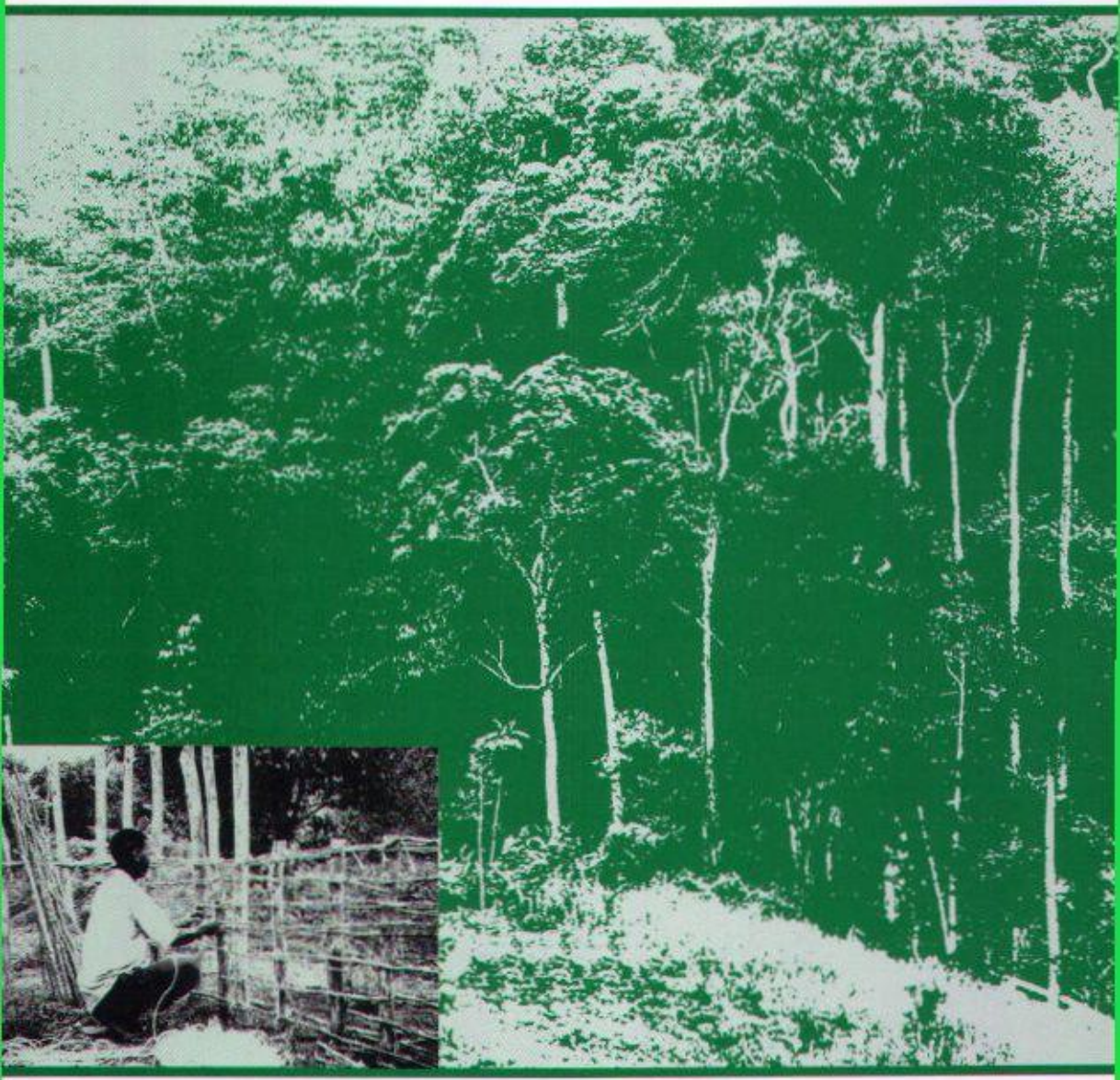
...nd Utilization of Natural Resources in the East Usambara Forest Reserves: Conventional Views and Local Perspectives

John Francis Kessy



PROPOSITIONS

1. Accepting the fact that collection of forest products in Tanzanian forest reserves continues despite the strict access rules, is to accept failure in a constructive way on the part of the Forestry Division.
(*This study*)

2. Trying to preserve all the forest in the East Usambaras carries the risk of losing all of it through unregulated utilization.
(*This study*)

3. Ethnic heterogeneity is not always hostile to joint action.
(*This study*)

4. By focusing biodiversity conservation efforts on forest reserves without giving attention to local farming systems, no account is taken of existing indigenous knowledge and conservation measures such as domestication of forest species.
(*This study*)

5. Plant domestication as an indigenous management strategy is demand driven.
(*This study*)

6. Essentially, the ambiguity in defining community-based resource management initiatives stems from the existing ambiguity in defining a community.
(*Cernea, 1990*)

7. The debate on biodiversity conservation has fallen victim to crisis talk in conservation circles, an occupational hazard to which conservationists are as vulnerable as relief agency personnel.
(*Guyer & Richards, 1996*)

8. When it comes to meeting user needs, research methods like fashion designs are often complementary rather than competing - mainly to the surprise of their initiators.
(*Personal experience*)

9. Accepting stakeholder reconciliation as a give-and-take process, provides one of the most crucial parts on the "conservation jig-saw puzzle" in developing countries.
(*This study*)

10. The term "forest reserve" can misleadingly carry the notion of "species richness". Some forest reserves are very poor in terms of species depending on the ecological conditions.
(*Personal experience*)

John F. Kessy
Conservation and utilization of natural resources in the East Usambara forest reserves: conventional views and local perspectives
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Conservation and Utilization of Natural Resources in the East Usambara Forest Reserves: Conventional Views and Local Perspectives

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Conservation and Utilization of Natural Resources in the East Usambara Forest Reserves: Conventional Views and Local Perspectives

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This book is dedicated to:

* My parents Francis Paul Leweri and Mary Ndekusara Mashina, that they tuned my youth in favour of education;

* My children, that they may be inspired to get highest levels of education in their life-time.

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CHAPTER 1
GENERAL INTRODUCTION

This chapter presents general introductory remarks. It opens with a presentation of some of the burning issues among the biological and social scientists in relation to conservation. Whereas most biologists view local communities as threats to key biodiversity conservation areas, social scientists tend to consider communities as agents of landscape construction who may decrease, conserve or even augment biodiversity, depending on local livelihood strategies. Some remarks are made on the trade-offs between present and future utilization of resources, in relation to the concept of sustainable development. The chapter also discusses the Tanzanian environmental situation, with special emphasis on forest management.

1.1 **The African environment**

The African continent is unique in terms of social, demographic and ecological changes. The continent has in a global perspective the most rapidly increasing human population, the highest levels of poverty, and a wide variety of ecosystems undergoing constant transformation. High levels of endemic biodiversity are to be observed alongside perhaps the longest experience of human involvement in the process of influencing that biodiversity. The Olduvai Gorge in northern Tanzania, for example, has provided evidence of some of the oldest humans (Ogot & Kieran 1969) suggesting very early interactions between man and the natural world. As concluded by Richards & Little (1994) the above mentioned characteristics of the African continent pose major challenges to the social and biological sciences, calling for integrated and yet specific studies on the social processes affecting biodiversity. While threats posed by humans to biological diversity have captured the public imagination around the globe, the social science community has not kept pace by providing the kind of in-depth, theoretically-based research that would allow plausible relationships between habitat use by humans and environmental conservation (Little 1996). There are, however, a few studies in East Africa that address the conservation-people nexus, one such is Rodgers & Homewood (1991). A deficiency of clear scientific insight on the location-specific relations between human culture and biodiversity has resulted in conservation approaches with some negative impact on the daily lives of rural communities in Africa. Habitat loss mainly through human transformations is reported to be the main threat to biodiversity in the conservationists world. Consequently, the relationship between humans and the landscapes that surround them is often viewed as being antagonistic, suggesting that these habitats have to be protected against human mismanagement and overuse (Richards & Little 1994).

The traditional paradigm is coming under challenge as new findings emerge from social science studies. It is now appreciated that many, if not all, habitats are in significant respects created or shaped by humans, challenging the notion of pristine tropical ecosystems in Africa. Scientific evidence from different parts of Africa increasingly confirm this situation (Hamilton & Smith 1989; Davies & Davies 1991). Similarly, the theory that human population growth and biodiversity levels necessarily have an inverse relationship is questioned by some recent studies. For example, Kandeh & Richards (1996) observe that many rural African populations know from historical experience that rising population numbers go hand in hand with a requirement for intensified stewardship of the land and that consequently good stewardship enhances some aspects of biodiversity conservation. Wiersum (1997) describes the co-evolution process between the livelihood strategies of human beings

and their natural environment resulting in a variety of tree management strategies ranging from protection of wild species to domestication. The argument has therefore been against general stigmatization of entire groups of people such as shifting cultivators as being adversely related to the environment. The same argument is brought forward by scientists who have worked with the pastoralist communities in East Africa (Rodgers & Homewood 1991; Little 1996). Pastoralists have contributed significantly to shaping the observed biodiversity in the East African Savanna habitats in contradiction to the traditional idea that pastoralists are habitat degraders propelling desertification. Homewood & Rodgers (1991) suggest that the herding strategies of Maasai pastoralists along the Serengeti area of northern Tanzania strongly modified grasslands in terms of the proportion of important perennial and annual species. Consequently the removal of these tribal people from conservation areas provoked a massive explosion in wildebeest numbers which in turn created considerable grazing problems for other grazing species. Working in a different location within East Africa, Little (1996) draws a sharp contrast between wildlife numbers in areas of high and low human population around the Lake Baringo basin of central Kenya. While the former areas have higher wildlife populations, the latter are virtually devoid of wildlife due to the activity of big game hunters from abroad. This observation also suggests that to blame local communities for mismanagement of natural habitat is sometimes wrong.

At present biodiversity conservation is considered to be a major aspect of sustainable resource management. Sustainable resource management as advocated by the Brundtland report puts much emphasis on ecological stability, impact of human population increase on the environment, resource use and ownership, equity and poverty, alternative indicators of progress and democratic participation in the decision making process (WCED, 1987). These parameters are supposed to bring about the kind of development which meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Environmental management therefore becomes one of the key determinants of sustainable development. It is apparent that the integration of biological, social and economic goals is a prerequisite in any sustainable resource management system. According to O'Brien (1996) while the biological system goals focus on genetic diversity, ecosystem resilience and biological productivity, the social system goals focus on cultural diversity, social justice, gender equity and community participation in decision making. At the same time, the economic system goals focus on increasing production of goods and services, satisfying basic human needs, reducing poverty and increasing equity. Due to the conflicting nature of the different system objectives on limited resources, the different goals can only be adequately represented by sets of trade-offs with a range of constraints, operating within the society-nature interface. A systematic study of these trade-offs is mandatory if realistic solutions to environmental problems are to be identified.

The research findings presented in this book will contribute, it is hoped, to improved understanding of the forestry-society continuum. The study focuses especially on interactions between human communities and natural environment in an area of high forest conservation priority in Tanzania. In the study area official forest management strategies are dominantly influenced by the traditional view that local communities have adverse effects on the environment, accelerated by population increase. The mere fact that this study was endorsed and financed by the biodiversity conservation lobby in East Africa indicates a gradual appreciation of the role of local people in shaping the natural environment. The study takes the concept of sustainable management of forest resources as a starting point and proceeds

to reveal the fact that conservation initiatives as advocated by conservationists in their standard forest protection models tend to jeopardize the present needs of the local people in favour of future uses of forestry resources. The study further shows that such standard forest protection models give no room for professional foresters to pay attention to and assist local people in their diverse indigenous forest management strategies, some of which have a positive contribution to make to conservation. During the research much emphasis was placed in trying to understand the ways in which local communities utilize and manage biodiversity. The motivation for this kind of research stems from the appreciation of the fact that comprehensive knowledge about the significance of forest products to rural communities contributes substantially towards working out possible strategies for involving these communities in the management of the forests. Richards (1992) emphasizes that any study of forest resources in the local economy must seek to understand as much as possible how, and in what way, forests are important in the daily life of local communities, because the values of local people are aspects needing attention in any attempts to reconcile conflicting stakeholder interests in forest resources.

1.2 **The Tanzanian situation**

Tanzania is the country where the research was conducted (Fig.1). The country is rich in natural resources ranging from forests, agricultural land, aquatic resources and minerals, all of which are important to local people, conservationists and the national economy. As this study focuses specifically on forest resources, the situation with respect to forest resource conservation will be further described.

In terms of forest resources, forests and woodlands alone cover about 44 million hectares of land in Tanzania which is more that 45% of the total land area. About 1.5 million of the forest area comprises closed-canopy forests and mangroves, while the remaining 42.5 million hectares are open woodlands. Natural forests are classified broadly as forest reserves and public forest lands. While forest reserves are strictly controlled by the central government, public forests are administered by district/local governments. In total, the country has about 540 forest reserves, covering a total area of about 13 million hectares (about 15% of the land area or 30% of the total forest estate). The average standing volume of trees in closed-canopy forests is estimated at 197m^3/ha while the figure for woodlands varies from 15 to 47m^3/ha (NCSSD, 1995). In addition to the natural forests, there are about 150,000 ha of softwood and hardwood forest plantations in Tanzania. About 80,000 ha are owned by government while the rest are privately owned.

The Tanzanian National Conservation Strategy, (NCSSD 1995) pinpoints the major environmental issues in relation to forestry as including uncontrolled deforestation, weak concession and revenue collection systems, inadequate involvement of local communities, lack of sufficient information on the state of the resource, inefficient utilization of resources, and preference for a narrow range of forest species in terms of utilization. The country is threatened by a high rate of deforestation taking place for the past three decades at an officially reported rate of about 400,000 ha annually (Mnzava 1980; Ahlback 1988). This has necessitated the direction of quite a substantial amount of foreign aid to village afforestation, soil conservation and other projects related to environmental rehabilitation. However, as pointed out by Mnzava (1980), Skutch (1985) and Kajembe (1994), most of the community forestry projects have not been very successful, a feature which they explain in terms of poor involvement of the local people.

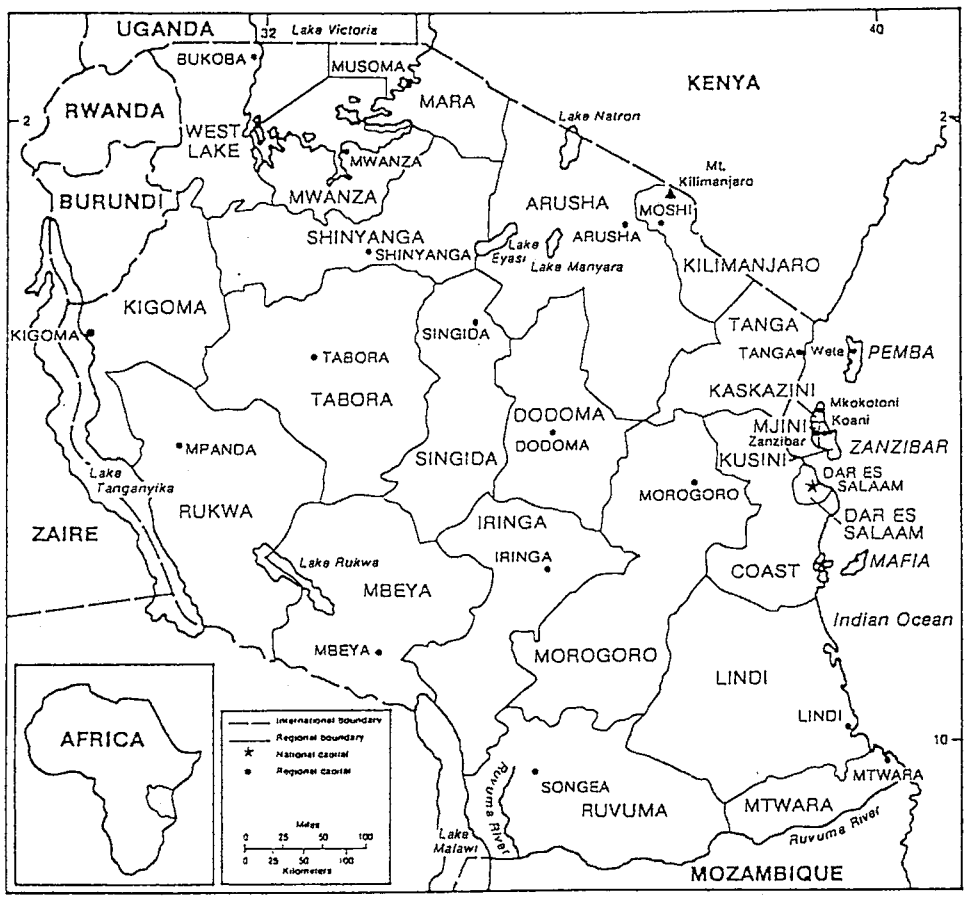

Figure 1 The location of the United Republic of Tanzania and its administrative regions within the African continent. Tanga region is on the eastern side of the country *(adapted from Yeager, 1982)*.

On the other hand, some successful indigenous forest management strategies have been observed elsewhere in Tanzania. Examining cultural beliefs and practices related to forests in northern Tanzania, Gerden & Mtallo (1990) found out that in Babati local people set aside forest patches for particular activities or purposes such as circumcision, meetings, burial, catchment, rain making and initiation. There are rules and regulations governing the use of these areas and local people observe agreed societal norms in relation to the management and utilization of these forest reserves. Despite the fact that the area has been deforested over many years, these forest patches have survived into the current generation. Similar indigenous forest management approaches have been observed elsewhere in Tanzania (Kessy 1993, Kajembe 1994). One of the arguments in this thesis is that although traditional management approaches could contribute substantially to designing current forest management approaches for the country, too little attention is given to indigenous knowledge and forest management systems by existing forest departments because policies are derived from conventional conservation approaches.

To conserve components of its natural and cultural heritage, Tanzania has established a large system of protected areas. This system includes areas devoted to wildlife (in particular National Parks, Game Reserves) and forests (Forest Reserves). Under the overall jurisdiction of the Ministry of Tourism, Natural Resources and Environment (MTNRE), the National Parks and Game Reserves are managed by Tanzania National Parks (TANAPA) and the Department of Wildlife respectively. Responsibility for the Forest Reserves rests with the Forest and Beekeeping Division (FBD), again within MTNRE. Faunal and floral resources outside the protected area system fall under the jurisdiction of local government, on what is commonly referred to as public lands.

For a number of years both TANAPA and the Department of Wildlife have been experimenting with new conservation methodologies based on co-management and sharing of conservation benefits with local stakeholders. An example is the Selous Game Reserve, with support from the government of Germany (Marenga, 1992). These approaches appear so promising that steps have been taken to revise the Tanzanian wildlife policy to create an enabling environment for widespread application of the new thinking (DOW, 1994).

In the forestry sector a number of projects have experimented with similar co-management concepts. However, unlike the wildlife sector, experiences with co-management in the forestry sector are not reflected in policy review. Recently some attempts in transferring forest management to local communities have been reported (Wily & Haule 1995; see also Chapter 8), creating considerable interest. However, such initiatives have been implemented under local government regulations rather than as part of a mainstream forest sector policy review. Further, the initiatives have so far taken place in depleted public lands with very small patches of forest cover remaining. These forest patches have little to offer either to local people or to the Forest Division. At the same time, the Forest Division is being challenged by the need for a fundamental change in the state's relationship to forest resources. As elsewhere, the traditional approach of central control and revenue generation from natural forest timber and plantations is beginning to undergo a strategic shift towards local control, natural forest conservation for multiple values, and the provision of extension services to non-government tree growers. As pointed out by Ramsay & Kessy (1996) there is a concomitant need for policy reform and institutional re-engineering in the Tanzanian

forestry sector. The challenges facing the forestry sector in Tanzania call for new thinking in forest management policy. This is a central theme in the reported research.

In the conservation-with-development philosophy it is accepted that sustainable management of natural forest resources depends on improved forest protection, resource substitution and land-use stabilization through agricultural intensification outside the forests, increased rights of local communities to manage the resource and sharing of conservation benefits among stakeholders as an incentive to change behaviour (Stocking & Perkin, 1989). In light of the preceding parts the major problem as far as forest conservation in Tanzania can be interpreted as how to connect new and realistic understandings of forest-people linkages to forest sector management reforms. Current implementation of forest conservation undertakings by the Forest and Beekeeping Division (FBD) of the Ministry of Natural Resources, Tourism and Environment (MNRTE):

- concentrates on conventional forest protection approaches (essentially forest guards "police" the forest reserves) irrespective of its limited manpower;

- pays little attention to empowering communities to manage their natural resources (few steps have been taken to involve various stakeholders in conservation).

Policy reforms within the forest sector in Tanzania have been slow (for example the forest policies of the 1950s are still in use) despite the fact that recommendations for updating these policies have been put forward for quite some time (TFAP 1994). This has partly been a result of conservatism within the forest division, as a result of which policy reform initiatives are subject to institutional capture and bureaucratic encirclement within the Forest Division (Ramsay & Kessy 1996). Evidence exposing the inefficiency of the existing forest management and control mechanisms as practiced by the Forest Division is accumulating. As illustrated by the Kazimzumbwi forest reserve case (Box 1) there is some confusion as to who exactly controls the forest resources in Tanzania, given the fact that the Forest Division cannot efficiently stop deforestation taking place at a distance of less than 100 km from headquarters. Yet, the FBD has not handed over the management of such forest reserves to other institutions such as NGOs and local community groups.

The current situation in Tanzania in terms of environmental problems, natural resources, conservation approaches, institutions and economic development, is the result of a number of historically-rooted physical and socio-economic factors. Among these are population growth trends, topographic and climatic factors, political economy, agricultural development and land tenure issues. These factors are briefly discussed in the coming section to shed some light on the historical shaping of the existing situation.

1.3 Contributing factors to the environmental situation in Tanzania

1.3.1 Growing population and unpredictable climate

The last national population census in Tanzania was conducted in 1988 and it revealed that in total, the country has a population of about 24 million people and a population growth rate of about 2.8% per year. However, higher rates of population growth of up to 3.4% per year have been reported (TBS 1988) especially from the highland areas where rainfall is more reliable than in the rest of the country. Most recent population estimates suggest a total

BOX 1: WHO CONTROLS FORESTS IN TANZANIA?

As Dar es Salaam city expands, suburbs advance into nearby villages along the coast region forcing farmers to encroach on forest reserves in search for farming land. In Kazimzumbwi forest reserve this encroachment was so alarming that the Tanzania Wildlife Conservation Society pleaded with forest "authorities" to stop the deforestation trend. According to MIOMBO, 1995 (cover story), this is what happened:

The Deputy Minister (natural resources) instructs that the encroachment must be stopped. The Director of Forestry instructs the District Forest Officer (DFO) to stop the encroachment. The DFO asks for police support from the District Commissioner (DC). The DC instructs District Police Commander (DPC) to provide the support. The DPC says he needs orders from the Regional Police Commander (RPC). The RPC says this is a forest and not a police matter. The Regional Forest Officer is unable to persuade the region to act. The Regional Commissioner says courts must order action, then the police can assist. Courts say their job is to try existing cases not to seek new ones. The Wildlife Society appeals for action to Forest Division. The Forest Division suggests the Society takes this up with the Prime minister.

country population of about 28 million people (MLHUD 1995). With the exception of the fertile and rainy highland pockets, most of the country is sparsely populated with an average population density of about 26 persons/km^2. In the highly populated, fertile and rainy highland areas population densities of up to 230 persons/km^2 have been reported. The Tanzanian population is made up of more than 120 ethnic groups. Most of these ethnic groups are small and the largest ethnic group (the Sukuma) accounts for only about 13% of the total population (Yeager 1982). Although each ethnic group has its own language or dialect, Kiswahili serves as an effective lingua franca. Population growth impacts on demand for natural resources such as agricultural land and forest products. The demand in turn threatens the environment.

Topographically Tanzania can be divided into four main regions (Ahlback 1988), which are closely related to climatic zones. These include the coastal plain and the islands, the central plateau enclosed by the rift valley, the Lake Victoria zone and the highlands. The central plateau forms the largest part of the country although it is thinly populated. On the other hand the highlands are mostly found in the north-east and the southern parts of the country rising above the central plateau and are generally more fertile supporting higher populations. The country has an equatorial type of climate which is modified by altitude resulting in a range of climatic zones. Three major climatic zones recognized include the lowland zone, the plateau zone and the highland zone (Burley et al. 1989). The lowland climatic zone lies between sea level and 650 m covering most of the coastal area of mainland Tanzania and the islands of Zanzibar. The zone receives variable amounts of rainfall ranging between 1100mm to 1300 mm per year and temperatures ranging from 18^{0}C to 26^{0}C. The rainfall pattern is both unimodal and bimodal depending on the location. The plateau zone lies between 650 and 1500 m with a unimodal rainfall pattern and varying amounts of rainfall ranging from 500 mm to 1000 mm per year. This type of climate occupies most of the centre and western parts of the country with some semi-arid portions. The highlands climate is semi-temperate with

temperatures ranging from 10-21^{0}C and up to 2000 mm of rainfall per year. The rainfall pattern is normally bimodal. Lower precipitation of up to 650 mm per year is experienced on the leeward (western) sides of the mountains. Sometimes frost occurs at altitudes of 2000 m and above. It has been observed that most parts of the country experiences drought every 4-5 years and severe drought every 9-10 years. The rainfall pattern has influenced the distribution of natural resources, such as forests and woodlands. While most forests are found in highland and coastal areas with reliable rainfall, the drier parts of the country only support woodland and savanna vegetation. Re-current drought makes farmers vulnerable to harvest failure. As a coping strategy farmers close to natural forests tend to open farms under forest canopies to take advantage of the micro-climate. They also try to secure plots of land in diverse ecological and climatic settings to distribute risk. These coping strategies have implications for the deforestation observed countrywide.

1.3.2 **Political economy**

In the first six years of independence, Tanzania experienced a reasonable degree of economic progress. The annual rate of growth of GNP was about 10.5% representing an annual per capita growth rate of about 8%. Agriculture continued to contribute about 43% of the GNP and the country enjoyed large increase in output and value of her principal export crops, except for sisal which faced heavy competition on the world market from substitutes such as jute and synthetics (Kahama et al. 1986). The country was able to finance about 56% of development spending. By this time industry contributed about 9% of GNP, a doubling since independence. In short the situation was promising, although external dependance was still very pronounced.

From 1967 to 1973 Tanzania adopted some policy guidelines that were meant to dictate a new economic development path. These included the Arusha Declaration of January 1967; the Socialism and Rural Development Policy of September 1967 and the Decentralization Policy of May 1972. In general, the Arusha Declaration provided the country's development strategy and a turning point towards a socialist mode of production. *Ujamaa* (*brotherhood*) was endorsed as the Tanzanian version of socialism. The declaration stipulated clearly that the major means of production and exchange should be controlled by peasants, and the state was the custodian of peasant rights. Most industries, financial institutions and large estates were nationalized. Since the country did not have enough experts to manage these institutions foreign management was retained under contract. Nationalization went hand-in-hand with creation of very large parastatal companies difficult to manage effectively and efficiently. The same year the government issued a policy statement on socialism and rural development which among other things called for the establishment of Ujamaa villages in which people would work together for a common goal. These villages were meant to serve as centres for economic development mainly through agriculture. It was assumed that people would willingly relocate themselves in newly designed village areas, only to be realized later that they were reluctant. In 1973 villageization became compulsory and coercive. The decentralization policy aimed to bring the decision-making organs closer to the people. In theory the policy encouraged popular participation in decision-making processes. However, in practice a lot of decisions were still top-down in nature. Financing nationalized industries, institutions and parastatal organizations proved difficult for the government, and according to Kahama et al. (1986) industrial development was left to take place haphazardly without proper direction.

In the agricultural sector, the coercive formation of Ujamaa villages led to dramatic increase in the number of registered villages but also to the abandonment of traditional agricultural areas, the outcome of which was a decline in agricultural output. By the end of 1973 the GNP growth rate had dropped to 7.72%. With increase in population the per capita GNP growth rate was 3.93%. There was a 14% decline in the export of the main crops, compared to 1967. The country experienced a period of severe economic hardship from the early 70s to the late 80s. The provision of social services could no longer be sustained.

Environmental degradation caused by deforestation and soil erosion threatened large areas of semi-arid Tanzania, partly because of the clustering of population in the Ujamaa villages, where farmers had little experience to cope with new environments (Kjell et al. 1988). There was a dramatic decrease in the real wage level. This resulted in low morale, increased corruption and growth of informal income-generating activities outside and inside work places to earn extra income. In the mid 70s and early 80s the country experienced shortage of consumer goods in the shops and periods of hunger. Many reasons were provided in political platforms to account for the economic hardships. These ranged from global increase in oil prices, collapsing of the East African Community, and war with Uganda to bad weather. But it is also a fact that the Ujamaa policy, with its forced villageization campaign, had contributed substantially to the problems. The policy lacked the necessary incentives to increase production and investment while the forced movement of farmers made them reluctant to work efficiently. Farmers' locally adaptive agricultural knowledge accumulated during hundreds of years in old villages was rendered useless. On the other hand the planning of the villages was not properly done. For example some farmers were moved from fertile areas to less fertile ones just because the latter were closer to the main road (Kessy 1995).

It was recognized that the ordinary Five Year National Plans could not address the rapidly changing economic conditions. Special programmes were launched, including the National Economic Survival Program (NESP) of 1981, the Structural Adjustment Program (SAP) in 1982, and the Economic Recovery Program (ERP) resulting from an agreement with the International Monetary Fund (IMF) in August 1986. NESP and SAP aimed at improving productivity in the agricultural and industrial sectors by putting more emphasis on the marketing aspects of agricultural and industrial products so as to provide the necessary incentives towards production. Allocation of scarce foreign exchange was to be closely studied for efficient utilization of the funds. The programmes were implemented to improve capacity utilization of the industrial sector from below 40% to over 60%. The government was so ambitious that NESP was only implemented for a year before it was modified into SAP with almost similar objectives, and later on to ERP. Through the ERP Tanzania signed an agreement with IMF for financial assistance. The idea had previously been rejected because of the conditionalities tied to IMF loans incompatible with the Ujamaa policy. The launching of the ERP seems to have symbolically inaugurated the defeat of the Ujamaa ideology, although on paper Tanzania is still a socialist country. The ERP led to frequent and substantial devaluations, increased liberalization and derestriction of domestic trade, and more emphasis on private sector in production and trade. The flow of resources to social services was reduced and many services formerly paid for by the government such as education and health, were now charged to citizens through what is locally referred to as "cost sharing". Producer prices have been increased as an incentive to agricultural production but real incomes and real wages continue to decline. Although the GNP is reported to have

increased slightly, the living standard of the ordinary Tanzanian has dropped drastically, as gap between rich and poor increases.

To sum up, Tanzanian political-economic history has had a number of obvious environmental, institutional and economic consequences. Among the environmental consequences we see deforestation and soil depletion, as a result of population clustering in Ujamaa villages. Established Ujamaa villages are currently the most conspicuous local institutions throughout the country. Poor economic performance has left the country incapable of handling conservation and development initiatives without foreign support.

1.3.3 **The agricultural economy**

Currently Tanzania is one of the world's poorest countries despite the fact that it is rich in natural resources. Agriculture is the main economic activity in a country in which over 80% of the population live in rural. The country's economy largely depends on export cash crops to provide up to 50% of GNP. In 1990 for example, NCSSD (1995) reports that agriculture accounted for almost 46% of GNP. During the same year secondary production activities such as manufacturing, construction, transport, storage, communication and power accounted for only about 20% of GNP. A further 33% came from the tertiary sector including services, health, education, finance and public administration. The contribution from the forestry sector was about 1%. The main export crops include coffee, cotton, sisal, tobacco, tea, cashew nuts and pyrethrum. About two-thirds of land is suitable for grazing, while much of the rest, especially in the west, is infested by tsetse fly. It has been estimated that the country has over 12 million livestock units and that most of the livestock is concentrated on the northern part of the country which in some cases is overstocked (Burley et al. 1989). The reliance on agricultural crop exports has rendered the country very vulnerable to fluctuating world market prices resulting in recent decline in productivity and a shift to a more subsistence-oriented food-crop economy.

Tanzania's economic development, like that of many other developing countries, faces increasing poverty, inadequate food and nutrition, ill-health and low standard of living. Ahlback (1988) reports a per capita GNP equivalent to only US$ 210 declining to about US$ 140 in the nineties. Small-scale subsistence agriculture still dominates the Tanzanian economy and industrial production is small, with a relatively slow growth rate. This situation has made Tanzania into one of the major recipients of foreign aid in the Third World (World Bank 1979). The practice of shifting cultivation, common in many parts of the country, has been condemned as unsustainable, and a destructive agricultural practice which causes deforestation and land degradation as population density increases (NCSSD 1995).

