fields are being cleared along the lake's shore, replacing reed beds, and along the main river, cutting into the remaining woodlands. Generally, it is felt that there is less rain than there used to be and that the rains are increasingly unreliable. This is perceived to be due to over-harvesting of trees, but this is felt to be necessary due to the need for agricultural expansion. Soil erosion was observed in a number of places, especially in the Kaliani and Nkonkwa. Gullying is most severe in Kaliani due to the steep gradient of the surrounding slopes However, no action is being taken to combat this. No aspect of tree management was noted, and agroforestry and tree planting are not priorities, although women now have to walk two to three hours to fuelwood collection areas.

4.5 Conclusion

For many along the lakeshore agriculture is a secondary activity. However, just inland many people are primarily herders or farmers or both. In the main, even those whose primary activity is fishing do some subsistence farming. Agriculture, therefore, has an important impact on the lake and the lakeshore environment. The largest impacts were seen to originate from four major factors:

- new fields encroaching onto riverbanks and the shores of the lake where the sandy soils are particularly easily eroded;
- agriculture taking second place to fishing, especially in Kaliani, to the extent that some issues are not addressed despite the possession relevant knowledge;
- burning of vegetation to encourage fresh grass in the open grazing areas; and
- a lack of local bylaws and joint action.

Further impacts result from removal of trees on the hills surrounding the area for timber, fuelwood, and poles.

The general level of environmental understanding seemed to be fair, although it varies among individuals. However the commitment to effect change was far less for a number of reasons:

- change may increase workloads;
- there is no motivation to innovate as everyone else is doing the same thing;
- trees, while low in number in the surrounding hills, are not seen as being particularly important;
- soil erosion, while recognised, does not seem to have reached the point where people feel the need to do something about it, even if many (as in Kaliani) have little access to other land;
- forest fires are started by different types of people for different reasons, all of which need to be addressed for effective control; and
- riverbank damage, again while recognised, is not fully appreciated and again needs to affect everyone.

To overcome these issues there needs to be a combination of education, local government commitment, local bylaws, and local policing, as well as possibly some District level legislation, e.g. regarding riverbank and lakeshore protection.

5 THE SOCIO-ECONOMICS OF THE HOUSEHOLD

Beatrice Marwa and Eunice Salamba

5.1 Introduction

The objective of this part of the exercise was to improve understanding of household characteristics, dynamics, and survival strategies. The first data collection tool used was wealth and social group definition. Informed local team members were asked to define what constitutes “wealth” in the study villages, and then, on the basis of this definition, to identify socio-economic groups.

The ranking criteria in all villages were comparable, and were based on ownership and control of property. Ownership and control of productive assets such fishing gear, a transport boat with an outboard engine, land, livestock, a large shop in Mgambo, or a milling machine, as well as non-productive assets such as a modern house in Kigoma or a television and video cassette player were unanimously identified as important criteria of wealth

Hence, a rich household was defined as one that owns a combination of the assets mentioned above, and is able to manage them appropriately. This group is small in all villages, typically comprising less than 20% of households. The majority are better off fishermen who employ and control many other fishermen. They also tend to own two acres or more of oil palms and cassava, six or more shoats.

Below them is a second group comprising about 30% of households, typically less successful fishermen, or livestock keepers: people who have a boat but not an engine; people who cannot afford to have a burnt brick house with a corrugated iron roof, but with at least an acre of cassava and perhaps of bananas for brewing local beer, and who work for themselves.

Below these two groups is a third much bigger group (45%) to which belong households whose members work for others. These live in mud brick houses with thatched roofs, and generally cannot afford to send their children to school. Below this is a very small, almost invisible group, of very poor households (5%) who live in simple grass huts, or even have nowhere to live, and who have few worldly possessions. To this group of households belong the tramps and beggars.

After these wealth groups had been identified, a sample of households to be interviewed was drawn from each group using the observable indicators identified above. A semi-structured checklist of questions was then used to collect information on household size and composition, educational levels, sources of livelihoods, expenditure priorities, labour use and availability, access to financial resources, health and sanitation, and gender relations and the division of labour. Other data collection tools used included daily timetables, seasonal calendars, and direct observation.

Other data collection tools used included daily timetables, seasonal calendars, and direct observation.

5.2 Types of households

In Tanzania it is normal to find rural households headed by men, if not the husband, then a close kin: a son; a brother; or an uncle. In Buhingu, the few female headed households tend to be headed by widows.

5.3 Household size and composition

Sizes of households in the study area vary greatly depending on the type of household and nature of the village. In Buhingu village, for example, where the town-like nature of the community necessitates for many people to stay in one household the size ranges between eight and 18 people, with an average of ten. In Kaliani, however, the sizes range between five and eight with an average of six.

In general fertility levels seem to have decreased somewhat in the Ward in recent times. Currently a woman conceives between six and nine pregnancies in her lifetime, down from eight to 12 a decade ago. However, typically only six of these babies live to maturity. Age of first pregnancy seems also to have decreased considerably; with girls as young as 12 reported to have given birth, although it was not clear how common this is. Traditionally girls did not start families until they were 16 years old.

