TECHNICAL PAPER 22

Indigenous knowledge and forest use:

Two case studies from the East Usambaras, Tanzania.

Kerry A. Woodcock

1995

East Usambara Catchment Forest Project

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PREFACE

The present study was undertaken as the socio-economic part of the biodiversity surveys in Magoroto Hill in Muheza District. Selected information from the study was included in the biodiversity report from Magoroto Hill. However, since the study was rather detailed and contained a considerable amount of information on local knowledge and forest use by the local communities is was agreed to have it published separately as one of the East Usambara Catchment Forest Project Technical Papers. The study makes a contribution to our understanding and knowledge about the local peoples relationship with and dependence on the East Usambara forests. It also provides quite detailed and some quantitative information on forest products use, which may help in developing sustainable forest management arrangements which take into account the traditional entitlements to forest produce and traditional ways of managing resources.

The study was carried out by Kerry A. Woodcock, between July and December 1994, in connection with the East Usambara Biodiversity Surveys, commissioned by the East Usambara Catchment Forest Project, and implemented by Frontier-Tanzania, a collaborative venture between the Society of Environmental Exploration and the University of Dar es Salaam. Kerry's close association with the villagers in the area while she was working for the Kambai Forest Conservation Programme provides her with an insight which hopefully will assist others who work with traditional resource management and sustainable land husbandry in the East Usambara mountains.

Stig Johansson

Chief Technical Adviser

ABSTRACT

This study investigates the resource use patterns of forest adjacent communities in the lowland and submontane forests of the East Usambaras, Tanzania. The East Usambaras have become an area of international conservation priority because of their high levels of biological endemism and species richness and their role as a climatic regulator and area of water catchment.

This research has taken a multidisciplinary, case study approach which reveals how livelihood strategies respond to changing environmental and social circumstances. In particular, the variations in strategies and coping mechanisms between those adjacent to reserved and non-reserved forest and response to declining resource availability are discussed.

Forest - adjacent communities have traditionally depended on the forest resource for 'fresh' agricultural land and have collected a wide range of forest products for their daily subsistence. Present day farming practices still rely on shifting agricultural practices and farmers still look to the forest for the next generation's farm land. With population increase and increasing numbers of immigrants settling in the area, forest reserves and reduced forest product availability due to human disturbance and overuse, communities are increasingly finding that the availability of land and good quality forest products is greatly reduced.

Livelihood strategies are demonstrated to depend primarily on agriculture. Forest resource utilisation of some forest products, such as firewood and edible plants collection from forest sources is demonstrated to be a function of preference and access rather than need. Wild food collection, whether derived from forest, bushland or shamba may also be regarded as a socio-economic buffer for the rural poor and remote who may be unable to obtain alternatives. For other forest products however, such as polewood it would appear that collection is based much more on need.

In identifying ways to minimise the negative social costs of conservation whilst maintaining and strengthening local peoples entitlements, there is a need to understand the decisions made by local people in respect to their daily subsistence. Local people have a wealth of indigenous knowledge which they utilise on a daily basis. They are also highly adaptive in many ways to their changing environment, such as changing their reliance from forest derived foods to shamba and bushland derived foods when access to forest resources are prevented.

Key Words: resource use, forest adjacent communities, East Usambaras, livelihood strategies.

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1. THE STUDY AREA

1.1. Physical setting

1.1.1. Location

The Eastern Arc Mountains

The Eastern Arc chain of mountains were formed about 100 million years ago. The chain begins in the north with the Taita Hills and continues south with the Pare, Usambara, Nguu, Nguru, Uluguru, Ukaguru, Malundwe, Rubeho, Udzungwa and Mahenge ranges. The mountain forests of Malawi and northern Mozambique are included in the Arc by some authorities. It is thought that they have been isolated from each other for the last 20 million years, maintaining uniform climatic regimes during this time, resulting in their high rates of endemism (Sayer 1992).

The Usambara Mountains

The Usambara Mountains are located between 4° 24' and 5° 16'S latitude and 38° 10' and 38° 48'E longitude and are situated in Tanga region, north east Tanzania. Traditionally the mountains are divided into two major blocks, West and East Usambaras, which are separated by the north-south running Lwengera Valley.

The East Usambara Mountains

The East Usambara Mountains (Figure 1) are located between 4° 48' and 5° 13'S and 38° 32' and 38° 48'E and start 40 km from the coast. Administratively, they fall into Korogwe and Muheza districts, however, this study is confined to Muheza district only.

1.1.2 Geology and pedology

The geology is predominantly acidic Precambrian basement rocks. Soils are ferralsols according to the FAO/UNESCO classification. The montane soils are highly leached and acidic with little fertility in contrast to the lowland soils, which have more bases and are more productive in terms of agriculture. The boundary between typical laterized (ferralitic) and non-laterized soils (ferrisols) has been put at 900 m on the wetter east and south east sides (Iversen 1991). Soils are generally deep (1 to 5 m and deeper), red or bright sandy clays or sandy loams (Cambridge-Tanzania Rainforest Project 1994).

1.1.3 Topography and relief

The East Usambara Mountains rise sharply to over 1,000 m and peak at 1,500 m, and have unusually high rainfall and low temperatures at higher altitudes, possibly due to their proximity to the sea (Hamilton 1989). Mlinga has an altitude of 1,069 m and Mhinduro 1,033 m.

1.1.4 Drainage

Mount Mlinga is the source of the Mkulumuzi and Mruka river which drain Magoroto Hill. The other areas of study are drained by the Muzi, Semdoe, Miembeni which flow into the Sigi river (Figure 2). The Sigi is the main source of water for Tanga town.

1.1.5 Climate

Rainfall is monsoonal, with a wetter south-easterly monsoon from April to October and a drier north-easterly monsoon from November to March. Rainfall peaks correspond to the movement of the Inter Tropical Convergence Zone. The long rains are from March to May (mwaka), the short rains from October to December (vuli). Rainfall increases with altitude from 1,200 mm annually in the foothills to over 2,200 mm in the highest areas. Totals are higher on south-east facing slope as they are exposed to the moist winds from the Indian Ocean. Temperatures drop with altitude. The lowland mean temperatures are typical for their altitude, in contrast to the abnormally cool climate of the uplands. Moreau (1935) gives a mean temperature of 24°C and mean annual rainfall of 1,650 mm for a site at 200 m in the Middle Sigi Valley.

1.2 The Forests

1.2.1 Vegetation

Tanzania holds a large proportion of the Zanzibar-Inhambane Regional Mosaic, one of the major floristic types of Africa (White 1983). Due to their unusual features of climate and relief, the East Usambaras are outstanding in containing a large proportion of the small total area of forests typical of this floristic region (Lovett 1989). This type overlaps with the currently used term 'East African Coastal Forest' (Lovett & Wasser 1993).

At higher altitudes the forests belong to the Afromontane floristic type (White 1983). Moreau (1935) classifies the Usambara forests into three main types based on structure, climate, dominant species and avifaunas:

- Lowland Forest, below 800m, solely in the East Usambaras;
- Intermediate or Submontane Forest, between 800 m and 1,500 m in both ranges; and
- Highland Forest, 1,500 m and above, mainly in the West Usambaras.

This study takes case studies from both lowland (Manga Reserve) and submontane forest (Magoroto Hill).

1.2.2 Forest cover and human disturbance

There is estimated to be 5,214 ha of 'intact forest' (22%) and 11,050 ha of 'exploited forest' (48%) out of a total 23, 101 ha surveyed. However, there were large blocks of lowland forest not covered by the inventory. These include Manga Forest Reserve. Recent mapping has occurred through aerial photography and Manga Forest Reserve has recently been studied during the East Usambara Biodiversity Surveys in December 1994.

1.2.3 Importance of East Usambara forests

The East Usambara forests are of great biological importance. The climate is particularly wet, with a bi-modal rainfall distribution supporting more moist forest types than in the rest of the Eastern Arc, and hence a potentially greater variety of plant and animal species. There is an unusually large area of transitional forest between the lowland and submontane types. The forests are very rich in a variety of endemic species. It has been estimated that there are about 2,800 plant species, of which a quarter are endemic (Iversen 1991). The best known endemic plant species are three or four *Saintpaulia* species (East Usambara Catchment Forest Project

1995). The level of endemism and species richness of the forests is one of the major reasons for the nature conservation emphasis. Both floral and faunal endemism has been highlighted by Rodgers and Homewood (1982) and Iversen (1991).

In addition to their biological significance, the East Usambaras serve several important ecological functions which include water catchment and stream protection and soil conservation. The forests are vital for the long-term sustainability of smallholder agriculture and industrial plantations, such as sisal, cocoa and tea estates. They are also a source of traditional forest products required for local subsistence livelihoods. On a world wide scale, the East Usambaras may be important as a genetic resource. There is also great potential for tourism in the area. The value of the East Usambara forests has been officially recognised in the East Usambara Catchment Forest Project: phase 2 report (1995), which named the area as one of the national target zones for conservation of ecosystems and genetic resources.

1.3 Population and settlement history

1.3.1 The earliest settlements, 200-1740 AD

There are 50 archaeological sites known to exist in the Usambaras. The earliest is said to date back to the iron age in the third century AD. Early iron age pottery has been found under tall submontane forest (Hamilton 1989). The Usambaras was probably ruled by bantu-speaking blacksmiths, despite the fact that no traces of iron smelting have been located in the Usambaras yet. Traditional crops before the introduction of cassava, maize and bananas were durra, peas and beans. Cassava was possibly introduced around 1500AD.

1.3.2 The Kilindi Dynasty, 1740-1891

The largest and traditionally rivalling tribes in the area were the Wazigua, Wabondei and Wasambaa. The only well known Usambara chief prior to the Kilindi dynasty was king Tuli, ruling in Vuga in the West Usambaras. The arrival and take over, around AD 1740 of Mbegha, the first Kilindi ruler, resulted from a civil or tribal war. Mbegha came from the Nguu Hills, south of the Usambaras and his kingdom covered the West Usambaras. In 1790 Mbegha's son Bughe became chief in Vuga and peaceful development continued.

In AD 1800, Shebughe expanded the kingdom southwards into Wazigua country and conquered the East Usambaras. His son Kimweri ye Nyumbani continued the expansion, holding the whole coastline below the Usambaras by AD 1835.

The first European to visit Vuga was the German missionary Krapf in 1848. He wanted to open a mission. Initially Kimweri refused but on a second visit in 1852 they were granted permission to open in Tongwe. The first British mission was opened in Magila by Allington in 1867. It was here that he founded the "Universities' Mission to Central Africa" in 1868. Later missions were opened in Umba, Mkusi, Misoswe and Msalaka.

1.3.3 Native agriculture in the 19th Century

The local Kisambaa language is very rich in botanical and ecological terms. Krapf (1858), Baumann (1889), Warburg (1894) and Buchwald (1897) all described the Wasambaa as traditional pastoralists with a highly developed and sophisticated agriculture with intricate irrigation systems. The fields were fertilised by cow-dung. Warburg (1894) has given an

account of the traditionally cultivated plants, including the uses of wild species. In the 19th century bananas and maize were said to be the two most important crops.

The traditional lifestyle of the Wasambaa appears to have undergone negative development during the unrest ca 1855-95 (Iversen 1991). The literature indicates that at this time the Wasambaa did not subsist in equilibrium with the ecology of the area. Holst (1893) described in detail the impressive irrigation system, but also observed large areas of forest on steep slopes converted to farmland. Traditional shifting cultivation was continuing way up to the hilltops. New forest did not develop where slash and burn had been practised (Buchwald 1897) and large forests broken up by farming and bush fires were common in drier areas (Baumann 1889; Doring 1899). The neighbourhood of Vuga was completely denuded early on, and firewood had to be collected from long distances (Krapf 1858; Meyer & Baumann 1888).