1.3.4 **Land tenure**

1.3.4.1 **Evolution of land tenure in Tanzania**

Land holding in Tanzania before colonization was based on the traditional law and culture. Each ethnic group had chiefs and headmen controlling and allocating land to members of the group. Population densities were low and extensive shifting cultivation dominated in most parts of the country. With this kind of cultivation, requiring new areas of bush every few years, land allocation was a continuous process. During the German and British colonial rule in Tanzania the same system of land allocation continued at local level with some exceptions. The German administration introduced plantation agriculture in the country. By so doing, the

traditional land tenure system was altered. Prime agricultural land was allocated in freehold, mostly to settlers (MLHUD 1995). In 1895 the German administration passed the Imperial Decree regarding creation, acquisition and conveyance of land whereby all Tanganyika was declared as Crown Land vested in the German Empire. This decree facilitated the alienation of land from tribal areas and the establishment of plantations. Transfer of Crown Land could only be effected through the German Governor either by conveyance of ownership or lease. In fact this was the beginning of "nationalization" of land in the country. Under British rule, the enactment of the Land Tenure Ordinance Number 3 of 1923 (commonly referred to as Land Ordinance Chapter 113) declared all land in Tanganyika as public land and introduced the concept of rights of occupancy. According to this act, rights over or in land were placed under the control of the British Governor to be held, used or disposed of as rights of occupancy for the benefit of the indigenous people of Tanganyika (MLHUD 1995). In 1928 the British redefined "the right of occupancy" to include the title of a native community lawfully using or occupying land in accordance with customary law. This was an attempt to protect native rights. However, compulsory acquisition of native lands by the Colonial government for the benefit of immigrants was left unchanged. Immediately after independence, the new government passed the Freehold Titles Conversion and Government Lease Act of 1963 through which freehold titles were converted into leaseholds. Later in 1969 the leaseholds were converted into Rights of Occupancy. This was a move by the government to have more control over land because the freehold titles entailed the exclusive possession of land rights in perpetuity, the owner was allowed to subdivide the land or lease it again, there were no land development conditions and the government had no right to interfere with the legal occupation of the land. All these features were reversed by the Government Leaseholds, Conversion of Rights of Occupancy Act, No 44 of 1969 which also made it compulsory for land owners to pay land rent to government and empowered the President of Tanzania to revoke any right of occupancy whenever it was considered necessary to do so. The traditional functions of Chiefs, which included land allocation were rendered obsolete by The African Chiefs Ordinance (Repeal) Act. No 13 of 1963 which officially abolished Chieftaincy in Tanzania.

1.3.4.2 **Existing tenure and its impact on resource management**

To date, the main feature in the Tanzanian land tenure system is state ownership of land. All land in Tanzania is controlled by the state which in turn grants rights of use and occupancy to different segments of the society including villages, individuals, companies, parastatal organizations and various investors. Formal land markets are therefore non-existing (NCSSD 1995). Much of the land in rural areas is "owned" under customary land tenure conditions where land administration was initially controlled by local chiefs and later on by village governments. However, in principle, the land is still owned by the state and the state can revoke customary ownership rights. This has resulted in complicated tenure arrangements and conflicts between local people, who strongly feel that they own the land (many consider it "private"), and the state which feels that it has full control of all land. In 1992 the Parliament passed an act to abolish all customary land tenure rights and encouraged village land allocations by the state which issues title deeds to demarcated village lands. As such, most public lands can be leased to villages by the state and the villages can then allocate the land to individuals. On the other hand, in most urban areas statutory rights of occupancy for a specific period of time is the most common form of tenure. As noted by NCSSD (1995) and MLHUD (1995) this land ownership situation has resulted in insecurity of tenure especially in rural areas, partly because of the bureaucratic nature of the village land demarcation and

titling procedures. Conflicts between customary law and statutory titles have been observed in various parts of the country especially in those areas which were affected by villagezation. In those areas where the newly established villages collapsed farmers have sometimes opted to return to their old villages where they owned land customarily only to find out that the state has allocated that land to other investors - conflicts between local people and a Canadian large-scale wheat project in northern Tanzania is one such case.

It has further been noted that the existing land legislation and institutional set up for land tenure are inadequate to deal with dynamic changes, such as the change over to a market-oriented economy, privatization, increased urbanization and population increase (NCSSD, 1995). Incentives for more efficient use of resources, including investment for land improvement and development are lacking. They are also inadequate in addressing various land use conflicts between major economic activities. It is emphasized that insecurity of tenure has resulted in a number of environmental problems including promotion of open access particularly in forests and woodlands, urban squatting, and mismanagement of public lands. A general lack of resource use control on public lands is evident and uncontrolled migrations on to such land is one example. The district and local governments lack both the manpower and the facilities to enforce local controls over land. At the same time, there is no clear division of responsibilities between central and local government in allocation of land, resulting in problems of double allocations, especially in urban areas, and between competing users in rural areas.

The relevance of land tenure to biodiversity conservation stems from the fact that individuals, community groups and institutions are unlikely to invest labour and resources in sustainable forest management, or in stable land-use outside forest areas, without some assurance that they or their heirs will reap the benefits. Since biodiversity conservation calls for investments of labour and other resources security of tenure is a key component for successful conservation. Whereas some social analysts argue for a revolutionary transfer of ownership rights to local people (for example Lynch and Talbott 1995) others argue that in situations where government ownership of forest resources is unlikely to change land ownership can be substituted by local people's rights to specific economic benefits from forest resources (Stig, 1996). Looking at the situation in Tanzania, the Forest Division and other government bodies are likely to maintain their official and legal mandate to manage the forest estate as reserves for the foreseeable future. Conservation of biodiversity and attempts to involve local people in forest management in such situations need to take into consideration realities on the ground. Efforts geared at defining tenure rights in public lands might be more rewarding than trying radically to transfer ownership of the forest reserves to local people.

1.4 **Summary**

The chapter has attempted to set the context for the following detailed analysis of the East Usambara mountains. It has pointed out that while conservation biologists view forests as natural entity, social scientists think of forest landscapes as an intersection between natural processes and human agency. The biological outlook results in adoption of strict conservation measures without due consideration of the role of human agency in forest landscape management. The result is likely to be antagonism between conservationists and local people. Confrontational approaches are unlikely to prove sustainable.

Confrontation and conflict is likely to be worst where, as in Tanzania, environmental problems have been associated with population growth trends, adverse political-economic trends and subsistence agriculture operating in conditions of land tenure insecurity. The failure of the Tanzanian government to review its forest policies and accommodate new conservation approaches, such as joint forest management, compounds the problem of forest destruction. It will be argued that failure to promote indigenous forest management strategies and utilize indigenous knowledge in forest conservation has deleterious consequences for the forest resource base. The following chapters will elaborate further on the biodiversity conservation dilemma in Tanzania by focusing on one of the high priority biodiversity conservation areas in the country, namely the East Usambara forests.

CHAPTER 2
ENVIRONMENTAL CONCERNS IN THE EAST USAMBARAS

The theme of environmental concerns in Tanzania is picked up in this chapter, which deals with specific environmental concerns in the East Usambaras (north eastern Tanzania) an area known for its high degree of forest species diversity and endemism. The chapter addresses the main problems that the research was meant to deal with, centered on assessing the values that shape different stakeholders' actions in relation to the East Usambara forests.

2.1 Introduction

One of the areas in Tanzania where concern for environmental degradation is most intense is the East Usambara mountains. The mountains form part of a chain of isolated mountains stretched in an arc around eastern Tanzania. This arc is comprises of the Usambara mountains (East and West), the Pare and Kilimanjaro mountains. Further south-eastwards the arc includes the Nguu, the Ukaguru, the Uluguru and others such as the Udzungwa. The Usambara mountains are divided into two blocks, the West and the East Usambaras. According to Hamilton & Smith (1989) the East Usambaras cover an area of about 1300 km^2, located between $4^0 48"$ and $5^0 13"$S and $38^0 32"$ and $83^0 48"$E. These are separated from the West Usambaras by the Lwengera valley. The East Usambaras fall into two administrative districts, Muheza and Korogwe, while the West Usambaras are found in Lushoto district, all within the Tanga region (Figure 2).

2.2 Climate and soils

The East Usambaras have monsoonal climate with a bimodal rainfall pattern. The long rains fall between March and May while the short rains are experienced between October and November. The rainfall pattern coincides with the northward and southward passage of the intertropical convergence zone. Occasional precipitation is experienced however almost every month. Altitudinal influence on the climate is quite significant; rainfall increases while temperatures decrease with altitude. Hamilton & Smith (1989) report the average annual rainfall varying between 1200 mm at about 200 m altitude, to about 2200 mm at 900 m. Temperatures in higher altitudes are lower than in inland Tanzania and humidity is high, with some mist during the long rains.

Soil types vary with altitude. Soils at higher altitudes (above 850 m) are highly leached and acidic with little inherent fertility. What there is, is rapidly exhausted by continuous agricultural activity. The clay fraction is composed of kaolin (Lundgren 1980) and has low capacity to absorb bases. Organic matter under forest averages about 4% in the upper 10 cm of soil but is very low at greater depth. Soils at lower altitudes, on the escarpments and in the lowlands, are less highly leached, have more bases, and are inherently more useful for agriculture.

2.3 The people

The two main indigenous groups in the study area are the Wasambaa and the Wabondei. The Wasambaa reside mostly on the slopes of the mountains while the Wabondei are more concentrated in the valleys. The main economic activity for the majority of people is farming. Coffee and tea estates were introduced in the area by the Germans and British

colonizers respectively. According to Hamilton & Smith (1989), tea estates now dominate mainly because the British replaced most of the coffee estates with tea.

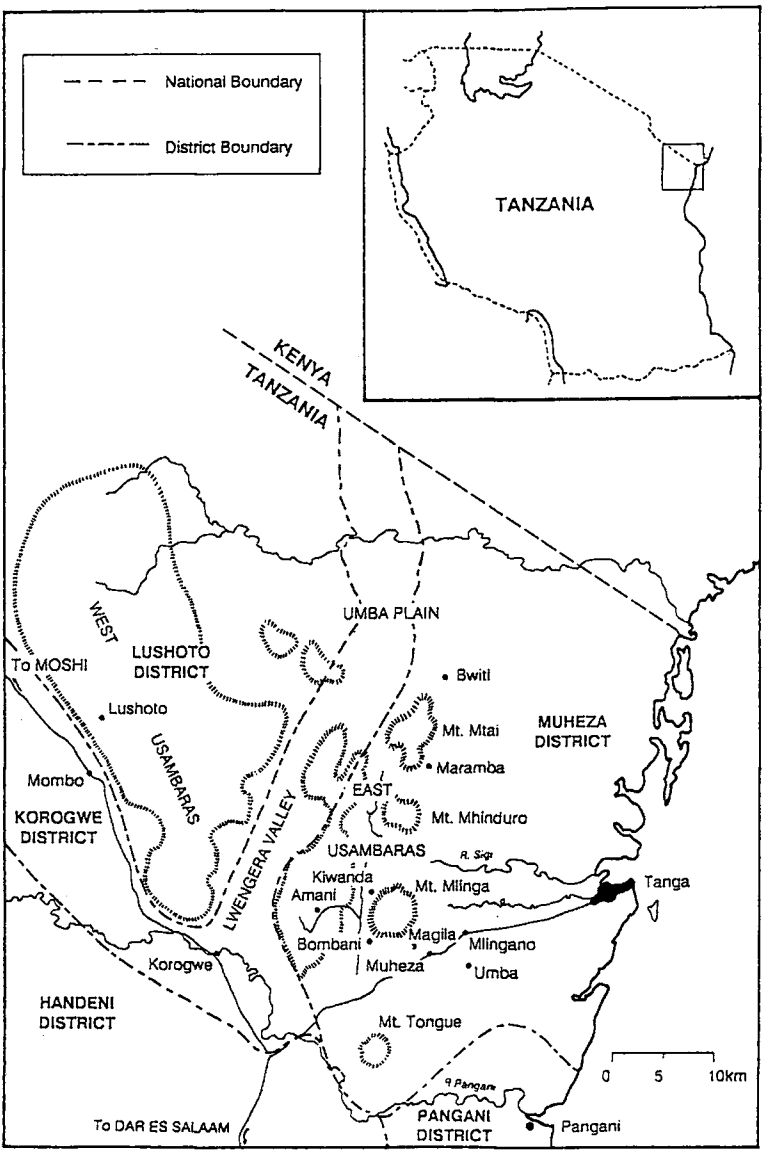

Figure 2 Location of the East Usambara mountains within Tanzania *(adapted after Hamilton & Smith, 1989)*

It was also under British rule that catchment forest reserves were demarcated to safeguard water supply to Muheza, Tanga and the coastal areas of Tanzania, which rely heavily on the East Usambara catchment area. Expansion of tea plantations went hand-in-hand with commercial logging by big companies such as Sikh Sawmills Tanzania Limited. An important aspect is the fact that the introduction of these commercial activities in the area brought in more outsiders whose hunger for farming land, ultimate survival and environmental impact have become issues of much concern to conservationists and development agents in the Usambaras today. Labourers in the tea estates from the overpopulated West Usambaras and other parts of Tanzania are reported to have cleared forests for subsistence farming. Likewise, commercial logging and pitsawing attracted additional workers who also cleared the forests for farming activities.

According to Hamilton & Smith (1989), Sayer (1991) and Bech (1993) the squatters bring with them two main threats to the forests. The first is cultivation of cardamom *(Elettaria cardamomum)* under forest. Cardamon is a shade-loving crop that exhausts soils rapidly, suppressing forest regeneration and necessitating frequent opening of new areas as old ones are exhausted. This practice threatens the biological diversity in the area because some of the species cleared and suppressed are endemic to the East Usambaras. The second threat is population increase. The population density is now 30 to 60 persons/km^2. The now dense population relies substantially on forest areas and surroundings to meet basic survival needs.

Another category of outsiders in the area are the conservationist and foresters, donor agency representatives, researchers, government employees and owners of commercial undertakings such as sisal and tea estates. These outsiders interact with one another and with the local people at different levels and in different spheres of influence. Diverse as they might appear, all have in one way or another some interest in what is taking place, as far as the management of the forests is concerned. Of special relevance in respect to forest management are the representatives of the forest conservation services. These are in charge of protecting and maintaining the various forest reserves. Currently the Forest Division of the Ministry of Natural Resources, Tourism and Environment manages the forest reserves and is supposed to take a firm line on illegal activities in the forests, such as encroachments farming and pitsawing. Central government control of the forests through the Forestry and Beekeeping Division has been strongly supported by some scientists (Hamilton & Smith 1989). The assumption is that forest reserves managed by central government offer the best chance of survival because the recent tendency has been for forests outside the forest reserves to disappear.

2.4 Land use conditions

The land use in the East Usambaras has been classified by Hyytiainen (1995), based on a survey which was conducted in the area in 1993. According to this survey, forests and agriculture are the predominant land-use types in the area. Whereas forests cover 50.4% of the land, agricultural activities make use of about 43%. Other land-use categories include woodlands (4.9%), grasslands (0.4%), rivers and ponds (0.1%), barren land (0.5%) and settlements (0.7%). As a land-use category, forests include those in forest reserves, forests on public land and plantation forests. Agricultural lands on the other hand are the domain of subsistence peasant farming and commercial estate farming, dominated by tea and sisal estates. Woodland and grassland are encountered in the lowland areas where semi-deciduous savanna and bush vegetation are a common feature. The research reported below focused

mainly on the activities in the forest-people interface with some attention on what is taking place on the agricultural land as well.

2.5 Forest conditions

2.5.1 Introduction

A survey conducted in the late eighties (AFIMP, 1995) revealed that out of the total 100,000 ha of natural forests in the area in the early 20th century only about 23,000 ha remain. The survey also estimated that about half of the remaining forests in the East Usambaras is still intact and more or less undisturbed by human activity, suggesting the existence of "pristine" environments in the area. However, Hamilton et al. (1989) uncovered evidence of human activity in localities previously described as undisturbed by man. The findings led archeologists to conclude that Early Iron Age human activities in the East Usambara forests probably may date from 2900 years BC (Schmidt 1989) and that exploitation of forests at that time might have been quite intensive locally. Two main forest types can be identified in the East Usambara mountains, despite the fact that altitudinal variation in floristic composition seem to be continuous. These are the lowland (semi-deciduous) forest below 850 m altitude, and the sub-montane (evergreen) forest at altitudes above 850 m. Many lowland forest species are widely found in other lowland forests near the East African coast, but many of the submontane forest species occur only in the Eastern Arc mountains. A good number of these species are endemic to the East Usambaras.

2.5.2 Conservation status: variation in stakeholder interests

In terms of biological diversity, Table 1 summarizes the degree of species diversity and endemism in the area. The East Usambara forests have about 2855 vascular plant species of which about 25% are endemic or near endemic, implying either that they are found only in the East Usambaras or in the Usambaras and other limited localities within the eastern arc mountains. Out of the total 276 tree species recorded about 18% are endemic. The degree of endemism among different fauna groups varies from 84% for millipedes to only about 5% for birds. There are few endemic mammals (c. 2%). The generally high degree of endemism among plants and non-mammals is explained by the long-term isolation of these mountains (Rodgers & Homewood 1982, Hamilton & Smith 1989, Iversen 1991). Long periods of isolation permitted species in the forests to evolve undisturbed. As mentioned earlier, the East Usambaras are further characterized by a special climate influenced by both altitude and proximity to the sea. This also is thought to have contributed to the high level of diversity. These features make the East Usambara mountains specially important as far as the maintenance of biodiversity is concerned.

The picture of levels of species diversity and endemism in the East Usambaras (Table 1) raises the question of what conservationists and local people consider to be "relevant" biodiversity. It is apparent that the highest endemism is encountered in groups such as wasps, lizards and millipedes. These are of great interest in conservation terms but are not readily seen as of importance by local people, who tend to value forests from a more utilitarian perspective. Further, while ecotourism potential in the East Usambaras is currently a subject of much discussion in the area (FAO/GEF, 1995) it is doubtful whether this pattern of endemism will add much to the attraction of the area for tourists.

Table 1: Species diversity and endemism in the East Usambaras (Rodgers & Homewood, 1982).

Group of plants/animals	Number of species	Endemic/near endemic (%)
Vascular plant spp	2855	25
Millipedes	37	84
Predatory wasps	74	37
Gastropods	122	45
Lizards	22	64
Forest amphibia	15	27
Forest birds	100	5
Snakes	15	20
Mammals	55	2
Tree spp (>10m tall)	276	18

However, a gap between what is relevant biodiversity to conservationists and local people does not imply that there are no areas where the interests of the two groups converge. For example (as will be shown) the range of tree species is of interest to both conservationists and local livelihoods. Also, tourists are reported to visit the area to see rare plant species such as African violets (*Saintpauli spp*) only found in the East Usambaras. Further, some snake collectors visit the area regularly to collect specific snake species, generating income for a few community members who assist in the collection process. However, the "relevant biodiversity" gap mentioned earlier raises the issue of needing to reconcile stakeholders interests in managing the forests, because it is unrealistic to expect that local people will share conservationists interests exactly. One of the key issues addressed in this study, therefore is the collection of information to assess the ways interests vary amongst different groups of stakeholders in the East Usambaras, and how, if at all, these differences could be reconciled. This is the central focus of this thesis.

2.5.3 **Access conditions to reserved forests for local residents**

Most of the forests in the area have an official status as forest reserves. According to the forest reserve regulations which currently govern the management of these forests entry to the reserves by the local people is prohibited with some exceptions. Two exceptions are access for fuelwood collection from dead branches, and collection of traditional medicines. Local people are allowed to collect dead wood from the forests only once a week. Formerly the local people could pay a fee and obtain a permit for collection of poles, bushmeat and other forest products from the reserves but of late this has been stopped. Permits for logging activities have also been stopped although the activity continues illegally. Illegal collection of other forest products is also common as will be illustrated in Chapter 7.

2.5.4 Non-reserved forest types in the area

Surrounding the forest reserves is public land with farms and scattered patches of natural and forests and plantations. Besides the reserved forests also the following legal types of forests are present:

1. Natural forests owned by district or village authorities,
2. Natural forests which are individually owned under customary tenure,
3. Woodlots, mostly of exotic tree species, owned by individuals, villages or other institutions such as estates,
4. Plantation forests of exotic trees owned by the Tanzanian government, and
5. Natural forests owned by the tea estates under long lease title deeds.

Most forest resources in the public lands are controlled by district and local authorities but gradually forest patches in the public domain are being gazetted to constitute part of the forest reserves and the proposed Amani Nature Reserve. Most attention has previously been given to the forest reserves, and little is known about what the public forests hold in terms of species diversity and distribution because they have not been intensively surveyed.

Notwithstanding the lack of information on the biological status of the forests outside the reserves, the considerable levels of encroachment by farmers onto these forests suggest that high levels of biodiversity erosion might be taking place unnoticed in the public forests. Some trees on the public land are protected and the farmers are not allowed to cut them without a permit from a forest official who will only issue one once the trees have a diameter of at least 173 cm. But in real life, it has proved difficult for the district authorities to control these areas because of lack of both human and financial resources. Some attempts at community based forest management at village level are operating on an experimental basis in some areas on the public lands, notably the northern part of the East Usambaras around Maramba, as will be discussed in Chapter 8.

Aspects of forest development activities in the area in relation to different forest types are discussed later in detail in chapter 9, but here we simply wish to underline the above point that official forest management as applicable to the forest reserves is not the only management option in the area, although it is the dominant one. The focus of this research is to investigate alternative forest management possibilities, so these other situations are also of interest in later analysis.

2.6. Problem statement and research justification

The research seeks to discover stakeholder attitudes and interests as they affect conservation prospects for the biodiverse forests of the East Usambaras. The justification for research on this problem is that unless thorough knowledge of the stakeholders interests in the forests is attained, the chances of developing sustainable conservation strategies are slim.

2.6.1 The problem of biodiversity conservation in the East Usambaras

As one would expect the problem of biodiversity conservation in the East Usambaras is a complex one. It is complex because of the diversity of interests of the range of stakeholders. As a problem involving many actors, it raises also the issue of variation in the value systems of different actors. Values are largely influenced by the perceptions that an interest group or individuals have in relation to the existing forest resources. For example, the international community might view forest resources in a developing country as common heritage of mankind while the local people might view it as the heritage to a particular ethnic group. These diverging understandings of a similar resource will definitely influence the way in which given interest groups value or relate to the resources. One of the problems affecting biodiversity conservation initiatives in any part of the world arises when the interests, values and perceptions of the key stakeholders are so diverse that they cannot readily be accommodated in any agreed single resource management arrangement. With diverse ecosystems of interest for biodiversity conservation and a diversity of stakeholders with varied perceptions and value systems simple global solutions are likely to prove troublesome. The situation calls for comprehensive understanding of the various stakeholders and their interests in different ecological settings, taking into consideration socio-cultural aspects in each area. The reported research attempts to address this problem in the East Usambaras by studying the context of stakeholders' interests and socio-cultural conditions. The East Usambaras has received much conservation attention and assistance from national and international agencies partly because of its high biodiversity status. However, it is questionable whether the values and perceptions of many of the key local stakeholders are consistent with these international biodiversity conservation objectives. Given the reported rate of continued deforestation in the area and evidence of growing antagonism between conservationists and local people it was decided that the first basic consideration in this research would be to try and understand the local people-forest nexus.

Problems associated with biodiversity conservation can safely be perceived as problems related to the way people's values and perceptions determine their actions towards biological resources. It is actually people's actions which either contribute to biodiversity conservation or erosion. With this in mind, it was decided to research on the ways in which the perceptions and values of the key stake holders in the East Usambaras shape their actions towards biological resources in the areas. Although a number of factors have been postulated to cause biodiversity loss (see Chapter 4), it was not considered proper to assume that these postulated factors are universal. Logically, these factors will tend to vary from one locality to another depending on the prevailing socio-economic and socio-cultural conditions. Despite the variability, it is of central importance to identify and prioritize the causative factors of biodiversity loss in a particular area in order to address the problem more objectively. This was the second basic consideration in my research.

In some developing countries (for example in Asia and some South American states) the involvement of rural communities in managing natural resources has offered promising results (Sarin 1993; Saxena 1993; Lynch & Talbott 1995). The outcome of such approaches largely depends on the local situation in terms of political history, cultural and economic conditions. In forestry it depends on the existing relationship between the communities and the forest in terms of wood and non-wood forest products. For example, if the local people rely heavily on forest products from forests to be conserved for biodiversity purposes then much attention needs to be given to the issue of seeking alternative sources of the products.

On the other hand, this attention might not be necessary if the forest in question is a site of ritual activities and under local protection. An identification of the key interest groups and the necessary institutions to handle such forest management arrangements is imperative for any successful arrangement to take shape. It is an added advantage if indigenous forest management practices and the local institutions upon which new arrangements can develop already exists. Involving stakeholders in conserving the forest biodiversity requires fundamental information of this kind, and the research reported in this volume was intended to provide such information. This is the third basic issue around which the study was shaped.

2.6.2 Previous studies of the East Usambaras

The East Usambaras have been studied quite extensively. Much of the relevant literature has been summarized by Hamilton & Smith (1989) and Iversen (1991). As apparent from these reviews, most studies have taken the form of technical reports covering technical issues such as soils, climate, hydrology, vegetation and species diversity. Unfortunately, very little has been done on the interaction between rural communities surrounding the forests and the forest itself. This deficiency is pointed out by Hamilton & Smith (1989), who emphasize that a balance must be sought between conflicting interests so that any overall forest management plan carries enough conviction and acceptability within the community to be workable. Alongside with the recommendation to establish a nature reserve in the East Usambaras, Hamilton & Smith (1989) suggest the need for socio-ecological research (for example on the causes of forest encroachment, pitsawing etc.) to provide information to help establish more efficient systems of control. Since then, some researchers (mostly MSc. students) have developed short-term socio-economic studies in the area (for example, Schut 1996; Ondrua 1995; Masayanyika 1995) complementary to the present study. According to Owen (1992) a feeling of confrontation exists between the local people and the authorities. The communities do not claim ownership of the forest but they feel that they have certain rights to use the forests. Relations between local people and forest guards are reported to be bad and villagers believe that their own use of forest resources for domestic purposes was doing no long-term damage to the forests, implying that the regulations banning them from entering the forest are not appropriate, and aplicable only to commercial exploiters. Finally, Owen (1992) concludes that the proposed nature reserve in the area will definitely intensify the existing confrontation between the authorities and the local people. Ineffective conservation and sustainable utilization of forest resources in the East Usambaras has been pinpointed as the core problem facing various conservation efforts (EUCFP, 1995). Some of the causes of ineffective management have been located as lack of local community awareness and community involvement in conservation initiatives.

2.6.3 Summary

In view of the need to develop a more effective approach to biodiversity conservation in the East Usambaras, the general aim of this research was systematically to collect and analyze information on both technical aspects of forest utilization and management and on socio-cultural aspects of forest conservation. Such research, it was reasoned, would contribute to a better understanding of forest-people interactions in the area. In particular, the research would be useful in assessing values, perceptions and actions of different stakeholders regarding the forest resources in the area. Such understanding might assist in developing future forest management plans for the area and improve the effectiveness of policies and projects on the ground. If the planning process takes into consideration different stakeholder interests and the challenges that these interests present to implementation, planners will be

better positioned to identify ways of dealing with potential conflicts over natural resources and to propose effective compromise.

CHAPTER 3
CONCEPTUAL FRAMEWORK AND STUDY OBJECTIVES

Chapter three presents the conceptual framework of the research and elaborates research objectives. The chapter identifies the main value systems that influence biodiversity conservation in the East Usambaras, showing that the dominance of conservationists' values over the values of other stakeholders in the area contributes to misunderstandings among key stakeholders, in turn jeopardizing the success of conservation initiatives. The chapter closes with an elaboration of the main research objectives and study questions. The focus is placed on collecting empirical evidence to substantiate the disparity of value systems amongst different stakeholders, the impact of this disparity, and possible modalities for reconciliation.

3.1 Concepts in perspective

For analytical purpose the concept of biodiversity conservation in relation to livelihood strategies of the local people and sustainable development is the centre of interest in the presented work. Biodiversity as a concept, is discussed in chapter 4. Suffice it to mention at this point that biodiversity refers to the variety of life forms which can be measured in terms of biomes, ecosystems, species and genetic variability. Conservation may be defined as the management of human use of the biosphere so that it may yield sustainable flow of benefits from one generation to another (USAID 1994). As such, conservation embraces preservation, maintenance, sustainable utilization and restoration of the natural environment. Any discussion on biodiversity conservation is definitely very much influenced by the kind of biome or ecosystem under consideration. In this particular study forest biodiversity is the focus of interest. The conservation of forest biodiversity is studied from a management point of view. According to Wiersum (1993) forest management entails deliberate actions geared towards conservation and possible enhancement of useful resources and controlled utilization of those resources. Biological resources include genetic resources, organisms or parts thereof, populations of species or any other component of ecosystems with actual or potential use or value for humanity (UNCB 1992). The importance of conserving biodiversity stems from the values that biological resources have for a variety of interest groups and the potential that these interest groups see in variety of life forms. Interest groups may range down from international to national and local levels and values in question can be classed as economic, scientific, cultural, spiritual or aesthetical. As pointed out by USAID, (1994) while biodiversity valus for local people relate to their daily life needs, the nation state's values relate to the economic benefits to be derived from biological resources (both consumptive and non consumptive). At the international level biodiversity values relate very much to the global concern for maintaining existing species richness on earth, expressed in terms of a common heritage of humans. An attempt to understand how these different value schemes clash and where they might be reconciled is worthwhile because values influence the pattern of resource utilization observed at field level.

3.2 Whose values dominate in conservation?

Conservation efforts in most developing countries have tended to emphasize the international scientific value of biological resources and to focus on areas of high species richness and endemism. Consequently, these values have largely dictated what, where and how conservation efforts have taken place. Given their high degree of species diversity and endemism, it is therefore not accidental that the East Usambara forests have received much

attention from conservationists. Unfortunately most conservation efforts have exclusively concentrated on setting aside specially selected sites for protection against human exploitation, the over-riding but untested conviction being that human activities must always result in environmental degradation and loss of biodiversity. A key feature in most conservation initiatives has been the emphasis on future use of forest resources. The products that local communities draw from the forests to sustain their livelihood and generate wealth are mainly biological resources. Logically, local people's livelihood strategies must influence biological resources, and consequently consideration of livelihood strategies ought to form an integral part of any sustainable conservation initiative. According to WCED (1987) sustainable development should be interpreted as a process of change in which exploitation of resources, the direction of investment, the orientation of technology and institutional change are made consistent with future as well as present needs. In forest conservation terms, sustainable biodiversity conservation should then be based around a mobilization of the actual and potential values that forest resources might have for both present and future generations. Among indicators of actual and potential values of forest resources to local communities are both the current uses of the resources, and future-related initiatives such as domestication of forest plants by local people. In practice it can be observed that in most conservation initiatives the present value of forest resources is often too easily subordinated to the presumed needs of future generations. This may show bad faith on the part of conservationists. The question of "whose future?" has to be addressed. Local people know that the route to their "future generation" lies in the adequate survival of the present generation. Conservation efforts are directed towards establishment of protected areas where present utilization is restricted. In Africa the conviction that local people degrade the environment has ignores the fact that a range of indigenous forestry-related cultures and practices in some instances were supportive of conservation objectives. In these cases local and global futures intermesh. But imposing global futures without taking account of local ideas about the future is likely to result in antagonism between conservationists and local people. Where communities around protected areas have developed suspicion of conservation policies the question of "whose future counts" may be central.

One of the main arguments in this thesis is that despite the strictness of conservation policies against local utilization of the protected areas, in practical reality the conservation areas are still subject to uncontrolled and unplanned, mostly illegal, utilization resulting in forest destruction. This is likely to continue because human use of biological resources is fundamental to the existence and future survival of communities surrounding protected areas. Further, the conservationists should realize that they are not the only stakeholders as far as the forest resources are concerned. Decisions made by other stakeholders, such as private companies and the local people, will continue to affect forest conservation strategies, unless the values of each interest group are taken into consideration during the planning process. This is why the research aims to raise the question of reconciliation among various stakeholder interests with respect to biological resources as a proposed key to success in conservation initiatives.

Furthermore, it will be pointed out that the search for such a reconciliation is basically a political process. During this process attention must be given to both ecological and social factors. These two factors are partly interacting in the prevalent land-use system. As illustrated by this analytical model (Fig. 3), policy factors influence what takes place in the

environmental and social systems in relation to a particular resource, and these influences ultimately affect the existing land-use system.

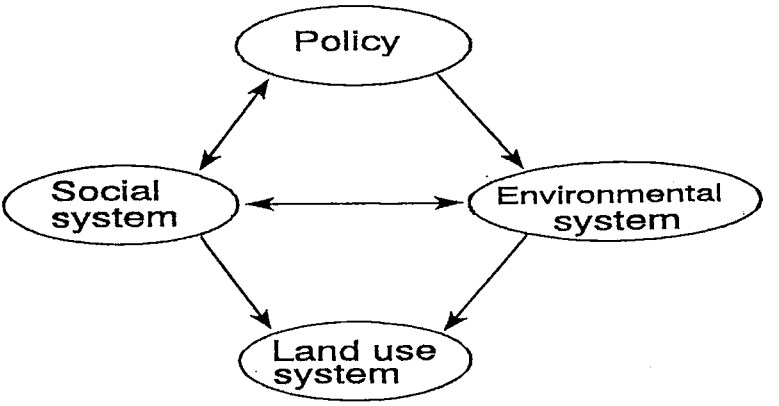

Figure 3 Factors to be considered in searching reconciliation in biodiversity conservation.