5.4 Dependence ratios

A dependence ratio is the total number of dependant children, elderly and disabled people in a household divided by the number of able bodied adults who form the labour force. In the study area the ratio of dependence varies from 1.6 in Nkonkwa, to 2.0 in Kaliani, to 3.0 in Buhingu, with an overall average of 2.2:1, which is quite reasonable given the variety of natural resources available.

5.5 Educational levels

The educational level of most people is very low. Many have gone through primary school but a considerable number have not finished the required seven years of study. This is because they have left school at an early age, the boys to go fishing, and the girls to help with farming. Hence a very negligible number go through to secondary school. Generally, educational levels of women are lower than those of the men, although those of the youth are higher than those of their parents.

5.6 Sources of livelihoods

The inhabitants of the Ward depend upon fishing, agriculture and business for their livelihoods, as shown in Table 5.1.

Table 5.1 Sources of livelihoods in Buhingu Ward (%)

	Kaliani	Nkonkwa	Buhingu
Fishing	90	20	15
Agriculture	3	70	75
Business	7	10	10

Source: Field Data, December, 1997

The relative importance of fishing and farming changes as one moves from Kaliani in the south to Buhingu in the north. Kaliani borders the MMNP, so benefits from rich fishing grounds as a result of the park's exclusion ground, but suffers from lack of land for agricultural expansion.

5.7 Expenditure priorities

Expenditure priorities differ from one individual to another, from one household to another, and from place to place. Table 5.2 illustrates the expenditure priorities of some social groups in Kaliani and Nkonkwa.

Table 5.2 Expenditure priorities of some social groups in Buhingu Ward (%)

	Fishermen	Male farmers	Women
Build a house	12	-	-
Food	40	20	65
Clothing	6	20	15
Household expenses	-	-	2
Health care	20	20	18
Entertainment	-	30	-
Investment	12	-	-

Source: Field Data, December, 1997

Note the prominence of extra-household expenditure priorities for men and inter-household expenditure priorities for women. In most rural communities in Tanzania household provisioning is the responsibility of women. In contrast to Kirando, where fishermen tend to have more disposable income than farming men, and to spend more on entertainment, in Buhingu farmers with oil palms have a constant source of income, and are able to spend significant amounts on entertainment, while many fishermen, particularly in Kaliani, are Moslem, and do not drink alcohol.

5.8 Labour use and availability

In Tanzania most households depend on the labour force available within the household. When demand exceeds supply they resort to communal labour such as work parties (Mung'ong'o, 1995:107). In Buhingu Ward family labour is still depended upon for both agriculture and fishing. However, in times of crisis in farming, such as during the weeding and harvesting periods, *kibarua* (hired labour) is preferred to work parties, although costs are high by local standards (for example, 25,000 to 30,000 TSh to have a one acre field tilled, depending on how weedy it is). Households with fishing gear normally use their youths as hands. When that labour force is not enough outsiders are also hired. Hence, during the fishing season many youths drop out of school.

5.9 Access to financial resources

The basic sources of livelihoods for the people of the Ward are the lake and the land, and every member of the community has the birthright to exploit these resources to the best of his or her ability. However, there are few institutions offering credit or development assistance. The MMNP has assisted with materials for classrooms, teachers' offices, dispensary wards, etc., though its Community Conservation Service (Malisa, pers. comm.), and the TACARE Project is supporting tree seedling nurseries and agroforestry in Nkonkwa and Buhingu (Kashula, pers. comm.).

5.10 Health and sanitation

There is a health centre for the whole Ward in Buhingu village. However, its services are not satisfactory, as it has too few staff (17), too little medicine, and no operating facilities. Furthermore, the boat used to transport patient to Kigoma is not working, and there is no money for fuel. Generally, health education is provided to mothers who visit clinics, and people seem to be aware of the necessity of good sanitation, and although the quality of

facilities differed greatly both between and within villages, every home visited had a pit latrine, and unlike many other places, 90% of households report that they boil drinking water. The success of this health education seems to have been based on effort, stressing that prevention is better than cure, particularly where medicine is limited, and reference to serious cholera epidemics in the past. The few who do not boil their drinking water blame fuelwood shortages, particularly in Kaliani.

5.11 Gender relationships

5.11.1 Women's labour and time use

Apart from the biological roles of motherhood, women in the Ward spend their time provisioning for their families, cooking, cleaning the house, etc.. Much time is also spent outside the house doing agricultural work, petty business, and attending to community development activities. Figure 5.1 illustrates the daily schedule of a typical woman during the dry and wet seasons. Fuelwood is collected on the way back from the fields.

Figure 5.1 Women's daily schedules in Buhingu village

	Dry season	**Wet season**
0400		Wake-up, fetch water
0500		Prepare children's food
0600	Wake-up	Leave for fields
0700	Fetch water, clean-up	Farmwork
0800	Breakfast	Farmwork
0900	Petty business, handcrafts, etc.	Farmwork
1000	Petty business, handcrafts, etc.	Farmwork
1100	Visit market	Farmwork
1200	Prepare lunch	Farmwork
1300	Lunch	Farmwork
1400	Lunch	Farmwork
1500	Rest	Go home, prepare & eat lunch
1600	Hair plaiting, handcrafts, etc.	Farmwork
1700	Handcrafts, entertainment, etc.	Farmwork
1800	Fetch water	Farmwork
1900	Prepare dinner	Return home & prepare dinner
2000	Dinner, prepare to sleep	Dinner, prepare to sleep
2100	Sleep	Sleep

Source: Field Data, December, 1997

5.11.2 Women's control of resources and income

In the tradition of the Tongwe and the Ha the man controls all household resources and income generated. Even when a woman buys a piece of land from the proceeds of her businesses, it falls under her husband’s control. When a man dies, his widow inherits his property, unless she remarries outside her late husband’s family, in which case it is passed to the children. On her death, the first child, regardless of sex, inherits the property.