1.3.4 The Germans 1891-1918

Under German colonial occupation a number of forest reserves were created and policed with vigour. Areas outside those reserves were cleared for coffee, sisal, rubber, oil palm and teak. Wohltmann (1902) observed that the Magrotto plantation, started in 1896, which was dealing in coffee still looked promising in 1898, but three years later the yields were declining like in all the other coffee estates.

1.3.5 The British 1918-1961

During the British colonial period the coffee plantations were largely abandoned, and emphasis was put on timber and tea production. As the problems of soil erosion resulting from the earlier forest clearance became evident, plantation owners were banned from destroying more forest. Some plantation areas were also replanted as forest reserves under compulsory purchase orders.

1.3.6 After Independence 1962 - present

After independence, a number of factors led to an escalation of forest clearance. Concessions were made to local people, allowing them cultivation rights in the former forest reserves. There was a decline in the tea industry which resulted in tea workers seeking local land to cultivate. There was also an influx of outsiders looking for farm land and work in the timber industry. The result was a great increase in population and smallholder farming at the expense of the forest. At lower altitudes the expansion has been mainly on public land and degazetted forest reserves, while at higher altitudes expansion took place primarily on leased land belonging to estates.

More recently there has been an influx of non Wasambaa people specifically for the production of cardamom, which puts an increasing pressure on the forests (Rodgers & Homewood 1982). 80-90% of all cardamom produced in Tanzania is grown in the East Usambaras. Export is controlled by the Tanga Region Cooperative Union, but it has been claimed that the best local income comes from illegal exports of cardamom and timber to Kenya (Iversen 1991).

2 THE STUDY

2.1 Objectives

The specific aim of this study was to investigate the demand for and dependence on products from the forests of the East Usambaras and investigate the value of these products to local people. How socio-economic and environmental processes affect the livelihoods and welfare of forest adjacent communities was also studied. In particular, the variations in strategies and coping mechanisms between those adjacent to reserved and non reserved forests and the response to declining resource availability was investigated.

It is hoped that the study may go some way to helping in the identification of ways of minimising the negative social costs of conservation whilst maintaining and strengthening local peoples entitlements.

The main objectives were:

- to identify the range, purpose and extent of use of forest products collected for subsistence and commercial use by households in forest adjacent villages;
- to determine by whom and how the various forest products are collected;
- where they are collected from (forest reserve, public forest, bushland, shamba);
- determine consumption patterns and the value attached to each product;
- to determine whether use is based on access, need or preference for forest products; and
- to estimate how overall declining forest accessibility and changes in land management affect the livelihood strategies and welfare of forest adjacent communities.

2.2 Methodology

A multidisciplinary, case study approach was utilised over the six months research period. Case studies of two areas were taken; Magoroto Hill (submontane forest) and Manga Forest Reserve (lowland forest) (Figure 3) with ten week periods at each. At each area two villages were studied in depth, with other nearby villages visited. Appendix 1 shows villages studied with sub villages and number of households, group and key informant interviews conducted.

A range of methods were usefully combined to triangulate data rapidly and progressively; Rapid Rural Appraisal (RRA), Household Interviews and Ethnography.

2.2.1 RRA

RRA has been referred to as an "data economising" or "data optimising" approach; it can be used to collect limited data that produces useful results inexpensively and quickly. The rapidity of the RRA approach does not lead to an incomplete or shallow collection of data. Unlike most conventional research methodologies, RRA uses a diversity of sources, including the assembled lore of the villagers themselves, to ensure that comprehensive information is

collected. Investigating the community's situation through a variety of means makes it possible to cross-check the data and increases the accuracy of the analyses.

A variety of RRA techniques were utilised;

- ***Group discussions and meetings*** (casual; specialist/focus; deliberately structured). Group meetings were found useful to discuss historical events and changes through time of a community and to allow an initial definition of the range of products and their relative availability around the forest edge villages. Useful when talking to specific groups such as hunters and the women's group when talking about wild vegetable collection. The primary school children were also targeted to talk about wild fruit collection.

- ***Participatory mapping.*** This was a useful tool for identifying those households to be interviewed. Social maps were able to be drawn by other members of the community pointing out those households which were wealthier and those which were poorer (Appendix 6).

- ***Key informants.*** Through group discussions, participatory mapping and through general conversation key informants, such as traditional herbalists, hunters and nurses were identified and then separate meetings were arranged to visit them.

- ***Transect walks.*** This was often more of an informal discussion whilst passing through areas with different local people and whilst having opportunistic spot discussions.

- ***Time lines:*** chronologies of events, listing major remembered events in a village with approximate dates. Every community has a heritage of experience and environmental knowledge that influences present attitudes and behaviour (NES Government of Kenya 1990). The time lines were prepared through discussions with small groups of local residents, with emphasis on community elders. These discussions were aimed at stimulating exchanges about problems and achievements in forest resource management as far back as the oldest member can remember or were told by their parents and grandparents.

- ***Seasonal diagramming*** - by major season or month to show days and distribution of agricultural labour, food availability, wild food collection. This helped to highlight seasonal fluctuations, particularly in the dry season, when a period of low food and income coincides with heavy agricultural work involved in field preparation. Certain products, such as forest foods for example, are even more crucial during this period (Scoones 1992).

- ***Scoring and ranking.*** This was especially used when discussing preferences for different tree species for different uses.

2.2.2 Household interviews

Semi-structured interviews are often part of RRA's and have been regarded by some as the 'core' of good RRA (Chambers 1992). It can entail having a mental or written checklist, but being open-ended and following up on the unexpected. Increasingly it is using participatory visual as well as traditional verbal methods.

The decisive factor in choosing the household as the sample unit is that in developing countries, the household is the most common unit of production as well as of consumption (Casley 1987). The working definition of the household which I used was as follows:

A household comprises a person, or group of persons, generally bound by ties of kinship, who live together under a single roof or within a single compound, and who share a community life in that they are answerable to the same head and share a common source of food.

The sample of households to be interviewed were determined through participatory mapping and through discussion with village elders. This was not stuck to rigidly and often we were called by people to they homes and people asked to be interviewed, these were included in the data.

Each village had a number of sub villages and the aim was to interview 2-3 households in each sub village to cover different geographical and socio-economic situations. People who were identified as being poorer were more often than not widows, mentally handicapped and generally those people who were reliant on others and the rich looked after these people. Where sub villages were very large more households were interviewed.

The household interviews would often start with the head of the household, predominantly male, however in the majority of cases the interview would lead to a family discussion with women, men and even children on some occasions contributing. It was often the case, when perhaps the discussion would come round to firewood collection for example, that the men would say, "That's the work of the women. My wife knows more about that." The women would then be encouraged to talk.

2.2.3 Ethnography

Ethnography is a complementary approach. The use of household ethnographies allowed for a deeper insight into the value of and attitudes towards forest resources. In three villages the researcher lived and worked alongside the women for a week or more and towards the end of the research period the majority of days were spent with a key informant in the village - sharing in her daily activities.

Ethnomethodology aims to examine ordinary, common sense, mundane living ... remaining faithful to procedures and practices that members use to construct and make sense of the social world (Benson & Hughes 1983). In other words, it examines activities and both the external and internal causes and conditions, enabling a true representation of social phenomena.

This was achieved through participant observation. Participant observation, draws on a wide range of sources of information to build up the best picture possible of peoples lives and to allow a deeper understanding of the circumstances and the basis for the decisions they make. The participation in peoples everyday lives for an extended period of time - watching, listening, asking questions and asking to be taught to perform village tasks - cooking, collecting wood, thatching etc.

The participation in the female head of households everyday life, allowed the gathering of more detailed information on collection and use patterns. This gave a deeper understanding of the role forest resources play in household welfare and subsistence strategies.

2.3 Problems encountered

A multidisciplinary approach was utilised to triangulate data in order to eliminate bias in the data. The major problem encountered was probably through language. At the time of research the principal researcher's Kiswahili was limited. Interpreters were required and hence some understanding may have been lost in the interpretation.

Access to women was never a problem, however when having mixed group meetings it was found that either none or only a few women would actually attend and even then they would stay on the periphery of the meeting. To combat this, separate meetings were held with women, formally through the UWT (Womens' Union Of Tanzania) and informally whilst visiting women in their homes and shambas (fields).

3 SOCIOECONOMIC SETTING

3.1 Magoroto Hill

3.1.1 Location and history

Magoroto Hill is located at 5° 7', 38° 45'E (Figure 3) and is a small plateau with a ring of higher ridge around the eastern, northern and western sides and a lower outlet for the Mkulumuzi river in the south. The central area is at an altitude of 650-770 m and the ridge rises to 880 m. Access from Muheza, via Lord Baden-Powell road and Magila village.

Magoroto Hill is probably best known for Mlinga Peak, the 'ghost mountain' of the Wasambaa people. This area was once largely forested, with grasslands only on the steepest parts. Today this public land area is extensively cultivated with much cardamom growth and subsistence cropping (Iversen 1991).

The former rubber plantation in the area, Magrotto Estate (Amboni) was opened in 1896 (Appendix 2). Production changed to palm oil in 1921, with small amounts of black pepper, coffee and rubber also grown. In 1968 cardamom, cloves and tobacco were experimented with and in 1987 hybrid palm oils were planted. As of September 1991 (Tye 1993), the estate carried 269 ha of mature oil palms (Dora and Vuma), 35 ha of young hybrid oil palms, some 20 ha of cardamom cultivated under a thinned forest canopy with a cleared understorey and 0.5 ha of cloves. In addition, derris was formerly cultivated under the palms and still exists in large areas and there are small areas of black pepper which are grown on *Cedrela odorata* for support which have been established near the factory.

The Mlinga-Magoroto Ridge is unique in carrying its own endemic plant species, found nowhere else in the world, not even in the rest of the neighbouring East Usambaras. This unusual habitat has been almost completely destroyed with only two tiny fragments remaining. Mlinga Peak (a 190 ha Forest Reserve) and the Magrotto Estate. Mlinga by itself is severely threatened by annual fires on the surrounding farmland. Such a tiny area could be completely destroyed by a single catastrophic event.

The area is vital as a catchment of Muheza town and Tanga region. Magrotto Estate adjoins the Muheza District Magoroto Conservation Area, a reserve set aside by the District Authority on degraded land around the water intake for Muheza town supply.

3.1.2 Population

Magoroto Hill has four settlements, Mgambo, Mwembeni, Magula and Gare with a total population (Table 1) of 4,003 in 1984 (national census), and is now estimated at 4,239, of whom approximately 29 (6 families and 2 Amboni guards) live on Magrotto Estate. The average household size is 7.1, whereas on the estate it is 4.5. 84.2% of households interviewed were male headed, the others being headed by widows or spinsters.

Table 1. 1984 Census for Magoroto Hill (Village Chairman).

Village	Power to work	No power to work	Total
Mwembeni	527	747	**1,274**
Magula	425	638	**1,063**
Mgambo	381	636	**1,017**
Gare	218	431	**649**
Total	**1,551**	**2,459**	**4,003**

Almost all families interviewed have lived on Magoroto Hill for many generations. Those which are immigrants to the area have settled for reasons of business, e.g. tailoring and pitsawing. The majority are from the Wasambaa tribe with the minority being Wabondei and Wapare. The six families with members who are employed by Amboni at Magorotto Estate are all migrants to the area, but three families are from the Wasambaa tribe. The mean average period of immigrant residence is 14.6 years.

3.2 Manga Forest Reserve

3.2.1 Location and history

Manga Forest Reserve (locally known as Kwaboko), with an area of 867 ha, was gazetted as a Forest Reserve in the 1950's (Appendix 2). In 1962, it was proposed that the reserve should be degazetted or converted into a teak plantation. In 1967 however, it was still listed as a forest reserve by the Government of Tanzania, although the eastern boundary of the reserve was moved back in order to give Mkwajuni villagers 60 acres for settlement purposes.