The current situation is dominated by conservation policies which dictate what should be done in the environmental system and neglects the social aspects of life. The resulting land-use system focuses on forest reserves as key conservation areas. However, the reserves are actually illegally utilized and sometimes destroyed by social dynamics, namely livelihood strategies. The arguments in this research are that unless the social and environmental systems are allowed to influence policy equally, the resulting land-use pattern is most unlikely to be unsustainable. At the same time, without interactions and communications between the stakeholders in both the social system and the environmental system, it is unlikely that the influence of these systems on policy will be systematic enough to result in policies that enhance sustainable land use. This means that conservationists will have to develop understanding of, and show respect for, the local political processes through which struggles to develop livelihoods are played out in rural Tanzania.

3.3 Value systems and their implications in conservation

As discussed above, different groups of people hold different values with respect to biological resources. Consequently when studying the relationship between the social system and the environmental system it is necessary to distinguish various stakeholders, their values and perceptions in relation to biodiversity. For present purpose three main stakeholders were identified and studied in the East Usambaras namely the Forest Division, private companies and local people (Fig. 4). This categorization is a simplified representation of the range of stakeholders with specific interests in the area to facilitate analysis with limited resources. As pointed out by Grimble et al. (1995) resource management issues involve a variety of stakeholders who can be conceptualized in a continuum from macro to micro levels. Whereas global and international interests in a forest resource are represented by stakeholders at macro

level, local communities represent a micro level stakeholder category. In between, there are stakeholders at national, regional and district levels. Stakeholders are essentially social groupings and social groupings are not isolated entities. This is merely an analytical convertion. Taking the Forest Division in the East Usambaras as a case, it caters for the interests of global, international, national and regional (e.g. catchment) interests but paradoxically pays least attention to local people's interests. The Forest Division has given a mandate to the East Usambaras Catchment Forest Project (EUCFP) to manage the forest resources in the area on the behalf of the Forest Division. EUCFP is therefore supposed to put into consideration the global, national, regional as well as district interests in the managing the forests. Other government departments, such as those in the ministry of agriculture, have more influence on the public and farmlands, but lack of human and financial resources obscures their interests. The latest developments in the area have seen the following:

- extension of forest reserves incorporating public and farmland areas with support from regional and district government and political leaders;
- financial and managerial difficulties facing one of the biggest projects in the area (EUCADEP) which is under the Ministry of Agriculture;
- re-orientation attempts within EUCFP towards farm forestry, agroforestry and more people-oriented field activities;
- mandate given to EUCFP project management to issue tree harvesting permits in the public lands - this was formerly the responsibility of district and regional forestry offices.

These developments point towards the reality that EUCFP is essentially a broker between international, national, regional, district and village interests as far as the East Usambara forests are concerned. Consequently, the analysis can safely consider the Forest Division as a main stakeholder.

The analysis considers the value systems of each stakeholder to try and bring out the relation between present and future utilization values. The analysis goes on to assess the various approaches to conservation and utilization of the forest resources and the resulting effects on biodiversity. A critical examination of different perceptions of stakeholders on biodiversity values, as well as the linkages between various stakeholders with respect to management practices, expose the need for stakeholder reconciliation and participation as a new approach to conservation and forest resources utilization.

As indicated in Figure 4, the relationship between the conservationists and commercial estates in the area (**A**) used to be casual. However, following the signing of a management agreement between the estates and the Forest Division whereby natural forests owned by the estates will now be managed by the Forest Division under the proposed nature reserve, the link between the two is getting stronger. The link between the commercial estates and the local people (**B**) is rather weak especially when it comes to decision making. The only areas of interest for the two are in relation to casual labour, fuelwood collection in former estate forests (now managed by Forest Division) and the tea outgrower scheme. Because of strict forest access rules for the local people and the extension of forest reserves the relationship between conservationists and local people (**F** and **G**) is almost antagonistic. The link between the approaches used by the conservationists and the estates (**C**) is considered unstable unless

the squatter's issue is resolved. At the same time local people's reliance on forest products from the former estate forests is now curtailed following the management agreement with the Forest Division. This makes the link between the two (D) unpredictable.

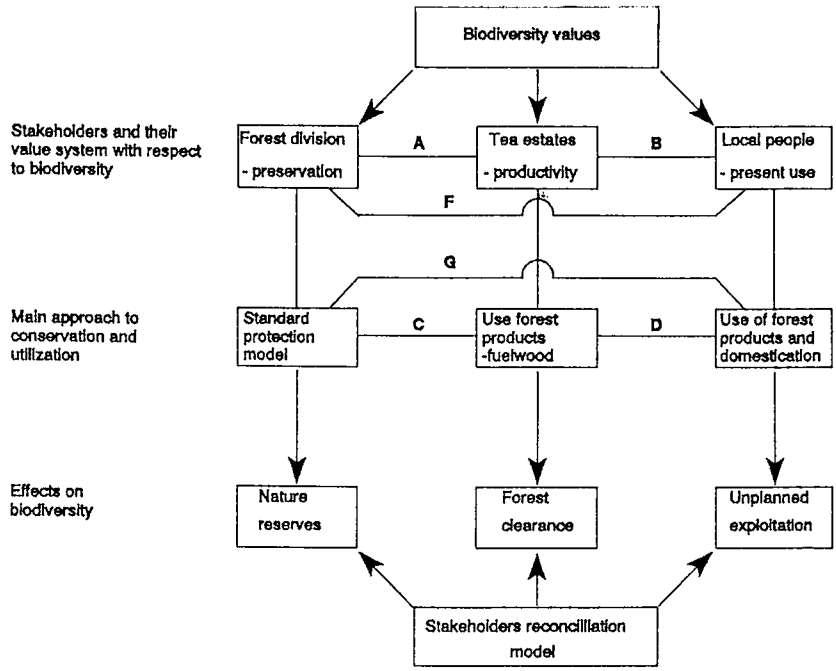

Figure 4 Conceptual framework for research (see text for explanation)

While conservationists put much emphasis on the future significance of resources, local people are pre-occupied with present utilization in their livelihood strategies. At the same time the private companies are more concerned with the productivity of their enterprises. To achieve what they perceive to be the future of the East Usambara forests, conservationists have opted for the standard protection model with establishment and continued extension of the forest reserves. Most recent extensions are based on the theory of island biogeography, linking species biodiversity and viable wildlife populations to size of protected area (Newmark 1993). The argument for the expansion of the forest reserves, the establishment of a nature reserve and a total ban on local people's utilization of the forest resources, as presented by Newmark, is that many of the rarer populations of upper order animal species (birds in particular) appear to require an area as large if not larger than the remaining natural forests in the area and are restricted to primary intact forests. While this study does not intend to argue against the validity of the conservationist's point of view, it will demonstrate that local people's demand for forest products, especially building materials, is very high and immediate alternatives are non-existing. The implication is that the people will continue to

collect forest products illegally unless some attention is given to their own values and concerns.

Furthermore, this study tests the assumption that local people are not just mere gatherers of the forest resources but that they are in reality engaged in management practices of their own. These practices range from controlled utilization of certain forest products to actual domestication of highly-valued tree species (Wiersum 1997). The study considers that such indigenous management practices might contribute towards conservation, serving as a starting point in developing more sustainable ways of easing the pressure on the forest reserves. But to develop this point in practice requires some re-thinking of forest policy formulation. In particular attention will have to be paid to restricting building at local level. But the local people should not be considered as the only local stakeholders because commercial estates (tea estates in the Amani plateau and sisal estates in the lowlands) also influence conservation initiatives. The commercial estates in the area continue to make most of their decisions privately, although some have negative impact on the local people and the forests. An example is the tea estates' decision to continue to "import" cheap labour into the area, without consultation, adding to the pool of land-hungry squatters around the forests. The role of the commercial estates in conservation of the forest resources must also be taken into account. Ways must be found, institutionally, to draw them into the local politics of stakeholder negotiation.

3.4 **Study objectives and research questions**

The objective of the study is to investigate the potential and limitations of involving local communities and other stakeholders in conserving the East Usambara forests, and to propose appropriate development strategies for harnessing such potentials. Specifically the study aims:

1. to investigate the perceptions of different interest groups in the area concerning biodiversity, its importance, local conservation needs, and what they consider their future relationships with the forests ought to be;
2. to examine the values of forest products and services to local stakeholders;
3. to study indigenous forest/tree management practices in the area to establish the contribution of such practices and changes to conservation/erosion of biodiversity;
4. to examine local people's involvement in managing the forests, in relation to current official forest conservation policies, and to propose any improvements that might lead to the development of a management and institutional strategy better involving local people.

In order to address the above mentioned study objectives, a set of research questions were posed to guide the investigation process. These are summarized as follows:

1. What are the characteristics of various stakeholders in the area?
2. What value does the East Usambara forest biodiversity have for local people and other stakeholders in the area?
3. How do these values shape stakeholder interests and activities in relation to the forests?
4. What are the resulting effects of stakeholder's decisions on forest biodiversity?
5. Can the interests and values of the different stakeholders be reconciled?
6. What will this reconciliation involve in terms of policy, institutions and options?

3.5 Structure of the thesis

The theoretical background to the research is provided in Chapter Four. This discusses the concept of biodiversity in various perspectives and considers the imbalances in conservation cost and benefit sharing among local, national and international interest groups. The issue of community management of forest resources is examined conceptually, institutionally and in terms of the significance of forest products to rural communities. Chapter Four also discusses the concept of domestication of forest plants as an indigenous forest/tree management strategy.

The research reported in this study covers both technical forestry aspects as well as sociological ones. This necessitated the utilization of a range of research methodologies, ranging from participatory rural appraisal and household surveys to more specialized surveys of the use of forest products and the impact of forest products collection on the forest ecosystem. Research methodologies adopted for the research are discussed in Chapter Five.

The main findings of the research are presented in chapters six to nine. Whereas Capter Six focuses on socio-economic conditions in the East Usambaras in terms of demography, farming conditions and local institutions, Chapter Seven considers the values the forests in the area have for local people, ranging from non-consumption to utilitarian values. In Chapter Eight, the effects of forest utilization on the forest ecosystem are examined via analysis of the structure of forests used by people. Possible alternative sources of forest products are also discussed in Chapter Eight. The possible evolution of a village-based forest conservation initiative as an alternative forest management strategy is also examined. Chapter Nine dwells on the perceptions of different stakeholders concerning the issue of biodiversity, and shows through providing qualitative and quantitative evidence of forest product collection, how local people's perceptions of biodiversity are reflected in their activities in the forests. Finally, Chapter Nine considers the implications of conservationist values and perceptions as reflected in management strategies adopted for different forests in the area. Finally Chapter Nine considers via an analytical model that stakeholder reconciliation requires a conducive policy and effective institutional environment, as well as programmes geared to seeking alternative sources of forest products. The stakeholder reconciliation model presented underscores the theme of communication between stakeholders as a key component for successful conservation. Conclusions are developed in Chapter Ten.

CHAPTER 4
THEORETICAL BACKGROUND/LITERATURE REVIEW

Going through literature related to conservation one comes accross a variety of arguments concerning the extent of environmental problems in different parts of the world, conservation concepts and various approaches to solving conservation problems. The theoretical background presented in this chapter dwells on such arguments and provides the foundation upon which the research was built. The presentation outlines some different perceptions of the extent of environmental problems in Africa as well as on fundamental concepts in biodiversity conservation. These different perceptions are a reflection of the diversity of values that individuals and social organizations attach to natural resources. It is these value systems which encourage the debate on community management of forest resources and underscores the significance of indigenous forest management systems.

4.1 Perspectives on African environmental problems.

At this point in history, when the environmental debate is at its peak, one question needs to be answered consistently by scientists proposing solutions to African environmental problems. The question can be framed as *What is the magnitude and what are the causes of environmental problems in Africa?* Available literature suggests much variation in the opinions of scientists as to how they perceive the problem. While many conservationists argue that environmental problems in Africa have reached a crisis, others consider the situation has been exaggerated. The conservationist scenario as summed up by Timberlake (1985), Myers (1984) and Soule (1984) presents the environmental crisis in Africa as a matter of Africa's population growth rate, the highest in the world, not being matched by increased food production and provision of social services, leading to declining standards of living. Further, expansion of unsustainable agriculture at the expense of natural ecosystems, coupled with increasing livestock numbers, ultimately lead to land degradation, desertification and loss of biological diversity. This scenario therefore presents the continent as being on the brink of ecological collapse. It has been argued (Bell 1987) that the proliferation of conservation and development interventions in rural Africa for the past few decades has been triggered by the concern and alarm built into the scenario described above. Such interventions are essentially Western prescriptions for rural African problems, as described by the conservation lobby. Since the trend of man-environment relations is seen to be dominated by human mismanagement of natural resources, conservation in Africa has been taken to mean exclusion of rural people from areas of interest in environmental protection (Anderson & Grove 1987). The result has been interventions fostering the establishment of national parks and forest reserves and enforcing the borders between local communities and protected areas.

The "concern and alarm" scenario has been criticized by proponents of realism, who emphasize on objective assessment of localized man-environment interactions rather than generalized stigmatization. Bell (1987), disillusioned by the dramatized way in which African environmental problems have been presented, queries the indicators used to predict a crisis in human/livestock population increase linked to degradation. The fact that populations keep increasing implies that the continent has not yet reached its carrying capacity in ecological terms, otherwise, as predicted by ecological population growth models, shortage of land, food and other resources would have led to population crash. However, it

is evident from Bell's standpoint that human ability to manipulate the productivity of ecosystems has not been fully considered. Richards (1986), Evers (1994), and Netting & Stone (1996), among others, expose various ways in which rural Africans have developed survival mechanisms to cope with harsh environments. At the same time these studies show that some survival mechanisms have positive environmental impacts, such as enhancing biodiversity at various levels. On land availability and frequent food shortage problems in Africa, Bell (1987) argues that since only reasonably low proportions of arable land are under cultivation at any one point in time in most African countries the proposition that rural Africa is facing an immediate shortage of arable land is open to question, except in limited local cases. Further, food shortages in rural Africa are related to emergency situations such as droughts and civil disturbances or arise through putting too much emphasis on cash crop production at the expense of food crops. They are not direct consequences of production pressure on the environment.

It is interesting to observe what a young generation of African researchers considers to be the nub of the environmental problem in the continent, and what they see as the cause. Monde (1991) points out that many African scholars refuse to accept poverty and Afropessimism as inevitable, mainly because of the continent's richness in human and natural resources. Further, attempts to bring changes in the continent have suffered from rigid constraints such as foreign debt servicing, economic reforms and poor governance. The same thinking is shared by other researchers. In a recent workshop on *Democratization and Food Security in Africa*, organized by the *Global Coalition for Africa* in The Netherlands, a number of young African experts stressed that environmental and food security problems in Africa vary in intensity depending on local situations. Further, whereas population increase contributes to some of these problems in some cases, the core causes of African development and environmental problems are very much linked to current global trade relations, civil wars, corruption at national government levels, and the way democratization has been introduced on the African continent (GCA 1996). While corruption and civil wars result in poor resource allocation at national level, democratization results in opposing religious and ethnic divisions in some countries, leading to civil wars which distort production and environmental conservation strategies. Further, economic recovery at national level has been very much hampered by skewed global trade relations and transnational resource transfer facilitated by major global financial institutions such as the World Bank and the IMF, and by the overall process of globalization. This political-economic scenario is rarely associated with African environmental problems, with but a few exceptions (Monde 1991, Richards 1996).

An unprejudiced analysis of the problem should pay attention to the perceptions of rural African communities on the issues. Having grown up and worked in rural Africa, the author sees a completely different scenario at local level. In most African rural areas, for example, an increasing number of children is not perceived as a problem but rather as a blessing from God. Each child is believed to come with its own fortune and in the extended African families the perceived "children burden" (in Western thinking) is widely distributed. At the same time most rural communities associate food shortage and decreased land productivity problems with lack of the necessary infrastructure and support from their national governments, and misfortunes such as bad weather. If conservation initiatives have to consider rural residents as stakeholders then this version of events cannot be neglected. It is the opinion of the author that an analysis of environmental problems in various situations

should be taken on a case-by-case basis and generalization should be avoided as much as possible.

4.2 **The concept of biodiversity**

The concept of biodiversity has become a popular policy issue in political contexts in recent years. Nonetheless, not only has the term biodiversity, from "biological diversity", been defined differently by different authors, but also the perception of the concept of biodiversity differs from one interest group to another. UCOTA (1992) defines biodiversity as the variety and variability among living organisms and the ecological complexes in which they occur. According to this source diversity can be observed within ecosystem, and at species and genetic levels. In this context, diversity refers to a number of items and their relative frequency. At the ecosystem level, a landscape consisting of many different ecosystems has more diversity than a landscape with only one ecosystem. The argument follows that when a landscape with tropical forests, savannah woodlands and mangrove ecosystems is converted into agricultural land its ecosystem diversity is reduced. This notion is challenged by proponents of agrodiversity, as discussed in forthcoming sections. At the species level, species diversity can be reduced, for example by overgrazing a rangelands which formerly had a high number of annual and perennial grass and shrub species, leaving behind only a few unpalatable species. With regard to genetic diversity, an environment sustaining both domestic varieties of a crop and the crop's wild relatives has a higher diversity compared to an environment with only the domestic varieties.It is pointed out by UCOTA (1992) that while the concerns over loss of biodiversity today focus almost exclusively on species extinction it distorts the definition of the problem because species diversity is only one form of biodiversity. Interpreting the concept of biodiversity ODA (1991) puts more emphasis on the fact that biodiversity refers to the degree of variety in nature, it is not nature itself.

In addition to the term biodiversity the term biological resources is often used. This refers to all the components of the living world (living organisms) of use to human beings. According to WRI (1989) biodiversity and biological resources are identical at local level because most habitat modifications or reductions entail an erosion of biodiversity. However, at a larger scale of analysis and when the benefits are less local, biodiversity and biological resources are not identical because trade-offs exist. WRI (1989) argues that the failure to distinguish between biodiversity and biological resources at different scales has led some authors to attribute the value of all ecological services to biological diversity and to equate biodiversity with all wild/natural products, a conflation tending to exaggerate the value of biodiversity per se.

Oldfield & Alcorn (1991) indicate that in discussing biodiversity a cultural dimension should be considered. It is argued for example that conservation of biodiversity should go hand in hand with conservation of cultural diversity. The socio-cultural dimension is further emphasized by Richards (1992) who argues against conservationists who consider themselves as "savers of the forests" without taking into account the local people's perceptions of the forests and forest resources. Indeed, rural people through their cultural practices and taboo systems, have in the past often contributed in a significant way to the maintenance of forest conservation (Kajembe 1994). However, such indigenous management systems were often not directed at the forests as a total ecosystem but rather to forest components considered to be useful (Persoon 1991).

The cultural shaping of biodiversity has very much been emphasized by proponents of agrodiversity and the role of local communities in maintaining biodiversity. According to this school-of-thought, transformations of natural ecosystems by rural communities often result in a new form of biodiversity, referred to as agricultural diversity or agrodiversity (Guyer 1996; Netting & Stone 1996; Richards & Kandeh 1996) often not appreciated in the conservation arena. Netting & Stone (1996), for example, elaborate the situation with a West African case study. According to Netting and Stone migrant Kofyar farmers of central Nigeria opened vast areas of wooded land through shifting cultivation. Because of the nature of spontaneous, gradual and unplanned (by the government) migrations of these cultivators who founded permanent smallholder communities, a quite considerable agrodiversity of domesticated plant and animal species has established itself as part of their sustainable farming system adaptations. These people also utilize, maintain and preserve, within or adjacent to their properties, areas of natural ecosystems that contribute valuable food supplements, construction materials, medicines, organic fertilizers, fuels and the like. Netting & Stone contend that as local people pursue their twin goals of producing subsistence and a surplus for the market they necessarily discourage specialization and propagate agrodiversity under circumstances of increasing resource scarcity and higher population pressure. Netting (1993) sums up the facts that agricultural biodiversity contributes to increased resource productivity over time, expansion of amount and quality of labour applied to the farm and insurance and risk reduction at household level.

The perceptions of rural communities as to what biodiversity entails and how it should be managed under different socio-economic settings might vary considerably from what most governments, scientists and even donor agencies put across. Success in any biodiversity conservation initiatives depends partly on the shared perceptions, on what should be conserved and for what reasons, by different stakeholders.

4.3 **Loss of biodiversity**

Loss of biological diversity is currently a problem raising much concern globally. This concern according to Wilson (1988) stems from the accumulation of substantial knowledge on the extent of deforestation, species extinction and tropical biology. It is this knowledge that has brought global problems into sharper focus and broader public exposure. The growing awareness of the close linkage between conservation and economic development has further contributed to this issue. However, as pointed out by UCOTA (1992) an accurate estimate of rate of the loss is not possible at present because of the abundance and complexity of ecosystems, species and genetic types which have defied complete inventory and direct assessment of changes. Nevertheless, Dasman (1991) suggests that we should not put too much emphasis on numbers like the rate of loss per year or per day; rather we should try to concentrate on what we know. According to Dasman (1991) the following are examples of known facts: the number of most of our large vertebrates has been declining and their ranges contracting (e.g. elephants, rhinos, whales, etc); there is an overall decline in the abundance of wildlife globally; the rate of habitat loss is alarming, especially for tropical forests, followed by others such as dryland and wetland ecosystems. Dasman therefore argues that maintenance of biodiversity should focus on these known facts and try to halt the trend as seen from both biological and social perspectives. Similarly, Guyer & Richards (1996) observe with concern, that there can be too much speculative concern with the unknown portions of biodiversity, making the concept of biodiversity odd from the point of view of quantification. The importance of maintaining biodiversity cuts across a number of writings.

The main reasons given as to why biodiversity should be maintained (Oldfield & Alcorn 1989; ODA 1991; UCOTA 1992) can be summarized as follows:

- The normal functioning of the biosphere in which human beings live depends largely on the continued existence of different plants and animals in different ecosystems. Therefore there is a risk involved in losing any species or community that is essential for ecosystem functioning.

- The future of agriculture depends on our continued ability to develop new varieties of plants and animals to suit different disease, pests and climatic circumstances, a feature which largely depends on having reservoirs of genetic materials. The reason is extended further to include future discoveries of medicine/drugs which depend on the same genetic resources.

- Biodiversity can be considered as an indication of environmental quality. As habitat destruction continues it contributes to already observed rapid environmental changes and other severe planetary stresses.

- There are also ethical, aesthetic and cultural reasons for conserving biodiversity. Examples include arguments on equal rights of all species to continued existence on the planet and on continued use of forest resources by different communities for cultural activities.

All the reasons given are based on how society values biodiversity. Again depending on the level of analysis the value of biodiversity varies from international, national and local people's point of view. In order to address the problem of biodiversity loss one needs to consider both the standpoints in question and the root causes of the loss. According to ODA (1991) the main immediate causes of biodiversity loss are habitat destruction and species overexploitation. The underlying causes, which are not uniform in all the areas, have been categorized into:

- Development pressure arising from, among other things, population growth and economic development. It is alleged that rural communities have a very high real social rate of time preference - i.e. they prioritize short-term development problems. As a result of this, conflicts arise between the livelihood strategies of the local people (at household, regional and national levels) and conservation strategists. Hamilton & Smith (1989) in advocating for long-term planning in the Usambaras claim that they are aware that major conflicts have arisen between conservationists and those interested in more immediate exploitation.

- Various forms of market failure and inappropriate policies. Some property regimes (e.g. open access and "common heritage") are a disincentive to local people and developing countries to conserve genetic resources. Biodiversity conservation objectives vary according to who is the intended beneficiary and scale of analysis. Priorities tend to differ at global and national levels, and at developed/developing country and local people's level. Wells (1992) points out that the uneven distribution of conservation benefits is a disincentive to effective conservation and that ineffective positive interventions (e.g. poor enforcement of conservation laws) and unintentional

negative interventions (e.g. taxation and poor credit facilities for local people) contribute to loss of biodiversity.

As one goes through the vast literature on biodiversity conservation, ranging from biological to social perspectives, it becomes apparent that it is not the importance of conserving biodiversity, or the concern about the loss of biodiversity, that brings much argument but rather the modalities of conserving biological resources and socio-economic issues such as who bears the costs and benefits of conservation. On modalities, most arguments, especially from social scientists, dwell on the fact that conservation approaches suffer from professional prejudices, especially in the biological sciences, as in for example the dominance of professional conservation knowledge over indigenous knowledge and the lack of attention given to social factors influencing biodiversity.

The distribution of costs and benefits of conservation at different levels is an issue of concern in the following section.

4.4 Costs and benefits of conservation

The importance of conserving high potential biodiversity areas cannot be overemphasized. It has been appreciated by the international community that not only are these areas important for this generation but for future generations as well. This appreciation stems from the fact that supply of essential products and services from these ecosystems is threatened. However as expressed by Vorhies (1994) the no matter what this generation would like to conserve in terms of natural resources it boils down to cost and benefit sharing at different levels. According to Bell (1987) and Well (1992) while most of the benefits from conservation accrue to the international community most of the costs are borne by the local communities, which have to forego a number of current benefits by not utilizing the resources around them. Elaborating on the distribution of costs and benefits of conservation, Bell (1987) points out that the costs in terms of alienated land, restrictions on resource use and damage to life and property are mainly carried by rural populations, particularly those at the interface between settlements and conservation areas. Further, the political and financial costs of administering conservation programmes are carried mainly by national governments. At the same time, benefits of aesthetic and recreational experiences and scientific opportunities are enjoyed mainly by foreigners. The benefits of national prestige as well as revenues from conserved resources are enjoyed mainly by national governments. Bell (1987) concludes that rural interface communities carrying much of the costs derive few benefits (in short there is uneven distribution of conservation costs and benefits). It has further been observed that the in the conservation arena public discussions of costs and benefits of conservation is couched almost exclusively in terms of indirect utilitarian and monetary consequences of conservation or lack of it (Bell 1987). The emphasis by conservationists that preservation of genetic diversity is required to maintain crop production is one such indirect utilitarian perspective. Arguing on similar lines, Guyer & Richards (1996) observe that too much publicity is given to the unknown portion of biodiversity despite the fact that some ecozones have only been thinly explored and new species are being encountered. This emphasis on the potential rather than actual uses of biodiversity according to Bell (1987), is counterproductive, since direct benefits are not enjoyed by local communities they carry insufficient weight as incentives to conservation at local level. Stress on future potential use of biodiversity gives local communities and national governments hopes concerning future benefits, but may be opportunistic, unreaistic and potentially counterproductive (Bell 1987). More realistic

conservation incentives are needed. A qualitative and subjective assessment of protected areas benefits and costs distribution at various levels (Dixon & Sherman 1990; Wells 1992) presented in Table 2 provides a starting point for remedying this uneven distribution.

With reference to Table 2, it is seen that consumption and recreational benefits are potentially the most significant benefits at local level, but have minimal significance on transnational scale. These two benefits directly affect the livelihood and incomes of local people. Non-consumption benefits, benefits from ecological processes, biodiversity, education and research benefits, are all at best of moderate local significance, but can be extremely important from a global perspective, despite the fact that they are difficult to measure with accuracy.

Watershed values are the only protected area benefits likely to be of great significance at regional level. The likelihood is based on the argument that maintaining natural vegetation cover helps to control erosion, reduce sedimentation and downstream flooding, and regulates stream flow. According to Wells (1992) distribution of future benefits has been assumed to occur at all spatial scales and to vary between sites from very low to very high values. Further, benefits currently ranked as insignificant or of low significance on certain spatial scales may in future be more important - examples include biodiversity, research and education benefits. Table 2 also shows that while most of the direct costs are most significant at regional/national level, indirect and opportunity costs are most significant at local level e.g. damage caused by wildlife, and consumption benefits denied to local people due to strict access rules. At the same time all categories of costs are either insignificant or of minor significance at global level, as assessed by Wells (1992). It is this mismatch between cost and benefit sharing that needs remedy.

Arguing for a much more fair distribution of conservation benefits especially at local level, Wells (1992) recommends adjustments in protected area management objectives to generate more consumption benefits at local level, remittances at national and local levels from multinational bio-prospecting companies, and the integration of conservation with development projects. The management objective adjustment recommendation would involve regulating the extent to which harvesting of natural products is permitted in protected areas in favor of local people. Many of these recommendations have been tried in a number of developing countries with positive impacts though not without some practical problems.

4.5 Community management of forest resources

4.5.1 General considerations

A distinction has to be made between community and communal management of natural resources. The term community refers to all the people living in one place (e.g. a village), but the term communal refers to different groups in a community with common interests (for example ethnic groups, tribes and clans) and thus refers specifically to discrete parts of the community (FAO 1993). In systems of communal forest management access is more closed, reserved exclusively for members of the group and no others. In community forest management access is more open, more inclusive of the whole. In this case all members of the community including smaller groups within the community have rights of access following mutually agreed upon rules and responsibilities. Community management of forest resources is therefore considered to involve collective action (Cernea 1990), institutional

Table 2: Relative significance of protected area benefits and costs on three spatial scales (Wells, 1992)

	Spatial Scales[1&2]		
	Local	Regional/National	Transnational/Global
Benefits Categories			
Consumptive benefits	0 - 3	0 - 2	0 - 1
Recreation/Tourism	0 - 3	0 - 3	0 - 1
Watershed values	0 - 2	0 - 3	0 - 1
Biological diversity	0 - 2	1 - 2	0 - 3
Non-consumptive benefits	0 - 2	0 - 1	1 - 3
Ecological processes	1 - 2	1 - 2	2 - 3
Education and research	0 - 2	0 - 1	2 - 3
Future values (for all above categories)	0 - 3	0 - 3	0 - 3
Costs Categories			
Direct costs	0 - 1	0 - 3	0 - 1
Indirect costs	0 - 3	0 - 1	0 - 1
Opportunity costs	0 - 3	0 - 3	0 - 1

Notes:

1. 0=insignificant, 1=minor significance, 3=major significance.
2. The underlined figures are at the scale where the benefit/cost category has the potential to be more significant.

- Examples of consumption benefits include timber, food, medicines, building materials and fuelwood. Non-consumptive benefits include aesthetic, spiritual and cultural benefits. Ecological benefits include climate regulation, nutrient cycling and pollination. Future values refer to benefits expected to arise but which have not been identified.
- Examples of direct costs include administrative and infrastructural costs while damages caused by protected areas eg by wildlife would be indirect costs. On the other hand, opportunity costs would include all foregone benefits as a result of lost access to resources in the protected areas.

development, enduring social structures and value systems that activate and organize individual actors.

During and immediately after Hardin's seminal paper on "the tragedy of the commons" (Hardin 1968) collective management of natural resources was viewed as being destructive and leading inevitably to overexploitation of the resource. As time went by it became clear that Hardin confused collective management of a resource and open access (free-for-all) situations. Subsequent work has shown that there is a role for collective action in resource management, in both resource utilization and nature conservation (for example Wade 1987; Cox & Elmqvist 1991; Bennett 1992, and FAO 1993). This work allows us to consider community forest management as a alternative management strategy in managing tropical forests.

Community forest management consists of a group of deliberate activities by a community for conservation and possible enhancement of useful forest resources and controlled utilization of those resources. In this context, forest management refers to the organization and control of the creation, maintenance and/or utilization of forests, trees and associated resources (Wiersum 1993). This involves a decision-making process. As Gibbs & Bromley (1989) put it, community forest management requires:

- A structure for group members to make decisions on the required resource management practices;
- Group control over the behaviour of the group members to ensure that the planned management practices are carried out;
- Control over the distribution of collected forest products;
- Ability to exclude others.

The kind of conceptualization discussed above aids in analyzing different rural communities and their interaction with surrounding natural forests and in judging whether communities really have any management strategies towards the forests. For example rural communities can co-exist with natural forests simply because of low human population pressure. Low rates of forest product cause no harm to the forest, but in actual fact the community has no definite strategies to manage the forest. In such situations, talking of indigenous management systems as being sustainable makes no sense (Persoon 1991).

In the context of this study, community forest management will refer specifically to forest management activities in which the responsibility for planning and carrying out the management activities lie with local people, acting individually, communally or as partners of the forest service (Wiersum 1992). As pointed out by FAO (1978) the main feature of community forestry that it has to be participatory and directed towards rural needs, in particular the needs of the rural poor. By contrast, state forest management has tended to seek to dominate in many developing countries for a number of decades. Essentially management strategies have alienated the local forest users from the surrounding forests. This has been reported as one of the reasons why government and donor funded interventions geared at conservation law enforcement and village afforestation have failed in some areas, and deforestation continued (Skutch 1985; Cernea 1990; Kajembe 1994). Attempts to reverse the trend aim to try and involve local people in participatory community forest management. However, recommended approaches in participatory forest management vary from one

locality to another, mainly because different interest groups (national governments, donors, NGOs and even local people) have varying perspectives on what participation entails. As pointed out by Wasberg (1992), the concept of participation includes a very broad category of activities and approaches making it necessary for the user to be specific whenever using it. Inglis (1994) distinguishes between passive, interactive and dynamic participation. According to Inglis just raising people's awareness of what is taking place in the project (e.g. through extension) is referred to as passive participation. Participation is said to be interactive when for example the project involves local entrepreneurs and companies in tendering. This requires some kind of interaction and sharing of information between the project and interested parties outside the project. Dynamic participation goes deeper to address issues such as implementation of joint forest management agreements with local communities and other interested parties. As pointed out by Shepherd (1992) genuine dynamic participation in forestry can only be observed in those initiatives whereby all interested parties have had a substantial say in the decision making process. This is contrary to traditional forestry which has tended to be closely linked with national needs and priorities. In some developing countries such as India and Nepal participatory community forestry has taken the form of what is known as joint forest management which according to Sarin (1993) tries to enhance partnership between government forest departments and village institutions on the basis of clearly defining rights and responsibilities of both parties. This approach pre-supposes the capacity to form local institutions, a feature which varies greatly with socio-economic set up and political history of the community in question, as discussed in a forthcoming section. Nevertheless, joint forest management has been shown to be promising (Lynch & Talbott 1995; Saxena 1993), though not without criticisms.