5.11.3 Women's participation in decision-making processes

Village governments have been ordered by the Prime Minister's Office to set aside 20% of leadership positions in the village government structure for women. Thus women are, in principle, in a position to participate in decision-making processes at the village/community level. However, most of the women elected seem to lack the experience and confidence necessary to play an effective representative role, and many can hardly articulate the issues important to them as representatives of their fellow women.

6 INSTITUTIONS, INFRASTRUCTURE, MARKETS AND BUSINESS

Mabochi Hamza and Enock Mwamfupe

6.1 Introduction

Institutions visited included schools, religious institutions, markets, and the health centre in Buhingu village. Further discussions were also held with individual businessmen and women.

6.2 Institutions

6.2.1 Schools

The Ward has three primary schools with a total of 1,066 pupils and 17 teachers (Table 6.1).

Table 6.1 Primary schools in Buhingu Ward

	Est.	Number of students					Classes	Streams	Avg. stream size
		Male		Female		Total			
		#	%	#	%				
Kaliani	1993	80	59	56	41	136	4	4	34.0
Nkonkwa	1985	200	60	135	40	335	7	9	37.2
Buhingu	1952	300	50	295	50	595	7	16	37.2
Total		**580**	**54**	**486**	**46**	**1,066**	**18**	**29**	**36.8**

Source: Field Data, December, 1997

The buildings in Kaliani and Nkonkwa re in relatively good condition, but those in Buhingu are old and dilapidated, and there is no housing for teachers. There are also serious shortages of both reading and writing material, and only one desk between about three pupils.

The educational level of most people is very low (see section 5.5), with high dropout rates, particularly for girls, who often leave school to marry while still young; for example, at the time of the study, the final year class at Buhingu Primary School included only 70% of the girls who had started together in the first year.

There are currently no secondary schools in the Ward, but efforts are being made to build one at Igalula to cater for the whole Division.

6.2.2 Medical facilities

There is a 15 bed health centre in Buhingu village. It was built in 1973, and opened in 1978, and serves the two Wards of Buhingu and Igalula. It has a total of 17 staff, but no operating theatre. The supply of medicine is very inadequate, and depends on the monthly Essential Medicine Programme kits. The most common complaints are malaria, bilharzia, diarrhoea, worms, and skin conditions.

6.2.3 Religious institutions

The dominant religions are Christianity and Islam. Christianity is represented by all the major denominations, including Roman Catholics, Anglicans, Baptists, Pentecostalists, the Assemblies of God, the International Fellowship Church, and the Evangelist Assemblies of God. Islam is represented by the Sunni. Some religious institutions are planning to build dispensaries and/or schools, and their co-operation in environmental education may prove valuable to the Project in the future.

6.3 Infrastructure

6.3.1 Transport

The Ward is has no road connection inland to the east. Most people, therefore, depend on lake transport using local outboard engine boats and the weekly services of the MV Liemba.

6.3.2 Water sources

People depend on water from rivers and the lake for domestic use and for watering livestock. The Ward has a total of three rivers, the Kabezi, the Kamkonde, and the Lagosa. The Kabezi in particular is subject to seasonal flooding.

6.4 Markets and business

There is a small market in each village with stalls selling clothing and groceries. Many people come to sell commodities such as beans, maize, bananas, cassava, tomatoes, onions, and fish. However, palm oil and rice are stored and sold from the home to traders, and sardines are bought by middlemen directly from the drying grounds.

7 FORESTRY AND WILDLIFE

Aristides Kashula and Fredrick Malisa

7.1 Introduction

The team assessed the impacts of harvesting and general utilisation of the natural resources of the land and lake. On the land there is hunting and harvesting of wildlife, timber, pole, and fuelwood extraction, charcoal production and the harvesting of medicinal plants. On the lake there is harvesting of animals such as hippos, crocodiles, and other reptiles. Methods included semi-structured interviews and discussions, transect walks, and direct observation.