Manga Forest Reserve has two settlements in close proximity to its boundary; Mkwajuni, on its north eastern corner and Kwatango on its north western corner. Mkwajuni village is five minutes walk from the reserve whereas Kwatango is approximately a one hour walk to the reserve boundary and is also surrounded by public forest. These two settlements fall under Misozwe Ward, Muheza District, Tanga Region.

3.2.2 Population

The total population of the two villages is estimated at around 1,600. The majority of families originate from Muheza district and are of the Wasambaa and Wabondei tribes. There is a small proportion of the population who originate from other areas of Tanzania who initially moved into the area for employment on the sisal estates (Kibaranga, Lanzoni, Sigi-Miembeni) or with Sikh Sawmills (1988-1992). After work ceased many of these immigrant workers decided to settle and farm in this area.

Over the last ten years, Kwatango village has allowed approximately ten families from Lushoto district to settle on public forest land, immediately adjacent to the reserve. The

immigrants were in fact advised by their own village government to migrate to the Kwatango area because it was perceived that there was plenty of fertile land. In most cases land is given by the village government or borrowed from individuals with excess. Land rarely has to be bought.

3.3 Livelihood and Agriculture

The main source of income is cash crop sales, with the exceptions of minor sales of local alcohol (tembo and boha), which are made from coconut and sugar cane respectively, and baskets and mats. Women rank crop sales as the largest source of family income, followed by alcohol production, mat and basket weaving and shamba cleaning. Magrotto Estate employs eighteen people and two Amboni guards. Very few non-estate households have members with off-farm employment, however the majority of households have members of the family working away from home in the towns who contribute to household income in the form of remittances. Off-farm employment may be in the form of kiosks (food and household goods), hotelis (selling tea, doughnuts, chapatis and occasionally ugali and beans), tailors, carpenters, teachers and health workers.

All non-estate households have land. On average each farmer has between five and ten acres of land. Whilst Magrotto Estate was in production, each estate household had access to one acre within the estate (to plant maize and cassava only). Since production has ceased, each household has been requested to stop farming the land. They now only have access to a garden area in front of their homes. The majority of households acquired their land through family inheritance, with land inheritance being patriarchal. Women do not own land but are given shambas by their fathers, husbands or brothers on which to farm.

Mkwajuni villagers have moved from their fathers land (known as Chambangwe) due to soil infertility. In 1981 Kibaranga Sisal Estate returned a portion of estate land to the public. Each household head was given eight to ten acres, depending on the number of sons and the extent to which farmers were able-bodied. Immigrants to the area apply for land through the village government or are given land by friends or family with excess. Land is rarely bought and if it is not given it is often lent for an extensive period of time. Immigrants who have settled in Vumba (sub-village of Kwatango) in the last seven years, said that they were told by their village government in Lushoto (Western Usambaras) to move to the Kwatango area because it was perceived that there was ample agricultural land. Villagers perceive the forest as agricultural land for the next generation. Hence, when forest was reserved, the local community often felt that 'their' land and livelihood had been stolen from them.

The traditional farming method is shifting cultivation. Traditionally farmers work an area of land for three to five years and then move to 'fresh' land when crop yields decline. Cleared forest land is preferred as 'fresh' farmland. The area is slashed and burned, the residue being left. In this way agriculture exerts pressure on the natural forests. The majority of farmers leave areas of land fallow after cultivating the same piece of land for a couple of years, they will return to farm there again after approximately five years. Land is also left fallow when farmers become too physically weak, as was stated among most elders. Only those with small areas of land, mostly immigrants, tend not to leave land fallow at times. Approximately fifty percent of farmers engage in inter-cropping (maize and beans, cassava and beans). When planting maize, three seeds will be planted in the same hole to increase the chance of germination. If all three germinate, one will be cut, leaving only two to grow. The majority of farmers employ crop-rotation on their farms and perceive their land to be fertile. Older

members of the community, however, remember that *'in the past one acre of land produced much maize, but now four acres does not produce enough.'*

All farming techniques are learned through knowledge passed down from one generation to the next. All members of the household help with farm work and only the wealthier farmers employ labourers at harvest time or when preparing the land for planting.

The main subsistence crops are maize, cassava, beans (kidney, pigeon-peas and mung), coconuts and bananas, with sugar cane, sweet potatoes, yams, pineapples, oranges, cashew and groundnuts also common, plus small quantities of vegetables such as spinach, okra, tomatoes and ngogwe (sh)/nyanya chunvi (sw) (a kind of green tomato) grown in gardens close to the home.

The main cash crops are maize, coconuts, oranges, sugarcane, groundnuts with cardamom, cloves and black pepper being specific to Magoroto Hill. The markets for sales are Muheza and Tanga. Mkwajuni and Kwatango villagers often join together to hire a vehicle to transport crops at harvest time. Magoroto villagers did have an Isuzu lorry collaboratively owned by a local business man and the villagers for this purpose, however on leaving the area in September 1994 there were ownership disputes and the vehicle was not available for village use. All communities stress the poor condition of roads to markets as a major barrier to their development and well-being. Crop export prices are not fixed, as they depend upon varying successes of seasonal harvests. Examples of current prices are 700 Tshs per kilogram of maize, 300 Tshs per kilogram of groundnuts, 250 Tshs per kilogram of black-eyed beans and 2,000 Tshs per kilogram of cardamom (1995). 80 - 90 % of all cardamom produced in Tanzania is grown in the East Usambaras. Export is controlled by the Tanga Cooperative Union, but it has been claimed that the best local income comes from illegal exports of cardamom to Kenya.

The most commonly grown tree crops are bananas, coconuts, oranges, limes, mangoes, jackfruit, pawpaw, cashewnuts. The majority of trees found on shambas are fruit trees, both planted and retained during land clearance. Very few farmers have planted or retained non-fruit trees. Of those who have, the main reasons given for doing so were to produce timber and building poles and for those on Magoroto Hill, for support for black pepper and shade for cardamom. A small number of farmers have experimented by planting teak on their shambas for timber. The excess seedlings were given to village chairmen after reserve boundaries were planted by Catchment Forest Guards, who in turn gave them to villagers. Unfortunately villagers had little success, since they were not shown how to plant or care for the seedlings. Men are almost wholly responsible for making decisions on tree planting, retention and use. The planting of trees is in fact a land ownership issue, since the person who plants the tree also owns the land around it. Consequently, since traditionally it is the men who own the land it is not usual for women to be involved in tree planting activities.

Almost all households own chickens and ducks, which are managed by the women, and approximately fifty percent of households own goats and sheep, which are managed by the men and boys. Other livestock owned are pigs, rabbits and guinea pigs. It is not usual to eat this meat regularly, goats and sheep in particular are reserved for ceremonies and will be sold in times of severe hardship. Cattle are not traditionally owned in this area, however in Mgambo and Mwarimba villages there was one farmer each who owned dairy cows. Dairy cows were introduced into the area in 1985 by the Tanga Smallholder's Dairy Development Programme (TSDDP) and these are zero grazed for the majority of the time. All other grazing

animals are forest and bushland grazed, there appears to be no zero grazing. Only Kivuleni (sub-village of Mkwajuni) was noted as having a specifically designated area for goat grazing (9 acres) which is communally owned.

4 FOREST RESOURCE UTILISATION

4.1 Introduction

Smallholder farmers of the East Usambaras utilise a variety of different products derived from forest sources for their daily subsistence. These include wild foods; vegetables, mushrooms, fruits, honey, animals and materials for weaving mats and baskets and for making brushes, thatch, rope, firewood, building materials, materials for making furniture and household and agricultural utensils, and medicinal plants. Specific forest sites are also areas of traditional spiritual value. The forest is not of great commercial importance for the majority. However, cash is obtained in submontane areas from the sale of cardamom which is required to be grown under the shade of forest. Pitsawing for commercial timber sale was also found to occur in some areas despite the 1993 ban.

4.2 Wild foods

Wild foods collected and eaten by village communities include edible plant leaves, fruit, fungi, honey and bushmeat. These foods are collected from forest, bushland (secondary forest growth/fallow shamba) and shamba. The data shows that those communities (Magoroto and Kwatango) living adjacent to public forest land collect a wider range of wild food derived from forest, bushland and shamba. These communities (Magoroto and Kwatango) who have legal access to forest show a preference for forest derived foods rather than shamba or bushland derived foods and those adjacent to reserves (Mkwajuni) predominantly collect from shamba and bushland due to lack of access to the forest resources.

4.2.1 Edible plants

Indigenous knowledge of wild edible plants is high. Young girls learn at an early age which are edible. They are very skilled in plant identification, for example, ndelema (*Basella alba*) looks very similar to matoyo which is a poisonous plant.

All groups and households interviewed and those observed, regularly use wild edible plants in their diet. 25 different varieties were named, 8 derived from forest and 14 derived from shamba and bushland (Appendix 3) and in each case it is the leaves which are eaten.

There is a seasonality of collection found particularly in Magorotto and Kwatango communities but which is not as highly defined in Mkwajuni community. Magorotto and Kwatango communities tend to collect and eat wild plant leaves approximately twice a week. This may increase to three to four times per week in the dry season (Jan/Feb) and between July and September when there is reduced planted vegetable availability from the shamba. Villagers are required out of necessity to supplement their diet more frequently from the wild resource and/or buy extra supplies from village shops and Muheza market if cash is available in the household. Mkwajuni villagers collect and eat wild plant leaves on a daily basis throughout the year. Through discussion with Mkwajuni villagers it was suggested that daily dependency on wild plant resources was due to lack of access to alternative food sources, such as a butchers, the distance to market and low ownership of poultry and goats.

There were differing opinions to preference for wild edible plants and those which are planted on the shamba. Many expressed a preference for wild plants, saying that they are better in terms of taste, iron and protein content and abundance. A common statement was that the vegetables *"increased the amount of blood in the body."* Dark green leafy vegetables contain a modest amount of protein, some iron, a lot of vitamin A, vitamin C, calcium and niacin (Fleuret 1979; Hennessey & Lewis 1971; McLaren 1961; Shanley & Lewis 1969), whereas light green leafy vegetables such as lettuce and cabbage contain little protein or vitamins. Cassava leaves (Kisamvu - sw, Pea - sh, *Manihot utilissima*) contain seven times as much protein and more vitamins than the root (McLaren 1961). The young leaves are best (Werner 1990). Other varieties, such as Mbwembwe - sw, Kisamanguo - sh, (*Bidens pilosa*) contain substantial quantities of fat (22.5%). Others commented, however, that planted vegetables saved on time of collection and food preparation. Collection of wild edible plants is solely the role of women. Collection is normally undertaken on the return from the shamba or at the same time as collecting firewood. Only the best, young foliage is collected. A number of varieties require a long cooking time, since they are bitter in taste and therefore may need between 1 and 2 hours cooking before they are palatable.

It was discovered that those communities living adjacent to public forest collected and ate forest derived plants more frequently than those communities adjacent to forest reserve who ate more bushland and shamba derived wild plants (Table 2). Through discussion with Magoroto communities it was discovered that forest derived plants are collected more frequently due to preference in taste. Those communities adjacent to forest reserve do not collect forest derived plants due to lack of availability through lack of access to the forest resource.

Table 2. Edible plant preferences.

Vernacular Name	Botanical Name	Habitat	Preference Rank
Magoroto Hill			
Ndelema - sh	*Basella alba*	Riverine	1
Msangani - sh	*?*	Forest	2
Mchunga - sw/Msunga - sh	*Sonchus luxurians*	Shamba	3
Tikini - sh	*?*	Forest	4
Mbwembwe - sw/Kisamanguo - sh	*Bidens pilosa*	Shamba	5
Mnavu - sw	*Solanum nigrum*	Forest	6
Kisamvu - sw/Pea - sh (leaves)	*Manihot utilissima (cassava)*	Shamba	7
Mchicha - sw/ Bwache - sh	*Amaranthus sp.*	Shamba	8
Mkwajuni			
Mchunga - sw/Msunga - sh	*Sonchus luxurians*	Shamba	1
Mlenda -sw/Hombo -sh/Kibwando -b	*?*	Shamba	2
Mchicha - sw/Bwache - sh	*Amaranthus sp.*	Shamba	3
Mbwembwe -sw/Kisamanguo - sh	*Bidens pilosa*	Shamba	4
Kisamvu - sw/Pea - sh (leaves)	*Manihot utilissima (cassava)*	Shamba	5
Kibwabwa	*?*	Shamba	6
Kwatango			
Msangani - sh	*?*	Forest	1
Mchunga - sw/Msunga - sh	*Sonchus luxurians*	Shamba	2
Mlenda -sw/Hombo -sh/Kibwando -b	*?*	Shamba	3
Tarata - sw/Taata - sh	*?*	Riverine	4
Mnyekewa - sh	*?*	Forest	5

(Preference Ranking: 1 = most preferred; 8 = least preferred; sw - kiswahili, sh - kisambaa, b - kibondei).