It is sometimes argued that local community interest in participatory management of the forests is influenced by the need for forest products, by cultural factors and in the option of using forests as a source of income or employment (Wiersum 1993; Kessy 1992). According to Sarin (1993) a number of factors need to be considered in stimulating joint forestry management strategies. One must first of all match defined forest areas with certain groups of people in terms of physical proximity, formal and informal rights, forest dependence, resource scarcity, indigenous organization forms for forest management, traditional cultural values, and local leadership. Effective local institutions also have to be created as viable units of organization. These have to be functional with clearly defined norms and ability to carry out management functions. Finally there have to be clear organizational procedures for defining forest management objectives, for clarifying roles and objectives, and for regulating access and harvesting with equitable distribution of benefits.

Under joint forest management there is often a need to reconcile state forest management objectives and local community objectives, because these are frequently diverse. While the state might aim at large-scale commercial utilization of the forests to increase national income, local communities are mostly interested in small-scale wood as well as non-wood exploitation for their subsistence (Wiersum 1993). The state, in many circumstances, would aim at having centrally controlled forests with stipulated rules and regulations on their management. However, with poor infrastructure, corruption and lack of incentives for forest officers/guards, enforcement of such rules and regulations becomes impossible, creating a kind of unintended open-access situation. Local communities would most probably prefer locally-controlled management with communally accepted norms in forest utilization. Such local organizations have an added advantage in terms of availability of human resources in

managing the forests compared to government officials. Finally, there is also a tendency for the state to overlook an important management objective for local communities, namely preservation of their cultural integrity.

From the above discussion it is implicit that getting a realistic picture of the interaction between the forest resources and surrounding communities is a pre-requisite in any community forestry undertaking. Further, it is crucial to investigate the dependence that the rural communities have on the natural forests in order to establish the potential incentives for the community conservation action to take place.

An assessment of participatory forestry initiatives in Tanzania reveals that they have either been passive or just interactive, based on the categorization suggested by Inglis (1994). These initiatives have largely been described as social forestry projects (Kessy 1992; Kessy 1995; Kajembe 1994; Skutch 1985) and are mainly top-down in orientation. It is only recently that a more dynamic kind of participation has been observed in its infancy stage (as presented by Wily & Haule 1995). The case of Mpanga village forest reserve discussed in Chapter Eight below is another example.

4.5.2 **Institutional considerations**

Because community management of forest resources involves collective actions, observation of group norms and distribution of benefits, it requires well-established institutions if it is to be effective. It has been noted that collective actions have the highest occurence and chance of being effective when people belong to organized groups, and when they are informed and consciously perceive that it is in their best interest to act purposely in a coordinated manner (Cernea 1990). Further, the performance of these groups is likely to improve when the group has developed leadership structures and internal norms and procedures relevant to organizing and managing its members to overcome conflicts arising from deviant behaviour. It is when the institutional framework is poorly defined that Cernea (1990) advocates social engineering (formation of institutions) as part of community forestry initiatives, a process that frequently proves to have been neglected where schemes are performing poorly. In the local environment, units of social organization range from pre-existing groupings such as households, kinship groups and chiefdoms, to groups purposively organized for community forestry purposes. However, groups established for other purposes can as well be motivated and mobilized to undertake forestry-related activities. This is particularly possible with some formal institutions such as village authorities, but may also apply to informal groups such as sports clubs and cultural groups. As pointed out by Cernea (1990) mobilization of social units to participate actively in forest management activities is one of the avenues through which forestry initiatives can function as mechanisms for building up social capacity for rural development. However, the identification and mobilization of local institutions for forest management needs to take place cautiously. It has been observed that for sociological reasons "communities" as population clusters cannot and should not be treated as ready-to-use corporate actors in community forestry initiatives (Lynch & Talbott 1995; Cernea 1990; Benda-Beckman personal communication). This tends to be especially true where communities and villages are just geographical residential units and not necessarily corporate organizations, excepting they prove to behave so. Further, community members' heterogeneity and stratification does not always work in favor of collective action unless the need for such action is strong enough to overcome social differences. It has been noted that under very heterogeneous community situations authority systems tend to have uneven power

over community subgroups. In such situations local community leaders often appear reluctant, or not strong enough, to mobilize individuals belonging to some community subgroups to work towards a common goal. This results in a situation whereby "shadow" leaders from "untouchable" subgroups jeopardize the functioning of approved local community leaders. While some case studies presented in literature disclose the community forest management difficulties posed by heterogeneous population clusters (Dumont 1980; Cernea 1990), others report successful collective actions from such communities (Gamser 1987; Wily & Haule 1995; Murombedzi 1991). It is concluded that much as the definition of a community can be ambiguous, so can the resulting community-based initiative, unless special attention is given to prevailing local conditions. Available literature suggests that with more bottom-up approaches the ambiguity in defining specific communities and their respective social units can substantially be reduced by appropriate sociological analysis.

4.6 Plant domestication: An indigenous management strategy

4.6.1 Domestication as a concept

Scientific interpretation of what plant domestication entails has ranged from conventional biological definitions to more inclusive ones. Leakey & Newton, (1994) representing the conventional biologists school of thought have defined plant domestication as human-induced changes in the genetics of a plant in order to conform the plant to human agroecosystems. According to this conceptualization, the process of plant domestication results in the plant's inability to survive in natural ecosystems. On the other hand, McKey et al. (1993) and Dove (1994) provide a more inclusive definition which describes plant domestication as involving a co-evolution of human society and nature with the combined processes of natural and cultural selection creating a great diversity of human influenced agroforestry types.

It has further been argued (Prance 1994; Wiersum 1997) that plant domestication involves a number of phases whereby extractivism for example can be regarded as an initial phase in the plant domestication process. Prance (1994) describes domestication as a process of naturalization of plant species towards specific human induced growing conditions during which normally an increased adoption for specific uses takes place. According to Wiersum, (1995) the process of plant domestication involves changes in plant exploitation practices which brings with it changes in the plant's morphology and genetics as well as its growing environment.

Scientists have also considered the increasing human-plant interaction in the process of plant domestication. For example Chase (1989) describes plant domestication as a process of increasing human-plant interaction which not only involves a change in plant characteristics and biophysical environment but also adaptations in human activities with respect to the use and manipulation of valuable natural resources. McKey et al. (1993) interpret the concept of domestication at landscape level as opposed to plant level. A domesticated landscape is defined as a landscape that has been modified by humans from its highly biodiverse state to a state that may still have high biodiversity but which contains a greater concentration of resources useful to humans. Since many agroforestry systems develop as a gradual modification of forests by enriching them with useful crops the concept of domesticated landscape has been considered as being inclined to these agroecosystems (Wiersum 1996). To sum up, the process of domestication can therefore be described as an evolutionary process from gathering to breeding, during which changes at the level of both landscape

system and the plant species, going hand in hand with closer interactions between tree resources and humans.

4.6.2 **Historical perspective**

Historically plant domestication has been part of indigenous forest management and livelihood strategies. A long tradition of humans influencing forests in order to increase their derived benefits exists. Whereas forest management is sometimes described as deliberate manipulation of the forest ecosystem to increase timber production and environmental goods, Hladik et al. (1993) argue that the first efforts by ancient communities to manipulate forests were not directed towards these products but rather towards other products which were in short supply such as edible plant products. For example it has been reported (Hladik et al. 1993) that ancient communities in New Guinea were managing natural forests by trimming, thinning and ring-barking in order to increase the natural stands of taro, bananas and yams even as long ago as the late Pleistocene (some 30,000 - 40,000 years ago). Some evidence also shows that indigenous forest management was not only for subsistence needs but for commercial products as well. For example even as early as the fifth century AD certain forest products such as gums and resins were being traded in Southeast Asia and forest management practices were being carried out to regulate their production (Dunn 1975; Dove 1994). As summed up by Wiersum (1997) it is now increasingly acknowledged that the traditional bias of equating forest management with professional forest management practices based on scientific principles is untenable. A more realistic understanding of indigenous forest management is one based on empirical analysis of how different groups of local people define and value the various components of the forests and how they interact with the forests. Cultivation of wild food trees has been postulated to constitute the first steps in the evolution of a domesticated landscape (Sauer 1969). According to Wiersum (1997) such cultivation probably began when the act of collection caused changes in micro-environment which favored rejuvenation of the collected species and the spontaneous growth of plants from leftovers of products which the collectors brought to their camps. As such plant domestication near temporary camp sites gradually evolved to permanent cultivation - mostly through vegetative propagation. The sagopalm (*Metroxylon sagu*) cultivation in Southeast Asia and New Guinea is one such case (Boerboom & Wiersum 1983).

4.6.3 **Domestication in the context of this book**

Whereas the concept of domestication applies to both flora and fauna, this book only dwells on plant domestication. The process of plant domestication is understood to include deliberate decisions made by local people:

1. to leave some species of forest origin in their farms during the process of opening up land for cultivation with the intention of tending such valuable species.
2. to collect forest species with special values and introduce them in their homegardens where they tended are tapped for valuable products.

This conceptualization has been presented by Shepherd (1992) and Wiersum (1997) who view domestication in indigenous forest management perspective as a continuum from forest/forest component management to the management of specific species in farms. During the first phases of such domestication, most highly valued biological resources are actively conserved by local people. Consequently the early phase of domestication can be considered as an indigenous type of biodiversity conservation. It reflects the local perceptions of the need to

maintain those forest resources they consider valuable. In addition, domestication may also viewed as a means to achieve biodiversity conservation by reducing the exploitation pressure exerted on useful plant species in their natural habitats.

4.7 Forest products for rural communities

An understanding of the significance of forest products to the rural communities contributes substantially towards working out possible strategies for involving these communities in the management of the forests. As pointed out by Richards (1992) while it might be of interest to ethno-pharmacologists to pay more attention to medicinal plants in the forest or a conservationist to look at rare species it is essential also to investigate the importance of forests to the daily life of local communities in their struggle to make ends meet, a struggle which can sometimes threaten the forests. A range of wood and non-timber products can be realized from forests by rural communities depending on local conditions. These products range from useful forest plants and animals to the fertile forest soils which the communities need for farming purposes.

A notable aspect of forests as sources of non-timber products is the issue of household food security. Superficially the concern with food security may appear to have nothing to do with professional forestry. However, FAO (1989) elaborates the point that the problem of household food security goes beyond seasonal crop yields and includes factors such as deforestation, seasonal variation in food supply, availability of fodder and other forest foods, shifts from subsistence to the cash economy and the timing of cash needs for different activities at household level. The relationship between forests, household food security and welfare has conceptually been illustrated by Ogle (1996) with special reference to the Tanzanian situation (Fig. 5). Ogle underscores the importance of forests to local livelihoods in terms of agricultural production systems, forest products collection and income generation. Some of these aspects are demonstrated further in this thesis using data from the East Usambara forests.

Because forest values to the local people vary any attempt to confront this problem has to be of a multidisciplinary nature. As summed up by Falconer & Arnold (1988) the importance of forest and farm tree resources with regard to household food security is based on the understanding that these resources serves to supplement existing food resources and income, fill in seasonal shortfalls of food and income as well as provide seasonally crucial agricultural inputs. They also help reduce risk and lessen the impact of droughts and other emergencies. The resources appear to be especially important for the rural poor who largely rely on off-farm employment opportunities to address their household needs. In addition to these aspects of household food security, more commercially-oriented forest product utilization may be important, for example local-level manufacturing of forest products. Different groups in the community may be interested in different products.

4.8 State, civil society and resource management

As can be concluded from earlier comments on local institutions in this chapter, the presence of appropriate local organizations is important in stimulating community forest management. Whether effective local institutions are present or can be developed depends substantially on the general condition of civil society.

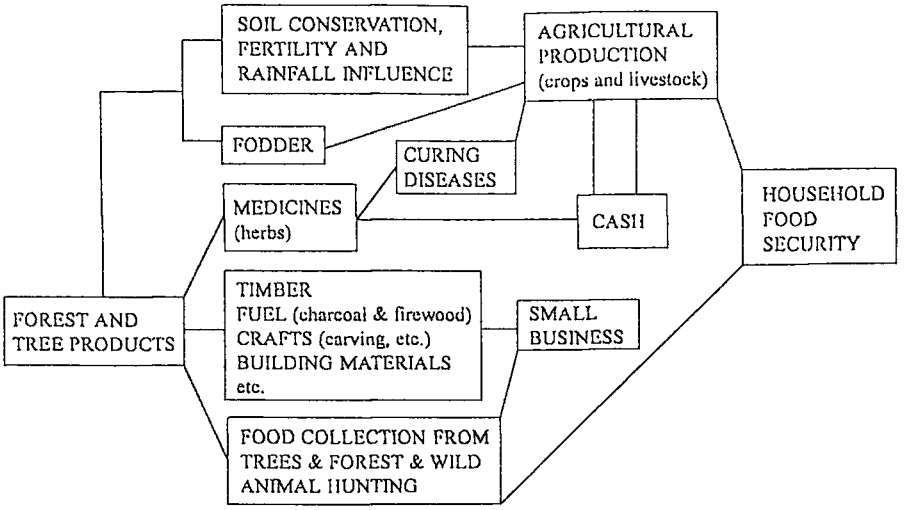

Figure 5: Schematic presentation of the relationship between forests and household food security (Ogle 1996).

Good governance and institutional accountability are repeatedly emphasized in literature as important contributors to sustainable management of natural resources (WCED 1987; UCOTA 1992; UNCB 1992; GCA 1996). Good governance and institutional accountability in resource management depends on national policy formulation, resource allocation and policy implementation. In this section the main concepts of state and civil society are discussed and the impact of the two on resource management is given attention. These concepts function as pivots around which stakeholder's involvement in forest management revolve. Effective involvement of stakeholders in forest management depends very much on the policy environment and the institutions on the ground. These in turn are influenced by the level of responsibility assumed by the state and civil society. In the following sub-sections the concepts of relationship between state, civil society and resource management are discussed.

4.8.1 **The key concepts**

All communities are necessarily political entities and are defined and governed by certain rules about the exercise of power. A community is defined by the way in which its members create, re-create and abide by the existing principles of obligation between the governors and the governed. As pointed out by Chabal (1994) the concept "power" refers to the balance between control and consent which governs the relations between rulers and the ruled. Further, power and production are the two axes of politics in any society. Political accountability determines the nature of relations of power in a community. Political accountability therefore defins power in terms of its acquisition, exercise and dissipation. Accountability, then, refers to the notion of political and institutional obligations as well as the obligation of members of the community towards each other. It is therefore a relation of reciprocity between the rulers and the ruled, the chiefs and the villagers, leaders and their

followers, and it constantly changes responding to internal and external environments (Chabal 1994).

The state can be defined as the organized aggregate of relatively permanent institutions of governance (Chazan et al. 1992). It is seen as a set of associations and agencies claiming control over defined territories and their populations. Consequently, the main components of the state are decision-making structures, decision-enforcing institutions and decision-mediating bodies. It becomes apparent that the state is an important institution as far as resource management is concerned because resource management revolves around decision-making and implementation. As pointed out by Chazan et al. (1992) the definition of the state as an institutionalized legal order separates this notion from those of regime and government because the structures of the state through the organization of people and resources and the establishment of policy outlines and priorities are essentially institutions of power. In contrast, "regime" refers to the rules, principles, norms and modes of interaction between social groups and state organs. It is therefore concerned with the form of rule and deals with the way in which political relations are carried out and focuses on how state power is exercised and legitimated. The concept of government on the other hand relates to the specific occupants of public office who are in position to make binding decisions at any given time. Although state, regime and government may or may not overlap empirically, conceptually they are distinct, as the previous discussion has made clear.

Civil society has been defined as a public realm between the state and the family which is actually made up of public political activities and is the source of legitimation of the state (Bratton 1994). Despite the fact that political activities which take place at the state-family interface can be motivated by private (family centered) interests, they are essentially public in the sense that they entail collective actions in which individuals join to pursue shared goals and that activities take place within an institutional framework beyond the boundaries of the household. When the shared goals happen to be related to land use and natural resources management then the contribution of civil society to solving conservation problems cannot be over emphasized.

States do not operate in a vacuu, but rather the relationship between state and civil society determine the complexion and fate of state policies. Civil society then becomes an indispensable component of any political system. Chabal (1994) describes civil society as a vast ensemble of constantly changing groups and individuals whose only common ground is their exclusion from the state, their consciousness of their externality and their potential opposition to the state. Chabal makes a distinction between civil society and community in the sense that communities essentially assemble citizens regardless of their political power, while civil society is defined in relation to the politics of the state. As such civil society is subjective, unstable, discontinuous and unquantifiable. It can only be identified by the effects of its politics. Differentiation of the extensive institutional terrain between state and family is emphasized by Harbeson et al. (1994). According to Harbeson, institutions of civil society such as neighbourhood associations, women's groups and religious groupings are very different from the institutions of political society, in which these authors would include, for example, political parties, elections and legislatures. This kind of distinction is important especially when it comes to state decentralization of power and civil society's participation in the decision making process. For example, community forestry as discussed in this thesis requires institutions in the civil society realm. The effectiveness of local people's

participation in forest management will depend largely on the existence and effective functioning of appropriate institutions within the state-household interface.

4.8.2 **Reciprocity of state and civil society in forest management**

The relationship between state and civil society ought to be reciprocal, for effective and participatory forest management to succeed. It is only when the state is receptive to ideas originating from the civil society that dialogue and reconciliation among stakeholders can be sought. On the other hand, much as the civil society institutions participate and air the interests of the community in relation to forest resources, these institutions also have responsibilities of accountability and transparency in relation to the interests of community members and the society at large. From the aforesaid, the role of state ought to be an enabling one while civil society is the focus of genuine participation.

The enabling role of the state in fostering biodiversity conservation has been summarized by USAID (1994). According to this source, the state has to establish a strategic natural resources and land use planning system incorporating biodiversity issues. It should as well create a policy environment conducive to land-use systems that conserve biodiversity, and the state should decentralize power. Further, policies should provide mechanisms through which the best indigenous and modern knowledge systems can be combined to develop a deeper understanding of the full range of conservation concerns.

4.9 **Sociological terminology**

A brief clarification on the sociological terminologies used in this book in relation to different categories of social groups is essential. The term **local**, as used in phases like "the local people" refers to people or tribes residing in the study area. These could be **indigenous**, if they are natives to the East Usambaras, or foreigners who came to the area for different purposes, such as commercial activities, or work as casual employees in the estates, or as government employees and employees of donor agencies. These categories of people are examples of what is referred to in the study as **interest groups**, specifically groups of persons engaged in the same occupation in relation to the surrounding forests, considered to have similar interests as far as the management of the natural resources in the East Usambaras is concerned. The term **squatters** is used to refer to those inhabitants of the study area who originally came to the area to work in the estates but who were fired or decided to find some other means of making a living, settling on the land and farming illegally. **Government Authorities** refers to the government agents and offices established to safeguard the interests of the government as far as the management of resources in the area is concerned.

Chazan et al. (1992) use two terminologies also encountered here namely **ethnicity** and **ethnic groups**. Whereas **ethnicity** refers to a subjective perception of common origin, historical memories, ties and aspirations, **ethnic group** pertains to organized activities by persons linked by a consciousness of a special identity jointly seeking to maximize their corporate political, economic and social interests. Ethnicity, which can also refer to a sense of peoplehood, has its foundations in combined remembrances of past experience and in common inspirations, values and expectations. An ethnic group is, therefore, a culturally based social organization. In Tanzania an ethnic group is commonly referred to as *Kabila* in Swahili language, sometimes translated **a tribe**.

The term **stakeholder** is used frequently. It refers to all those who have a stake in the exploitation and management of forest resources in the East Usambaras. This conceptualization is adopted from Grimble et al. (1995) who further elaborates that stakeholders include all those who affect and/or are affected by the policies, decisions and actions of a given system. Stakeholders and **actors** are used interchangeably in this book. As emphasized by Grimble et al. (1995) the interactions between different stakeholders may result in **conflicts** of interest; the management of such conflicts involves some **trade-offs**. In this context **conflict** refers to the situations of competition and/or disagreements between two or more stakeholders. **Trade-off** is the process of balancing conflicting objectives. This process often involves foregoing of individual or group benefits in favour of joint action and harmony.

4.10 Summary

The problem of engaging local communities in biodiversity conservation has been brought into focus by a literature review. This review exposed different points of view on the concept of biodiversity, and illustrated the mismatch in conservation costs and benefit-sharing at different levels. It also illustrated that communities can engage in resource management, for example through the practice of community forestry and domestication of plant species, as part of their livelihood strategies. However, to be sustainable these local involvements require active engagement of civil society. In this regard relevant institutions and shared objectives on conservation matters between different stakeholders are important. Later it will be shown that certain local interests in forest product collection, e.g. pole cutting in the East Usambaras, are not necessarily in line with conservationist interests of conserving species for future use. This difference in interests presents us with a central problem of how to protect rare species without jeopardizing local livelihoods. In order to solve this problem, the research focused on the questions how local villagers gain their means of livelihood from the forests and what kind of institutional resources might be engaged in efforts to develop and agree upon a conservation strategy beneficial to the range of stakeholders in the East Usambaras.

CHAPTER 5
RESEARCH METHODS

The chapter provides a detailed description of research methods employed to accomplish the study. It was necessary to make use of a multi-method approach in the research because of the variety of information needed to address the research questions. It is worthwhile mentioning at this point that primary data collection involved an iterative process whereby curiosity arising from results of one survey spontaneously made it necessary to conduct another survey either to cross check information or fill information gaps. While the first part of this chapter covers the more general kinds of surveys conducted, the second part presents more specific surveys on use of forest products. The final part describes the additional data collection procedures and some aspects of data analysis.

5.1 Research location and general surveys

The research was carried out in the East Usambara forests and its surrounding villages, described in Chapter 2 and 3.

5.1.1 Reconnaissance investigation and selection of case study villages

The initial work comprised identifying bureaucracies and different stake holders in the East Usambaras, including the Forest and Beekeeping Division (Ministry of Natural Resources Tourism and Environment), a variety of conservation and development projects in the area, and the villages to be sampled. Procedures were both formal and informal. During reconnaissance survey discussions with village leaders were conducted in twenty villages (out of the total of 54 villages in the East Usambaras). The discussions introduced the researcher to the area and also eased selection of case-study villages. Villages visited around Amani were Ubiri, Mbomole, Mlesa, Mikwinini, Kisiwani and Mashewa. Villages in the lowland area around the Mnyusi escarpment visited include Potwe Mpirani, Potwe Ndondondo, Shambakapori, Mnyusi, Kwamzindawa, Kwegunda and Gereza. On the northern side of the East Usambara mountains around Maramba the villages of Churwa, Majengo Mhindilo, Hemsambia, Maramba A, Vuga and Maramba B were visited. During this preliminary investigation key issues such location, population size, ethnicity, social interactions, local institutions, economic activities and people/forest interactions were given attention. The overall exercise provided a general picture of the research area.

Six villages were then selected as case-study villages. Their selection was a purposeful sample, with the objective of including villages representing the various conditions in the area. The villages and their characteristics (summarized in Table 3) are as follows:

Mikwinini village: The village is located close to a tea estate and most of its inhabitants are estate workers, the majority of them being immigrants from different parts of the country. Land scarcity is quite a big issue as the village area is small, the village being surrounded by forest reserves and tea estates. It was therefore considered interesting to study the interactions between immigrants and indigenous people in the area and their reliance on the forest reserves for their livelihood, given the village's "squeezed" position.

Kisiwani Village: Located inside the proposed Amani Nature reserve. It is in this village that the main offices, and hence the focal point for the nature reserve, are to be located. It was

Table 3: Major features of case study villages.

VILLAGE FEATURES	MIKWININI	KISIWANI	POTWE NDONDONDO	KWAMZINDAWA	VUGA/ HEMSAMBIA
Geographical position	On top of the Amani plateau (high altitude)	At the foot of the East Usambaras (middle altitude)	At the foot of Mnyuzi escarpment (low altitude)	At the foot of Mnyuzi escarpment (low altitude)	Northern side of the Usambaras along Maramba (middle altitude)
Main economic activities	Farming, working in tea estates, government employees and petty business	Farming, government employees and petty business	Farming, working in sisal estates, government employees and petty business	Farming, government employees and petty business	Farming, petty business and government employees
Forest categories	Forest reserves, tea company forests and public forests	Forest reserves, teak plantations and public forests	Forest reserves, sisal estate forests and public forests	Forest reserves and public forests	Forest reserves and public forests
Recent forest development	Tea company forests taken by Forest Division	Proposed Amani Nature Reserve	Gazettement and compensation	Gazettement and compensation	Requested gazettement
Forms of land use	Agroforestry farms, forests and tea estates	Agroforestry farms and forests	Agroforestry farms, forests, and estates	Agroforestry farms, forests and national ranch	Agroforestry farms and forests
Active projects	EUCADEP and EUCFP	EUCADEP and EUCFP	EUCFP	EUCFP	EUCFP

interesting to study the awareness of the villagers of this new development and the extent to which they have been involved at different stages. Also the impact of the proposed nature reserve regulations on their daily life was of importance.

Potwe Ndondondo and Kwamzindawa villages: These are located at lower altitudes, close to Korogwe, but also forming part of the Mnyuzi escarpment which has recently been earmarked for gazettement to form part of Kwamkoro forest reserve. The gazettement process involved land appropriation from farmers who were promised monetary compensation. At the same time the area is close to sisal estates, and a majority of ex-estate workers have opened farms on public forest land. Land conflicts between the estates and the villagers are common, especially in Potwe.

Hemsambia and Vuga villages: Located on the drier northern side of the East Usambaras in Maramba Division. The villages have put forward a request for support to initiate a community-based village forest reserve in one of their ritual forests, namely the Mpanga forest. It was considered important to follow up the development of this new initiative in the study area.

5.1.2 Participatory Rural Appraisal (PRA)

As a research tool PRA serves the purpose of opening up discussions with villagers on a particular topic of interest. In this particular research the main issue was local community involvement in forest conservation/management. PRA achieve its purpose by making use of simple methods such as mapping, Venn diagrams, time line and matrix scoring, all of which can be handled by villagers with minimum level of education and yet provide useful information (Chambers 1992; Keregero et al. 1993; Kessy 1995). These methods ensure that participants in the discussions are relaxed and thus cooperative, but they also demand substantial explanations by the research team so that the methods are well understood by the participants. To get participants for the PRA exercises in the studied villages, the village chairman was normally requested to call a general meeting of all villagers. The aim of the meetings was explained to villagers before hand. Once a good number of villagers had turned up a location would be identified where exercises could be conducted. Preference was given to locations where villagers passing-by could join the discussions. As time went by each group tended to grow in size.

Presented below is a brief description of the main PRA methods used in this research.

Resource mapping
In each village, the villagers were requested to draw a map showing their village boundaries, land use and resources existing in the village. Easily available materials such as ash, chalk, stones, leaves etc were used to mark the different components on the map, drawn on the ground. Important discussions proceeded alongside the mapping activity. Land availability, forest reserve regulations and impact on village life, availability of different forest products and villager's participation in forest conservation/management were all topics of discussion.

Matrix scoring
Matrix scoring was used to compare the availability of different products used at household level from ecosystems differing substantially in terms of species diversity. This was meant to solicit farmer perceptions on the importance of species diversity with respect to different ecosystems. The products were mentioned by the villagers themselves and the scoring was such that ecosystems with higher availabilities of specific products got higher scores compared to the rest. The maximum score was three while the minimum was zero. Zero was assigned to those ecosystems where the product is not available. Matrix ranking was also used to compare traditional healing and modern treatment from villagers' perspective.

Venn diagram
Venn diagrams were mainly used to evaluate the functioning of local institutions in the villages and to get an insight into the kind of existing institutions which might be of importance if local communities were to participate effectively in forest management. Villagers were requested to list all institutions in their village. Although villagers were

requested to list all kinds of social organizations (formal and informal) currently functioning it was interesting that they did not consider informal organizations such as dancing groups and football clubs, later identified in consequent surveys. Instead, the discussions focused on formal institutions at village level, particularly the committees established in every village for performing specific tasks such as village defence, education, environmental protection and road maintenance. Government institutions such as forestry projects, hospitals and schools together with religious institutions such as the church and mosque were also listed and discussed by villagers. It was clear at this point that villagers did not perceive informal institutions as organizations of interest in relation to forestry/development issues. This might be the result of the lack of attention given to these institutions in earlier conservation and development programmes both governmental and non governmental. A big circle was drawn on the ground and circular cards of various sizes were supplied to villagers. It was agreed that bigger cards were to be used to represent institutions which were stronger (well functioning) and more reliable at village level. It was also explained that cards representing such strong institutions were to be placed closer to the centre of the big circle drawn on the ground. Poorly functioning institutions were represented by smaller cards and were placed further away from the center of the circle. Very poor institutions might even be placed outside the circle. It was explained further that the big circle on the ground represented the village community that was being served by these institutions.

Time line

This technique was used to get information on the most important events in the villages over years. The villagers were first asked to recall an important event that had occurred in their village in the far past. Normally villagers would identify the oldest man in the group and he/she would tell of an event which occurred in the past as far as he/she could remember and this would serve as the starting point. Other villagers would mention events which occurred in more recent years up to the present. Changes that had occurred with regard to forest ownership and management were given more attention.

The four exercises described above were used as a starting point for deeper probing on village conditions and villagers' relations with the forests. Therefore the discussions which went hand-in-hand with the exercises were of prime importance. Further, the exercises were conducted by the main researcher with the assistance of four research assistants who were first trained on PRA methods in Mbomole village. All the assistants were conversant with the area and two of them knew the local language (Sambaa). A report on the findings from the PRA exercises was prepared (Kessy 1994) and will be referred to in this thesis when appropriate.

5.1.3 Household questionnaire surveys

5.1.3.1 Questionnaire design and pre-testing

The survey was intended to pursue major research issues identified during the exploratory phase. Goldman & McDonald (1987) suggest that such detailed surveys are an essential part of research after reconnaissance investigations in order to sharpen the research focus. An open-ended questionnaire was therefore designed, as distinct from a more structured one, to give as much room as possible to accommodate respondent's ideas. As pointed out by Richards (1980) open-ended interviews serve the purpose of disclosing the system of knowledge and structuring of ideas central to the respondent's own views of the world. The

questionnaire was designed to solicit socio-economic data, forest products utilization trends and local people's perceptions of a variety of conservation and development aspects in the East Usambaras.

Prior to the actual survey the questionnaire was pre-tested in Mbomole village, Amani Tanga by the research team after which it was modified to suit local conditions. A copy of the final version of this questionnaire is included (Appendix 1).

5.1.3.2 **The sampling procedure and the actual survey**

Selection of households was achieved through a random sampling procedure. Village governments in the study area keep reliable records on village population. For example, information on the number of households in the village is normally available in all village offices. A household is normally identified by the name of the household head, who might be male or female. For the purposes of this study a list of all household heads was obtained from the village governments in the case-study villages, and from this list a random sample was made. The sampling fraction was 20%. In total, 292 households were surveyed in the six case-study villages.

Like other surveys, interviews were conducted by the researcher with the assistance of a network of research assistants residing in the six case-study villages. Respondents were in many cases a husband and wife whenever the two were available at home. However, other members of the household, especially adults, were sometimes inevitably called by the household head to join the discussions, especially on issues related to indigenous knowledge and forest product utilization. In the female-headed households this occurred most frequently. The head of household is normally the main decision-maker at household level but not always the most knowledgeable. As discussions proceeded attempts were made to take quantitative measurements of forest products utilized at household level. This was quite a difficult exercise because most of the products are collected illegally from the forests. However one day in each week villagers are allowed to enter the forests for fuelwood collection and the women would sometimes "smuggle" some wild vegetables, etc with them. It was therefore important to visit the households on such days, and with good sense of humour a team member would finally manage to measure the collected products, mostly vegetables.

5.2 **Specialized surveys on use of forest products**

5.2.1 **Building materials survey**

This survey aimed to investigate the different building materials that are commonly used by the villagers in different parts of the East Usambaras. Special attention was given to those materials of forest origin such as poles and ropes. In this aspect the kind of species used and the quantities required for a specific building were recorded. The survey also aimed to investigate villagers initiatives to use alternative materials such as sisal ropes and nails. A copy of the forms used is attached as appendix 2.

It was necessary to define a criterion for the selection of houses to be surveyed. Two considerations were: 1) ease of identifying species use for building purposes and 2) achieve to describe the current state of affairs in terms of species used, preferences, and scarcity and use of alternative materials. The houses surveyed were therefore only those under construction at the time of the study and in which the framework structure was completed.

The framework structure in this context implied that all the poles and withies were already put in place and tied together but the house was neither roofed nor plastered with mud. All the houses in this state in the five villages of Mikwinini, Kisiwani, Potwe, Kwamzindawa and Vuga were surveyed making a total of 41 houses.

5.2.2 A survey on items of forest origin

In order to fill information gaps on household utilization of forest products towards the end of the field study period, a survey of items such as utensils used at household level was designed. This was carried out in five of the case-study villages, namely Hemsambia, Kisiwani, Kwamzindawa, Potwe and Vuga. In each of these villages a sample of households representing 10% of the total number of households in the village was selected for investigation. In all a total of 135 households was surveyed. From each household we recorded as many household items in use as possible derived from materials of forest origin. Other information collected was on the quantities/counts of the identified items, species of origin, means of acquisition, purchase prices for the purchased items and finally the expected life time of each item (Appendix 3).