7.2 Forest resources

7.2.1 Forest types

Four vegetation types were identified:

- the vegetation of the Mahale Mountains which comprises: alpine bamboo (*Arundinaria* spp.), montane and low altitude galleried forests; montane bushland and woodland composed of *Acacia* spp., *Terminalia* spp, *Uappaca* spp., *Pericopsis* spp., and solid stemmed bamboo (*Oxytenanthera* spp.); and montane grassland. Valuable timber species include *Pterocarpus angolensis* (*mninga*), *P. tinctorius* (*mkurungu*), *Sterculia tragacantha*, and *Milicia excelsa*, among others..
- the plateau woodland which rises between the park and the village communal lands. Species composition varies with topography: in the valleys the vegetation is dense, and includes *Milicia excelsa, Khaya anthotheca,* and *Oxytenthera* spp. (*mianzi*), while on the hills is it more open, and includes *Parinaria curatelifolia, Annisophylea* spp., *Combretum* spp., and *Albizia antunensiana.* Trees and bushes are often stunted as a result of frequent fires and uncontrolled cutting, and valleys and riverbanks are mostly cleared, which has resulted in rivers becoming wider and shallower, and more liable to flooding, especially along the Katobelo valley.
- scrub and bushes associated with *Acacia* spp. occupying relatively large areas between the plateau woodlands and the settlement areas of Nkonkwa and Buhingu. The few remnant indigenous trees and shrubs suggest that these are former forests degraded/destroyed by agricultural conversion, cutting, and fire; and
- riverine vegetation along the lakeshore and river courses composed of reeds such as *Phragmites mauritanius* and small trees and shrubs such as *Sesbania sesban.* These strips are currently under threat of clearing for agricultural expansion, particularly around Nkonkwa Bay and the Katumbi sub-village of Nkonkwa, and along the Katobelo valley.

7.2.2 Forest and tree tenure

The forests in the MMNP are controlled by TANAPA. Outside the park, much of the natural forest exists as common property but village governments have begun to lay down some regulations to manage and safeguard it, particularly in Kaliani, which is bordered by the MMNP and has limited communal lands. In Buhingu village some people have applied to the village government for permission to own areas of natural vegetation containing valuable timber species such as *Pterocarpus angolensis*, *P. tinctorius* and medicinal plants. The aim is to protect and utilise these resources sustainably as private property, which is very innovative. However, neither village governments nor any other traditional institutions have experience of or regulations guiding such schemes, and, according to the Forest Ordinance, valuable timber species such as *P. angolensis* are the property of the state and controlled by the Director of Forestry.

7.2.3 Uses of forest products

Different tree species have different uses, as illustrated in Figure 7.1. Trees in the MMNP are protected.

Figure 7.1 Tree utilisation ranking

Local name	Botanical name	Timber	Fuelwood	Building	Medicine	Ritual
Buhonja	D. usambarens					•
Buhono	P. microcarpa			•		
Bukindu	P. reclinata	••		••		
Ifumya	D. malangensis				••	
Igogola	Aspilia spp.				•	
Ikese	A. albida/tortilis		••		•	
Ikuku	F. cycomorus				•••	
Ikusu	U. kirkiana		••		•••	
Itobolobo	M. kilimansch	•				
Kabamba	Brachystegia spp.		•••		••	
Kamembe	B. macrantha	•	•		•	
Kangurungufu	P. febrifingum				•	
Kaselenje	T. sericea	•				
Lifungwa	K. aethiopica				•••	
Lufila	A. senegalensis				•••	
Lusenzagisha	?				•	
Lusungunimba	F. indica				•	
Lwago	F. exasperata					•
Mbanga	Per. angolensi	•••••	••••	••		
Mfila	I. angolensis	••••••	••••		•••	
Mikoma	Strychnos spp.		••••			
Miombo	Brachystigia spp.		••••			
Mjimo	F. thonningii				••	••
Mkimbu	C. africana	•••		•	••••	
Mkola	Afzelia spp.	••••••				
Mkole	G. mollis		•			
Mkoma	C. asculenta	••	•••••	•	••	
Mlembela	A. noldeae	•				
Mninga	P. angolensis	•••••••	•••	•••	••	
Msolo	S. saponaria		••••			
Mtimpu	A. venosum				••••	
Mtobo	A. gerekeana		•		•	
Muba	J. globiflora	•	•		•	
Mubula	P. culaterifolia	•	•			
Muhongoro	T. mollis	•••	••	••		
Mujonso	V. colorata				•••	
Mvule	Milicia spp.	••••••				
Mwenge	P. tinctorius	••••••	••••	•••	••	
Myofu	K. anthotheca	••••	•	•		
Mzingati	Cordia millenii	••••••	••	••	••	
Nkamba	A. asphodeloides			•••	••••	

Source: Field Data, December, 1997

7.2.3.1 Timber

Most of the timber produced in the area comes from local forests and neighbouring villages such as Igalula and Rukoma. All major species are in short supply due to increases in demand for construction, boat building, and furniture making. According to one boat builder there have been great changes in both the abundance and size of timber trees in the past decade. For example, the distance travelled to harvest *mvule* is said to have also increased from three or four hours to seven to ten hours, and logs now typically only yield eight to ten boards, as opposed to 28 in the past. Some species, such as *Dalbergia melanoxylon* (*mpingo***)** which is highly valued for boat building, are reported to be locally extinct.

In the Buhingu village there are three carpentry workshops which use about 5,800 boards per year for furniture and roofing. Timber is also required for making and fishing boats; about ten are built each year, using about 300 boards, and demand is rising.