It was indicated that some of these edible plants are considered to be "poor mans" food. For instance, when talking to the women's group on Magoroto Hill there was much laughing and disgust at the mention of tikini. Tikini is available throughout the year and it was said that they only used it out of necessity if the other wild varieties and planted vegetables are not available.

Change through time in availability of different species was also noted. It was noted on a number of occasions that one variety of plant known locally as Tebwa which was highly utilised by past generations is now very scarce and thought to be only found in some areas of the lowland.

Few vegetables seem to have been domesticated around the home, however since many are abundant around the shamba, along paths and around the home this does not appear to have been necessary. It would seem however that those communities who do not have access to forest have adapted to utilise shamba derived edible plants.

4.2.2 Edible fungi

Edible fungi are found to be utilised by the majority of households from forest, bushland and shamba. Nine varieties were found to be used from the forest and 12 from shamba and

bushland (Appendix 4). Communities adjacent to forest reserve were found not to use forest derived fungi. The most commonly collected can be seen in Table 3.

They are mostly collected by women, particularly those varieties which are collected from shamba and bushland. Those which are forest derived tend to be collected by both men and women when they are passing through the forest, but particularly by women whilst they are collecting firewood and edible plants. Collection is based on seasonal availability, therefore the majority of collection and utilisation occurs in the short (vuli) and long (mwaka) rains.

Table 3. Most commonly collected edible fungi.

Vernacular Name	Botanical Name	Habitat
Nkuvi -sh	?	?
Vitundwi - sh	*Termitomyces aurantiacus*	Cleared/Cultivated
Magh'wede - sh	*Auricularia delicata/polytricha/ fuscosuccinea*	Decaying wood
Ugenda na nyika -sh	?	?
Magong'ongo - sh	*Termitomyces letestui*	Cleared/Cultivated/Edge of forest

(sh - kisambaa)

4.2.3 Wild fruits

The forest is not a significant source of fruit for most members of the household. For most people it seems more convenient to obtain fruit from trees planted or retained in land clearance, on the shamba and around the home, such as bananas, coconuts, oranges, mangoes, pawpaw, jackfruit, sweet sop/custard apple, grapefruit and guava. However, knowledge of forest and bushland fruits is extensive.

Twelve forest and bushland varieties of fruit trees and bushes were indicated as being utilised. Most are collected by younger children before and after school when they are playing. They tend to eat half while they are collecting and return with the other half for the rest of their family to eat.

A number of mothers and fathers stressed the importance of wild fruits in the diet of young children. Wild fruits and berries are rich in vitamin C as well as natural sugars.

4.2.4 Honey

Honey is mostly collected from natural hives for domestic consumption. It is not widely collected, but in each village there are a couple of people (all men) who are knowledgeable in the collection of honey. They claim to have taught themselves through experimentation. It does not appear that honey collection is a tradition in this area and in fact many people fear bees and say that *"bees are dangerous for human life"*. Many villagers, however, know of the traditional bee keeping of Handeni Region, but do not know how to practice this. There was found to be only one man, in Mkwajuni, who is experimenting with modern box hives. The honey and wax is collected regularly and sold to private individuals in Tanga.

Table 4. Tress species identified specifically for natural bee hives.

Vernacular Name	Botanical Name
Mbuyu - sw/Muuyu -sh	*Adansonia digitata*
Mkuyu - sh	*Ficus capensis*
Mvule - sw	*Milicia excelsa*
Muembe - sw	*Mangifera indica* (planted) Mango
Mnyese - sw	*Parkia filicoidea*

(sw - kiswahili, sh - kisambaa).

Those who collect from natural hives, collect mostly from tree hives and occasionally from underground hives. In the majority of cases no tree species were identified as being specific for hives, however Table 4 shows those which were identified. Hives are most often found in forest, but if found on shambas, the shamba owner will often ask the expert to come and collect the honey and in turn the collector will give the shamba owner a litre of honey and keep the rest himself.

In the dry season, (January to March) over 5 litres can be collected at one time, at other times perhaps only one litre. The bee hives are often found inside the hollow of a tree trunk, and the honey is removed by hand after sedating the bees with smoke. A mixture of dry and damp coconut palms are said to produce the best smoke for this job. The collector is always careful to leave 1 or 2 combs remaining. In this way, the bees will remain and the collector may return at a later date.

Honey is normally collected for domestic consumption, however, half may be sold locally. The bee larvae are often fried and eaten, but the wax is not utilised. Bee larvae contain 10 times as much vitamin D as fish liver oil and twice as much vitamin A as egg yolk.

4.2.5 Hunting

Hunting of forest dwelling animals is an activity undertaken both in forest and on shamba. Hunting appears to fall into three categories; scaring animals from crops (and possibly killing them) and trapping animals on shambas, hunting in groups in the forest, hunting alone in the forest using traps and guns. Hunting in forest is solely a male activity whereas women and children may be involved in scaring animals from crops on the shamba..

Scaring animals from shambas

Forest dwelling crop pests are a major problem for communities living adjacent to forest. A major investment of time is put into guarding the crops from these pests, particularly in vuli (short rains) and at harvest time. This is usually the role of women and children. Animals are scared away normally by the use of noise, throwing stones, catapults and using dogs, and occasionally using pangas, spears and bow and arrows. Animals are rarely killed in this way but if they are they may be used for domestic consumption. The main attacks come from vervet monkeys (*Cercopithecus aethiops*) in the day and bush pigs (*Potamochoerus porcus*) and cane rats (*Thryonomys swynderianus*) at night. Birds, such as weavers, are a problem in the rice fields in the lowlands.

A number of farmers have managed traps on and around their shambas. Many have experimented with placing snares and deadfall traps in and around the periphery of the

shamba. However they say that this is not effective since the animals are wise to this. Animals are rarely caught in this way but bush pig and mongoose are most frequently caught like this.

Immigrants who live in Vumba (sub-village of Kwatango) have an organised hunt once a week into the forest with the sole purpose of reducing populations of wild animals which may attack their crops. They do not utilise the carcasses.

Villagers 'blame' the forest for these crop pests. They feel there has been an increase in crop pests from the past and a few have suggested it is because the forest has decreased in size and therefore the animals are coming to the shambas to look for food. Others have suggested that the increase is due to the fact that they are not allowed to hunt in the forest reserves.

Hunting in groups in the forest

Hunting in groups in the forest is solely a male activity and occurs in all villages apart from in Mkwajuni village where no-one admitted to this practice (although on returning to the village at a later date two villagers were observed going into the forest with guns). Each village has at least two groups of men who hunt together, once or twice a week and other groups who meet less regularly and see hunting as more of a social event. Groups of between three to ten men go into the forest (those on Magoroto Hill may venture many miles down to the lowland forest which is more abundant in wildlife) with dogs, nets, bows and arrows pangas and occasionally guns. Very few people own guns, due to the expense of bullets. However, in almost every village there is one man who owns a gun. A hunter in Kwemnazi (sub-village of Mgambo) said that the younger generation seemed no longer interested in hunting in groups and feels that the last time of the great hunters was in the 1940's.

The most commonly hunted animals are bush pig (*Potamochoerus porcus*), blue monkey (*Cercopithecus mitis*), vervet monkey (*Cercopithecus aethiops*), red duiker (*Cephalophus natalensis*), bushbuck (*Tragelaphus scriptus*), and African civet (*Viverra civetta*). Other animals hunted include banded mongoose (*Mungos mungo*), rock dassie, colobus monkey (*Colobus angolensis*) and baboon (*Papio cynocephalus*).

Hunting in groups in the forest appears to be mainly a social activity. Bushmeat tends to be for domestic consumption, and is divided equally among the members of the group and is rarely sold to the rest of the community. Other parts of the animal are not utilised but the skins are often kept as a trophy.

Hunting alone in the forest

Trapping in public and reserve forest appears to be common, using snares and pits. Traps have been noted in Manga Forest Reserve, however villagers do not admit to trapping. Bush pig (*Potamochoerus porcus*), cane rat (*Thryonomys swynderianus*), banded mongoose (*Mungos mungo*) and genet are trapped most often. One individual in Kwatango manages fifty traps every day in one area of public forest. He normally traps approximately two animals per week, so returns appear to be low.

Attitudes to wildlife and hunting

Communities do not depend on hunting as a source of protein or income. Rather than a necessity, bushmeat is either perceived as an occasional luxury, or by some (generally the

younger generation) as 'old fashioned , poor mans food'. Hunting in groups is also seen as an important male social event.

Hunters have noted that some animals are less abundant in the Magoroto Hill area than they were in the past. For example, the colobus monkey (*Colobus angolensis*) was last seen in the area in 1976. Most hunters attribute the reduction in animals in the area to their own activities and the decrease in forested areas. They feel no remorse and feel that it is an advantage to have less wild animals in the forest in order to reduce occurrences of crop attacks.

4.3 Weaving materials

The fronds of the wild date palm, *Phoenix reclinata* (mkindu-sw, msaa-sh, the tree and ukindu, the fibre) are used by women for weaving baskets and mats for household use and for wedding gifts. The importance of the plant is emphasised in early accounts of Usambara plant use (Fleuret 1980). Individual leaflets of palm fronds are woven to make strips about 2-3 cm in width. Narrow strips are sewn together side by side to make mats or coiled and sewn to make fans and wall hangings. Fans, food covers, wall hangings, floor mats and baskets are the range of products produced. Some women gain extra income by making products to order to sell them locally.

Villagers say that ukindu is now difficult to obtain and can only be found in the more inaccessible parts of the forest. Ukindu can be found locally on Kitulwe Hill and Mlinga Peak on Magoroto Hill and the women sometimes buy from men who pass through these areas while hunting. However, the majority of material is bought from Tanga or Muheza since it is whiter and considered to be of superior quality. Local ukindu is normally used for mats which are to be dyed. The dye is bought from Tanga or Muheza. Fans, food covers and wall hangings are often decorated with paintings of fruit and vegetables and a saying or proverb. In the villages food covers, fans, small and large mats can be sold for 250, 150, 1,000 and 5,000 TShs (1995) respectively and can be sold for almost double the price in the towns.

The fronds of the Minyaa tree are used locally for brushes and baskets and can be found in hilly areas, such as Kitulwe, Magoroto Hill. Bamboo, found on Magoroto Hill (sub-montane forest) is used to make larger baskets to be used in the home. Small baskets can be sold for 150 Tshs and larger baskets sell at around 400 Tshs (1995). The number of baskets made in a month depends on the amount of time available after working on the shamba.

4.4 Medicinal remedies and sources

Magoroto Hill has one medical dispensary, situated in Mwembeni village. For more serious ailments, villagers travel to Kicheba or TEULE hospital, Muheza. When Magorotto Estate was in production an ill person would be transported by the estate vehicle. Ill people are now carried down by stretcher. Mkwajuni and Kwatango villagers use Lanzoni and Kwatango dispensaries respectively. Kwatango dispensary is supplied with a monthly package of drugs donated by UNICEF, but villagers say that supplies do not last the month.