5.2.3 Market surveys

A market survey was carried out with the purpose of collecting information on the kind of forest products which are commercialized. The products included vegetables of forest origin, medicines, walking sticks, carvings, baskets, honey and fruits. These were studied in three markets of Muheza, Tanga (Ngamiani) and Maramba (on the northern side of the East Usambaras). Before the actual survey a preliminary investigation was conducted to get a rough idea of the kind of merchants in the three markets, their tribes, the products they sell and the sources of their products. It was then decided that only those merchants who draw their products from within Tanga region would be studied in detail irrespective of their tribes. A total of 16 merchants were interviewed therefore and their products measured in the three markets. Sellers were asked about the names of the species they were selling, sources where they could get the products, means of acquisition and retail price (Appendix 4). Merchants use different units, such as teaspoonful of medicine in prescribing medicines, for example. In order to quantify the amounts it was necessary to buy the products, get prescriptions and measure at home.

5.3 Forest survey

The purpose of the survey was to investigate the extent of human disturbance to the forests. Human disturbance results from collection of different products such as building poles and medicines. The distribution of tree diameter classes, coppicing trees, dead tree stumps, debarked trees and wildlife traps were used as indicators of human disturbance in the forest. The survey also aimed to investigate the ecosystem's responses to such human disturbances by observing processes such as coppicing and regeneration. Sample plots of 0.1ha in size were made at different distances from the forest edge. The distances considered were 100 to 200 m, 500 m and 1000 m from the forest edge. In these plots observations of various forest characteristics such as species composition, human impact and forest regeneration were made and recorded in special forms designed for the exercise (Appendix 5). A total of 150 sample plots were established and surveyed in Kwamkoro forest reserve.

5.4 **Survey on domestication of forest plant species**

As the interviews proceeded respondents were frequently referring to their farms as main sources of some forest products as opposed to the surrounding forests. It was therefore considered important to investigate the species of forest origin cultivated in the farms and the motives for their cultivation. This survey was therefore designed to investigate the contribution of homegardens in supplying a variety of forest products through domestication. As mentioned earlier, whereas the concept of domestication is applied to both flora and fauna, this research dwelled only on plant domestication.

On-farm investigations were conducted by a team of three experts: the author (trained in natural resources management), a botanist, and a local resource person (a herbalist). The survey was an interactive dialogue between the team and some household members rather than an interview. A special form (Appendix 6) was designed for information recording in the field. Information was sought on the size of farm holdings, land ownership, farming system, household population and main economic activities, use of forest products at household level, plants of forest origin domesticated in the farms, the use of such species, availability of the species products from surrounding forests and reason for domestication.

Three villages were covered for this particular survey Kisiwani, Potwe and Vuga. These were purposely selected to represent the different ecological zones in the East Usambaras. Kisiwani is located in the Amani Division, ranging from mid to high altitudes, with relatively more fertile soils, higher annual rainfall, and surrounded by dense natural forests with more endemic species. The homegardens are more developed and receive better management. Potwe is located in the lowlands, with poorer soils, less rainfall, surrounded by natural forests with fewer endemic species. The homegardens are less developed in terms of species diversity. While Kisiwani and Potwe represent the two extremes of the spectrum, Vuga is intermediate. It is located at mid altitude on the northern side of the East Usambaras, drier than Amani but wetter than Potwe. The soils are relatively fertile compared to those in Potwe and the homegardens are fairly well developed.

Table 4: Farm sizes of the households encountered in the domestication survey.

	Farm sizes (ha) in respective villages		
Farms categorized	Kisiwani	Potwe	Vuga
"Normal" farms	1 - 5 (n = 12)	1 - 5 (n = 15)	0.5 - 5 (n = 14)
Farms which include earmarked areas for gazettement	8 - 10 (n = 3)	6 - 8 (n = 3)	none
Average per village	3.9	3.3	2.5

Selection of households and the farms to be surveyed was random with a sampling fraction of 5%. Table 4 presents the farm sizes for the households surveyed in the three villages. The survey involved a total of 15 farms in Kisiwani, 18 in Potwe and 14 in Vuga. Farm sizes

indicate the demanding nature of the survey because the "walk in the farm" approach was used. However in some cases reported farm sizes included areas which were potentially earmarked for gazettement but which were not yet surveyed.

In each household the team introduced itself to the household head or any other adult who was available at home. The team would then request a member from the household to take them around the farm and discussions would then proceed with casual observations in the farm. The farmer would report a plant in the local language which would either be confirmed or refuted by the local herbalist or any other local adult around. The team would first record the local name(s), then try to identify the plant botanically, and finally would collect voucher specimens for further confirmation of identity. Useful check-lists for vernacular names of species such as those provided by Greenway (1940); Sangai (1963); FTEA, (1952); Rodgers & Homewood (1982); Hamilton & Smith (1989) and Iversen (1991) were also used to assist in identifying the species and analyzing the data.

5.5 Additional data collection

5.5.1 Indepth interviews with key informants

These interviews were conducted by the main researcher using a tape recorder. The discussions were rather informal. Three categories of key informants could be identified:

- Government/Private Company officials;
- Experts/specialists from the local community;
- Youth groups.

In the first category the government officials interviewed included the Regional Natural Resources officer, Regional Forest Officer, the Project Manager Longuza Teak Project and officials from the Tanzania Sisal Authority. A spokesman for the East Usambara Tea Company was also interviewed. The discussions mainly aimed to get the perceptions of different Government/private agencies as to what is the role of local communities in conservation undertakings. Further, the interviews aimed to find out how committed these agents are to conservation activities and if, for example, private companies felt that they were responsible for some of the immigrants who have been alleged to cause deforestation through opening of farms.

In the second category local experts/specialists such as traditional healers, builders, basket makers, hunters and wood carvers were interviewed. It was very difficult to make some of these experts trust that the interviews were not to be followed by legal action against them because most of the forest products they use are collected illegally from the forests. However, attempts were made to educate them about the fact that this was just an academic exercise which could also be beneficial to them in the long run. The interviews aimed to find out the kind of forest products they were dealing with, problems they were facing and potentials for future cooperation between different users and the foresters.

Among the youth groups interviewed were school children and young villagers who in many cases were school drop-outs. The age range was from 15 to 30 years. No prior arrangement was made to get these young men. Most of the school children were either found resting somewhere or playing games. The young men were mostly found around 'jobless corners' either charting under a tree, listening to radio programmes (eg a football match) or playing

cards. Girls were busy most of the day but at water collection points they were willing to be interviewed while queuing for water.

5.5.2 **Participant observation**

This was a very useful method of checking information from the surveys especially on those aspects of village life which most villagers would avoid to discuss openly in an interview or a village meeting; for example, encroachment in the forest reserves to collect building materials. During the two years of fieldwork, constant interactions with the villagers were part of the information collection process. The researcher developed collegial relationships with villagers while trying to study their way of life, making sense out of interactions with the forests in their daily tasks.

5.5.3 **Secondary data collection**

The researcher spent some time in libraries, and project and government offices searching for information. Among the government offices visited in Dar es Salaam were the Forest and Beekeeping Division, The Ministry of Lands and The National Environmental Management council. The Forest and Beekeeping Division is currently trying to implement the Tropical Forestry Action Plan while the National Environmental Management Council is pursuing a National Conservation Strategy for Sustainable Development and carrying out a number of Biodiversity studies countrywide. The Ministry of Lands was pushing for approval of a new National Land Policy. The policy was finally approved in 1995. During the period of secondary data collection in different government ministries and departments the researcher got the opportunity to discuss with senior government officials matters related to conservation at policy level.

5.6 **Data analysis**

The data were systematically analyzed to throw light on the research questions and objectives presented in chapter 3. The analysis was both quantitative and qualitative.

As mentioned earlier in chapter 5.1.2 the findings from the reconnaissance survey and PRA exercises were analyzed in the field to provide some insight for the more detailed surveys which were to follow. However, some of the findings are referred to in forthcoming chapters.

Information collected through the questionnaire survey was coded and fed into an SPSS computer programme for analysis. The coding involved structuring the responses from the open-ended questionnaire and assigning them nominal values for analytical purposes. For the purpose of this study descriptive statistics were of interest in the analysis.

Data collected from the building materials survey, survey of household used items, market survey, forest sampling and domestication survey were analyzed using the Q&A4 database programme. The analysis was mainly in terms of descriptive statistics. Figures and presentations were prepared using Harvard Graphics 3.0 computer programme. Species names and synonyms were cross-checked using Kewensis database (RBG, 1993) with some assistance from the Plant Taxonomy Department at Wageningen Agricultural University.

Content analysis was used to analyze qualitative information from in-depth interviews, and participant observation. The analysis aimed to study the themes and tendencies portrayed in the content of recorded conversations and observations made in the field.

CHAPTER 6
LOCAL LIVELIHOODS

This chapter is divided into three main sections. The first section presents the demographic situation in the study area in terms of population size, population growth trends and ethnicity. The second section describes the farming conditions in the area and how they affect forest resources. The section further presents an analysis on the limitations associated with the farming system in the East Usambaras to provide an insight on the role of forests in the farming system. The third section discuses the local institutions that are in place and their potential for participation in forest conservation issues.

6.1 Demographic situation

The East Usambaras have a heterogenous human population with a relatively high population growth rate. The national census conducted in the area (1967, 1978 and 1988) indicates population growth trends as presented in Appendix 8. According to these estimates the average population growth rate for the whole area is around 1.6% per year. The population growth is the outcome of both natural increase and in-migration. The majority of inhabitants arrived in recent migrations (during the last 100 years) in search of arable land and employment opportunities. The total population of all villages in the East Usambaras in 1988 was estimated at 113,400 people with an average village population of about 2000 inhabitants. During this survey, a total population of 14,230 inhabitants was recorded from the six villages implying an average village population of about 2372 people, suggesting a total population of about 128,000 for all the villages in the study area. During the 1988 national census it was estimated that the population would increase at the rate of 2.1% per annum suggesting that by 1996 population size would be around 133,800. My own estimate from survey work is less than this. It is not clear what has caused this slight decline. It might be an indication that immigration has dropped, due either to the decrease in amount of land available for clearing or poorer prospects in the tea estates as tea prices drop. It could also mean that family planning measures are now observed more seriously, given the well established family planning unit in Amani. The average household population was about 7 persons/household. About 30% of the surveyed households had more than 8 persons/household. The maximum number of inhabitants per household recorded was 17 while the minimum was 2 persons. The population was supported by an average farm size of about 3 hectares.

The survey also revealed the heterogeneity of the community in terms of ethnicity (Table 5) while Table 6 gives the background of different inhabitants (natives or immigrants). The figures in Table 5 indicate that the majority of inhabitants are from the main ethnic groups in Tanga region namely the Sambaa, Bondei and Zigua. Other ethnic groups represented in the area include the Pare, Hehe, Digo, Chagga, Kisii, Kamba, Nyamwezi, Nyiramba, Sukuma and Luguru. However, most of these are immigrants from highly populated districts within Tanga region such as Korogwe and Lushoto in the West Usambaras and from other parts of the country (as confirmed in Table 6). Through participant observation it was evident that some of the people who claim to be natives are just the earliest immigrants who settled and grabbed land before the others. This was very evident in the villages around tea estates like Mikwinini, which is largely an immigrant village. The timber boom in the 1960s and 1970s brought with it renowned pitsawing ethnic groups such as the Hehe, Bena and Kisii.

The Chagga and Pare originate from the highly populated Kilimanjaro region which neighbors Tanga region on the northern side. These two ethnic groups are known for being enterprising and control a wide range of petty business in the East Usambaras. Recently reported illegal pitsawing in Kisiwani Village (as revealed in PRA exercise, FAO/GEF 1995) was thought to be the work of a few Chagga settled on the peripheries of villages. At a time when pitsawing is prohibited they find it especially lucrative. They are believed to have hired some Kisiis who are good pitsawers. The other ethnic groups such as the Sukuma, Nyamwezi and Luguru do originate from the central and western part of Tanzania and their settlement in the East Usambaras is mainly associated with employment seeking in the surrounding estates. In years of good tea harvests the Tea Companies in the area make deliberate trips to the Western part of the country in search for cheap labour. The interested individuals, mostly young people in the age of 16 to 30 are transported to the area and are given temporary employment contracts. After the harvesting season their contracts expire, they are paid meager terminal benefits and most of them decide not to return to their original homes. Instead they hang around searching for temporary employment, farming opportunities and petty business. Many of them decide to settle for good.

The distribution of ethnic groups in the area reveals some kind of pattern in relation to specific ethnic groups. Whereas the Sambaa, Bondei and Zigua are found in almost every part of the East Usambaras, the Bena are more concentrated in the lowland villages where historically they immigrated to these lowland areas to work in the sisal estates. Some Benas have also settled in the Amani plateau where they worked in tea estates. A peculiar situation is encountered in the northern side of the East Usambaras, namely in the villages of Hemsambia and Vuga. These villages are very close neighbouring Kenya and some ethnic groups namely the Taita, Kisii and Kamba originate in Kenya. While the Kisii and Kamba (good pitsawers) have moved to other parts of the East Usambaras the Taita who are mostly farmers have settled in and dominate the village of Hemsambia. The other ethnic groups are scattered in the area without any particular pattern.

Table 5: Ethnicity of household heads, of 292 households surveyed in six villages.

Head's tribe	Frequency	Percentage
Sambaa	153	52%
Bondei	34	12%
Taita	29	10%
Zigua	26	9%
Bena	15	5%
Others	35	12%
Total	292	100%

Table 6: Reported history of household heads in 292 households surveyed in six villages.

	Frequencies and recorded percentages in respective villages						Area totals and percentages
	Kisiwani	Mikwinini	Kwamzindawa	Potwe	Hemsambia	Vuga	
Natives	26(43%)	5(25%)	5(12%)	38(55%)	10(18%)	29(51%)	113(39%)
Immigrants	34(57%)	15(75%)	26(75%)	31(45%)	45(82%)	28(49%)	179(61%)
Village location	High/medium altitude in Amani Division		Lowland zone along the Mnyuzi escarpment		Medium altitude and drier north of East Usambaras.		

6.2 Farming conditions and their relation to forests

6.2.1 Land ownership and farm holdings

Most of the land in villages is owned under customary tenure conditions (acquisition through the local chiefs followed by inheritance). Most villages were affected by the villagezation policy as a result of which all the land within a village is categorized as "village land", but within this category individuals own plots acquired customarily and thus feel that the land belongs to them. Immigrants therefore have to borrow land from indigenous people or encroach on the forests, especially those in the public domain. During the PRA exercises conducted as part of this research the condition of having landless villagers was denied in all the villages. However it was generally agreed that there was a substantial number of immigrants who were living and farming on land they had borrowed from villagers who owned relatively bigger pieces of land. This land borrowing practice was locally referred to as *Kinyange farming*. Most of the Kinyange farmers were young, just married and unlike the rest of the villagers they perceived themselves as being landless villagers.

The research pursued the issue of land ownership further through household surveys and made an investigation of the different means by which farmers had acquired their land. Further inquiries were also made concerning the size of farm holdings and the sufficiency of such holdings to meet household demands, as perceived by the farmers themselves. The average farm size per household in the studied villages was about 3 ha., the minimum being 0.5 ha. Some farmers reported farm holdings of up to 10 ha. but these included areas which had been earmarked for gazettement by the EUCFP. Table 7 presents the reported means of land acquisition in the studied villages.

Land allocation by local chiefs and later by village authorities was mainly done for early immigrants who arrived in the area when there was still plenty of land. It was also done when a son grew up and he wanted to be independent. He was then supposed to request for land from the leaders and they would allocate him a piece of land. Only about 11% of the interviewed farmers (mostly elderly household heads) reported to have acquired land this way. The majority of farmers (about 53%) inherited their land from their parents while about 23% purchased their land.

Table 7: Reported means of land acquisition for 292 surveyed households in the six villages.

	Frequency	Percent	Cumulative %
Village allocation	31	11	11
Purchased	68	23	34
Inherited	154	53	87
Borrowed *(Kinyange)*	39	13	100
Total	292	100	

Since state ownership of land dominates in Tanzania, purchasing of land was more of a local arrangement among the interested parties with some few witnesses (mostly village leaders). Such purchased land would still be considered as owned under customary tenure rights. So what you actually sell is your customary tenure right. The study also revealed that about 13% of the farmers are farming on borrowed land. They do not feel secure on the land although some long-term investments such as tree planting could be observed on their farms. Most of these are young couples and have a strong feeling of being landless. However they do not have much hope of getting their own land in the area. Some youths have indicated their willingness to move to other areas if the necessary conditions exist, as discussed later.

6.2.2 The farming system in relation to forests

The majority of inhabitants (about 84%) in the studied villages are farmers and consider farming as their main economic activity. Farming in this context includes livestock keeping. Only about 5% of the surveyed households kept livestock (mainly cattle, sheep, goats, pigs and poultry). Improved breeds of cattle were more common in the Amani Division where a Dutch-funded dairy project is operational. Pigs were only encountered in non-Muslim households and almost every farmer kept local breeds of chicken. Other economic activities include employment in the tea estates or government offices, petty business (such as small hotels, local beer brewing, kiosks and tailoring), traditional healing and production of various household items such as baskets, curving and furniture. It was noted, however, that even those inhabitants who were involved in other activities had their own farms, although they spent less time in the fields compared to full-time farmers.

Shifting cultivation is still practiced in some areas of the East Usambaras. With the steep terrain and highly leached soils land under cultivation becomes unproductive after three to four years of continued cultivation, making it necessary for farmers to open up new areas for subsistence farming. The old farms are then left fallow. Much of the cleared land would be from natural forests either through encroachment into forest reserve edges or from the poorly controlled public land forests. Given the intensification of forest patrols by forest field staff around the forest reserves the tendency has been for farmers to grab land from the public land and assume its ownership. This intrusion into public land forests gives the farmer some room for maneuver as he waits for the fallow land to regenerate its soil fertility over years. However the process contributes to the dwindling size of forest cover in the area which is an issue of much concern to biodiversity conservationists. Plate 1 (page 94) reveals the contrast between protected forest reserves and poorly managed public lands in the study area.

The main crops cultivated vary from one location to another. Around Amani the main food crops include maize, beans, bananas, yams and cassava while the main cash crops are sugar cane, cardamon, black pepper, cinnamon and cloves. Coffee was introduced in the late eighties as a cash crop by EUCADEP (East Usambara Conservation and Agricultural Development Project) but lack of ready markets discouraged the farmers, who finally decided to pay less attention to this crop. Fish farming was also introduced by the same project in most of the villages in Amani area. The productivity of the main food crops is low due to soil acidity and leaching. The crops also take a longer time to mature due to lower temperatures compared to the lowlands. The main problems with the introduced cash crops such as cardamon, cinnamon, cloves and black pepper is unreliable local markets after a breakdown of local cooperatives as reported by 80% of respondents. In the lowlands along the Mnyuzi escarpment and in the northern side of the East Usambaras the main food crops are cassava, maize, beans, swamp rice and sweet potatoes. The encountered cash crops were cardamon, sugarcane, poorly tended coffee (in Hemsambia), a variety of spices and coconut which serves both as a cash and food crop.

Poor transport infrastructure and costly farm implements were also reported to hinder farm productivity. Transport is a major problem on the northern side of the East Usambaras where even a very robust 4-wheel drive vehicle can only make it halfway to the villages of Vuga and Hemsambia from the main bus/lorry terminal at Daluni. This has slowed down the speed of investment in the area and has affected economic growth. Rarely are these villages visited by agricultural extension workers and some researchers classify them as being unaccessible. Informal interviews with farmers and youth groups in the villages of Vuga and Hemsambia have shown that these groups are aware of, admire and long to receive the extension services offered in Amani Division (it takes about 12 hours walk from these villages to Amani) by the EUCADEP project. Deeper probing revealed that farmers were much more interested in the introduced crops in Amani and frequent visits by extension workers. Most of them also believe that such project activities in their area would draw the attention of district and regional authorities to do something about the road. Discussions with the EUCADEP project (Ramsay & Kessy, 1996) revealed that the project had plans to extend to this area and it had also taken initial steps, such as recruitment of an officer in charge of the area and reconnaissance. However, these plans were frustrated by irregular funding from the project financiers, namely the EEC.

Generally speaking the whole area lacks a strong cash crop economy mainly because of poor soils, costly farm implements, insufficient research and above all poor marketing infrastructure which acts as a disincentive to increased productivity. The author is not convinced that the problem of outright land scarcity, which is frequently cited by agricultural projects in the area as the reason for poor cash crop development, is valid. The issue is more one of land distribution and management. At every point in time in the East Usambaras there are some farms left fallow, indicating that some farmers have land to spare while others have none. This is confirmed by the *Kinyange* farming practice described in the previous section. That being the situation it is not proper to generalize that land scarcity is the biggest problem hampering productivity in the East Usambaras. However, soil fertility is a problem especially on the high elevations. Further, even in those areas where land is insufficient, experience from other populated areas of Tanzania with smaller farm holdings, like those in the highlands of Kilimanjaro and Bukoba, have shown that with proper land husbandry it is possible to develop a strong cash crop economy based on well-managed agroforestry systems.

The livestock component in the agroforestry systems of Kilimanjaro for example has buffered the soils against extreme leaching effects and farm productivity was proved to decrease in proportion to decline in stall fed livestock at household level (Okting'ati & Kessy, 1989). The only disadvantage that the East Usambara farmers have when compared to farmers in Kilimanjaro and Bukoba are the poor soils. However, casual observations in the field, especially visits to the so called "contact farmers" under the EUCADEP project, reveal much difference in farm performance between dairy cattle owning farmers and the rest. Cattle owners tend to have better farms as a result of good land husbandry and the use of manure.

Selling food crops to urban areas through middlemen immediately after harvesting is a common practice in the East Usambaras to improve household liquidity. This practice not only threatens household food security at later times of the year but it provides poor cash returns as well. This is normally because crop prices are low during the harvesting season when markets are flooded.

6.2.3 **Small scale tea and cardamon farming**

A controversial proposal has been put forward by the tea estates encouraging farmers to convert some of their farm holdings into tea plots in order to boost their cash economy (Ellman & Ngaiza, 1994). Despite the attractiveness of the venture based on financial criteria the proposal has been radically challenged by the conservation projects in the area. According to this proposal farmers who would devote their land to tea farming would get support from the tea estates in terms of herbicides and marketing of the produce. Environmentally oriented projects in the area argue that tea farming is not environmentally friendly since it uses herbicides and pesticides. It has further been argued that in a catchment area like the East Usambaras enough tea farming has been tolerated so far from the tea estates and converting farmer's plots to tea would worsen the environment in terms of water pollution.
The author has a few observations to make in relation to the proposed scheme. First, given the poor soil conditions in the area only a limited number of crops can perform well and one of them is tea. Secondly, although land scarcity is perceived as a common phenomenon in the area there are some farmers who own land which they do not utilize fully. Thirdly, the area lacks a strong cash crop economy which would improve the local standard of living. From these observations, rejecting the proposed scheme out of hand courts the danger of "throwing away the child with the bath water". A more detailed investigation on the land holdings that farmers possess and their utilization, advice on the amount and type of pesticides to be used and proper land use plans at village level might come up with a compromise through which farmers might be better off without worsening the existing environmental problems in the area. Other factors need to be taken into consideration as well. For example, tea is a perennial crop which entails long term investment and uncertainties about the future prices need to be considered.

The controversy of cardamon cultivation in the East Usambaras has been well documented (Hamilton & Smith, 1989; Owen, 1992; Sengoe, 1994). Cardamon, a shade loving crop, is a heavy nutrient feeder and a good cash crop, encouraging farmers to open up the forest understorey for its cultivation. Soil depletion was fast and more land was required implying more openings in forested areas. The crop has been largely condemned for its contribution to the rolling back of natural forests and soil depletion. Discussions have been going on about what would be sustainable cardamon cultivation in the East Usambaras in the sense that this could fill part of the cash crop vacuum. During this research discussions were held between

the researcher and one of the agricultural projects in the area which has been pursuing the issue of sustainable cardamon cultivation (namely the EUCADEP). It was revealed that EUCADEP had planed to conduct joint research between the project and the Tanzania Forest Research Institute (TAFORI) to work out the modalities of cultivating cardamon in farmers' homegardens sustainably. In the research, EUCADEP, with technical assistance from IUCN would work on the agricultural component while TAFORI would concentrate on the tree component in the agroforestey systems around Amani. Unfortunately this research was not undertaken due to irregular funding from EEC.

Casual observations in the field show that farmers have been experimenting on this area where EUCADEP and TAFORI failed to do something. In the Villages of Vuga and Hemsambia where there isn't much forest to open up for cardamon cultivation some farmers have tried cardamon in their farms (Plate 2, page 94). Few such experiments could be observed but still the cardamon was performing well, may be because these experiments were in what one could call "the first rotation". The author is therefore a bit pessimistic about the future performance of these experiments mainly because cardamon is a heavy nutrient feeder and farm manure is scarce (given the lack of livestock already noted). A shift from cardamon cultivation to sugarcane has been observed in some areas (Schut, 1996), especially on the Amani plateau as a coping strategy in relation to dwindling soil nutrients, pressure from the foresters against forest encroachment and poor crop marketing conditions. Although this coping strategy can be more rewarding for the farmer (in the sense that the market for sugarcane is readily available), it tends to encourage on-farm deforestation because sugarcane, unlike cardamon, prefers areas without forest canopy.

6.2.4 Effects of forest reserve extensions on farming

Over the years the land use patterns in the East Usambaras have been changing, especially on the forest-farmland interface. Many changes have been a result of the implementation of the EUCFP activities in the area, a project intended to safeguard the forests of the East Usambaras against human destruction, strongly backed by the Forest and Beekeeping Division and well financed by FINNIDA. The project has involved itself quite extensively in gazetting more land from the public domain since 1993 and the establishment of the proposed Amani Nature Reserve. This involvement has substantially reduced the amount of farming land and public forests. Figure 6 presents the three classes of land use in the forest-farmland interface, namely dense forests, poorly stocked forests and cultivation under canopy as reported by Hyytiainen (1995) and updated by Johansson & Sandy (1996). While the category of dense forests is self explanatory, the poorly stocked forests are mostly made up of areas heavily logged during the East Usambaras timber boom of the late sixties and early seventies. The third category of cultivation under forests consists of farmlands in both gazetted and public forests where shade loving crops like cardamon and a variety of food and tree crops such as coconut and fruit trees are cultivated by local people. In principle the gazettement procedure re-categorizes a piece of land as a forest reserve area where human activity is prohibited. This gazettement in some areas was intended to join isolated pieces of forest land and create some wildlife corridors in the proposed Amani Nature reserve. From the estimates in Figure 6 one of the outcomes of the gazettement process is the reduction in size of farmlands (cultivation under canopy) in the public forests from a total of 8878 ha. before gazettement to 8429 ha. after gazettement indicating a difference of about 449 ha. This difference has been added to the catchment forest land as indicated by an increase in the category of cultivation under canopy from 2138 ha. before gazettement to 2587 ha. after

gazettement. The figure of 449 ha. appears to be small, but in an area where the average farm size is 3 ha. per household of 7 people one could say that the gazettement decision carried with it a negative externality of placing about 150 households (supporting about 1050 inhabitants) at risk of landlessness.

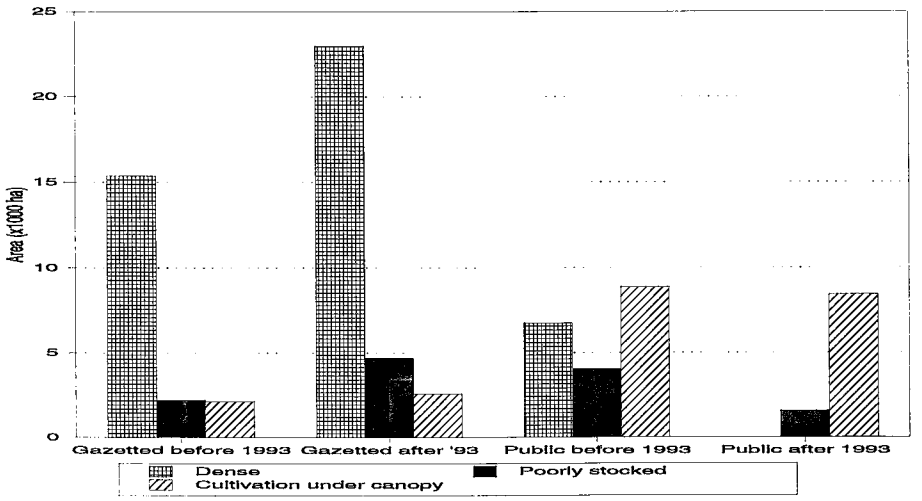

Figure 6: Area and type of forest cover of gazetted and public forest in East Usambaras by class, before and after gazettement proposals by the EUCFP Catchment Project (after Hyytiainen, 1995; Johansson & Sandy, 1996)

This newly gazetted land is supposed to be protected for natural regeneration to take place leading to a secondary natural forest that will form part of the Amani Nature Reserve. Farmers were supposed to be compensated in monetary terms for their crops. An evaluation team was commissioned when this study was on-going to estimate the amount of compensation due to the farmers. At this stage farmers were complaining about the low price tag attached to their foregone crops by the evaluation team. The farmers were further complaining that not only were the foregone crops poorly evaluated but (to put it in academic language) the value of land as a resource was not part of the evaluation computations. Compensation payments were delayed because of what EUCFP described as irregularities in the evaluation process, whereby some farmers were believed to have cheated the evaluation team on the size of their holdings. Finally payments were effected in early 1996 but it was only 30% of whatever was evaluated that the farmers received. Anger was piling up on the farmers side and the district authorities together with EUCFP management had to hold discussions in all the affected villages encouraging farmers to launch their individual complaints on any irregularities in the evaluation process to the district office which would handle the complaints on case-by-case basis. Farmers were also promised that the remaining 70% would be paid sometime in the future if the government secured some funds. It was at this point that the researcher held discussions with the EUCFP management, district and regional authorities as part of the East Usambaras Planning mission (Ramsay & Kessy, 1996). Although the project management was not too happy with a situation that might

jeopardize the success of its farm forestry mission with the farmers the district and regional authorities were of the opinion that everything was under control after previous discussions with villagers. The author is still very skeptical as to whether the 70% would be paid, given the country's torn-apart economy and the prevailing state ownership of land. The latest development in the issue is not too promising either. The Prime Minister visited the area to lay the foundation stone for the would-be Amani Nature Reserve offices under construction in Kisiwani Village. In his speech he addressed the issue with two clear messages: first compensation was more of a favor than a right since all land in Tanzania belongs to the state and so farmers should be patient. Secondly to avoid such complications in the future farmers should be encouraged to manage such would-be gazetted farmland areas as reserved areas within their holdings. The author finds these two messages to be contradictory under the existing land tenure system. Unfortunately the Prime Minister's visit took place shortly before the author completed his research, so the consequences cannot yet be assessed.

6.3 **Local institutions**

Local institutions constitute an essential component of any attempt to facilitate civil society engagement in conservation matters. Local representation and participation in the decision making process need to be achieved. Further, institutional norms accepted and observed by civil society provide the opportunity for community members to share responsibility, as might be necessary after the decision making process. The local institutional set up in the East Usambaras is therefore discussed in the next sections.

6.3.1 **Households as social organizations**

The household was found to be the basic unit of social organization around which most family activities revolve. A household normally consist of family members (husband, wife/wives and their children). In the extended African family set up a household frequently consists of close relatives assimilated in the family. For the purpose of this study, a household was considered as a production unit consisting of all members living together, working together and enjoying the benefits of their work together, normally under the leadership of a household head. About 40% of the surveyed households were made up of members from extended families while 60% were nuclear families. Social identification by kinship was evident despite the fact that intermarriage between different ethnic groups is a common practice. All the ethnic groups encountered during the survey were patrilineal, implying that land and other inheritable items would be subject to the customs of the father's clan. Through questioning and participant observations there seemed to be minimum conflicts in intermarried families from different ethnic groups. The most common conflict reported was with intermarriages between Bondei women married to men from other ethnic groups on the issue of burial ceremonies. In the Bondei tribe the wife has to be buried in her father's land while among the other tribes like the Sambaa she has to be buried in her husband's land. This implies that a Bondei woman married to a Sambaa, for example, would have to be carried back to her father's place for burial ceremonies, sometimes against the will of the husband. This has almost been accepted as a norm and complications only arise in cases of stubborn husbands. In very friendly cases, however, some Bondei in-laws allow their daughters to be buried by their husbands from other ethnic groups.