7.2.3.2 Fuelwood

Fuelwood is collected by women for domestic use, for brewing traditional beers, and for sale. Two decades ago women spent only half an hour travelling to and from fuelwood collection areas, but today it takes up to four hours. In a week a typical household uses about three headloads consisting of 15 - 20 pieces approximately 280cm long with a girth of 45cm (2.4m^3 in total). Demand for fuelwood has increased with recent increases in the brewing of *mandarakwa* beer and the distillation of *gongo*, although the popular banana beer, *kayoga*, does not require boiling. The team was told that at least fifteen 200 litre drums of *mandarakwa* beer were brewed each day in Nkonkwa and Buhingu, and that each drum requires about 1m^3 of wood. This has caused the emergence of a group of women who collect fuelwood for sale. Men buy fuelwood for smoking fish, processing palm oil, and burning bricks. One hundred to 150 200 litre drums of palm oil are processed per month in Nkonkwa, each requiring about four headloads (3.2m^3) of wood. Up to 5m^3 of wood are needed to burn one kiln of bricks

7.2.3.3 Charcoal

Very few people produce charcoal for local consumption in the study area, although some is consumed in Kaliani, where there are no communal forests, and Buhingu village, where there are a number of Ward and Divisional government officers consumes 120 – 130 bags per month.

7.2.3.4 Medicinal uses

People have a wide knowledge of the medicinal uses of local trees and shrubs. A group of herbalists/traditional healers told the team that they use combinations of tree and shrub species with specific animal parts to treat a wide range of illnesses, including headaches, intestinal problems, mental illnesses, and evils spells. They complained, however, that some tree species are now difficult to find as woodland and forest are cleared for agricultural expansion. They want the authorities to enact bylaws governing the exploitation of such species, and were prepared to work towards propagating them if provided with technical know-how.

7.2.3.5 Thatching grass

Women collect thatching grass for sale in the Ward and in neighbouring villages. Interviews with thatching *fundis* indicate that about 250-400 headloads of grass are used each dry season in Nkonkwa alone.

7.2.4 Tree planting

Tree planting began in the mid-1980s when the government launched a World Bank funded District-wide programme. Emphasis was placed on fruit trees such as mangoes, citrus fruits, coconuts, and oil palms, with some *Senna siamea* (*msonobari*) and *Melia azedratch.* This was followed in the late 1980s by a Fisheries Department programme funded by the FAO, but during both of these, all seedlings were brought from a central nursery in Kigoma and no local nurseries were established, and thus there were problems with sustaining activity.

In early 1997 the TACARE Project established village nurseries in Buhingu and Nkonkwa managed by local nursery attendants who raise a variety of indigenous and exotic species for distribution at subsidised prices. School nurseries and "*Roots and Shoots*" environmental education clubs have also been formed, and there are plans to support private nurseries too. Agricultural extension is also provided, and alley cropping demonstration plots have been established.

7.2.5 Conservation of trees and forests

7.2.5.1 Local beliefs, customs, and folktales related to trees

The team learned that historically trees and shrubs used for ritual and religious functions were conserved, for example, individuals of species of *mkuyu* (*Ficus thoningii* and *F. zanzibarica*) which were traditionally used as places of worship and of sacrifice to local gods to prevent calamities such as drought, locust plagues, famine, and disease. Traditional ideologies inculcated a strong belief in the minds of the people that these trees were able to harm whoever attempted to cut or harm them, and many remained undisturbed for a long time. The elders complain, however, that such beliefs are losing their hold due to modernity and the advent of new religions which worship distant gods with no direct relationships to nature and the local environment. However some traditional ceremonies and rituals are still carried out within the MMNP out of sight of priests, pastors, and sheikhs.

7.2.5.2 People's perception of trees and forests

Attitudes differ by social group. Women, for example, consider trees as sources of energy for domestic use and local beer brewing, sources of fruit for their children, sources of medicines, and a resource for sale. For fisherman trees are sources of timber for making boats, canoes, and fishing gear, and sources of energy for smoking fish. To farmers, some trees are good for maintaining soil fertility. However, most farmers would not hesitate to fell a tree during farm preparation if it would create too much shade for the crops, and used fuelwood to process palm oil and distil *gongo*. Cattle keepers consider woodlands and forests as pastures and shade for their animals, but they also harbour tsetse flies, ticks and other harmful vermin and parasites, which could be got rid of by felling the trees.

7.3 Wildlife resources

The Ward borders the MMNP, which influences the species recorded. No animal census has been done in the study area or the park, but the following were mentioned by villagers and the park officials:

- carnivores, including lions, leopards, and otters;
- herbivores, including various types of antelope and gazelle, buffalo, waterbuck, reedbuck, bushpigs, warthogs, and hippopotami;
- vervet monkeys, baboons, and other primates; and
- reptiles, including a variety of snakes, crocodiles, tortoises, monitor lizards, etc.

Different wildlife species have different uses, as illustrated in Figure 7.2. Animals in the MMNP are protected.