Villagers generally go to dispensaries or the hospital for serious ailments including, malaria, typhoid, arthritis, but for ailments such as dysentery and gastrointestinal disorders and children’s diseases such as chicken pox they may go to a traditional herbalist or treat themselves. Often villagers will go to the herbalist first and if they fail will then go to the hospital.

The majority of families know at least one traditional herbalist. Each village has at least three traditional herbalist and over fifty percent of households have planted some herbs around the home for medicinal purposes, mainly for stomach ache, worms and children's diseases (Table 5). Many useful herbs are also known and utilised from the shambas and bushland.

Table 5. Herbs and trees planted around the home for medicinal purposes.

Vernacular Name	Botanical Name	Ailment
Mzugwa - sw	?	Malaria/Intestinal Worms/Toothache
Muuka - sh	*Microglossa densiflora*	Intestinal Worms/Earache
Hozandogoi - sh	*Hyptis pectinata*	Intestinal Worms
Vumbapuku - b	?	Chest Cold/ Stomach Ache
Mwarobaini - sw	*Azadirachta indica*	Intestinal Worms
Mvuje - b	?	Prevent Cold
Kivumbasa - sw/b	?	Stomach Ache/Toothache
Mswele - b Mswelo - sh	?	Epilepsy in children
Eeza - b	?	Stomach Ache

(sw - kiswahili, sh - kisambaa, b - kibondei).

Trees, shrubs, herbs and climbers are utilised (Appendices 5 & 6).The roots and leaves are used more often, but bark, seeds and fruit are also used. Most specimens are collected from bushland areas, but some can only be found in forest and riverine habitats. Some traditional herbalists collect and plant useful species around the home.

Forest damage caused by medicinal collection is minimal, since many specimens are collected from bushland and shamba and then only small quantities of plant parts are required per treatment and plants are not killed in the process. There does not appear to be any commercial exploitation of plants for medicinal purposes.

Traditional herbal knowledge is passed from father to son. Herbalists interviewed suggested that the younger generation are increasingly less interested in learning traditional medicine. People of all faiths visit the doctors and the doctors say that they are as busy as ever. Normally, one doctor will treat between ten to twenty patients a day and patients come from as far away as Mombasa to visit well respected doctors. Payment for treatment depends on the ability to pay. As one doctor said, "If someone has ten shillings that will be enough." However, one highly respected doctor has had presents of bicycles and radios.

4.5 Areas of traditional spiritual value

In all communities, the majority of people, both young and old know of an area of traditional spiritual value. All areas have a number of characteristics in common, such as they are all found on hills and under the cover of forest.

4.5.1 Mlinga, Magoroto Hill

Probably the most well known area is Mlinga Peak, Magoroto Hill. Originally Mlinga Peak was the sacred place. However, it appears that the magic stone became of more importance. It is situated at the base of the steep climb to Mlinga Peak. The reason behind the apparent change in location is said to be due to the difficulty in the climb to the peak for the old and ill.

As told to me by the villagers of Magula and Mwembeni (Mwabejani sub village), if there is a problem , such as drought or an individual is ill, then a group of villagers or an individual themselves will go to the magic stone to pray. Mkiindi (special elder) would lead the praying to the god, Sekiteke. Mkiindi has died, but he has passed on the knowledge to his sons, as the knowledge was passed down to him.

Mkiindi (or now a family member) would sit on the magic stone, which is said to make you "fly" and lead the praying to Sekiteke. They ask Sekiteke to stop sleeping, wake up and they ask for rain or the problem to be solved. If rain comes or the problem is solved then the group will return and sacrifice a sheep or goat to Sekiteke and will cook and eat the meat as part of the ceremony.

The sacred site requires the shadow of forest. Hence, it is prohibited to clear land for shamba. Another traditional rule concerning the forest around this sacred site is that if you wish to collect forest products from the area then you must only collect one type of product per trip, e.g. mushrooms or firewood, never both. If you fail to do this, it is thought that you may get lost in the forest and will find it difficult to return home.

Similarly on the way to the peak, as you pass the magic stone it is said that you will find it difficult to return that way if you do not leave a donation/gift to Sekiteke in the revise of the magic stone. It is acceptable to leave a small piece of money, food or even a leaf (of any kind) if you have nothing else.

Around 1913/14 it is said that a German staying in Zanzibar visited the peak. He decided to light a fire on the peak. It is said that he hoped to see it from Zanzibar when he returned. The fire got out of control and much of the forest was destroyed on the peak (as far down as the shambas). It was said that people heard the spirits crying out and asking *"where will we stay now"*. Locals believe that some of the Europeans were killed by the angry spirits on the way down between Magila and Muheza.

Since the traditional practices require the shadow of forest the traditional religion was not practised at Mlinga Peak for some years until the forest regenerated. At the peak there is no indication of recent traditional ceremonies being held. However, Frontier Research Assistants visited the more inaccessible northern peak in December 1994 and found evidence of recent worship (coke bottles, cardamom seeds, leaves and money).

4.5.2 Kitulwe, Magoroto Hill

Mgambo villagers also mentioned Mlinga peak as being of traditional spiritual significance and a small number of elders mentioned that Kitulwe/Kiturwe Hill, above Mgambo-Kwemnazi had been a special site in the past. It was thought that the last time traditional beliefs were practised there was in the 1940's. The elders would climb to the top, drink alcohol and pray for rain and a good harvest. It was thought that Sebeo was the first man to settle in the area around Kitulwe. He came from Mkuzi Kwemsaa, Muheza District in the 1800's because of the problem of hunger in his home area. The whole area was under forest until the 1940's when more land was cleared for agriculture. Semaua was the first to be born in the area and he was a hunter.

4.5.3 Kipondo and Chonge, Magoroto Hill

Gare villagers also have their sacred sites. The founder of the village was said to be Sesaidi who originated from Lushoto-Gare (hence village name). The clan moved due to tribal wars in the home area. The two sacred sites are again on forested hills. One is believed to be the burial site of Kipondo, grandson of King Kimweri and the other of his granddaughter, Chonge. Kipondo's burial site is thought to be Ngaza Hill and Chonge is a small hill near Mwembeni-Kweshai.

If there is a problem they will first pray to Chonge and then Kipondo. Food will be taken and eaten as part of the ceremony, e.g. chicken and ugali. The last time a group prayed at these sites was thought to be 1984 when they prayed for rain. Villagers feel that there have been less visits in the last ten years since the rains have been regular and there has been an increase in the influence of Christianity and Islam.

Villagers said that villagers are still not permitted to have shambas in that area, however Frontier Research Assistants say that in August 1994 there were shambas planted to the top of Ngaza Hill.

4.5.4 Kweukindo, Segoma.

In Kwatango and Mkwajuni many people knew of Mlinga and also of Kweukindo which is in Segoma forest. In Mkwajuni village the old man who was knowledgeable about Kweukindo has died and the knowledge has not been passed on.

4.6 Fuelwood

Fuelwood is by far the most commonly used tree product in all locations, whether consumption is measured by frequency or volume. The main users are domestic but consumption by restaurants (hotelis) is also important.

In the areas studied, firewood is the main source of fuel. The three-stone fire is the cooking system used by all. Kerosene is used by only a small number of wealthier families, who may have a small stove but often it is only used to help ignite the fire. Charcoal is not utilised due to the lack of locally experienced producers.

Firewood is collected by women exclusively, men may bring a piece of wood back to the home on occasion when they are passing through the forest. Collection patterns are determined by family size, number of women in the household, proximity to the source of firewood and its ease of collection. If good quality firewood is readily available close by, then women tend to make frequent trips, collecting fairly small amounts each time. If firewood is scarce, trips are less frequent, but more women are involved in one trip and very large bundles are carried. On average women collect two to three times per week. Firewood is often undertaken on the return from the shamba and the workload is divided up between the female members of the household.

The majority of firewood is collected from forest sources, however communities adjacent to the reserve more usually collect from their shambas and bushland, although they do admit to occasionally collecting from the reserve. The reason given for collecting from the reserve was that the next nearest source is one to two hours walk away.

The time taken to reach the forest from which firewood is collected ranges from ten minutes in the case of Mgambo to two hours in Mkwajuni. Villagers say that it is becoming increasingly difficult to find good quality firewood and they are now required to travel deeper into the forest. On arrival at the forest, the distance walked in from the edge ranges between five minutes and forty five minutes. By the time firewood has been located, bundled up and carried home, the total journey time can range between fifty minutes and four hours.

In most places only dead wood is taken for firewood. Women in Mgambo were found to be collecting wood from old pitsawing sites. Large logs are split into more easily managed pieces. All women are highly selective about the species they prefer to collect (Table 6), with only recent immigrants to the area having difficulty in naming the species they prefer. If there are abundant supplies then women can afford to be selective with the species taken, and are well aware of the relative calorific values of the different types of wood available. Other characteristics noted as being desirable for firewood are ease of ignition, small production of smoke, slow burning, splitability and ease of rekindling the fire.

Table 6. Tree species prefered for firewood

Vernacular Name	Botanical Name	Preference Ranking
Magoroto Hill		
Mgwiza - sh	*Bridelia micrantha*	1
Mshai - sh	*Albizia adianthifolia*	2
Mohoyo - sh	*Afrosersalisia cerasifera*	3
Msambia - sh	*Pachystela msolo/brevipes*	4
Msaji - sw/Mjohoro - sh	*Cassia siamea* (planted)	5
Mkongoo - sh	*Sapium ellipticum*	6
Mkwajuni		
Mkole - sw/Mkoe - sh	*Grewia goetzeana*	1
Mbwewe - sw/Mfumba - sh	*Lecaniodiscus fraxinifolius*	2
Msewezi - sw/Mseezi - sh	?	3
Mtalawanda - sw/Mtaanda - sh	*Markhamia hildebrandtii*	4
Msagusa - sw	?	5
Kwatango		
Mhande -sw	*Craibia zimmermannii*	1
Mfunda -sw	?	2
Mbwewe -sw/Mfumba -sh	*Lecaniodiscus fraxinifolius*	3
Mtalawanda - sw/Mtaanda-sh	*Markhamia hildebrandtii*	4
Mwawia - sw/Muawia - sh	*Xylopia sp.*	5

(Preference Ranking: 1 = most preferred; 6 = least preferred; sw - kiswahili, sh - kisambaa).

In Mabejani (sub-village of Mwembeni) where there is a perceived shortage of firewood, women said that they use crop residues such as coconut husks and maize cobs, they also try to cook only foods which have a relatively short cooking time. Crop residues were also said to be utilised in Bombo (sub-village of Mgambo) when the women have no time to go collecting.

It was found that no villagers buy or sell firewood, there being no market.

Each village has at least two hotelis where tea and doughnuts are prepared. Larger hotelis may serve a wider range of food, such as bread, ugali and beans. A hoteli is normally attached to the owners home but the kitchen area is separate from the families. One three-stone fire is used and kept burning most of the day to keep water hot. Firewood is usually collected by the owner, with small children sometimes assisting.

4.7 Building materials

All villagers construct their own houses, the only exception being estate workers and catchment forestry guards who often have company accommodation provided and perhaps some school teachers who do not originate from the area and may rent accommodation (approximately 400 TShs per month for a 2 bedroom house). Required building materials include; timber, rope, plasterwork, bricks and roofing thatch or corrugated iron sheets. The standard home is a two bedroom house, with a living area and a separate building for the kitchen. The majority of homes are built from poles with mud daubing and grass or coconut palm thatch. The wealthier households may have corrugated iron roofs, smooth, painted plasterwork or sun dried or fire burnt bricks - all which extend the life of a house. Repairs to plasterwork occur a couple of times a year and some pole replacement may be required after four or five years.

The local building style requires standard poles or timbers cut roughly into long thin pieces to do the same job. Building poles are collected exclusively by men. Live trees are most commonly utilised for building construction, replacement and repair. Poles are cut from saplings for the withies (diameter 2 cm, length 2.5 - 3 m) and larger trees are often taken and split for the vertical poles (diameter 10-15 cm, length 2.5 - 3 m) and beams. Table 7 shows the average building pole requirements for the typical village buildings.