6.3.2 **Absence of "shadow leaders"**

Above the household level the next level of social organization is the village. As it will further be emphasized in the forthcoming chapters, the village government is the strongest

institution at local level. Normally the village is subdivided into a number of subvillages each with a subvillage leader who is answerable to the overall village leader. The village leaders are in turn answerable to higher authorities at Ward level. The hierarchy continues up to the Division, District, Regional and National levels. Socially the village authorities handle all day to day activities in the village. Mass mobilization for activities of common interest is one of the major duties of village leaders. An interesting feature in the East Usambaras, where the community is very heterogenous in terms of ethnicity, is the absence of "shadow leaders". One could expect a chain of power brokers based on ethnicity or main economic activities such as tea plucking. For example in the Mtwara region southern Tanzania, it has been observed that village leaders are almost dependent on traditional ethnic leaders in making their decisions. Msanga Mkuu village is one example where the traditional female leader (from one out of the three local ethnic groups) locally known as *Namalango* virtually controls two village governments because of her supposed supernatural powers and links with the ancestors (Kessy, 1993 - fieldwork). Village leaders have to consult her regularly before making a serious decision at village level. This is not happening in the East Usambaras. The difference is that all the three ethnic groups in Msanga Mkuu feel strongly attached to this traditional leader and it has been like that for centuries, unlike in the East Usambaras area where there is a very weak bond between immigrant ethnic groups and indigenous beliefs. As such when the village government is put in place and when the authority given to such an institution is well defined, the immigrants do not have strong reasons not to support this kind of institution. Most of the inhabitants are therefore more formalized and identified by their common interests in the area rather than by their ethnic origin and they rely upon the village authorities as facilitators more than rulers, because most services (eg. land acquisition) go through the village authorities. In practical terms the village government handles all activities at village level, ranging from social problems such as disputes to mass mobilization and local administration. The fact that the Ujamaa policy, which has operated in Tanzania for about two decades, has influenced institutions at village level cannot be neglected. According to this policy of *brotherhood* any individual who would dare to oppose the village government would be considered a traitor, working against the system. In an area dominated by immigrants, this feature has contributed to moderating the powers of earlier immigrants and it was in a way in favor of immigrant ethnic groups, who thereby have an equal chance of contesting for village leadership.

The village government structure is not without weaknesses. One of the weaknesses observed was the poor attendance of villagers at village meetings. Village meetings provide the platform for discussions and deliberations on important matters touching the daily lives of the village community. These meetings also are used for political campaigns, mass mobilization and visits by researchers. The villagers seem to be tired of frequent meetings. It was surprising however to discover that when villagers were interested in a particular subject and when they felt that their opinions were valued they would turn up for meetings. For example, initially villagers thought that the current research was intended to discuss the modalities of compensating farmers for their gazetted farms - some had thought that FAO (the sponsors of this research) had specifically sent the researcher to re-assess the compensation issue and pay the farmers. The turn-out for the meetings during the first PRA in most villages was enormous. The number decreased as the truth was discovered. Even so, the compensation issue formed part of the discussions in the research, and for this some villagers found it interesting and continued to participate. Informal socialization with villagers

after meetings (eg. drinking tea together) gave most farmers the impression that their participation was valuable and boosted their morale to participate in future gatherings.

6.3.3 **Institutions categorized**

Both formal and informal institutions exist in the study area. The formal institutions can be categorized into administrative, production and supportive institutions. Among the administrative institutions are the village, ward, division, district, regional and national authorities. Production institutions include those actively involved not only in production of goods and services but also in touching the daily lives of the community, with an impact on conservation initiatives. The tea estates, sisal estates and a national livestock ranch were the major ones encountered. Smaller ones like the sugar making groups were also present. Supportive institutions include projects and NGOs operating in the area. Informal institutions included football clubs, traditional dancing and singing groups, ritual clans and chess clubs.

6.3.3.1 **Village-to-national administrative hierarchy**

As briefly mentioned in the previous section, there exists a hierarchy of administrative institutions from village to national levels in Tanzania. A village is essentially an administrative assemblage of sets of households residing in an area geared towards fulfilling central government objectives and fostering rural development. Within the villages in the study area sets of households form sub-villages and ten-cell organizations. A ten-cell organization is made up of ten households within a subvillage and each ten-cell has a leader. Several ten-cells make up a subvillage which also has its leader. The subvillage leader is answerable to the village government which is normally made up of 25 members including the village chairman. Twenty four out of the 25 members including the village chairman are elected by the village general assembly while the village executive secretary is appointed by Divisional authorities on behalf of the district authorities to safeguard central government interests in the village government. The village government then elects a number of committees from within itself to oversee different aspects of village life, such as welfare committee, security committee, political awareness committee, environmental committee and the like. The village administration is in charge of all administrative matters at village level and is essentially a reflection of the central government administration in a village. The village government is answerable to ward *(Kata)* authority which in turn is answerable to divisional *(Tarafa)* authority. The hierarchy continues to district, regional and national administration. At each level there are government offices in charge of different sectors of the economy, natural resources included. Representatives of the Forest Division (regional, district and divisional forest officers) are therefore part of the hierarchy. In the early seventies the central government endorsed a policy intended to decentralize power to regional authorities and in early 1996 decentralization to district level was endorsed.

The survey revealed that the role of village governments as far as conservation was concerned was mainly to mobilize tree planting activities, fire fighting and to see to it that villagers observed soil conservation measures. Three committees within the village government were in charge of these activities, namely the environmental committee, the security committee and the welfare committee. The villagers had much faith in the village government as an institution and when poor leaders were in place, villagers would push for an immediate change to safeguard their interests. This was necessary in Kwamzindawa, but the check does not always work because according to government regulations changes can only be made after 5 years unless there is an emergency such as death.

A critical examination of the village government as one of the key institutions at local level raises a number of questions. One of the questions is whether the village government is really a civil society institution involved in the independent defence of local community interests, or merch the long arm of the state. The main characteristics of village governments include the facts that village governments are essentially a reflection of the central government at village level, they are politicized and culturally detached from traditional village structures, and they are quite formal. Despite the fact that the village governments are so far the best facilitators of joint action at village level in most parts of the country they are in principle central government units whose long history under the Ujamaa era has suppressed senses of togetherness and brotherhood based on community interests. These characteristics, when added to the poor attendance in village meetings, make it necessary to consider other kinds of institutions in the civil society realm which might supplement village governments. Examples of these are informal institutions discussed in chapter 6.3.3.4.

6.3.3.2 **Production institutions**

Tea estates in Amani division are a joint venture between the Government of Tanzania and two private companies namely the East Usambara Tea Company (EUTCO) and Karimjee Agriculture Limited (KAL) with support from CDC. They provide employment to local people and participate in conservation initiatives. For example when the research was on going an agreement was signed between the Forestry and Beekeeping Division (FBD) and the tea, companies which allowed FBD to manage natural forests on the private companies land to facilitate the establishment of Amani nature reserve. The estates also have been responsible for an influx of people into the area initially working as employees but finally settling as squatters. The squatters have been responsible for some forest clearance for agricultural land. Interviews with the tea company authorities revealed that the companies do not feel responsible for the destruction caused by the squatters because, according to the companies, once the employment agreement is over they have nothing to do with ex-workers. The interviews also revealed that the tea companies management does not value the forests for their biological value but rather as source of rainfall. According to one official, "A forest is a forest be it made up of one species or thousands of species; it is the same to our company provided it brings rainfall". For the biodiversity lobby the assignment is still tough!

Unlike the tea estates in Amani, sisal estates and the Magunga ranch are on the lowlands along the Mnyusi area. The two institutions are owned by the government and are both performing poorly. The importance of these institutions, however, has been their continuous conflicts with surrounding villagers in terms of villagers encroachment on to estate and ranch land. In Potwe village for example, farmers intruded sisal estate land and cultivated food crops. Kwanzindawa villagers also constantly intruded the ranch area. Farmers argue that since the performance of these institutions is so poor then allocation of vast areas of land is a wasteful way of using resources while surrounding villages are suffering from land scarcity.

The sugar-making women's groups are mobilized by EUCADEP. Their productivity is sometimes as low as 2 kg. of sugar per week. They have constantly been challenged for using too much fuelwood to produce so little sugar. With irregular funds from EEC to EUCADEP the frequency of visits by EUCADEP staff to encourage these groups has declined. However, these groups are potential key players in conservation undertakings in

the future because they provide a basic organizational structure for women upon which stronger groups might later be formed.

6.3.3.3 **Supportive institutions**

The main supportive projects in the area are the EUCADEP and EUCFP. The two projects work closely with KCFP, a small programme centered on the village of Kambai. Other projects include the Tanga Small Scale Dairy Project, Longuza teak project, Biogas project and various religious institutions.

The exceptional ecological status of the area and severe threats to the forest ecosystem have resulted in a number of forest conservation initiatives. These include:

- The *East Usambara Conservation and Agricultural Development Project* (EUCADEP) under the Ministry of Agriculture and Livestock Development, established in 1987 with funding from the European Community and technical assistance from IUCN, and now nearing the end of its second phase.
- The Forest & Beekeeping Division's *East Usambara Catchment Forest Project* (EUCFP), which commenced in 1991 with Finnish funding and technical assistance, and now in the second year of its second 4-year phase.
- The new NGO-sponsored *Kambai Forest Conservation Programme* (KCFP).

EUCADEP was designed as a "conservation-with-development" project, emphasizing community development as a means to benefit local residents and thereby reduce pressure on the forests. During its second phase, 1993-1996, EUCADEP has confined its activities to areas outside the gazetted Forest Reserves, in one Division of Muheza District. EUCFP was initially designed to strengthen management within the forest reserves, but is now beginning activities outside the reserves. The project operates in two districts, Muheza and Korogwe. The small KCFP is active around Kambai village.

All three projects share a common goal - conservation of the forests for their intrinsic value and for the benefit of present and future generations. However, the two major projects are characterized by differences in approach. EUCADEP emphasizes *process* (such as training, farm visits and participatory extension approaches), whilst EUCFP has used more traditional measures such as forest patrols. Of late EUCFP has begun experimenting with participatory approaches in farm forestry initiatives, but these are still in their infancy stage. The biggest challenge to EUCFP at the moment is to balance the newly introduced participatory approaches and the normal patrolling duties assigned the same field staff. Essentially the field staff have to present themselves to the farmers in two colors, one as a friendly extension worker advocating local participation and the other side as a strong "forest policeman". Negative reactions to the recent gazettement operations increase the degree of pessimism about the success of the farm forestry initiatives.

The Longuza teak project located in low-to-mid altitudes in the study area is both productive and supportive. The project which is under the FBD is involved in the production of various teak products such as sawlogs, poles and tree seeds. Revenues generated find their way to the national treasury through the FBD. However it is also supportive to villagers, by supplying fuelwood and seedlings to surrounding communities.

The Tanga Small Scale Dairy Project supports the villagers under a programme which can literally be translated *borrow a cow, pay a cow*. Through this programme farmers can

borrow improved breeds of pregnant heifers. The farmer pays back to the project a pregnant heifer after sometime and retains the old cow. The paid-back heifer can then be borrowed by someone else and the cycle continues. The project is beneficial to the farmers and has a very high potential to solve household food security and nutritional problems, increase household liquidity through sales of milk and improve soil fertility through farm manure. Farmers have formed a milk marketing cooperative called *UWAMA* which facilitates the marketing of milk to urban areas (mainly Dar es Salaam). The programme is funded by the Dutch Government.

There is a small biogas project which combines both research and support to local farmers who own cows. Farmers are assisted with the installations of biogas plants which make use of cow dung to provide household energy at reasonable costs. The project which is operated by the Department of Animal Science of Sokoine University of Agriculture is not too conspicuous in the area mainly because of its experimental nature and the small number of farmers who own cattle and can afford installation costs. Discussions with project facilitators revealed that the demand for the service has increased over the years. The author sees a lot of potential in this undertaking to address the energy crisis in the area, thus reducing pressure from woodfuel collectors on the remaining forests.

Religious institutions are among the most operational NGOs in the study area. They compromise various Christian and Muslim denominations. They participate in conservation activities such as tree planting initiatives and are normally willing to assist in mass mobilization.

6.3.3.4 **Informal institutions**

A common characteristic for most informal institutions encountered in the study area is that they are socializing groups and only in very few cases have they been mobilized to participate in conservation initiatives. One such group, religious in orientation, is the organization of ritual clans. But some ritual clans supposed to conduct traditional rituals such as rain making in the northern part of the East Usambaras have been involved in serious deforestation scandals. Nevertheless these kinds of informal institutions still offer some potential in serving as informal conservation-oriented institutions in the future, because conservation in the East Usambaras depends in part upon local peoples identifying themselves with the area and deriving pride from thier area and its resources. Some informal institutions already have proved themselves vehicles for building a sense of identification with area, and these groups might serve as catalysts in mobilizing the rest of the community. One such example - modern rather than traditional - is that of football clubs.

Local football clubs in the East Usambaras are organized at two levels. There are clubs organized by village and those organized by formal institutions like the tea estates and projects. Most villages have football teams. These are more common in the villages located in the lowlands than in the highland. For example in the lowland village of Potwe nine powerful football clubs were identified while only one case study village in Amani (Mikwinini) had a football team. However, other football teams exist in other non-case study villages around Amani such as Mlesa and Mbomole. In the northern side of the East Usambaras where the terrain is not attractive only school boys football teams were observed. Girl football teams are absent except in schools where the game is encouraged. Girls do play other kinds of sports like handball but this is also confined to schools. A very strong feeling

of identity exists between villagers and specific football teams. Generally when two villages are opposing each other spectators from each village would support their village teams. Around Amani there are several football teams organized by different formal institutions. These include the tea estate teams (eg Bulwa and Kwamkoro), Malaria Research Institute team, EUCADEP team and Kwamkoro Secondary school team. These get supporters not only from the formal institution workers but also from surrounding villagers. Unlike football clubs which are more organized, chess playing groups are more temporary. They are common in jobless corners and near kiosks. Although there are drafts players they do not have permanent supporters. It remains to be seen whether some of the local identity focussed by football could be aligned with care for the local environment as a statement about village identity.

Traditional dancing and singing groups are organized at village level. They do not meet too frequently but whenever there is an occasion in the village or at Ward/Division level some village dancing groups are organized to provide the needed entertainment. Sometimes there are intervillage competitions but they are not very common. The EUCFP has recently initiated a study which involves some of the village singing groups. The study aims to document conservation lessons taught through traditional songs. The study is led by an elderly retired teacher who sings with the traditional singing groups and documents any lessons that the songs were meant to convey to listeners. The study had just started when the researcher left the study area but the progress was reported to be good.

There are some clans in the study area which have the knowledge of conducting ritual ceremonies. One such clan is the Wakilindi clan. Rain making is one of the rituals they conduct although the many members of the community especially the youth have very weak belief in such rituals. It seems that if local informal institutions are to be used to build interest in conservation modern activities such as football hold out better potential.

6.4 **The youth at crossroads of conservation and development**

Changes that are taking place in the East Usambaras will definitely affect the young generation which forms part of the future of the area. During the survey, the researcher held some discussions which aimed to get the opinions of the young generation in relation to the future of the area. Among the key issues was to find out what the future holds for the youth in their point of view and what they thought might be possible solutions to the problems of population increase and dwindling land resources. The discussions also tried to find out the kind of formal and informal institutions that the youth thought could provide reliable organization and leadership in the future.

From the discussions is was evident that the youth were in a situation which the author can describe as the crossroads of conservation and development. On the conservation side they seem to be very much aware of the conservation needs for the area. They see the implementation of conservation objectives such as the establishment of the nature reserve and land gazettement as reasonable, only that such initiatives take no account of the actual problems the people are facing, and they do not provide alternatives. Regarding their personal future development most of the youth were of the opinion that their development was at stake mainly because neither was the government nor the on-going projects gave them the needed priority and support. Most of the young men and women interviewed were within the range of 16-30 years of age but they were still dependant on their parents. A majority

of them wished they had relatives in town who might otherwise have supported them to make a living in urban areas, like their friends who had left the villages. It was pointed out by one of the young men who was strongly supported by others that their dependency on their parents was not too much of a problem before the recent gazettement because they had more land to cultivate. The young man further lamented that whatever they try to do as young men - be it building a house, pitsawing or even farming - puts them in conflict with the forestry authorities at one point or another. Chances of running a private business in the rural area were explained to be slim due to lack of capital, low purchasing power and ever-growing household demands from extended families. The researcher posed a question as to whether the young generation thought that out-migration to less populated areas of Tanga region or Tanzania more generally might be a solution to the current situation. This idea was supported by a minority who thought that if the government could support their take-off in the new area they were willing to go, but insisted that it should be voluntary. However the majority were of the opinion that such a move would be another "villagezation" and constantly referred to the bad impact of the Tanzanian villagelization policy of the seventies, which was very coercive. They still believed that if the government or any other body was willing to support them they could do a lot in their current home area.

In terms of local institutions it was evident that they had much faith in village governments as a facilitating institution. Some of them were part of the village government, particularly in the committee for village defence and youth development. This committee might be equated to the "ministry of defence" at village level. The committee organized village vigilante patrols (*the Sungusungu*) and assisted the village chairman in mobilizing villagers to participate in communal work. Informal institutions like football clubs, drafts playing groups and traditional dancing groups form part of the social life of the young people in the village. No connection has yet been developed between these institutions and conservation or development activities.

CHAPTER 7
VALUES OF FORESTS FOR LOCAL PEOPLE

From the different surveys which were conducted it was possible to determine the values of the East Usambara forests for various stakeholders, especially local people. This chapter discusses these values ranging from non-consumptive to utilitarian. The utilitarian values derive from the variety of forest products collected by local people as part of their livelihood strategies.

7.1 Cultural and religious values

The East Usambara forests have cultural and religious values for the local people. Villagers could locate specific areas in the forests which have been used in the past or are still in use for religious and cultural practices. Examples include the Kizara forest around Kisiwani village located in the public land, and Mashewa area which now forms part of the forest reserves. The Mpanga ritual forest to be discussed in Chapter 8 is another. Religious practices in these special areas included rain making rituals conducted by members of the Wakilindi clan (Feierman, 1990). Other cultural activities included circumcision of young boys and girls. Training of the young in traditional dances and folklore was also conducted in the forests.

It has been observed that the religious and cultural values of the forests for the local people have declined in recent times when compared to the last century. A number of factors plausibly account for the observed decline. These include the ever increasing ethnic heterogeneity in the area as a result of migrations, pressure from Christianity and Islam, and lack of interest in traditional practices among the young. Previous surveys conducted in the areas also concluded that these were key factors in the process of cultural decline (Owen, 1992). Through observations made on the northern side of the East Usambaras this study also established that some traditional religious leaders have abandoned their values and succumbed to economic pressures, to the extent of liaising with pitsawers to deforest ritual forests in the public lands for individual financial benefits. At the same time, the establishment of forest reserves in the area did not take into consideration the traditional values of these specific areas in the forests. This is clear from the fact that some of the abandoned ritual forests are now located within the current forest reserves. However it is not clear whether these areas were abandoned because of the establishment of the forest reserves, or had been abandoned other reasons, perhaps prior to reservation.

Discussions with villagers revealed that in some traditional ritual practices (such as thanks giving ceremonies to ancestors), cleansing from bad omen and rain making are still carried out in these areas in a low tone. This is true for Mpanga ritual forest in Maramba. Owen (1992) reported that the Makonde people from southern Tanzania who have migrated to the East Usambaras in recent years have somewhat desperately begun to make use of an area within the Longuza teak plantations for their traditional ceremonies as a substitute for indigenous natural forests. However, the researcher did not encounter these Makonde activities because the research largely focused on the dynamics in the natural forests.

7.2 Catchment, microclimate and agricultural production values

The forests in the East Usambaras are appreciated locally, regionally and nationally for their catchment values. They provide catchment not only for Muheza but also for Tanga

municipality. They form the major catchment area for river Sigi which is the primary water source for Tanga and the lowland areas. River Sigi feeds into river Pangani which flows all the way through the coastal region of Tanzania to join river Wami, the main source of water in Dar es Salaam city before it opens to the Indian ocean. Agricultural productivity along these main rivers in very much influenced by the river regimes.

The value of forests in agricultural production cannot be over emphasized. The forests improve the microclimate contributing to both subsistence and plantation agriculture. For example the major reason presented by the tea estates management in the Amani plateau as to why the forests should be conserved was the effect that the forests have in attracting rainfall and improving the microclimate for tea production. All the farmers interviewed were aware of the fact that without the surrounding forests their agricultural production would be adversely affected by drought. Experiences of droughts in the West Usambaras were repeatedly reiterated by farmers as negative consequences of deforestation. For several years now cardamon cultivation by local farmers has been taking place under forest cover. The discussion about cardamon cultivation in the area has been presented in earlier chapters of this book. Suffice to mention at this point that cardamon cultivation under forest cover adds to the value of the East Usambara forests in terms of agricultural production.

7.3 **Utilitarian values**

The East Usambara forests provide a range of products for the surrounding communities and nearby markets. However the contribution of these products to the daily running of household life and the associated environmental impact vary from product to product. Fuelwood, building materials, lumber, medicines, edible materials, home utensils and minerals were among the consumption products encountered during the study. Other non-consumption values, such as conservation, provision of rainfall and spiritual uses are appreciated by all interest groups discerned in the area but the degree of awareness and commitment to safeguarding these non-consumption products varies from one interest group to another.

7.3.1 **Forests as sources of building materials**

The forests are the main sources of building materials in the East Usambaras and with increase in population collection of building materials poses a substantial threat to the fragile forest ecosystem. The materials include poles, withies and traditional ropes and are by large illegally collected from these forests (given the strict access rules prevailing). Rooting materials (coconut leaves) normally come from the farmers homegardens, and in case of corrugated iron sheets they have to be purchased. Presented below are findings from the building materials survey which aimed to establish the forest species used in different villages and the quantities demanded.

A total of 41 houses was surveyed in the five villages of Mikwinini, Kisiwani, Vuga, Potwe and Kwamzindawa. Of these houses 15 were from Vuga, 6 from Kwamzindawa, 6 from Kisiwani, 7 from Potwe and 7 from Mikwinini. The average size of the houses when all the villages are considered together was 2 rooms, with 4 rooms as the maximum and 1 room as the minimum. An average room has an average area of about 2.5 m^2. It was however discovered that the housesize varies from village to village. Smaller houses (1 to 2 rooms) were found in Vuga while the biggest houses (up to 4 rooms) were found in Kisiwani and Mikwinini. Potwe and Kwamzindawa had medium size houses (about 3 rooms/house). A

plausible explanation for this variation relates to the location of the villages with respect to the forests as the main sources of building materials. While Mikwinini and Kisiwani are located in the Amani area with many natural forests around, Vuga on the northern side of the East Usambaras is drier with less forested area. The distance from Vuga village to the nearest forests varies from 3-5 km and the terrain is unattractive for illegal collection of building materials. In relative terms, also, the public forests around Vuga are more depleted and the homegardens are less developed. It was discovered that 85% of the houses which were under construction belonged to young men between the age of 16 - 30 yrs who were struggling to get independent from their parents in order to get married. About 5% of the remaining houses belonged to spinsters while 10% belonged to married elderly people who were intending to replace old houses.

7.3.1.1 **Use of traditional ropes**

Traditional ropes from forest species are widely used as tying materials in house construction. However the species used often seemed to be location-specific (although some species are used in all localities). Use of alternative tying materials to replace ropes is increasing in some villages. One of the factors encouraging use of alternative tying materials is tight access rules to the forests. However some villages, those close to sisal estates for example, find it easier to get sisal ropes compared to forest materials. Table 8 summarizes the different tying materials used in house construction in the studied villages.

Table 8: Use of traditional ropes, sisal and nails as tying materials in local house building in the studied villages presented in terms of percentage of users.

	Traditional ropes		Nails		Sisal	
Village	Use(%)	Don't(%)	Use(%)	Don't(%)	Use(%)	Don't(%)
Vuga	93	7	20	80	40	60
Kwamzindawa	67	33	0	100	67	33
Kisiwani	100	0	67	33	33	67
Potwe	14	86	71	29	100	0
Mikwinini	100	0	29	71	14	86

The figures in Table 8 indicate that traditional ropes are used at least in every village but used more frequently in some villages than in others. The same applies to the use of alternative tying materials such as nails and sisal. Table 8 indicates that traditional ropes are used in all houses encountered in Kisiwani and Mikwinini villages but also in 93% of the houses in Vuga. However traditional ropes were only used in 67% and 14% of the houses in Kwamzindawa and Potwe villages respectively. This suggests that the abundance of natural forests in the Amani division provides a more reliable source of traditional ropes to villagers, than the drier parts of the East Usambaras, other factors (e.g. patrols by foresters) being equal. Among those who use traditional ropes, some use up to 3 different kind of ropes in a single house. For example, of the 32 houses in which ropes were used, 22% (all from Vuga) used 3 types while 28% used 2 types of ropes in a house. However, the majority (50%) used only one type of rope. About 39% of the total sampled houses did not use

traditional ropes at all. For those not using ropes the main reason mentioned was the difficulty of collection, given the tight access rules to the forests (56%) and availability of affordable alternative tying materials (44%). Table 9 presents the different species used as ropes in different villages.

Table 9 Species used as ropes in the case study villages. The figures represent the recorded percentage of surveyed houses in which a particular species was encountered.

	Recorded use in different villages				
Species	Vuga (%)	K/ndawa (%)	Kisiwani (%)	Potwe (%)	Mikwinini (%)
Triclisia sacleuxii	86	50	0	0	0
Dombeya cincinnata	7	75	0	0	0
Cyperus alternifolius	29	0	0	0	0
Landolphia buchananii	0	0	0	0	57
ukenda (unidentified sp)	43	0	0	0	0
Diospyros mespiliformis	36	0	0	0	0
umpemba (unidentified sp)	7	0	50	100	86
Deinbollia borbonica	0	0	33	100	0
nyegeza (unidentified sp)	0	0	33	0	0
Paullinia pinnata	14	0	0	0	0
Stephania abyssinica	14	0	0	0	0

The reported percentage of use in each village in Table 9 does not necessarily sum up to 100% because the use of a particular species in the construction work does not mutually exclude use of other species. As such the reported percentage indicates that the species is used either alone or in combination with some other species/materials. The table reveals some degree of species preference for use as building ropes at village level. This preference can either be explained in terms of availability of a particular species in that location, or as people's tradition. The results also indicate that the highest variety of species used in the construction work was observed in Vuga village where 8 different species are in use. Field observations suggest that the use of variety of species in Vuga is an indication of scarcity rather than having a wide range of choice because some of the species used are quite inferior in terms of strength properties, implying that the farmers reach a point of using whatever is available.

7.3.1.2 **The use of poles**

Poles used in the construction of traditional houses are normally about 10 to 15cm diameter at breast height and 2.5 to 3m tall. During the survey a total of 3410 such poles was

encountered in 41 houses from the five villages. Table 10 gives a summary of the main species used, their endemic status, and recorded quantities in the studied villages.

Table 10: Species used as poles in the case study villages, their endemic status[1], and frequency of use.

Species	Total count	Percentage
Local non endemic species: *Bridelia micrantha, Pachystela msolo, Albizia versicolor, Stereosperum kunthianum, Afrosersalisia cerasifera, Funtumia latifolia, Anthocleista zambesiaca, Strombosia scheffleri, Dracaena steudneri, Markhamia hildebrandtii, Rhus natalensis, Lonchocarpus bussei, Dombeya quinqueseta, Sapium ellipticum, Cassia singueana, Annona senegalensis, Harungana madagascariensis, Markhamia obtusifolia, Lablab niger, Harrisonia abyssinica, Cremaspora triflora, Rubus rasifolius, Blighia unijugata,*	2217	65%
Local endemic species: *Securindeia usambarensis, Millettia usambarensis, Allanblackia stuhlmannii, Cephalosphaera usambarensis, Anisophyllea obtusifolia, Enantia kummeriae*	477	14%
Exotic/naturalized species: *Cedrela odorata, Tectona grandis, Psidium guajava, Senna siamea, Eucalyptus camaldulensis, Grevillea robusta*	716	21%
Total	3410	100%

Table 10 shows that about 79% of the poles used originate from natural forest species. The other 21% come from species like *Tectona grandis, Eucalyptus camaldulensis, Senna siamea, Grevillea robusta* and *Psidium guajava* which have been introduced to the farms. At the same time, about 14% of all the species used are endemic. Of all the encountered species *Bridelia micrantha* is the most intensively used (21%). The use of species of forest origin does not mean that the forests are the only sources of poles. Farmers have domesticated some of the forest species in their farms. Whereas about 70% of the villagers whose houses were surveyed reported to have collected all their poles from the forests, 30% reported that they collected poles both from their farms and natural forests.

[1] Throughout this book species are classified as *endemic* when they are either found in the East Usambaras only or the E.Usambaras and in other restricted localities within the Eastern Arc mountains (Hamilton & Smith, 1989; Rodgers & Homewood, 1982; Iversen, 1991)

It was interesting to observe that *Cedrela odorata* which was introduced in the early 1920s in the Amani Botanical Garden is so widespread in the farms around the nearby village of Kisiwani. Farmers were tending the randomly growing seedlings in their farms and the species is now widely used for building purposes. *Eucalyptus camaldulensis* has been encouraged (by both EUTCO and EUCADEP) in most of the villages surrounding tea estates. The tea estates sometimes buy fuelwood from the villagers for their boilers. The species is also preferred by villagers for building purposes and the survey revealed that the use of eucalyptus for building purposes was more common on the Amani plateau, as was observed in Mikwinini village. *Psidium guajava* which is normally a fruit tree has found wide use in building houses as a result of scarcity of other species due to strict forest access rules. *Tectona grandis* has spread to most villages bordered by the teak forests. Farmers deliberately collect planting materials from the teak project and introduce the species in their farms. It is now used for building purposes as well as other uses. Farmers surrounding the teak project in the lowland zone collect or sometimes buy building poles from the project. According to Owen (1992) about 38% of the farmers in the lowland zone use teak for building purposes. This study confirmed Owens findings, because all teak poles encountered during the building materials survey were from Potwe village, located in the lowlands. The other exotic species used for building purposes, as indicated in Table 10, have been introduced in the area as part of previous tree planting campaigns and project activities. These are the ones which farmers have accepted most.

7.3.1.3 Use of withies

Withies are normally small trees of about 3cm diameter at breast height. In the construction process withies are tied across the erected poles using either traditional ropes or other tying material to complete the framework structure before plastering the walls with mud. In principle, plant species preferred for poles can serve the purpose as withies also but sometimes the unavailability of preferred materials forces farmers to consider alternatives. During the survey a total of 8732 withies of different species were encountered in the studied villages. The summary of results from the survey are presented in Table 11.

The table reveals that about 92% of the withies come from species of forest origin. Of these *Securinega virosa* was the most intensively used (comprising about 18% of the encountered withies). About 16% of all species used are endemic. The use of species like *Psidium guajava* and coconut leaf stalks is a common practice especially in the northern side of the East Usambaras (Vuga) which is drier and has less forests around. Table 11 shows that only 3 exotic species were encountered in use as withies while 5 endemic species were used. Generally most of the species used to provide building poles are also used as sources of withies.

7.3.2 Household items of forest origin

A wide range of items used at household level originate in the forests. During the survey, the following items of forest origin were being utilized at household level: beds, brooms, pancake discs, coconut extractors, cooking spoons, toolhandles, mats, mortars, stools, trays and baskets, walking sticks and clubs. In the forthcoming sections the items are characterized in terms of quantities used, means of acquisition and expected life time. These three characteristics are considered to have direct implications on forest use.

Table 11: Species used as withies in the case study villages, their endemic status, and frequency of use.

Species	Total count	Percentage
Local non endemic species: *Bridelia micrantha, Albizia glaberrima, Afrosersalisia cerasifera, Funtumia latifolia, Strombosia scheffleri, Markhamia hildebrandtii, Securinega virosa, Lippia asperifolia, Harungana madagascariensis, Alchornea hirtella, Annona senegalensis, Arundinaria alpina, Cocos nucifera, Tarenna nigrescens, Cremaspora triflora, Grewia plagiophylla, Oncoba routledgei, Dombeya cincinnata, Harrisonia abyssinica, Blighia unijugata, Trichilia roka, Premna chrysoclada, Hoslundia opposita.*	6636	76%
Local endemic species: *Sorindeia usambarensis, Millettia usambarensis, Rytigynia amaniensis, Enantia kummeriae, Cynometra spp, Cephalosphaera usambarensis.*	1397	16%
Exotic/naturalized species: *Tectona grandis, Psidium guajava, Senna siamea.*	699	8%
Total	8732	100

7.3.2.1 **Items used and their quantities**

Table 12 gives a list of the encountered items in the survey and their recorded quantities. Figures in Table 12 indicate that toolhandles form the largest portion of items used in the household (25%) followed by trays and baskets (14%), stools (12%) and then mats (10%). This reflects the main activities of the rural people as farmers making use of farming tools such hoes and axes. Trays and baskets are used in sifting, carrying and drying a variety of farm products. Customs, beliefs and lifestyle tend to influence the use of forest products. For example, Potwe, Vuga and Hemsambia are famous villages in coconut cultivation hence more coconut extractors are in use compared to villages around Amani. Also in the Muslim dominated village of Potwe "praying mats" *(miswala)* are in higher usage compared to other villages. Potwe has also been described by the villagers during one of the PRA exercises as one of the routes for various illegal products moving from Amani to Korogwe. Women were particularly complaining about increased violence as a result. This might explain why more men use walking sticks and clubs in Potwe and the nearby village of Kwamzindawa compared to other villages. In the remote villages of Vuga and Hemsambia where access is poor more wooden spoons were encountered compared to other villages where the use of "stainless steel" cooking spoons can be observed.

Table 12: Items used in households made of forest products, the absolute and relative times encountered during the survey and their reported use.