Figure 7.2 Wildlife utilisation ranking

	Meat	Sale	Medicine	Decoration	Traditional
Lion	•	•	•••	•	••
Leopard		••		•	
Otter	•••		•••		
Buffalo	•				
Reedbuck	•			•	
Bushpig	••		•		
Warthog	•				
Hippopotamus	•••	•	•		•••
Vervet monkey	•	•	•••	•	•
Baboon	•				
Snakes			•	•	•
Crocodile	••	••	••	•	
Tortoise	•	•••	••	•	•

Source: Field Data, December, 1997

Notes:

- lion: internal parts are used to make *hirizi* (local talismans); the bones are used in rituals and worship; the mane is worn in order to threaten others;
- leopard: the skin is highly valued.
- otter: the reproductive organs are used as medicine for strengthening male reproductive capacity;
- warthog: the teeth are used to strengthen children's skulls;
- hippo: the bones are mixed with the bark of *mninga* and used to treat general pain and leprosy, and the legs are used to treat elephantiasis; and
- tortoise: part of the tail is used to treat people with haemorrhoids;

According to local informants there has been a decline in animal populations outside the park in the last two decades as a result of increased human populations and expansion of settlements and farm land, and over-harvesting for highly sought after meat and trophies. Increased immigration of people from Congo is said to have exacerbated the situation as new meat preferences (e.g. the eating of primates) and demands for trophies have been introduced to the area.

8 RELATIONSHIP WITH THE MAHALE MOUNTAINS NATIONAL PARK

Claude Mung'ong'o

On the advice of a Japanese chimpanzee researcher, Prof. Nishisda, the Mahale Mountains Game reserve was upgraded to a National Park in 1985, although TANAPA staff did not arrive until 1989. As a Game Reserve, its resources could be exploited with the permission of the Director of Wildlife, and fishermen from Kaliani and other nearby villages fished from its beaches. However, when it became a National Park, no consumptive use of any natural resources was allowed, including in an aquatic zone extending 1.6km from the shore.

There seems to have been no consultation with local communities about this change, nor even adequate information on the reasons for it and what exactly the new rules mean, much less any compensation, and local fishermen do not understand the purpose of the exclusion zone, or that it might be of benefit to them in the long term in maintaining fish stocks. Fishermen in Kaliani in particular feel that the park is maliciously trying to harm them and hinder development, and have focussed their anger on the Community Conservation Warden, Frederick Malisa. Underlying poor relations are further tested by the fact that the exclusion zone is not demarcated; some fishermen enter deliberately and try to pretend they do not know they are in the park, while others are genuinely unknowing, particularly at night, or are driven in by bad weather, and resent the law enforcement efforts of park officials, which can include confiscation and destruction of gear.

Relationships with Kaliani are further soured by an ongoing dispute over the location of the boundary between the park and the village. Cartographers at the University of Dar es Salaam and a taskforce sent out by the Kigoma Regional Commissioner have both concluded that the gazetted boundary is correctly demarcated, but the community has refused to accept their findings. The people of Kaliani are mostly relatively recent immigrants from Congo, and are seeking to have Kaliani registered as an official village. In order for this to happen, however, they must show that they have enough land, which they do not, as they are bounded to the north by Nkonkwa, to the west by the lake, and to the south and east by the park. There are already some conflicts with Nkonkwa, but they may feel that their chances of winning some more land are better against the park, and hence they do not give up their struggle.

Unfortunately, the situation is being exacerbated by corrupt individuals who stand to gain economically and/or politically from the conflict. For example, the team was shown a village certificate numbered 244 indicating that Kaliani had officially been registered on 5 June 1995, just four months before the General Election. However, although it had obviously come from the District Council in Kigoma, it looked dubious, and may well be a fake.

It is important that the MMNP, through its Community Conservation Service (CCS), and with the help of other stakeholders, such as LTBP, works to enlighten the fishermen of Kaliani on the reasons for the fishing exclusion zone and the local advantages of it in terms of a sustainable fishery. Furthermore, the zone should be clearly demarcated, and the rules clearly explained to all.

The CCS and other stakeholders should also work towards finding a mutually acceptable solution to Kaliani’s desire to be a registered village, as if the village is properly registered, people may be prepared to let go of the boundary issue.

The CCS has a programme through which materials for social infrastructure projects are distributed to communities living around National Parks in order to partially offset these communities' lost opportunity costs and/or the inconveniences of living close to wildlife, and to improve relations. In the past few years the MMNP has provided building materials for classrooms and teachers' offices in Kaliani and Nkonkwa, as well as for a new maternity ward at the health centre in Buhingu. However, the people of Kaliani have not been appeased, and should perhaps be targeted more specifically in the future.

9 CONCLUSION AND RECOMMENDATIONS

9.1 Environmental impacts of production

9.1.1 Fishing

There is lack of unanimity on the issue of degradation of fish stocks, and people's perceptions of the long term viability of the fishery differ from village to village. While in some villages people have demonstrated a high level of awareness, others care little about over-exploitation or sustainability of resource use. Unsustainable practises result from:

- the incidence of piracy which has forced fishermen to limit their activities closer to the shore and caused a change to the use of smaller meshes which catch both juvenile and adult fish; and
- the growth of modern poultry industries in the urban centres of the region, which has increased the demand for sardines and juvenile forms.

Furthermore, varied sources of demand complicate attempts to regulate fishing as there are too many stakeholders at too many levels, the majority of whom are too far from the lake to have any knowledge of and/or concern for its biodiversity.

9.1.2 Land use practices

The largest impacts were seen to originate from four major factors:

- new fields encroaching onto riverbanks and the shores of the lake where the sandy soils are particularly easily eroded;
- agriculture taking second place to fishing, especially in Kaliani, to the extent that some issues are not addressed despite the possession relevant knowledge;
- burning of vegetation to encourage fresh grass in the open grazing areas; and
- a lack of local bylaws and joint action.