Table 7. Average building pole requirements.

		Number of poles		
Type of building	**Size**	**Vertical**	**Horizontal**	**Beams**
Two room house	3.5 by 3.5 m	70	200	60
Toilet	1.5 by 1 m	20	70	25
Kitchen	3 by 3 m	40	100	30

Most people are well aware of which tree species make the best building poles (Table 8). Characteristics include rooting ability, termite resistance, durability, hardness and straightness.

Table 8. Tree species preferred for building poles.

Vernacular Name	Botanical Name	Preference Ranking
Magoroto Hill		
Mgwiza- sh	*Bridelia micrantha*	1
Msaji - sw/Mjohoro - sh	*Cassia siamea* (planted)	2
Msambia - sh	*Pachystela msolo/brevipes*	3
Mshai - sh	*Albizia adianthifolia*	4
Mpera - sw/Mpea - sh	*Psidium guajava* (planted)	5
Mnyasa - sw	*Newtonia buchananii*	6
Mkwajuni		
Mtalawanda - sw/Mtaanda - sh	*Markhamia hildebrandtii*	1
Mkole- sw/Mkoe - sh	*Grewia goetzeana*	2
Mbwewe - sw/Mfumba - sh	*Lecaniodiscus fraxinifolius*	3
Mlanga - sw	*Millettia sacleuxii*	4
Msewezi - sw/Mseezi - sh	?	5
Kwatango		
Mtalawanda -sw/Mtaaanda-sh	*Markhamia hildebrandtii*	1
Mkeakiindi - sh	*Diospyros mespiliformis*	2
Mbwewe - sw/Mfumba - sh	*Lecaniodiscus fraxinifolius*	3
Mhafa - sw	*Millettia dura* (planted)	4
Mnkande - sh	*Stereospeirmum kunthianum*(n)	5
Mkuyu - sw	*Ficus capensis*	6

((n) = non-forest, indigenous tree; Preference Ranking: 1 = most preferred; 6 = least preferred; sw - kiswahili, sh - kisambaa).

Mkwajuni villagers expressed favour for *Brachylaena hutchensii* (mkarambati) which was once abundant in the area but is now unavailable due to overuse. People say they are finding it increasingly difficult to obtain good quality building materials from public forest and some say that they have to steal into the forest reserve.

The majority of houses are thatched with coconut palm fronds (viungo) and a small number of houses may be thatched with grasses and reeds (nyasi; ufi and ngaghe, kinyusu, mainde) all of which can be found around the shambas. Wealthier families tend to use corrugated iron sheets which extends the life of a house.

Almost all twine and rope for building comes from forest sources in the form of climbers, (e.g. Usisi, *Tiliacora funifera* and *Triclisia sacleuxii*, Ugoroto, *Landolphia kirkii*) or tree bark. Sisal (Mkonge - sw, Kamba - sh, *Agava sisalana*) is used in rare occasions but is not considered durable.

4.8 Pitsawing

Pitsawing has been banned in the area since January 1993. However, a number of pitsawing sites were seen on the south eastern boundary of Magrotto Estate which appear to have occurred since this date. It was reported that pitsawers from Tanga had been in the area as recently as April 1994.

The majority of pitsawers tend to be under contract from businessmen in Tanga, who then export the timber to Kenya and Dar es Salaam. In general pitsawers are not local and live and work within the forest and provide little extra income for locals, unless a tree is on a shamba and then the owner will be paid or given a piece of timber.

The best timber species are mvule (*Milicia excelsa*), mbambakofi (*Afzelia quanzensis)* and mnyasa (*Newtonia buchananii*). One person interviewed who previously was a pitsawer said that mvule (*Milicia excelsa*) and mnyasa (*Newtonia buchananii*) could be cut for a special reason (the District Officer has given permission to cut mnyasa (*Newtonia buchananii*) for school desks for the four schools of Magoroto Hill), but mvule should never be cut because it has been overused in the past.

Prices (1992) received from one tree when sold to the traders from Tanga were;

Mvule	(*Milicia excelsa*)	300,000 TShs
Mbambakofi	(*Afzelia quanzensis*)	180,000 TShs
Mnyasa	(*Newtonia buchananii*)	150,000 TShs

Local people on Magoroto Hill perceive the ban on pitsawing as advantageous for water catchment but disadvantageous in terms of a reduction of income.

4.9 Wood for furniture and utensils

Most furniture is purchased from local carpenters and is made to order. Pitsawn timber is utilised, the source of which is the local forest. Carpenters expressed concern over the pitsawing ban and said that he would be forced to stop production when his stores are depleted and return to farming. Many households own planks which they obtained before the ban and they use these when they require furniture.

Mvule (*Milicia excelsa*) and mbambakofi (*Afzelia quanzensis*) are the preferred tree species for furniture making because they are hard and resistant to termite attack. Mnyasa (*Newtonia buchananii*) is also commonly used because it is easily available. It is easy to work with and is used for windows and doors, hoe and machete handles but is not suitable for furniture.

Beds, chairs, doors and windows are the most common furniture produced. The market is predominantly local, however there is a small market for selling to locals who are now living in other areas (Muheza, Tanga, Dar es Salaam). A part-time carpenter can make a profit of 89,250 TShs per annum (1993 figure).

5 ATTITUDES TO THE FOREST

5.1 Magoroto Hill

In general, the communities of Magoroto Hill see the public forest as a resource for their day to day subsistence; for agricultural land, building poles, timber, firewood, food, weaving materials and medicine.

In some areas, specifically Kwemnazi (sub village of Mgambo) villagers have told of times when they were young, when the shambas reached the mountain ridges. Today there is forest on the highest ridges. They put this down to the fact that farmers have smaller shambas now

and that forested areas are retained for shade under which to grow cardamom. It is interesting to note, that in Magula, villagers perceived the planting of cardamom to be one way in which the forests are reserved, since, cardamom requires the shade of forest and therefore people do not cut down the forest. Unfortunately, cardamom growth is known to deplete the soil of nutrients and prevent the regeneration of the under storey. Forest encroachment for cultivation of subsistence crops is also occurring on the north west boundary of Magrotto Estate.

The water catchment and soil conservation properties of the forest were well known. However villagers complained that the government cared more about forests than the people living adjacent to them.

5.2 Manga Forest Reserve

In general, most villagers feel that the forest reserve should be for their use and livelihood, in terms of agricultural land and forest products. They are well aware of the restrictions on the use of the forest reserve and who officially controls it. They feel that the restrictions make their daily activities unnecessarily difficult and therefore do not avoid using the reserve altogether. They fear that if they are caught going into the forest reserve by the forest guards they will be taken to the police, asked many questions and possibly given a fine.

They also feel that the forest guards, by protecting the forest also protect the crop pests which most farmers spend considerable time trying to prevent from attacking their crops.

A few farmers see the forest as important for the prevention of soil erosion.

6 DISCUSSION

The main objectives of this study concern the need to understand the patterns of wild resource use of forest-adjacent communities. A case study approach reveals how livelihood strategies respond to changing environmental and social circumstances. In particular, the coping strategies of communities in response to reduced forest resource accessibility and forest product availability, either through the gazettment of forest reserves or through the adverse effects of human disturbance are discussed.

Forest - adjacent communities have traditionally depended on the forest resource for 'fresh' agricultural land and have collected a wide range of forest products for their daily subsistence. Present day farming practices still rely on shifting agricultural practices and farmers still look to the forest for the next generations farm land (5.1). With population increase and increasing numbers of immigrants settling in the area (3.2), forest reserves and reduced forest product availability due to human disturbance and overuse, communities are increasingly finding that the availability of land and good quality forest products is greatly reduced.

In the minds of local communities probably the biggest sources of conflict at present are agricultural land and timber for building and furniture making. These are perhaps the most visual products utilised from the forest and are the most highly policed by forest guards. Apart from land and timber, communities utilise a wide range of forest products for their daily subsistence. These products include firewood, polewood, thatch, twine and rope, herbal medicine, raw materials for weaving and basket making, edible plants, fruits, fungi, and bushmeat. In the areas studied forest products are not greatly utilised commercially.

However, some pitsawing was continuing in the area despite the 1993 ban and cardamom growth under the forest canopy in some areas.

Collection of forest products tends to be highly gender specific with women being responsible for firewood, vegetable and mushroom collection and men being responsible for building pole collection, thatch, twine and rope in all households. Hunting, honey and herbal remedy collections are usually undertaken by specialists who tend to be men in these areas. Children tend to be responsible for fruit collection. People are highly knowledgeable about the specific characteristics of different species of trees and plants and collection for specific use is species specific.

It would seem that although traditionally people have depended on the forest for subsistence, with increasing heavily policed forest reserves and a reduction in good quality forest products due to overuse, people have adapted to manage the wild resources in shamba and bushland areas more frequently. For example, Mkwajuni villagers rarely collect forest derived edible plants and instead rely on shamba and bushland derived edible plants. It would seem that although it may be suggested that villagers in Magoroto communities prefer forest derived edible plants (Table 2) there is still an abundance of knowledge concerning shamba and bushland derived plants. Similarly, women prefer to collect firewood from the forest, due to the abundance of tree species which have specifically desirable characteristics. However, in cases where they are unable to be selective (due to inaccessibility, time or illness) they may collect firewood from on and around the shamba. It would therefore appear that for some forest products, such as firewood and edible plants collection from forest sources is a function of preference and access rather than need.

For other forest products however, such as polewood it would appear that collection is based much more on need. Whereas wealthier households may utilise alternatives to forest products, such as mud brick housing and corrugated iron roofs, the average household would require polewood, thatch and rope from the forest. Wealthier households may also utilise kerosene cookers on occasion rather than relying solely on firewood as their source of fuel. In this way forest products can be seen to be a socio-economic buffer to the rural poor. Wild food collection, whether derived from forest, bushland or shamba may also be regarded as a socio-economic buffer for the rural poor and remote who may be unable to obtain alternatives due to lack of cash and alternative sources, such as meat from the butchers. The seasonality of collection, shown particularly in Magoroto communities also demonstrates wild food collection to be an environmental buffer. For instance wild edible plants may be collected more frequently in the dry season when there may be a decrease in the availability of planted vegetables and perhaps a coincidal reduction in household income from the farm.

In conclusion, forest - adjacent communities do not depend upon forest products for their subsistence, rather they are often utilised due to preference and access and as a socio-economic and environmental buffer for the rural poor. When forest resources become inaccessible or good quality forest products are unavailable local people have proven to be highly adaptive and utilise their vast indigenous knowledge to manage other wild resources derived from shamba and bushland.

7 CONCLUSIONS

In identifying ways to minimise the social costs of conservation whilst maintaining and strengthening local peoples entitlements, there is a need to understand the decisions made by local people in respect to their daily subsistence. Are their requirements based on need, access or preference to a resource?

Local people have a wealth of indigenous knowledge which they utilise on a daily basis. They are also highly adaptive in many ways to their changing environment, such as changing their reliance from forest derived foods to shamba and bushland derived foods when access to forest resources are prevented. Wild resource management by local people needs to be taken into account in agricultural planning and forest management. In shifting agricultural systems the distribution between forest and field and wild and cultivated is often blurred, as management of fallows and field sites is closely integrated. Local knowledge of such systems is critical in building sustainable agriculture and forest resource use for the future, under changed conditions of reduced forest areas and shortened fallows (Warner 1991).

Further research is required into the relationship between shamba, bushland and forest systems and how these existing systems can be improved and optimised, for example, through agroforestry practices. Individual farmers have proven to be innovative and willing to experiment on their farms. Many farmers have seen agroforestry practices and fish ponds in other areas of the East Usambaras and have attempted to copy, but without proper guidance there is a high possibility of failure. It is therefore essential to have a good integrated extension and advisory system for local farmers. To involve poorer farmers in on farm experimentation to find viable alternatives to forest products and to improve agricultural practices is perhaps the most immediate challenge. It is this sector of the community who rely most heavily on forest products and these who therefore suffer from reduced forest accessibility. Without assistance it may be these farmers who are hence forced to look and act only in the immediate future and hence forget about any form of sustainable agriculture and forest management.