Items	Total count	Percentage	Uses
Beds	89	6	sleeping
Brooms	147	9	sweeping
Pancake discs	38	2	rolling of pancakes
Coconut graters	69	4	scraping coconut flesh for food preparation
Spoons	128	8	cooking
Toolhandles	390	25	handles for tools such as hoes and axes
Mats	153	10	sleeping, praying, drying of foodstuffs and decorations
Mortars	106	7	pounding and grinding
Stools	194	12	sitting
Trays and baskets	219	14	sifting, drying and carrying a variety of farm products
Walking sticks	33	2	self support and as a weapon
Clubs	6	0.4	weapon for self defence
Totals	1572		

7.3.2.2 **Means of acquisition and expected useful lifetime**

When means of acquisition is used as a criterion in characterizing the items used in the households, four main categories of acquisition discern in the study area. These include homemade, purchased, inherited items and items presented to the owner as a gift. Table 13 provides the range of household items in use and their reported means of acquisition.

The table shows that about 54% of the items used at household level are purchased while 43% are homemade. The rest are either inherited (1.7%) or given as a present (0.6%). Field investigations revealed that most farmers purchase the items either from local experts in the villages (about 70% of those who purchase) or from nearby markets (30%). Among the homemade items toolhandles, cooking spoons and brooms which are easy to make constitute the majority in this category. While most toolhandles are made from a straight piece of wood, cooking spoons are mostly made from a coconut shell using a piece of wood as a handle.

Table 13: Reported means of acquisition for the variety of household items in the studied villages.

Item	Total number of items acquired through a particular means				Total count
	Homemade	Purchased	Inherited	Present	
Beds	28	56	5	0	89
Brooms	90	57	0	0	147
Pancake discs	7	30	0	1	38
Coconut extractors	1	64	3	1	69
Cooking spoons	122	5	1	0	128
Toolhandles	277	113	0	0	390
Mats	75	78	0	0	153
Mortars	0	95	11	0	106
Stools	64	122	5	3	194
Trays and baskets	6	209	0	4	219
Walking sticks	12	20	1	0	33
Clubs	1	5	0	0	6
Totals: sum (%)	683(43%)	854(54%)	26(1.7%)	9(0.6%)	1572

The product's useful lifetime has implications for forest resources in terms of the frequency with which materials are needed for replacement of the item. The useful lifetime was assessed on the basis of farmers knowledge and experience, having used the same items for decades. It was apparent from the survey that only about 5% of items have to be replaced yearly. These were mostly brooms, cooking spoons and some toolhandles made from less durable species. About 9% of items could be used for more than 10 years. These include beds, pancake discs, coconut graters, mortars, stools, walking sticks and some mats. Further, about 69% of the items have to be replaced within 5 years period, while 17% need to be replaced between 6 to 10 years. It was also observed that items that demand more wood from the forests such as mortars, beds and stools, have quite long useful life, suggesting that the pressure they exert on the forests is a lesser threat to the ecosystem than other uses such as building materials. This observation is reinforced when it is realized that some items, such as mortars, stools, pancake discs and coconut graters, can be made from wood left over from legal or illegal felling of trees.

7.3.3 **Medicines from the forests**

Traditional medicine collection from the forests is one of the activities tolerated by the Forest and Beekeeping Division in forest reserves. Traditional healers are frequently advised by

plants. Discussions with the healers revealed that they are comfortable with this procedure, although most of them do not think it necessary, because nobody would kill a plant essential for one's profession. In the remote rural villages the reliance on traditional medicines compared to modern treatment is substantial due to scarcity of hospitals/dispensaries, availability of medicines and the associated costs. In one of the PRA exercises conducted during this study villagers were requested to rank (through matrix scoring) traditional and modern treatment in terms of availability of medicines, distance to reach a doctor, fast services, costs and reliability in treating complicated cases. The villagers were requested to put a tick in the category of favoured treatment based on these criteria. Table 14 shows the results for two remote villages of Hemsambia and Potwe. Both villages have small dispensaries.

Table 14 reveals that while in both villages hospitals are considered to be more reliable in addressing complicated cases, traditional healing is sometimes considered a better option when other criteria such as availability of medicines, distance to reach a doctor, waiting time and costs are employed. Even with complicated cases villagers rely more on local dispensaries for referral to district hospitals rather than expecting within-village treatments. While one small dispensary caters for all the subvillages within a village, each subvillage might have more than two competent traditional healers providing fast services within reach. In most of the rural dispensaries availability, of medicines from regional and district offices is not smooth, mostly due to unavailability of supplies and poor infrastructure. On the other hand some traditional herbs are available in the traditional healer's farm as a result of domestication. The recently introduced "cost sharing" policy in all the government service sectors implies that patients have to pay to see a doctor and buy the medicines as well. This is very unattractive in poor rural settings and traditional healers provide an immediate alternative. Payment is sometimes in kind, waived for minor treatments, and payable when the patient has healed.

Traditional medicine collection takes place at two levels, i.e. by specialized healers and by household members. Knowledge of plants that treat most common diseases in the area is shared by most of the household members, making it necessary to consult a specialist (*Mganga*) only when the case is complicated. Two types of traditional healers operate in the East Usambaras. The first group is those who rely only on plant/natural materials to treat diseases, while the second group is comprised of those healers who are believed to have supernatural healing abilities. About 55% of the traditional healers encountered during this study use both approaches, i.e. natural and supernatural *"ramli"* healing.

The forests are a good source of products with medicinal value (leaves, barks, roots, fruits, sap etc.). A comprehensive list of forest species useful as medicines, parts used and diseases treated in the East Usambaras is available from previous studies (for example Hamilton & Smith, 1989; Owen,1992). This study concentrated more on the role of the traditional healers and other forest products collectors in the future management of the forests.

Table 14: Preferences and perceptions of villagers of Hemsambia and Potwe with respect to modern and traditional modes of treatment in their villages using pre-selected criteria.

	Modern treatment in hospitals		Traditional healing	
Criterion	Hemsambia	Potwe	Hemsambia	Potwe
Availability of medicines			More available	More available
Distance to reach a doctor			Closer	Closer
Fast services			Less waiting time	Less waiting time
Costs			Affordable and sometimes free of charge	Affordable and sometimes free of charge
Reliability in complicated cases	More reliable	More reliable		

As with other categories of forest products collectors, traditional healers participated in the research to expose the problems they are facing and suggest ways in which they could better participate in forest management as one of the important interest groups. One of the biggest problems facing the healers is lack of organization. Most of them operate in isolation and they only consult each other when one has a complicated case to handle. None of the encountered healers had any legal license allowing them to pursue their profession, and they thought that this was a big risk should patients die in their hands and relatives confront the healer. It also hinders them from attending distant consultancies fearing the same possible legal/social complications. They find it difficult to get licenses because of bureaucratic procedures which they thought could be cut short if they had an association of healers. They feel very much respected by the forest authorities and they are willing to participate in most forest activities.

7.3.4 **Forests as sources of food**

The study exposed the fact that the forests in the area are important to farmers as far as household food security is concerned. First of all, a lot farming activities take place under the forest canopy, especially outside the forest reserves. Farmers tend to prefer this kind of farming partly because some crops grown such as cardamon are shade loving, but also because during years of bad rains crops under forest cover stand a better chance of survival. Some food crops such as beans, yams, fruit trees, coconut and potatoes perform well in these shady forest/farm marginal areas contributing substantially to household food security.

Secondly, forests provide a range of edible non-timber forest products. These range from bush meat to a variety of vegetables and fruits. Not only do these foodstuffs ensure food availability at household level but they also contribute to the nutritional status within families. Table 15 presents the main plant species reported as used to provide a variety of household foodstuffs and the reported uses from the surveyed households. Among the wildlife animals hunted by the communities were wild pigs, duikers, dik, bushbuck and African civet. These contribute to reduce malnutrition at household level by providing a source of protein normally scarce in the rural environment.

Table 15: Forest plant species used to provide foodstuffs in the study area.

Species	Endemic status	Reported Uses
Allanblackia stuhlmannii	endemic	Fruits
Allophylus africanus	non-endemic	Vegetable
Annona senegalensis	non-endemic	Fruits
Basella alba	non-endemic	Vegetable
Bidens pilosa	non-endemic	Vegetable
Byrsocarpus orientalis	non-endemic	Vegetable
Cajanus cajan	exotic	Vegetable
Corchorus olitorius	non-endemic	Vegetable
Dioscoreophyllum volkensii	non-endemic	Vegetable
Eriosema psoraloides	non-endemic	Vegetable
Lactuca capensis	non-endemic	Vegetable
Ormocarpum bibracteatum	non-endemic	Vegetable
Pachystela msolo	non-endemic	Fruits
Platystoma africanum	non-endemic	Vegetable
Psidium guajava	exotic	Fruits
Corchorus capsularis	non-endemic	Vegetable
Solanum nigrum	non-endemic	Vegetable
Sorindeia usambarensis	endemic	Fruits
Tamarindus indica	exotic	Fruits
Vangueria infausta	non-endemic	Fruits

It was observed that while some species such as *Basella alba* and *Solanum nigrum* are used in almost every household others like *Platystoma africanum* and *Ormocarpum bibracteatum* are used much less frequently. For all the foodstuffs that farmers collect from the forests, the frequency of use is quite low. It was reported for example that some women collect these foodstuffs when they are allowed to enter the forests for fuelwood collection and they have extra time in the forests after the fuelwood collection. All the interviewed women in the surveyed households confirmed that they do not make deliberate trips to the forests for these foodstuffs. At the same time a number of these plants have been domesticated in the farms, as discussed in the coming chapters.

7.3.5 Fuelwood from the forests

All households surveyed reported that they relied heavily on fuelwood from the surrounding forests. Trees on the farms were also reported as another source of fuelwood. Local arrangements exist between the villagers and the EUCFP allowing farmers to enter the forests for fuelwood collection once every week. However, the villagers who were only allowed to collect dead wood and not allowed to carry any handtool such as machetes or axes were closely supervised by foresters. The fear on the foresters side was that the villagers could use such tools to destroy the forests. On average each household consumed about six headloads of fuelwood weekly. The volume of one headload was estimated at $0.03m^3$. The per capita consumption of fuelwood for the area has been estimated at $1.7m^3$ (Owen, 1992). The use of forests as sources of fuelwood has been well documented by previous studies (Hamilton & Smith, 1989; Owen, 1992; Elman, 1996) so this study concentrated more on management aspects. Fuelwood demand forecasts to aid future planning of fuelwood supplies in the area are presented in Chapter 8.

Villagers complained about the fuelwood collection day interval. They want the number of fuelwood collection days to be increased to at least three days a week. Complaints were also made about restrictions on use of handtools in the forests. The argument in this case was that it was dangerous for women to enter the forests unarmed since they would be poorly equipped to fight wild animals. However, no wild animals attacks have been reported. The EUCFP was still reviewing these complaints to see whether there was a case for increasing the number of fuelwood collection days per week.

7.3.6 Timber and gemstones

The East Usambara forests have commercially valuable timber species. These attracted sawmillers during the timber boom of the late 1960's and early 1970's. Much destruction was caused to the forests in the easily accessible villages (like Mlesa in Amani, where the main sawmill was located) through what was by then defined as "selective logging". Illegal pitsawing was also at the peak in those days. Logging was officially stopped in the 1980's and to date only illegal pitsawing cases are encountered here and there. The EUCFP staff frequently patrol the forests and in some cases they get villagers' support through reporting of illegal activities. Most areas opened by logging are now dominated by the quick growing invasive tree *Maesopsis eminii*.

A controversial proposal was put forward by EUCADEP (a conservation with development project) to allow farmers to pitsaw deadlogs (nicknamed by villagers as *Vibudu = unslaughtered animal's dead body*) in the forests. Such deadlogs result from natural catastrophes such as windfall. Others remain from previous legal and illegal logging in the area. According to this proposal villagers would saw the logs and sell the lumber to improve their financial status instead of leaving the logs to rot in the forests. This was implemented under the supervision of district foresters (not part of EUCFP). The project finally failed because some villagers joined hands with illegal pitsawers and felled fresh trees.

The forests are also rich in gemstones especially on the northern side of the East Usambaras. These include green tomaline, red garnet, blue sapphire, almandite, armelrold and yellow tomaline. Illegal miners were spotted in the area during fieldwork. They had camped deep in the forests for about a month before they came to the attention of the foresters. Most of them were local people supported by businessmen from nearby towns. The EUCFP foresters

who were tipped of some concerned villagers launched an operation with support from local police and arrested some of the miners, closing the mining business finally. The level of illegal mining at this time cannot be compared to that reported in other forests in Africa such as the Gola North reserve in Sierra Leone (Richards, 1996; Davies & Richards, 1989). However, one can not rule out the possibility that this kind of illegal digging of precious gemstones might expand in the future given the lucrative nature of the business, poor economic status of the local people and the remoteness of the mining sites, which makes it difficult for foresters to "police" the areas. Remote as these mine sites are, the only hope for a real solution to the problem may be genuine involvement of the surrounding villages in forest protection initiatives. Consequently, if conservationists are to get necessary support from villagers, consideration will have to be given to local people's values in relation to the forests. This is one of the situations where reconciliation of stakeholders' interests is essential.

7.3.7 **Marketing of forest products**

Marketing of forest products take place at two levels (within the villages and in nearby markets). The first kind of marketing is done by local experts who have the knowledge of manufacturing a variety of household items from forest products. For the local markets three markets in the study area were surveyed and the different forest products were encountered. Table 16 presents a cross-section of merchants encountered in the markets and the products they were dealing in. The products fell into three categories (medicines, home utensils and edible materials).

In total, 16 merchants were interviewed. Most merchants were from the main ethnic groups within Tanga region. One merchant however was a Luguru from central Tanzania residing in Tanga. All merchants interviewed drew their products from within Tanga region. There seemed to be a relationship between the merchants home area and the source areas where the products were drawn. Appendix 9 reports the source areas for the different medicines encountered in the markets. The majority of merchants would go back to their home areas every now and then to seek for some materials needed in the market. The use of middlemen was also reported. For medicines the quantities found in market were quite small. Most of the medicines were processed - ground into powder, but others were still in their natural forms (bark, dry leaves or roots). Measurements for the quantities in market were taken directly, either as counts of items (Appendix 9) or by weighing the product.

One of the main findings in relation to commercialization of forest products in the East Usambaras is that commercial use of forest products in the area is especially important with respect to medicinal plants. In total, 35 species were encountered in the surveyed markets in small quantities ranging from 0.5 to 7.7 kgs. Other products of importance included home utensils, of which 15 species were in the market. Food products from local plants are less commonly marketed, with only 3 species recorded. The complete list of different forest products encountered in the surveyed markets and their respective quantities is to be found in Appendix 9. Plates 3, 4 and 5 (page 94) show some of the products found in the market.

Table 16: A cross section of forest products merchants in the markets of Maramba, Muheza and Ngamiani.

Market	Merchant No.	Sex	Tribe	Products dealt with
Maramba	1	male	Digo	medicines
	2	male	Sambaa	medicines
Muheza	1	male	Sambaa	medicines
	2	male	Sambaa	medicines
	3	female	Sambaa	home utensils
	4	female	Sambaa	home utensils
	5	male	Digo	medicines
Ngamiani	1	male	Sambaa	medicines
	2	male	Sambaa	medicines
	3	male	Luguru	medicines
	4	male	Sambaa	medicines
	5	male	Sambaa	medicines & toothbrushes
	6	female	Sambaa	vegetables & home utensils
	7	male	Digo	wild fruits
	8	male	Bondei	home utensils
	9	male	Bondei	Honey

The observation that the quantities of forest products commercialized are small and that sources of these products are diverse even within the Tanga region itself (Appendix 9), suggest that the commercialization of forest products in the East Usambaras does not pose a significant environmental threat. However, exceptions would be in situations, for example, where an inexperienced traditional healer or any other forest product collector destroyed a plant in the process of collection.

Examining the domestic trade of non-timber forest products in southern Africa, Cunningham, (1993) reported that in more urbanized areas of Africa a general reduction in the number of commercialized forest products and their quantities could be observed. This was a result of availability of alternative food materials, medicines and utensils with the increased cash economy in urban areas. The only exceptions were with energy sources such as fuelwood and charcoal. The conclusion drawn by Cunningham was that commercial gathering of non-timber

forest products such as medicines in large countries with small urban populations (such as Mozambique, Zambia and Zaire) is limited and cases of over-exploitation are rare. The reliance on traditional medicines for rural communities in Tanga discussed in chapter 7.3.3 and the observed small quantities of forest products encountered in urban and semi-urban markets surveyed suggest that Cunningham's observations apply also to the Tanzanian situation.

7.3.8 Gender and forest products collection

Observations made during the field work revealed that forest products collection at household level entails a set of gender roles played by both men and women. The most conspicuous difference between the roles of men and women was in the collection of fuelwood and building materials. Whereas fuelwood collection is almost entirely the responsibility of women, building materials are collected by men. On the other hand collection of wild vegetables is done by women. As mentioned, women collect these vegetables on those days when fuelwood collection is allowed in the forests. Regarding the collection of medicinal plants, the nature of illness (e.g. emergency cases), the kind of medicine needed and the local "profession" of the collector are the main factors which determine who actually collects the medicines. As a general trend, both men and women collect medicines from both the forests and their farms. In cases of emergency whoever is closer to the incident and has the knowledge of the plant needed would go for it. However, if the medicine needed requires spending more time and energy in the forest (for example digging tree roots) them it is mostly men who go for the medicine. Locally recognized traditional healers whether men or women, frequently carry out the collection themselves in the forests partly to maintain secrecy of knowledge of relevant species.

Examining these gender dimensions, it is clear they reflect the division of labour observed at household level, as in other parts of Africa where women do most of the household chores such as cooking and taking care of children while men go out to search for opportunities to improve household welfare. It is also a reflection of the nature of forest products collected and the legalities involved. For example while it is allowed to collect fuelwood from the natural forests at least once a week, it is illegal and dangerous to collect building poles from the forests. Perceived as courageous household members in the African context, men therefore have to bear the risk of illegal collection of building poles when the household needs a house. It is their responsibility as men to build houses, so they have to find the materials anyway they can. Spinsters are normally assisted by close male relatives.

Commercialization of forest products also has a gender dimension. Looking at Table 16 the markets surveyed was dominated by men. However, when the researcher conducted informal interviews with local specialists in various aspects of village life, the majority of basket makers were women, while wood carvers, hunters and traditional healers were mostly men. One could generally conclude that women's participation in commercialization of forest products is more centered in the villages while men participate in selling forest products in both rural and urban areas. A plausible explanation for this situation is that women have other household chores to deal with and they spend more time in the villages. Also in Tanga villages, where the Islamic religion is relatively widespread, womens' movements outside the household are restricted. However, a similar situation has been observed in other parts of Africa as well. Quoting Louis Fortmann's study in Zimbabwe, Clarke et al. (1996) report that whereas men and women participate in the trade of forest fruits, men were more

involved in sales outside their localities and in distant places while most women would sell their products near their villages. For example only 6% of the women sold their products in Harare City, while about 46% of men sold their products there. By contrast only 8% of the men sold their products in nearby areas while 20% of women did so.

These observations on gender roles in forest product collection suggest that a realistic intervention or reconciliation of stakeholder's interests will have to take into consideration the different roles played by men and women in forest products collection. Some of these activities (for example basket making in Potwe village) provide one of the means through which rural women generate income independent from their male counterparts. This not only improves household welfare but also contributes to the emancipation of women from social oppression which sometimes results from lack of economic independence from men.

Photos

Plate 1

Plate 2

Plate 3

Plate 4

Plate 5

Legend for the plates:

Plate 1: Contrast between poorly managed public lands (right) and state forest reserves (left)

Plate 2: Farmers' experimentation with cardamon cultivation in agroforestry farms in Vuga village

Plate 3: Forest-derived medicines sold at Muheza market

Plate 4: Trays, coconut graters and brooms sold at Ngamiani market

Plate 5: Cooking spoons and tool handles sold at Muheza market

CHAPTER 8
FOREST UTILIZATION: IMPACTS AND MANAGEMENT

In this chapter attention is given to the impacts of forest utilization of local people using results from the forest survey conducted in one of the forest reserves in the study area. The structure of such utilized forests is assessed in terms of distribution of tree diameter classes, coppices, dead stumps and debarked trees. The discussion on alternative sources of forest products in the area dwells on the forest products that local people can collect from their farms and estimates of the extent of tree planting that might be necessary to offset the growing demand for fuelwood and building materials. Finally a discussion on the attempts by villagers on the northern side of the East Usambaras to establish a village based forest reserve winds up the chapter.

8.1 Impacts of forest utilization

From the forest sampling conducted in Kwamkoro forest reserve there was much evidence of human activities in the forest reserves even as deep into the forest as 1000m. It was interesting to observe the tendency of decreasing human activity as one moved away from the forest edge. Destruction of plants was more intensive towards the forest edge while the risk for wild animals being trapped increased as the distance from the edge increased. Four main criteria were used in establishing quantitative evidence of disturbances in the natural forests. This included the variations in tree diameter classes, the quantities and distribution of coppiced trees, the quantities and distribution of dead tree stumps, the distribution of debarked trees and the number of animal traps encountered. These factors were assessed at varying distances from the forest edge (200 to 1000 m.). The following section presents the results.

8.1.1 Distribution of tree diameter classes

Tree diameters measured conventionally as diameter at breast height (DBH) revealed much difference in terms of dominance with respect to varying distance from the forest edge. For the 150 temporary sample plots established during the survey a total of 7560 trees (above 10cm DBH) were encountered suggesting low stocking level of about 504 stems per hectare. AFIMP (1988) estimated an average stocking level of about 650 stems per hectare for the East Usambara forests including the less disturbed natural forests. This low stocking level, confirmed during the current survey, was not surprising because the forest was affected by commercial logging carried out in the 1970's and is still in its recovery stage. However, the distribution of tree diameter classes also suggests that the forest has been disturbed substantially by local people through illegal activities, mainly collection of building materials. Figure 7 presents the observed distribution of diameter classes with varying distance from the forest edge.

As indicated in Figure 7 trees of small diameters dominate close to the forest edge (100-200m from the forest edge) compared to dominance of large diameter trees deeper in the forest (500 - 1000m). In between, at 200 - 500m from the forest edge, the frequency of larger diameter class trees is greater than on the forest edge but not as great as deep forest. Evidence of commercial logging can still be observed, e.g. old logging roads and remaining dead stumps (discussed in the coming sections). At the same time, a striking phenomenon was that a substantial number of small diameter class trees were trees with coppice shoots.

In most cases these trees were not coppiced on purpose, but rather were regenerating from woodcutting. This suggests that as the forest struggles to regenerate, human disturbance (in terms of collection of forest products such as building materials) poses a threat to fuller regeneration.

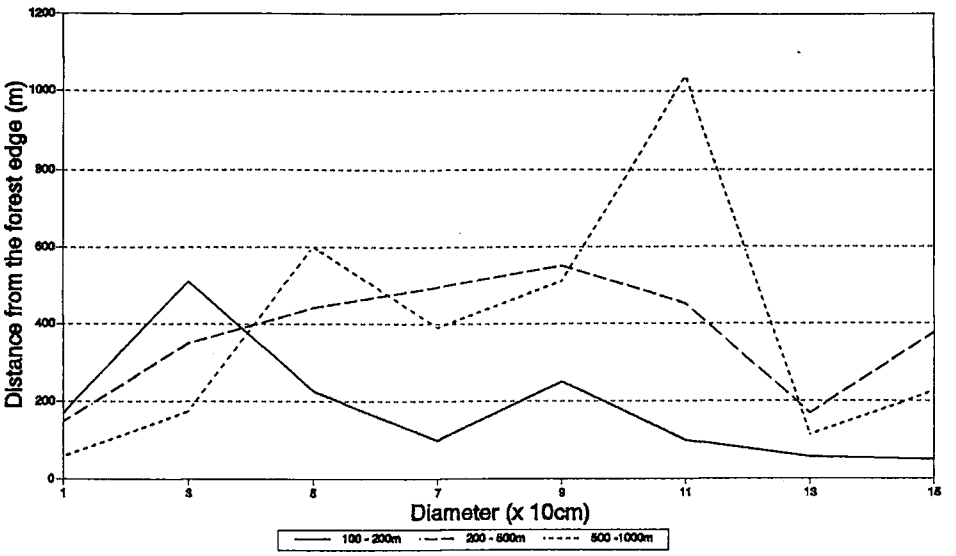

Figure 7 The distribution of tree diameter classes at varying distances from the forest edge as recorded in Kwamkoro Forest Reserve in East Usambaras.

Figure 8 shows distribution of coppiced trees at varying distances from the forest edge. About 49% of all the encountered coppiced trees fell within the 100 - 200 m range from the forest edge. At the same time 42% of such trees were within 200 - 500 m range, while only about 8% were encountered deeper into the forest. Since fuelwood collection is carried out by women on specific days of the week under close supervision of the foresters and since the collectors are not allowed to carry any working tools such as machetes with them, it is very unlikely that fuelwood collection is the main cause of this kind of forest modification. However, Owen (1992) observed that some villagers in Kwezitu village (not a case study village in this study) had developed the practice of illegally collecting fresh branches from the then tea-estate forests in order to dry them at home and later use them as fuelwood at times of acute fuelwood scarcity. Illegal collection of building poles and withies is the most plausible explanation for the high frequency of small diameter trees and wide proliferation of coppiced trees, especially within the outer 500m of the forest.

The outer forest edge is particularly preferred for a number of reasons. First of all the amount of regeneration following commercial logging is higher within this range as the forest tries to recover. This regeneration results in tree sizes most preferred as building poles or

withies. Secondly, working illegally close to the forest edge means that less time is spent in the forest and less distance travelled with an illegal load before entering the village. Informal investigations during the study revealed that illegal collection of building materials is mostly group work involving (for example) several members of the same family or close friends. The collectors normally carry with them very sharp working tools to be efficient. The team intends to spend as little time as possible in the forest, and to collect as many building poles as possible. The most crucial exercise for illegal collectors is to study carefully the routine work of the forest guards. Late afternoons seem to be the safest times of the day because the foresters have knocked off after office hours, there is still enough light to select, cut and pile the poles, and the team can return to the village in the early hours of the night. Therefore the closer the team is to the forest edge the better.

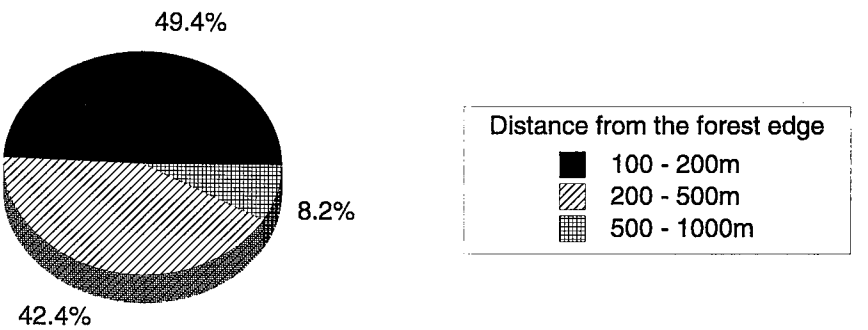

Figure 8 Distribution of coppiced trees at varying distances from the forest edge as recorded in Kwamkoro Forest Reserve in the East Usambaras.

Local experts associated the small diameter trees cut deeper into the forest with illegal trapping of wildlife. It was also observed that a number of plant species used as ropes in house construction were observed to have been pruned. For practical purposes these encountered rope species were classified together with coppiced trees species, but the species are clearly indicated in Table 17.

8.1.2 **Distribution of dead stumps and debarked trees**

Figure 9 illustrates the distribution of dead tree stumps and debarked trees at varying distances from the forest edge. The data reveal that while the number of dead stumps decreases as the distance from the forest edge increases the reverse is true for debarked trees.

Table 17 Encountered coppiced species, their endemic status and recorded percentages.

Species	Endemic status	Recorded %
Alchorna hirtella	Non endemic	6
Enantia kummeriae	Endemic	3
Bridelia micrantha	Non endemic	8
Mesogyne insignis	Endemic	2
Tarenna nigrescens	Non endemic	2
Adenia cissampeloides (Rope)	Non endemic	1
Trichilia roka	Non endemic	4
Cephalosphaera usambarensis	Endemic	1
Myriantus arboreus	Non endemic	2
Cola usambarensis	Endemic	2
Albizia glaberrima	Non endemic	5
Blighia unijugata	Non endemic	6
Afrosersalisia cerasifera	Non endemic	1
Parinari excelsa	Non endemic	1
Schizozygia coffeides	Non endemic	2
Funtumia latifolia	Non endemic	7
Markhamia hildebrandtii	Non endemic	11
Millettia dura	Non endemic	7
Malacantha alnifolia	Non endemic	2
Strombosia scheffleri	Non endemic	5
Hibiscus fuscus	Non endemic	1
Casearia engleri	Non endemic	1
Isoberlinia scheffleri	Endemic	2
Piper odoratum	Non endemic	3
Anisophyllea abtusifolia	Endemic	1
Cremaspora triflora	Endemic	1
Triclisia sacleuxii (Rope)	Endemic	1
Others		6

Most stumps had large basal diameter suggesting that they were logged for commercial purposes, especially those close to the forest edge. There is however a possibility that deep in the forest some kind of illegal pitsawing might have taken place. Because illegal pitsawing is time-demanding the pitsawers need to hide deep in the forest. However there was no evidence of recent pitsawing activities. The stumps were "old" and no logging pits were encountered. This suggests that the current level of law enforcement (in this forest reserve at least) has managed to control illegal pitsawing to some extent, although a lot still needs to be done if illegal collection of building materials is to be effectively controlled. Table 18 gives a list of species whose dead stumps were encountered in the field, their endemic status and recorded percentage of encounters.

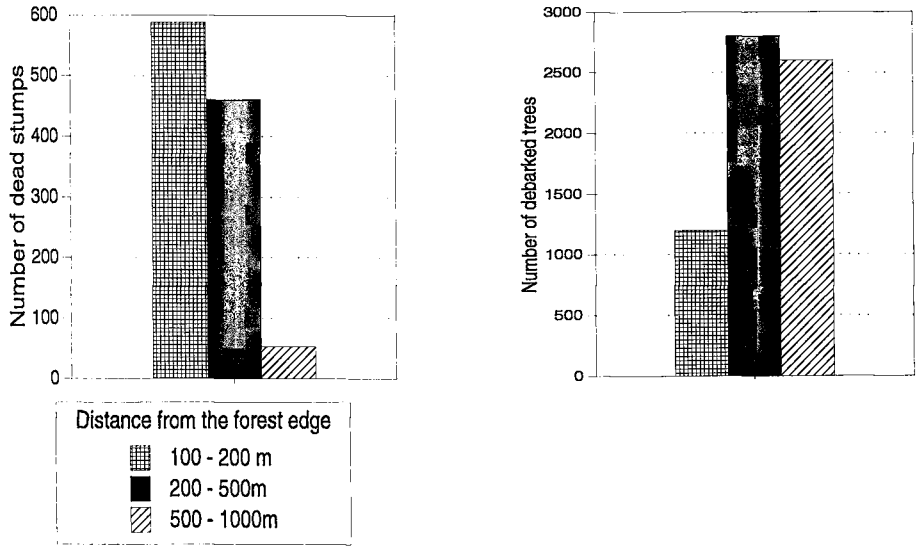

Figure 9 The distribution of dead stumps and debarked trees at varying distances from the forest edge as recorded in Kwamkoro Forest Reserve.

As highlighted at the beginning of this section, the proportion of debarked trees encountered increased with increasing distance from the forest edge. Debarking was only recorded if over 10% of the bark was removed. The main cause of massive debarking was preparation of wildlife traps, pig traps in particular. The traps are prepared in a form of a deep square pit covered on top by reasonably strong tree barks, yet weak enough to collapse when wild animal steps on them. The bait is placed on top of the covered pit. During the survey, a total of 7 such traps were encountered. Out of these 2 were found at about 500m from the forest edge, while 5 were deeper in the forest. It appears that the hunters start to collect barks as soon as they enter the forest and by the time they reach the area where they intend to place the trap they will have collected a substantial amounts of bark. As far as root damage was concerned it was difficult to differentiate between the destruction caused by wild pigs and that by humans. On two occasions it was evident that the root damage was human because roots were cut by machetes. The plants were medicinal.

Table 18 Encountered dead stumps (species), their endemic status and recorded percentages.

Species	Endemic status	Recorded %
Alchorna hirtella	Non endemic	4.5
Tarenna nigrescens	Non endemic	3
Strombosia cheffleri	Non endemic	2
Enanti kummeriae	Endemic	1
Adenia cissampeloides (Rope)	Non endemic	0.5
Bridelia micrantha	Non endemic	9
Funtumia latifolia	Non endemic	8
Cephalosphaera usambarensis	Endemic	3
Casearia engleri	Non endemic	1
Isoberlinia scheffleri	Endemic	3
Parinari excelsa	Non endemic	7
Newtonia buchanani	Non endemic	10
Markhamia hildebrandtii	Non endemic	6
Odyendea zimmermanii	Endemic	1
Macaranga capensis	Non endemic	3
Mesogyne insignis	Endemic	2
Khaya nyasica	Non endemic	8
Blighia unijugata	Non endemic	6
Schizozygia coffeides	Non endemic	1
Piper odoratum	Non endemic	1
Millettia dura	Non endemic	5
Myriantus arboreus	Non endemic	3
Others		12

8.2 **Indigenous forest management**

Community-based village forest reserves provide an option in the process of enabling local people to manage forest resources sustainably in order to secure forest products outside the

gazetted national forest reserves. In the northern side of the East Usambaras, the two villages of Vuga and Hemsambia have a ritual forest on public land which was badly destroyed by greedy ritual clan leaders. This is the Mpanga forest. The forest is small, covering only about 30 ha. and it was traditionally used for purposes such as rain making and crop harvest rituals. The rituals were led by one clan, the Wakilindi, who originate from the West Usambaras. (During the fieldwork the author had an opportunity to hold discussions with the remaining elderly members of this clan). Since this was the only clan capable of leading the rituals, and considering that all prayers were conducted in that forest, the community perceived the forest as belonging to the Wakilindi. In the old days when the ritual leaders were very committed to their responsibility, this perception was respected by both the leaders and the community. The situation that seems to have changed dramatically.