Further impacts result from removal of trees on the hills surrounding the area for timber, fuelwood, and poles.

9.1.3 Use of forest and wildlife resources

Pressures on forest and wildlife resources result from agricultural expansion, as well as over-harvesting of animals, poles, timber, and wood for domestic use and charcoal production, and uncontrolled burning. The effects of these are exacerbated because much woodland and forest exists as common property, but village governments have begun to lay down some regulations to manage and safeguard it. Private individuals have also applied for permission to own areas of natural vegetation containing valuable timber species and medicinal plants, with the aim of protecting and utilising these resources sustainably. However, neither village governments nor any other traditional institutions have experience of or regulations guiding such schemes, and valuable timber species are currently the property of the state. LTBP, with the help of relevant counterparts such as TACARE may be able to assist in unravelling such institutional problems.

9.2 Environmental awareness

The general level of environmental understanding seemed to be fair, although it varies among individuals. However the commitment to effect change was far less for a number of reasons:

- change may increase workloads;
- there is no motivation to innovate as everyone else is doing the same thing;
- trees, while low in number in the surrounding hills, are not seen as being particularly important;
- soil erosion, while recognised, does not seem to have reached the point where people feel the need to do something about it, even if many (as in Kaliani) have little access to other land;
- forest fires are started by different types of people for different reasons, all of which need to be addressed for effective control; and
- riverbank damage, again while recognised, is not fully appreciated and again needs to affect everyone.

To overcome these issues there needs to be a combination of education, local government commitment, local bylaws, and local policing, as well as possibly some District level legislation, e.g. regarding riverbank and lakeshore protection.

9.3 Problems and prospects for improved resource utilisation and management

To overcome these issues there needs to be a combination of education, local government commitment, local bylaws, and local policing, as well as possibly some District level legislation, e.g. regarding riverbank and lakeshore protection. However, the following issues will be important to consider when planning interventions.

9.3.1 Perception gap

Government officials and local natural resource users often have different perceptions of environmental problems (cf. Kikula, 1986). While the official view is drawn from the little formally collected data available, and often derived from generalising global scientific ideas, local land users' views are based upon direct observations, local values, and personal experiences. The final interpretation of change in various indicators and the assessment of its impact on natural resources is often coloured by such differing backgrounds. For example, a study in Kondoa District found that despite extensive gullying villagers did not perceive it to be a major problem as many of them had grown up seeing it all their lives, and considered it to be a natural phenomenon (Dejene *et al.* 1997:18). Thus it will be important to enhance local resource users' abilities to interpret change according to new circumstances, and to improve local knowledge by intermarrying it with scientific knowledge.

9.3.2 The politics of conservation

Many rural people are suspicious of the intentions of outsiders who come in with new ways of doing things, often as a result of bad experiences with previous state interventions.

9.3.3 Low levels of education

Educational levels in lakeshore communities are very low, and environmental education programmes should bear this in mind when considering methods of imparting knowledge and learning. The situation among women is particularly important, as although they are the least educated, they are often the most aware of environmental problems, and the most willing to take action to solve them.

9.4 Relationship with the Mahale Mountains National Park

Conflicts exist between the people of Kaliani and the park over lost access to fishing grounds, as well as the location of the boundary between the village and the park, in part because the people of Kaliani want the village to be officially registered, but lack sufficient land for this to happen.

It is important that the park, through the CCS, and with the help of other stakeholders, such as LTBP, works to enlighten the fishermen of Kaliani on the reasons for the fishing exclusion zone and the local advantages of it in terms of a sustainable fishery. Furthermore, the zone should be clearly demarcated, and the rules clearly explained to all. The CCS and other stakeholders should also work towards finding a mutually acceptable solution to Kaliani's desire to be a registered village, as if the village is properly registered, people may be prepared to let go of the boundary issue. Further material aid from the CCS to local communities should be targeted at communities with specific grievances.

9.5 Protected Area management

Recognition that successful management of Protected Areas (PAs) ultimately depends on the co-operation and support of local people has been growing among conservationists and natural resources managers in many places in the world. Projects like the Communal Area Management Plan for Indigenous Resources (CAMPFIRE) in Zimbabwe and the Lwangwa Integrated Resource Development Project (LIRDP) in Zambia have been established under such assumptions, and have recently taken the limelight as models of this supposedly new outlook in the management of natural resources in PAs (Wells & Brandon, 1993).

This outlook is not new to Tanzania. The problem of environmental degradation has been a concern of the government for a very long time. However, earlier conservation efforts generally not only ignored the needs of communities living in and adjacent to game and forest reserves, but also deprived them of means of subsistence through eviction or restrictions on access to land, pastures, and forests. Conservation programmes therefore become indistinguishable from the destructive aspects of the dominant patterns of development (Ghai, 1994:7). It was in realisation of these weaknesses in the prevailing approaches to conservation that institutions such as the Ngorongoro Conservation Area Authority began experimenting with the idea of *multiple land use*, with the aim of integrating biological conservation, conservation of the archeologically important features of the area, and livestock grazing by the resident Maasai pastoralists (Boshe, 1989). Twenty-five years of largely successful implementation have led not only to emulation by other conservation areas, but also to the emergence of a new rural development paradigm in Tanzania.