Traditional forests may have had a conservation role in the past, e.g. Mlinga Peak. With the gradual break down of control by clan leaders in the society, the emphasis on government control and the increase in the Christian and Islamic faiths there is unlikely to be a full revival of these traditional forest conservation rules (4.5.1). These are lessons that need to be learned from the past. Before attempting to forge ahead and solve problems, first you need to understand and know your target community. There is often much to be learned from the indigenous knowledge of individual farmers which is of use when designing and putting into action management plans. Local people also benefit greatly from the lessons of other farmers from areas such as Lushoto in the West Usambaras. These people have seen the effects of unsustainable forest use. Farmers in the East Usambaras need assistance in learning from other farmers and experimenting on their own farms.

In recent years communities have seen forests taken out of their control in the form of forest reserves. There is now much talk and research into community participation in forest management. This must go hand in hand with assisting and empowering farmers to experiment on farms and find their own solutions to some of their resource problems, on their land which they are entitled to manage themselves.

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APPENDIX 1

VILLAGES STUDIED AND THE TYPES OF INTERVIEWS HELD AT EACH.

Village/Sub village	No. of household interviews	No. of group discussions	No. of key informants
MAGOROTO HILL			
Mgambo			
Mgambo	2	2	4
Kwemnazi	4	0	3
Manga	3	0	1
Bombo	6	0	2
Magrotto Estate	6	0	1
Mwembeni			
Mwembeni	1	4	2
Kweshai	1	0	0
Kwedibo	1	0	0
Kwekanda	2	0	0
Kwetete	3	0	0
Kwesimba	2	0	0
Kivindo	0	0	0
Mabejani	0	1	1
Kibago	1	0	0
Ndingala	0	0	0
Magula	1	1	1
Gare	0	1	0
MANGA RESERVE			
Mkwajuni			
Mkwajuni	5	0	1
Barabara	2	0	0
Darajani	2	0	0
Schule	0	0	0
Mbuyuni	1	0	0
Kivuleni	2	0	0
Kwatango			
Hospital Kilindini	2	0	0
Mikoroshoni	2	0	0
Tamota	2	0	0
Zigi	2	0	0
Gombero	2	0	1
Gombero Kijijini	2	0	0
Shele	1	0	0
Mlembule	1	0	0
Vumba	1	0	0
Mitomingi	1	0	0
Mwarimba	2	0	1
TOTAL	**63**	**9**	**18**

APPENDIX 2

HISTORICAL EVENTS, AS TOLD BY VILLAGE ELDERS.

Magoroto Hill

Date	Event
1896	Magrotto Estate opens for coffee production.
1901	Coffee production yield observed to be reduced.
1913	A German sets fire to Mlinga Peak.
1914	First World War - villagers leave to fight.
1921	Magrotto Estate producing palm oil, black pepper, coffee, rubber derris.
1922	Locust epidemic.
1930	First sugarcane alcohol machine in Mwembeni.
1933	Locust epidemic.
1937	Locust epidemic.
1940's	Traditional religion and visits to Kitulwe Hill to pray for rain greatly reduced.
1946	Big increase in land clearance for agricultural land.
1950's	Traditional system of chiefs (Jumbe) and bartering faded out.
1955	Locust epidemic
1957	Radio Station built by East African Community in Mgambo village.
1960's	First tailor started business in Mwembeni.
1961	Independence and start of chairmanship.
1964	Good harvest.
1967	First cardamom crop planted on Magoroto Hill.
1968	Temporary Primary School opened in Mwembeni. Magrotto Estate plant cardamom, cloves and tobacco and continue with palm oil.
1969	Mwembeni Primary School officially opened. Mgambo Chairmans house is wired for lighting.
1975	Hunters noticed a decrease in wild animals in the forest.
1976	Mgambo Primary School opened (government paid for corrugated iron and villagers built the school).
1977	CCM Office built in Mwembeni. Radio Station closed and moved to Potwe.
1981	Mwembeni Dispensary opened.
1983	TIRDEP (Tanga Integrated Rural Development Programme) bring water pumps to Mgambo (2) and Mwembeni (3).
1984	ISUZU (7 tonne lorry) bought by Mwembeni villagers. Villagers contributed 2 TShs for every kilogram of cardamom sold and the rest of the money loaned from the CRDB.
1985-87	Magrotto Estate plant hybrid palm oil.
1986	Government assist villagers in planting cloves and black pepper on their farms.
1990	Good harvest.
1992	Mluka River flooded, affecting Magula village and caused soil erosion. EUCFP visited area and villagers remember slogan "Cut a tree, plant a tree." Bad year for crop pest attacks by baboons, monkeys and cane rats. Magrotto Estate reduce employee numbers from 70 to 40.
1993(Jan.)	Magrotto Estate stopped production. 20 people employed; 13 watchmen, 2

	Amboni soldiers, 4 shamba cleaners and 1 manager). Problems of villagers caused by Estate closure; less employment, no transport for the sick and no road maintenance. Pitsawing ban. EUCFP reforested area between Mgambo - Manga and Magila villages.
1994 (Jan.)	Visit from EUCFP Extension workers to explain water catchment properties of area.
1994 (Jan.)	UWT (Umoja Wa Wanawake Tanzania) Organisation of Women in Tanzania started in the area.
1994 (June)	Mwembeni - Mabejani; Mlinga area gazetted and villagers compensated for cardamom shambas.

Mkwajuni

Date	Event
Early 1900's	Immigrants moved to the area to work on Kibaranga Sisal Estate. Many people moved from Mwarimba to Mkwajuni area for fertile land.
1930	German Meyer brothers left SIDO (Small Industries Development Organisation) house.
1942	Kwaboko (Manga Forest Reserve) gazetted as a Forest Reserve.
1957	Chambange forest cleared for shamba.
1960	Kwaboko (Manga Forest Reserve) boundary moved back. Villagers given 60 acres to build more houses.
1963	Manga- Mwarimba public land put under sisal production. English Manager, John Wood.
1978	Primary School opened.
1981	Kibaranga Sisal Estate give plots of land to villagers on which to farm.
1986	Kibaranga closed, many workers moved to work on Bamba Sisal Estate.

Kwatango

Date	**Event**
1905	Church and Primary School opened by Bishop Thomas (Tanzanian) and William Becker (English).
Early 1960's	Muheza District Council Administrative Officer constructed road from Muheza to Kwatango.
1962-63	Villagers built dispensary. UNICEF donate drugs once a month.
1978	New Primary School opened.
1980's	Sigi - Miembeni Sisal Estate closed.
1982	TIRDEP give school farm implements.
1984	TIRDEP water pump project.
Late 1980's	Immigrants from Lushoto moved to area.
1988-1992	Sikh Sawmills employed people from outside who settled in the village to log area.

APPENDIX 3

HABITAT OF EDIBLE PLANTS.

Vernacular Name	Botanical Name	Communities which collect & eat (*)		
		Magoroto	Mkwajuni	Kwatango
Forest				
Kisogo - sh	?	*	*	*
Mnavu - sh	*Solanum nigrum*	*		*
Msangani - sh	?	*		*
Mnyekewa - sh	?			*
Tikini - sh	?	*	*	*
Riverine Forest				
Mkoswe - sw/Mng'oswe - sh	?	*	*	*
Nderema - sw/Nderema - sh	*Basella alba*	*		
Tarata - sw/Taata - sh	?	*		*
Shamba and Bushland				
Gahu - b	?			*
Kisungu - sh	?	*	*	*
Kibwabwa - sh	?		*	
Kisamvu - sw/Pea - sh (Cassava Leaves)	*Manihot utilissima*	*	*	*
Matembele - sw/Ukutu - sh (Potato Leaves)	?	*		*
Shafa - sh (Cowpea Leaves)	*Vigna unguiculata*	*		*
N'koko - sh (Pumpkin Leaves)	*Cucurbita peop*	*	*	*
Mbwembwe - sw/Kisamanguo -sh	*Bidens pilosa*	*		*
Mchunga -sw/Msunga - sh	*Sonchus luxurians*	*	*	*
Mchicha - sw/Bwache -sh	*Amaranthus sp.*	*	*	*
Mgangani -b	?	*		
Mlenda - sw/ Hombo - sh/Kibwando - b	?	*	*	*
Mnyeumbeue - sh	?		*	
Tee - sh	?		*	

(sw - kiswahili, sh - kisambaa, b - kibondei).

APPENDIX 4

HABITAT OF EDIBLE FUNGI.

Vernacular Name and Habitat	Communities who collect and eat (*)		
	Magoroto	Mkwajuni	Kwatango
Forest			
Magh'wede - sh	*		*
Mangaa - sh	*		
Manjuugo - sh	*		
Ngaha - sh	*		*
Mashashu - sh	*		
Mameno - sh	*		
Mayavungu - sh			*
Makundwakundwa - sh		*	
Mgalanganda - b		*	
Shamba			
Nkuuvi - sh	*	*	*
Mang'enyatonge - sh	*	*	
Mavinia - sh	*	*	*
Utondoo - sh			*
Gongote - sh			*
Uzozo - sh		*	
Kuviukombe - sh		*	
Kolwe - sh		*	
Vitundwi - sh	*	*	*
Magong'ongo - sh	*	*	*
Tembo-sw/Vioga nd'embo-sh	*	*	*
Ugenda na nyika - sh	*	*	

(sh - kisambaa, b - kibondei).

APPENDIX 5

MEDICINAL REMEDIES USED BY TRADITIONAL HERBALISTS, MAGOROTO HILL.

Thanks go to Doctors Benjamin Maua and George Aberd Shaaban for their time and willingness to share their medicinal knowledge.

Key:

Language: sw - kiswahili, sh - kisambaa
Part used: B - bark, L -leaves, R - roots, S -stem sap, F - fruit.

ILLNESS/PROBLEM	VERNACULAR NAME	BOTANICAL NAME	TYPE	PART	SOURCE
Appendicitis	Mtamba kuzimu - sw	*Deinbollia borbonica*	Tree	Roots	Shamba
(Roots boiled and water drunk in morning before food and drink).					
Asthma	Lion Bone		Ribs		
(Bone is burnt, an infusion made, then drunk).					
Asthma	Ufyambo - sh		Climber	Leaves	Forest
(Sap squeezed out of a handful of leaves, mixed with water, drunk).					
Asthma in children	Mhasha	*Veronica iodocalyx*	Bush	Leaves	Shamba
	Muuka - sh	*Microglossa densiflora*	Shrub	Leaves	Shamba
(Sap mixed with water and drunk. A spoonful taken morning, afternoon and evening for two days).					
Earache	Mchunga - sw	*Sonchus luxurians*	Herb	Leaves	Shamba
(Sap administered to ear in the evenings for two days).					
Epilepsy	Kamachuma - sh	*Priva cordifolia*	Shrub	Roots	Shamba
	Mlenga - sw	*Veronia abconica*	Shrub	Roots	Shamba
(One root of each taken and boiled and infusion drunk once a day for one week).					
Epilepsy	Mti wa kondo - sh		Bush	L/R	Shamba
	Hozandoghoi - sh	*Hyptis pectinata*	Shrub	L/R	Shamba
	Muuka - sh	*Microlossia densiflora*	Shrub	L/R	Shamba
	Mwinika nguu - sh	*Asparagus falcatus*	Bush	L/R	Forest
	Mlenga - sw	*Veronia abconia*	Shrub	L/R	Shamba
(Sap of leaves drunk with water and roots boiled and water drunk in the morning).					
Eczema in Children	Gugufa - sh		Shrub	L/R	Forest
	Samaka - sh	*Aframomium sp.,*	Shrub	L/R	Forest
	Ngoko- sh	*Piper capensis*	Shrub	L/R	Forest
	Ufiha - sh	*Olyra latifolia*	Shrub	L/R	Forest
	Ushuki - sh		Grass	L	Shamba
	Umpolo - sh	*Draecaena laxissima*	Shrub	L/R	Forest
	Kihumpu - sh	*Mucuna pruriens*	Climber	L/R	Shamba
	Mpingo -sw	*Dahlbergia melanoxylon*	Tree	L/R	Forest
(Leaves of all are dried, burned and the ash is mixed with oil and applied to the skin morning and night for seven days. The roots are boiled and the water drunk morning and night also).					
Eye ache	Ndiga - sw		Shrub	Roots	Shamba
	Ghole - sw	*Adenia cissampeloides*	Climber	Roots	Forest
(Roots burned and ash added to a little water and stored for a day. Eyes are then washed with the solution once before bedtime).					
Female Infertility	Muungu - sw	*Saba florida*	Tree	Roots	Forest
	Kitengwazi - sw		Tree	Roots	Forest
(Roots boiled and water drunk, morning, afternoon and evening for seven days).					
Flatulence	Mtamba kuzimo - sw	*Deinbolua borbonica*	Tree	Roots	Shamba
(Roots boiled and water drunk before breakfast. Only one dosage taken).					
Headache	Mshuza - sh	*Citrus aurantium*	Tree	L/R	Shamba
	Hashaanda - sw	*Veronia corolata*	Shrub	L/R	Shamba
	Mdongonyezi - sh	*Toddaua asiatica*	Tree	L/R	Forest
	Mkuungo - sh	*Terminalia sambesiaca*	Tree	L/R	Forest
(Roots boiled and water drunk, morning, afternoon and evening for seven days. Leaves dried, ground to powder and applied to head once).					
Impotency	Mkweme - sw	*Telfairia pedata*	Climber	Fruit	Forest
	Kijamitu - sw		Tree	Root	Forest
(Roots boiled and eaten with juice of Mkweme fruit).					
Insanity	Mwae - sh		Tree	Leaves	Forest
	Mvule - sw	*Milicia excelsa*	Tree	Leaves	Forest
(Leaves of Mvule must have fallen naturally. Leaves are boiled and water is drunk three times a day for seven days. If the patient starts to get better, the patient is taken under a big tree, hair shaved off and dried burnt leaves of Mwae and Mvule are rubbed into the scalp and chest).					
Intestinal Worms	Muungu - sw	*Cola Usambarensis*	Tree	Bark	Lowland Forest
	Mhombo - sw		Tree	Bark	Shamba

	Mviu - sw	*Vangueria tomencosa*	Tree	B/R	Forest
(Boil bark of each with roots of Mviu and drink water).					
Invincibility	Mjolwe - sw		Tree	Roots	Forest
	Mwembe - sw	*Mangifera indica*	Tree	Bark	Shamba
	(Naturally fallen coconut tree)		Tree	Bark	Shamba
	Ngukia - sw	(Type of stone).			
(Mjolwe root dried and powdered, mixed with dried powdered bark of Mwembe and coconut tree and then added to white powder from Ngukia stone. Take mixed in porridge in the evening for three days. If a person is killed by a snake bite or gun shot this remedy will resuscitate).					
Invisibility	Kingoza - sh		Tree	Roots	Shamba
(To hide from attackers, place root in mouth and close eyes).					
Malaria/Muscle ache	Mvuti - sw	*Lantana camara*	Shrub	Leaves	Shamba
	Mtura - sh	*Solnum incanum*	Shrub	Leaves	Shamba
(At least fifty leaves from each tree are boiled. The patient then bathes in water for a few days).					
Menstrual pain	Muungu - sw	*Cola usambarensis*	Tree	Bark	Lowland Forest
	Mhombo - sw		Tree	Bark	Lowland Forest
	Mviu - sw	*Vangueria tomencosa*	Tree		
Roots	Forest				
(Bark of Muungu and Mhombo boiled witha little water, roots of Mviu burnt. Ash mixed with bark infusion and drunk once a day for five days).					
Mumps	Mkuungo - sh		Tree	Bark	Lowland Forest
(Boil bark and drink water, morning and evening for seven days).					
Skin Rash	Ghole - sw	*Adenia cissampeloides*	Shrub	Wood	Lowland Forest
	Myonga pembe - sw		Tree	Wood	Lowland Forest
	Mkula - sw	*Pterocarpus sp.*	Tree	Bark	Forest
(Small piece of wood from Ghole and Myonga pembe and bark of Mkula soaked in water overnight. Patient bathes in it morning and night for one month).					
Snake Bite	Kikulagembe - sw		Tree	Leaves	Lowland Forest
(Dry leaves burned and applied to wound immediately).					
Stomach Ache & Diarrhoea	Mzumbasa - sw	*Ocimum suave*	Shrub	Roots	Shamba
	Mtura - sw		*Solanum incanum*	Shrub	Roots
Shamba					
(Roots of each boiled and water drunk. For diarrhoea, twenty leaves of Mzumbasa, dried, powdered and drunk with water).					
Stomach Ache	Mshinga - sh	*Trema orientalis*	Tree	Roots	Shamba
	Mkwamba - sh	*Securinega virosa*	Tree	Roots	Shamba
	Mtongwe - sh	*Annona senegalensis*	Tree	Roots	Shamba
	Mkiika - sh		Tree	Roots	Shamba
	Mbaazi - sw		Shrub	Beans	Shamba
	Msasa - sh	*Ficus exasperata*	Tree	Roots	Shamba
(Four roots of each boiled and water drunk).					
Stomach Ache	Mshinga - sh	*Trema orientalis*	Tree	R/L	Shamba
	Mshuza - sh	*Citrus aurantium*	Tree	Fruit	Shamba
(Roots of Mshinga boiled, leaves and branch burned and water, ash and juice of Mshuza fruit mixed and drank).					
Swollen Knee	Mtura - sw	*Solanum incanum*	Shrub	Leaves	Shamba
	Mshuza - sh	*Citrus aurantium*	Tree	Fruit	Shamba
(Dry leaves of Mtura, burn and mix with juice of Mshuza fruit and apply to knee).					
Toothache	Mkuyu - sw	*Ficus capensis*	Tree	Stem Sap	Forest
(Small amount of stem sap applied to tooth).					
Tuberculosis	Mkwanga	*Zanha golungensis*	Tree	Bark	Forest
(Burn bark and ash snorted and eaten morning and evening for seven days).					

APPENDIX 6

MEDICINAL REMEDIES USED BY TRADITIONAL HERBALISTS LIVING AROUND MANGA FOREST RESERVE.

Thanks go to Doctor Lukiano Tupa (Kwatango) who has sadly since passed on and Jumanne Hussein (Mkwajuni) for their time and willingness to share their medicinal knowledge.

Key:

Language: sw - kiswahili, sh - kisambaa
Part used: B - bark, L -leaves, R - roots, S -stem sap, F - fruit.

ILLNESS/PROBLEM	VERNACULAR NAME	BOTANICAL NAME	TYPE	PART	SOURCE
Asthma	Mhasha - sh	*Veronica iodocalyx*	Bush	Leaves	Shamba
	Ushunguyuyu - sh		Leaves	Shamba	
(Squeeze sap from leaves and mix with coconut alcohol and drink).					
Cataracts	Ufyambofyambo - sh			Seeds	Shamba
(Eat one or two seeds three times a day for one week).					
Coughing	Msasa - sh	*Ficus exasperata*	Tree	Leaves	Forest
(Grind leaves and dry. Add to porridge or tea once per day for two days).					
Coughing	Ufyambofyambo - sh			Leaves	Shamba
(Eat five to ten leaves three times a day for two days).					
Constipation	Ndeengwa - sh			Roots	Forest
	Mtamba kuzima - sh	*Deinbolua borbonica*	Tree	Roots	Forest
(Roots boiled in water and drunk three times per day for three days).					
Constipation and Gas	Mtura - sh	*Solanum incanum*	Shrub	Roots	Forest
(Chew roots and swallow mucus).					
Diarrhoea & Stomach Ache	Mwati - sh	*Greenwayodendron suaveolens ssp. usambaricum*	.Tree	Roots	Forest
	Mtonkwe - sh			Roots	Forest
	Ingoingo - sh			Roots	Forest
(Boil roots and drink water three times per day for three days).					
Dysentery	Sineakaya -sh			Leaves	Forest
	Ndugusi - sh			Leaves	Forest
	Uvuvundi - sh			Leaves	Forest
(Leaves ground and mixed with water and drunk three times a day for three days).					
Fever in children	Muuka - sh	*Microglossa densiflora*	Shrub	R/L	Forest
	Mshwee - sh			R/L	Forest
	Hozandogoi - sh	*Hyptis pectinata*	Shrub	R/L	Shamba
(Roots boiled and water drunk three times a day for one day. Leaves of Muuka pounded and added with a little water and drunk and leaves of Mshwee and Hozandogoi squeezed for sap and drunk with a little water).					
Gonorrhoea	Kitupa mzitu - sh			Roots	Forest
(Chew roots and swallow mucus).					
Indigestion	Ukoka - sh			Leaves	Forest
(Boil leaves and drink).					
Inducing Labour	Msofu - sh	*Uvariodendron sp.*	Tree	Roots	Forest
(Boil roots and drink water. Must only be done just before the full moon).					
Malaria	Mchunga - sw	*Sonchus luxurians*	Herb	Leaves	Shamba
(Eat the leaves and drink the sap with a small amount of water. Only take once, when fever is present).					
Menstrual Pain	Mtindi - sh		Tree	Bark	Forest
(Boil bark and drink water three times a day for three days).					
Menstrual Pain	Utambaa mgoshwe - sh			Leaves	Forest
(Grind leaves, mix with water and drink).					
Menstrual Pain	Mtalawanda - sh	*Markhamia hildebrandtii*	Tree	Leaves	Forest
(Boil leaves and drink water).					
Nausea	Mwengee - sh			Leaves	Forest
	Mkwamba - sh	*Socurinega virosa*	Tree	Leaves	Forest
(Squeeze sap from leaves and drink with a little water).					
Scabies	Goe - sh		Climber	Roots	Forest
(Boil roots and bathe in water).					
Stomach Ache	Mzumbambuku -sh			L/R	Shamba
(Boil leaves and roots and drink water).					

APPENDIX 7

SKETCH MAPS OF VILLAGES AND THE IMPORTANT ROUTES BETWEEN THEM AND THE FEATURES THAT ARE IMPORTANT TO PEOPLE

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Sketch map of Mgambo with sub-villages. Drawn by Chrispin Sylvester Kamote of Mgambo village.

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Sketch map of Manga, sub-village of Mgambo. Used to determine which participants to survey on the basis of perceived wealth. Drawn by Chrispin Sylvester Kamote of Mgambo village.

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Sketch map of Bombo, sub-village of Mgambo. Used to determine which participants to survey on the basis of perceived wealth. Drawn by Chrispin Sylvester Kamote and Johnson Mkufya.

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Sketch map of Mgambo sub-village. Used to determine which participants to survey on the basis of perceived wealth. Drawn by Chrispin Sylvester Kamote of Mgambo village.

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Sketch map of Kwemnazi, sub-village of Mgambo. Used to determine which participants to survey on the basis of perceived wealth. Drawn by Chrispin Sylvester Kamote and Maudi.

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Figure 1. Location of the East Usambaras within Tanga Region.

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Figure 2. River catchment areas of the East Usambara Mountains.

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Figure 3. Location of study villages.

East Usambara Catchment Forest Project Technical Paper Series

(ISSN 1236-620X)

The East Usambara Catchment Forest Project Technical Papers Series consists of reports on forestry issues in the East Usambara Mountains. This series started in 199. These reports aim to make information more widely available to staff members of the East Usambara Catchment Forest Project, to the Forestry and Beekeeping Division, and to other institutions and individuals concerned and interested in the conservation of the East Usambara forests.

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