The underlying assumption of the paradigm has been that local communities can best manage natural resources such as wildlife and forests if they are assured of clearly defined user rights, proper incentives, and the information and know-how to do it. Local people are thus expected to participate in the process of design, establishment, and management of conservation areas. The aim of such a participatory approach to decision-making is to allow all stakeholders to express their objectives in natural resource use and management, and to decide on how these can best be achieved. Furthermore, it allows stakeholders to evaluate the alternative uses of ecosystems according to their specific rationales, and hence empowers local people to make better use of and protect their environment. At a more theoretical level, it provides better information for use in resource management as a result of the intermarriage of indigenous and scientific knowledge (Tacconi & Benett, 1995:93).

According to the Tanzanian legislation governing wildlife and forestry conservation, however, Community Based Natural Resource Management (CBNRM) is not possible in National Parks and Forest Reserves (FRs) as they are both still governed by the concept of non-consumptive protection and exclusion. Thus, devolution of management responsibilities to village governments and the development of a conservation system based on sustainable natural resource use according to local needs and priorities may, therefore, not be possible in the near future in the absence of a major review and amendment of the relevant legislation.

Furthermore, there are problems with administrative structures in the forestry sector. At the national level there is the Forestry and Beekeeping Division (FBD), which defines policy and lays down guidelines for the management of FRs, and is actively involved in the management of industrial plantations, watersheds, and community based afforestation and soil conservation projects. However, recent changes in the country have devolved much power to the District Councils, which are substantially independent of the central government, and which each include a District Natural Resources Office (DNRO). But, there is no direct link between the FBD and the DNROs, making it difficult to identify whom local communities should deal with in order to progress CBNRM projects.

A similar confusion exists within the institutions managing wildlife resources. While National Parks operate under the direct management of TANAPA, Game Reserves are under the control of the Director of Wildlife in the Ministry of Natural Resources & Tourism, and neither of these institutions have any direct links with the local institutions at the District level or below. Meanwhile, however, both National Parks and FRs are facing tremendous pressures from the communities living adjacent to them, which require local solutions.

9.6 Community Based Natural Resource Management

Over and above the awareness raising campaigns and token incentives currently offered to local communities by TANAPA, there is need to find new approaches that will genuinely involve local communities in the management of natural resources and allow them to reap their rightful benefits now and in the future. An example of an innovative approach to CBNRM is provided in the Marine Parks and Reserves Act of 1994. The objectives of the Act are to:

- protect, conserve, and restore the species and genetic diversity of living and non-living marine resources and the ecosystem processes of marine and coastal areas;
- to stimulate the rational development of under-utilised natural resources;
- to manage marine and coastal areas so as to promote sustainability of existing resource use, and the recovery of areas and resources that have been overexploited or otherwise damaged;
- to ensure that villages and other local resident users in the vicinity of, or dependent on a marine park or main reserve are involved in all phases of the planning, development and management of that marine park or reserve, share in the benefits of the operation of the protected are, and have priority in the resource use and economic opportunity afforded by the establishment of the marine park or reserve;
- to promote community-oriented education and dissemination of information concerning conservation and sustainable use of marine parks and reserves; and
- to facilitate research and to monitor resource conditions and uses within marine parks and reserves.

The Act is now being implemented in the Mafia Island Marine Park.

At another level, there is need to create local FRs with local control of all aspects of management and utilisation. An example of such an effort is reported from the Coast Region where Regional and District Authorities have produced a Coast Region Forestry Action Plan (CRFAP) in realisation of the need to translate the national Forestry Action Plan into an implementable plan and process at the Regional and District level. According to the CRFAP document, the protection of forests and biodiversity is envisaged through, first, clear demarcation and protection of District FRs, and secondly, through encouraging villages to set aside Village FRs (RDD's Office, 1991). The rationale for this is the belief that the Districts are more likely to want to take protect their FRs because of their catchment values and revenue earning potential, while villages are more likely to want to manage their FRs for sustainable production of fuelwood, poles, etc.

However, initiatives such as these require that institutional mechanisms for improved community resource management be put in place. Village and local governments need to be strengthened to be able to manage their natural resources sustainably. However, many local leaders have little knowledge of natural resource and environmental management. Thus environmental education programmes should include as a priority capacity building for local government institutions and officers.

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APPENDIX A ITINERARY

Saturday December 6 1997	Travel to Mahale aboard a local boat
Sunday December 7	Briefing at MMNP, planning
Monday December 8	PRA work at Kaliani
Tuesday December 9	PRA work at Katumbi sub-village, Nkonkwa
Wednesday December 10	PRA work at Nkonkwa
Thursday December 11	PRA work at Buhingu village
Friday December 12	PRA work at Mgambo sub-village, Buhingu village
Saturday December 13	Debriefing at MMNP, depart for Kigoma aboard MV Liemba
Sunday December 14	Arrive at Kigoma
Monday December 15	Sectoral report writing
Tuesday December 16	Sectoral report writing
Wednesday December 17	Sectoral report writing
Thursday December 18	Planning meeting
Friday December 19	CM and BT depart for Dar es Salaam aboard Air Tanzania