Following the villagelization policy of the early seventies the community was administratively divided into the villages of Vuga and Hemsambia. The division, however, had little impact on the traditional beliefs and practices. The rituals continued to be conducted jointly under the leadership of the Wakilindi clan. Indigenous forest management in relation to this ritual forest involved tending operations at ritual sites (such as weeding and low levels of climber cutting). Forest utilization by community members was allowed on conditions that the ritual areas - what the author might call the "holiest" part of the forest - should not be trespassed by forest product collectors. Most of the community members feared these places. Further, the members had agreed upon other specific norms. For example, it was not allowed to cut down a tree big enough to cause vibrations on the soil as it fell down. This was believed to provoke the peaceful ancestors and be a bad omen. At the same time a number of forest tree species were never to be cut because they were sacred. Examples of sacred trees include *Cola usambarensis, Sterculia appendiculata, Adansonia digitata and Diospyros mespiliformis.* These norms actually contributed significantly to forest conservation which went hand in hand with controlled utilization.

It the late 1980s the leader of the ritual clan was coincidentally elected by the villagers of Vuga village to be an official village chairman. It was this man of "two hats" (ritual and village leader) who joined hands with corrupt district forest officers to allow remarkable levels of pitsawing by businessmen from urban areas to take place in the ritual forest. This was very frustrating for committed community members who had observed community norms to the extent of sparing commercial trees species of big diameter classes only to raise the appetite of commercial loggers. Much anger was piling up, especially within the nearby sister village of Hemsambia, not only because logging a ritual forest was considered a taboo but also because the Hemsambia was completely neglected as far as the distribution of logging benefits were concerned. Even within the Vuga village all the benefits ended in the village leader's pockets, although it was difficult for Hemsambia people to believe this. By 1992, the destruction was substantial and given the village level political situation (where much authority rests in the hands of a village chairman) the villagers could do practically nothing to stop the logging business, because the village leader was a beneficiary. Logically, the community's respect for the ritual clan was gradually fading out and the frequency of conducting ritual activities in the same forest became more and more irregular. The impact was even worse on the young generation which already had some reservations as far as the rituals were concerned. Many young people had already started questioning the validity of traditional rituals and the purity of the ritual clans even before the logging issue. The logging was the straw that broke the camel's back as far as the young were concerned.

It was the villagers of Hemsambia and Vuga under the leadership of disgruntled village and sub-village leaders who approached the EUCFP requesting the project to make arrangements for the gazettement of this forest before it was all gone. The project on its side found this a good opportunity to support villagers in developing a village-based forest reserve managed and controlled by the villages themselves instead of gazetting the forest. Not only did the project consider the lengthy gazettement procedure before making this decision but also the decision was consistent with the most recent developments in a project, concerned to develop a more people-oriented component within the project, with farm forestry as the main focus. Technically speaking, also, the level of destruction that had taken place in the ritual forest might not justify it gazettement on a "what does the forest hold" basis.

EUCFP supported a survey team which surveyed the forest. The two villagers formed a joint Mpanga forest management committee which oversees all activities in relation to the reserve. EUCFP commissioned a consultant to collect peoples opinions on how the forest should be managed and put regulations in place. While formal procedures for approval by government bodies were still in process, the villagers had already decided to close the forest for 5 years and put in strict control measures. The author is of the opinion that it is too early to call this a success because the forest is located in the drier part of the East Usambaras where forest products are scarce. The closure is meant to allow the forest to regenerate but what happens after 5 years is still not clear. Secondly the committee in charge of the patrols has no incentive at all. They just do it out of good will and of course to push the greedy ritual leader out of the forest. Already the most vocal and reliable Mpanga Forest Committee chairman who pushed for the establishment of the village reserve very strongly has left the village for wage employment in the nearby town of Muheza. This is likely to affect the voluntary forest patrol activities which depended on his charisma and enthusiasm. However it is also the opinion of the author that initiatives like the one in Mpanga are worthwhile supporting with careful nursing to see what might eventuate. It is only through successful grass roots initiatives of this nature that the government might be convinced to review its outdated forest policies and pay more attention to the most neglected stake holders.

8.3 **Domestication of forest species in the farms**

Farmers cultivate species of forest origin in their farms for different purposes. These include both consumption and non-consumption uses of the respective species. In the first category, species uses for food, medicine, construction, lumber and tools were recorded. The species used for cultivation, for non-consumption, uses such as water conservation, shade/support to crops and prohibited species, were also recorded. In the 18 homegardens that were surveyed all the natural forest species encountered were recorded. The exhaustive list is given in Appendix 7. Tables 19, 20, 21 and 22 cover the different main uses for which species were cultivated in those cases where a species was encountered four or more times (out of a possible 18). It should be noted that most species are also for common household purposes such as fuelwood, shade and simple construction.

Table 19 Domesticated species used as sources of food and the recorded percentages of encounters.

Species	Endemic status	Recorded percentage
Corchorus olitorius	non endemic	28
Byrsocarpus orientalis	non endemic	56
Basella alba	non endemic	100
Allophylus africanus	non endemic	28
Bidens pilosa	non endemic	50
Lactuca capensis	non endemic	67
Tamarindus indica	exotic	78
Telfairia pedata	non endemic	28
Solanum nigrum	non endemic	100
Psidium guajava	exotic	50
Pachystela msolo	non endemic	50
Allanblackia stuhlmannii	endemic	67
Dioscoreophyllum volkensii	non endemic	89
Annona senegalensis	non endemic	22
Vangueria infausta	non endemic	50

Table 20 Domesticated species for medicinal use and the recorded percentage of encounters.

Species	Endemic status	Recorded percentage
Hyptis pectinata	non endemic	44
Ficus capensis	non endemic	28
Securinega virosa	non endemic	33
Dombeya quinqueseta	non endemic	22
Psidium guajava	exotic	28
Uvaria acuminata	non endemic	28
Markhamia hildebrandtii	non endemic	33
Deinbollia borbonica	non endemic	28
Annona senegalensis	non endemic	33
Cola usambarensis	endemic	22
Vangueria infausta	non endemic	22
Milicia excelsa	non endemic	28
Bridelia micrantha	non endemic	50
Blighia unijugata	non endemic	22
Plectranthus barbatus	non endemic	72
Ocimum suave	non endemic	39
Solanum campylacanthum	non endemic	22
Microglossa densiflora	non endemic	28

Table 20 suggests great variation in knowledge of medicinal use of plant species from one household to another especially when the long list of medicinal plants encountered in the farms is taken into account (Appendix 7). In total 74 domesticated species were reported to be useful as medicinal plants. However, only 18 species (Table 20) were reported by more than four households (i.e.c. 20% of all the households surveyed). A plausible explanation is that there is much variation in terms of knowledge of medicinal plants within the community and farmers tend to domesticate the species they know. As pointed out by Owen (1992) some herbalists know up to 800 medicinal plants by heart.

From Table 22 it is evident that some of the species reported as domesticated for non consumption uses were also reported elsewhere as useful species for consumption uses. This is because farmers prefer trees which cater for more than one need. As such, they decide to domesticate species that do well with the crops as well as provide a range of products or services. Some trees, however, are officially protected by forest by authorities and one can not harvest these trees without a permission from the foresters, even if the trees are growing in the farm. Farmers still retain these trees which are very useful in their daily lives hoping that one day the rules might change or they might have a chance to go through the bureaucracies and get the required permission for harvesting "their own" trees. Meanwhile the trees serve other non-consumption purposes in the farms (soil enhancement and shade, for example).

During the PRA survey farmers in Potwe Mpirani and Kisiwani villages indicated much dissatisfaction with the lengthy process involved in getting such harvesting permits. The situation was worse in Potwe Mpirani where it was reported that sometimes outsiders from urban areas were given permits to harvest such trees in farmer's plots without the consent of the farmer. This situation had demoralized some farmers to the extent of them deciding to kill young trees/saplings of such protected trees rather than tend them for outsiders (Kessy, 1994). Clearly, where a protected tree in a farmer's plot has reached its required maturity for harvesting it would be an incentive to farmers if they were given the first priority, instead of outsiders. Further, there is a need to decentralize the permit-issuing authorities in such a way that most of the applications can be processed at village level, involving the district forester only on technical matters such as yield assessment for government revenue collection. These are some of the aspects that the proposed stakeholders reconciliation model (Chapter 9) might find relevant to deal with.

8.4 Possible future trends in wood demands and tree planting requirements

In order to get an impression of the amount of tree planting that might be necessary to supply alternative sources of forest products, some future demand estimates for fuelwood and building materials were made based on the findings of the present research and previous studies. First, demand estimates are presented as a basis for projecting the tree planting that would be necessary to offset the demand met from natural sources. A number of uncertainties about the future affect the reliability of these estimates. The most important factors are future population growth trends and changes in forest management. Consequently, a second section tries to address the "what if" scenarios, by applying a sensitivity analysis to such uncertainties.

Table 21 Domesticated species most frequently reported for use in construction, tools and lumber.

Category of use	Species	Endemic status	Reported %
Construction	*Funtumia latifolia*	non endemic	45
	Securinega virosa	non endemic	33
	Sorindeia usambarensis	endemic	39
	Pachystela msolo	non endemic	28
	Markhamia hildebrandtii	non endemic	72
	Bridelia micrantha	non endemic	89
	Vangueria infausta	non endemic	50
Tools	*Tamarindus indica*	exotic	33
	Markhamia hildebrandtii	non endemic	50
	Bridelia micrantha	non endemic	72
	Psidium guajava	exotic	33
	Enantia kummeriae	endemic	39
	Albizia versicolor	non endemic	28
Lumber	*Pachystela msolo*	non endemic	50
	Albizia adianthifolia	non endemic	39
	Milicia excelsa	non endemic	100
	Brachystegia spiciformis	non endemic	22
	Odyendea zimmermanii	endemic	33
	Allanblackia stuhlmannii	endemic	89

Table 22 Species domesticated by farmers for service functions.

Use category	Species	Endemic status	Reported %
Water conservation	*Ficus* spp	non endemic	83
	Bridelia micrantha	non endemic	39
	Ceiba pentandra	non endemic	72
Shade	*Ficus* spp	non endemic	89
	Tamarindus indica	exotic	28
	Albizia versicolor	non endemic	50
	Allanblackia stuhlmannii	endemic	33
	Ceiba pentandra	non endemic	72
Protected by forest authorities	*Milicia excelsa*	non endemic	89
	Pterocarpus angolensis	non endemic	50
	Dalbergia melanoxylon	non endemic	39

8.4.1 Estimated need for tree planting to meet future wood consumption

The reported research is complementary to previous studies conducted in the East Usambaras with respect to the demand for fuelwood and building materials. In particular, the research drew from and added upon the survey of forest products which was conducted by Owen in 1992. Whereas Owen's survey was centered on the Amani division alone, the present study provides wider coverage and includes the diverse ecological and culture settings of the northern side of the East Usambaras and the lowlands around Potwe. However, Owen's estimates of wood volumes required for different purposes such as fuelwood and building materials were useful in estimating the demand for such products based on data collected in this research.

As noted, the current estimated population in the study area is about 128,000 people. With estimated fuelwood consumption of 1.7 cubic meters per capita per year, Owen (1992) suggests current annual fuelwood demand for the area about 217,750 cubic meters. Fuelwood studies carried out in the West Usambaras revealed even higher annual fuelwood per capita consumption of about 2.6 cubic meters (Fleuret & Fleuret, 1978). Such high levels of consumption are a reflection of the cold weather in these highland areas which necessitate the use of fuelwood for warming the house. The relative abundance of fuelwood in nearby forests may as well encourage the use of more fuelwood at household level, despite of the difficulties and regulations associated with fuelwood collection. The estimated consumption of 1.7 cubic meters for the East Usambaras was used in the fuelwood demand projections made in this chapter and it was assumed that the figure remains constant during the planning period.

The population is growing at the rate of about 1.6 % (Appendix 8). Assuming population growth rate and per capita fuelwood consumption remain constant then the estimates for fuelwood demand for following ten years is as projected in Table 26. Ten years in this case is considered the short run period within which forest management authorities in the East Usambaras can adopt new strategies geared towards reversing the current deforestation trends by seriously seeking for alternative sources of forest products outside the reserves. Further, according to NAS (1980) in ten years time most fuelwood tree species can guarantee harvestable volumes of wood through their fast growth. The same species can also be used as building poles within ten years. As such, the ten years period is also relevant for the building materials estimates presented later in this chapter.

Casual observations in the field reveal that eucalyptus and grevillea have been the most preferred species by the farmers in the area in previous tree planting initiatives. Further, the species are performing well in the field. From the estimates in Table 23, if for example the management aims to reduce the reliance that local people have on the forests by at least 50% then strategies should aim at obtaining about 1,298,180 cubic meters of fuelwood from areas outside the forest reserves. Fuelwood plantation studies in East Africa have revealed that eucalyptus yields about 277 cubic meters of wood per hectare in rotations as short as six years while grevillea takes longer time and yields about 217 cubic meters of wood per hectare (NAS, 1980). For practical purposes and given the poor soils in the East Usambaras the average yield of about 200 cubic meters per hectare is assumed for both species. To meet the estimated target of about 1,298,180 cubic meters then about 6,490 hectares of woodlots are required for the ten years period. If this is distributed across the 54 villages in the study area, then on average each village should plant about 120 hectares of trees. Because of the

poorly surveyed and demarcated farms in the farm-public land interface it is not possible to know exactly if each village has enough land area for the required woodlots. However, it is possible to convert the hectares of fuelwood plantations to number of trees. The yield studies reported by NAS (1980), which also form the basis for the demand estimates in this research, were achieved on fuelwood plantations with an average stocking level of about 500 stems per hectare - for example, eucalyptus planted in Lushoto. If this stocking level is adopted, then each village should now plant about 60,000 trees to meet the fuelwood demands in ten years time. Planting should take place on both farm boundaries and in village public lands. However issues of defining tenure rights need some attention.

Table 23 Fuelwood demand projections based on the current annual population growth rate of 1.6% and fuelwood per capita consumption of about 1.7m^3

Year	Estimated population	Estimated fuelwood demand in m^3
1996	128,088	217,750
1997	130,137	221,230
1998	132,219	224,770
1999	134,335	228,370
2000	136,484	232,020
2001	138,668	235,740
2002	140,887	239,510
2003	143,141	243,340
2004	145,431	247,230
2005	147,758	251,190
2006	150,122	255,210
Total		2,596,360

Using the same ten-years short-run planning period, estimates of wood needed for building materials were made. These were based on the population structure in the study area as well as previous estimates of wood volume required in constructing a typical house in the area. The population structure in the area reveals that about 34% of the population is made up of youths in the age of 11 to 18 years. The total population in ten years is estimated to reach 150,122 and if the population structure remains the same then about 51,041 youths will be entering adulthood, representing about 25,520 couples each requiring a house. It was assumed that all building materials would be derived from sources outside the reserves because collection of building poles affects the forest structure substantially. The volume of wood required for one house depends on the size of the house. Owen estimated that a typical three rooms house requires about 2.4 cubic meters of wood, while a two-room house requires about 1.4 cubic meters of wood. This study estimates that the average size of houses for the

studied villages was about two rooms (chapter 7.3.1 refers). This average was adopted in estimates. The demand for building materials would then be about 35,728 cubic meters. A contingency factor of 10% was used to take care of potential immigrants and minor house repairs in the planning period. The required volume then becomes 39,300 cubic meters. This is equivalent to about 196 ha of woodlots. Distributed across the 54 villages implies about 4 ha of woodlots per village equivalent to 2000 trees per village. Added to the fuelwood demand each village will then need about 62,000 of trees planted during the planning period to cater for about 50% of fuelwood and 100% of building materials demand. This implies an annual tree planting rate of about 6,200 trees per village for ten years. To reduce the pressure on natural vine species used as ropes for building purposes, the people should be encouraged to use sisal ropes which are relatively abundant in Tanga and nails as substitutes.

8.4.2 **Sensitivity analysis of wood demands**

The estimates presented in the previous section are vulnerable to both changes in management objectives and future population growth trends even if per capita consumption of wood remains unchanged. Population growth rate can either increase or decrease while management objectives might shift, setting different targets. The sensitivity analysis takes into consideration the impact of such possible variations. The analysis assumes that wood consumption per capita and population structure remain unchanged in the coming ten years while population growth rates and management ambitions change. The changes are then reflected on the demand for fuelwood and building materials and the extent of tree planting necessary to offset the demand. The assumptions made regarding population growth trends were:

- population growth rates can increase to about 2% or even to the reported highland population growth rates in the country (about 3.5% per year). The increase might combine immigration and natural growth.
- population growth rate might decrease due to family planning campaigns and facilities or as a result of management agreements with the tea estates on the issue of deliberate "importation" of cheap labour into the area. The analysis assumes that such attempts might reduce the population growth rates to an average of about 1% per year in ten years time.

Regarding forest management objectives they can either be more ambitious or less optimistic compared to the estimates in the previous section. The previous section assumed that management objectives can aim to reduce local people's reliance on fuelwood from the forest reserves by at least 50%. However, more ambitious objectives might aim at 75% or even 100% reduction while less ambitious objectives might aim at only 25%, for example. This would definitely affect estimates presented previously.

The approach used in chapter 8.4.1 was also used in the sensitivity analysis. The effects resulting from changes in population growth rate are summarized in Table 24.

The estimates in Table 24 reflect the demand situation if all the wood has to be derived from sources outside the forest reserves. This implies adoption of a very optimistic management objective. However, the tree planting requirements will vary accordingly if less optimistic objectives are set (e.g. only 75% wood from non-forest sources).

Table 24 Sensitivity analysis for fuelwood and building materials demand estimates for the ten years period ending in year 2006.

Products	Reflections of population growth rate changes on demand estimates					
	Annual growth rate drops to 1%		Annual growth rate rise to 2%		Annual growth rate rise to 3.5%	
	Demand in m^3	Trees/village	Demand in m^3	Trees/village	Demand in m^3	Trees/village
Fuelwood	2,519,690	116,500	2,649,740	122,670	2,861,640	132,480
Housing	37,070	1,500	40,870	1,890	47,300	2,190
Total	2,556,760	118,000	2,690,610	124,560	2,908,940	134,670

Because of the preliminary nature of the quantitative analysis concerning other forest products such as medicines and home utensils, demand projections for these products were not estimated. More detailed (may be even product-specific) studies would be needed if such projections were to reflect the real situation. Further, forest products such as medicines and home utensils are constantly substituted with more commercial products as the cash economy and development situations improves. The rate of substitution is not known so far. This knowledge gap would fatally undermine the reliability of such estimates.

8.5 Conclusion

Sustainable management of the forests in the East Usambaras depends largely on the way the present needs of the local people can be met, and it is unlikely that conservation initiatives geared towards total preservation of the forest resources for future use will succeed. This study has shown that the forest reserves, where total preservation of the resources is advocated, have been utilized by local people against the strict conservation rules and their structures have been adversely affected because of this unplanned utilization. The main factor encouraging illegal collection of forest products is the high demand for forest products, especially building materials. Estimates in this chapter suggest that in ten years time if serious tree planting initiatives are implemented alongside other conservation measures the possibility of reversing the deforestation trend exists. However, this will largely depend on the level of interaction and cooperation amongst the stakeholders in the area, including the local people. These results, therefore, underscore the importance of stakeholders reconciliation in the area. The same applies to the case of the observed community-based forest reserve still in its infancy. Nursing such conservation initiatives to contribute to empowerment of local people will require high levels of cooperation among all stake holders.

CHAPTER 9
BIODIVERSITY CONSERVATION AND UTILIZATION

Values and interests in relation to forest resources are shown to differ between stakeholders. These have implications for forest management and utilization trends, regarding conflicts of interest between different stakeholder. The Stakeholders Reconciliation Model proposed later in this chapter focuses the relationships between key variables which influence the process of reconciliation amongst stakeholders. These variables include policy formulation, institutional set up, land use planning and communication between stakeholders.

9.1 **Perception of different interest groups on biodiversity**

The research has categorized the interest groups as far as the management, conservation and utilization of the East Usambara forests are concerned. These interest groups were identified as forest department and other government officials; conservation and development projects in the area; tea and sisal estates authorities; and the local community (very diverse in composition). The perceptions of these interest groups, as interpreted by the researcher, derived from a series of interviews, as presented in this section.

Forest and government officials, as well as different project leaders, form a notable interest group. The forest officials referred to in this case are the regional, district and village level forest officials. Other government officials in the area comprise an allied group. These operate hand-in-hand with project leaders and staff from projects in the area. The majority of these officials are well educated, ranging in qualification from PhD holders down to professional certificate holders. As the level of qualification increases, the range of activities carried out by the officer gradually change from field-based activities to more administrative and advisory tasks. The study found out that this category of stakeholders views the forests in the area in more than one dimension. First and foremost the forest is seen as a national resource which they have to safeguard, and secondly as a resource of great significance at global level, due to biological status and catchment values. Thirdly, it is seen as resource highly demanded by surrounding communities for subsistence as well as for some commercial benefits. Perceptions on biodiversity and its importance do not differ much from what is reported in the literature by various scientists. This group also sees the need to involve local communities in the management of this fragile resource and most of them are working on the modalities of involving local people bits-by-bits as expressed by the EUCADEP and EUCFP as well as regional and district political leaders. Two main challenges face these interest groups. First of all on one side most of them are responsible to make sure that law enforcement is in place but on the other hand they promote local participation which calls for a less rigid approach. Secondly, the strength of these interest groups to pursue their planned activities, be it in law enforcement or support to participatory initiatives, largely depends on availability of funds. In many cases, the government can barely provide their salaries on time, let alone provide funds for field activities. Most initiatives are donor dependent, therefore.

The privately-oriented interest group perceptions on the importance of the forests and the biodiversity value proved to be quite different from those of government and project officers. The East Usambara Tea Company, taken as representative, showed much awareness of

conservation needs. However, forests were viewed from a different angle - as a source of rainfall which to boost production. For example, when asked if he thought diversity of species in the forests was important, one official answered that to him a forest is a forest whether made up of one or a million species, provided that the forest brings rainfall. This group does not feel responsible for destructive activities such as clearing of forest land for cultivation by their ex-employees who have ended up in the area as squatters after retirement from the tea estates.

Another important interest group is made up of local people. Previous chapters in this book have described their heterogeneity, which cannot be overemphasized. This study, as well as some previous studies in the area (e.g. Kajembe and Mwaseba, 1994) expose the fact that the local people in the East Usambaras are very much aware of forest conservation needs. Several reasons explain this awareness and are summarized as extension education, experiences from the West Usambaras, and experience of drought in the East Usambaras following the establishment of teak plantations from cleared natural forests. Many extension education campaigns on the importance of conserving the natural forests and tree planting have been carried out in the area, both the existing projects and by politicians. Discussions with villagers also revealed that they are aware of the deforestation which has taken place in the West Usambaras, and the resulting bad consequences which they wish to avoid in East Usambaras. A good number of immigrants originate in the West Usambaras. At the same time about 20% of the interviewed farmers associated the drought experienced in the area in the Seventies with the clearance of natural forests in the sixties in order to establish teak plantations. This, however, has not been proven scientifically, and as mentioned earlier, various parts of the country experience some drought every ten years. Suffice therefore to note that from the farmer's perspective forest clearance and drought were correlated; whether casually or not remains to be proven. As an interest group local people value the forests mostly from a utilitarian perspective - in terms of products and services that the forests can supply. This was very evident in one of the PRA exercises conducted in some of the case study villages, where participants were requested to rank, through matrix scoring, the ecosystem which they considered most important to them, using a range of forest products as criteria. The scoring from one of the case study villages (Mikwinini) is presented in Table 25. A similar trend was observed in other case study villages (Kessy, 1994).

In Mikwinini the ranked ecosystems included the natural forest reserves, tea estate natural forests, tea plantations and agricultural farms in the village. While the researcher facilitated identification of different ecosystems, products were identified by villagers alone. It is interesting to note that the villagers did not itemize rainfall as one of the forest products, although continuously referring to forests as important sources of rainfall is vital for their lives. This shows clearly that villagers were thinking more in terms of direct product inputs into households rather than indirect benefits. The ranking was done by scoring (an empty box was allocated zero). Villagers used small stones in the scoring exercise.

A very hot discussion took place among villagers concerning those products the researcher allocated a star (*) in the table. The villagers wanted to make it clear that some ecosystems had high potential supply the named products but the products were not freely available due to existing forest regulations. The star therefore indicates that current regulations hinder the utilization of these products, from villagers' perspective. The most important observation was that villagers value what professionals call *biodiversity* according to the use of species from

Table 25 Matrix scoring used to rank different ecosystems in the East Usambaras based on ability to supply a range of forest products (Mikwinini).

Products Natural/agro ecosystem	F/wood	Vegetables	Poles	Medicines	Ropes	Bush meat	Baskets	Timber
Forest reserves	xxx *	xxx *	xxx *	xxx	xxx *	xx *	x	xxx *
Tea estate forests	xx	xx	xx	x	0	0	0	0
Tea plantations	0	x	0	0	0	0	0	0
Farms	x	xxx	0	x	0	x	0	xx

various ecosystems in their daily lives. The exercise also exposed alternative sources of different forest products. As a stakeholder group, the local people value biodiversity from a more utilitarian perspective. At the same time they do consider future flow of benefits to coming generations, especially in relation to rainfall availability which ensures crop production.

9.2 Trends with respect to forest management and utilization

This section summarizes the main findings in relation to the activities taking place at the forest-people interface and their likely impacts on both the environment and the community. In the first section the various forest types found in the area, their ownership and the kind of forest development initiatives taking place in each category of forests, is summarized. The second part presents some quantitative and qualitative evidence relating to people's use of forest products as recorded from various surveys conducted during the research. The final section discusses the likely impact of forest management and utilization strategies on local people and the environment.

9.2.1 Forests management trends

The forest types in the study area can be categorized into six different groups according to ownership. These are natural forest reserves, owned by the Tanzanian government and managed by the Forest Division, tea estate natural forests, forests in the public domain owned by the district and village authorities, individually owned forests, plantation forests owned by the Tanzanian government and managed by the Longuza Forest project on behalf of the Forest Division, and finally village and individual woodlots. In each of these forest types different management trends are observed. Table 26 summarizes the main forest types in the areas, ownership and the main forest trends observed in each forest category.

As can be seen in Table 26 the main forest development activities in the forest reserves involve tightening of forest access rules with the establishment of a nature reserve. The latter makes it necessary to gazette more forest land from individuals and the public domain to allow regeneration and provide for wildlife corridors in the reserve. The Forest Division has

Table 26 Forest types, ownership and observed forest development activities in the study area.

Forest type	Ownership	Forest development activities
Natural forest reserves	Tanzanian government	• Tightening access rules • Establishment of Amani Nature reserve(gazettement)
Tea estate natural forests	Kind of private ownership with title deeds.	• Inclusion in the nature reserves through management agreements with the Forest Division.
Public/Village natural forests	District and village authorities	• Poorly controlled • Some gazettement • Initiatives for village based management arrangements
Individual natural forests	Owned under customary tenure rights	• Small in size • Some included in the nature reserve plans and gazetted • Evidence of clearing for farming
Plantation forests (exotic)	Tanzanian government	• Production of commercial logs • Supply fuelwood to local people
Individual/Village woodlots (mostly exotic species)	Individuals and villages	• Gradual recognition of poorly defined tenure conditions

also made some management agreements with the tea estates to allow the Forest Division to take over the management of the tea estate forest as part of the nature reserve plan. Most forests in the public and village lands are poorly controlled due to lack of necessary infrastructure and resources to manage them properly. Some forests in this category will also be gazetted as part of the nature reserve plan. It is interesting to note that the Mpanga village-based forest reserve initiative reported earlier operates on village forest land. Clearing of land for agriculture is still evident in some few patches of disturbed natural forests owned by individuals under customary tenure conditions. However, these forests are small and some have been included in the gazettement plan. The land ownership condition is very confused,

especially on what is referred to as public lands. While these public lands are supposed to be controlled by district authorities, poor control has resulted in a perceived "private" ownership of some parts of the public lands by individuals who customarily owned pieces of land close to public lands. Over the years individuals, opening farms and controlling activities in parts of the public lands close to their farms, went unchecked for such a long time that these farmers have some kind of perceived ownership of these lands. It is only when a new development like the gazettement process takes place that the confusion on who owns what surfaces strongly. The confusion on ownership also is strongly observed in the established village woodlots. Most of these woodlots were established either as part of a project like the EUCADEP or through political tree planting campaigns (Ramsay & Kessy, 1996). The woodlots have suffered from poor management, as a result of undefined ownership conditions and gradually this situation has resulted in shift of emphasis from village woodlots as advocated by the EUCADEP project to farm forestry by individuals, now strongly advocated by the EUCFP.

9.2.2 **Forest products collection: summarized evidence**

The various surveys provide much evidence on the forest management and utilization strategies by local people. The evidence is both qualitative and quantitative. This section summarizes the evidence in two parts. The first part quantifies and provides observed remarks on forest products collection by different interest groups (Table 27 refers) while the second part dwells on aspects of plant domestication and commercialization (Table 28). As presented in Table 27, fuelwood collection by local people involves a total of about 27 different natural forest species. The annual consumption per capita has been estimated at about 1.7 cubic meters. At the same time, from the building materials survey more than 90% of the species used for construction purposes are collected from the natural forests. An average house consumed about 5 kgs of traditional ropes from natural forest species. Of interviewed individuals in the process of building their houses 70% reported that they collect most of their building materials from the forests while about 30% reported that they rely on both tree species from the forests and their farms. It was observed that most species used as poles were also preferred for use as withies. While all the interviewed households confirmed that traditional medicines are used in their households, about 70% of the respondents confirmed that they consult traditional healers now and then. The main sources of traditional medicine were reported to be the surrounding natural forests and farms. A total of 185 local species are known to be of use as medicines (Hamilton & Smith, 1989). All households interviewed confirm that they use food materials from the forests, especially vegetables. The survey revealed that a total of 28 local species are used, and on average each household consumes about 1 kg of vegetables from the forests per month. About 83 forest species are used in making various household utensils. The most frequently encountered items were toolhandles, trays, baskets, stools, mortars, mats, brooms and spoons. Five wildlife species provide bushmeat for villagers.

However quantification was difficult because hunting was done with much secrecy. The meat entered the villages late at night and without a predictable pattern. The facts that about 45% of the interviewed farmers reported that they eat bushmeat in their households, hunters were encountered and interviewed, animal traps were encountered in the forest survey, local people have different nicknames for bushmeat from different animals to confuse the authorities, and that the researcher ate bushmeat served by villagers, all prove the activity is on-going. Equally, encounters with confiscated lumber, and several ambush attempts by

Table 27 A summary of forest products collected by local communities in the East Usambaras: Species used and their endemic status

Forest product	Number of species used			
	Total	Endemic	Exotic	Marketed
Fuelwood	33		6	
Poles	35	6	6	
Withies	32	6	3	
Ropes	11	1	-	
Foods	28	4	3	3
Medicines	185			35
Home utensils	83	2		15

Table 28 Role and number of species domesticated in the farms in the East Usambaras.

Role	Number of species		
	Total	Endemic	Exotic
Lumber	8	2	2
Other construction materials	21	4	1
Foods	28	4	2
Medicines	43	8	1
Handtools	13	1	2
Shade	5	1	1
Water conservation	3	-	-
Officially protected	3	-	-

foresters, confirm that illegal logging and mining still take place in some localities in the study area.

Table 28 provides evidence that a range of multipurpose tree species of forest origin are domesticated by the villagers for various reasons. While most species are domesticated for consumption others are kept for non-consumption purposes. In reality, all species kept in

farms serve both purposes. The table further reveals that about 53 forest species provide a range of products sold in the market. However the quantities found in market are quite small.

9.2.3 **Forest management and utilization implications**

Earlier discussions have outlined a range of forest/tree management and utilization activities in the study area, as practiced by the local community as well as the forest authorities. This section summarizes implications of different management and utilization activities for both the community and the environment. Utilization activities include collection of forest products by the local community and commercialization of forest products. Management activities include domestication of forest species, community based forest management initiatives and the establishment of the nature reserves (involving land gazettement and inclusion of tea estate forests within reserves). Table 29 presents the summary of the implications.
It is evident from Table 29 that management and utilization decisions made by both the forest authorities and the local community might have both negative and positive impacts on the community and the environment.

From a forest management point of view this is an indication that any management strategy that does not sufficiently involve all stake holders in the decision making process is likely to face problems resulting from independent decisions made by neglected stakeholders. At the same time, forest management decision made in isolation will likely fail to optimize the flow of positive impacts from the neglected stake holder group due to lack of communication in the decision-making process. For example, one of the prime objectives of the forest authorities is to conserve biodiversity and reduce negative environmental impacts such as soil erosion. While the forest authorities have the opportunity to achieve their objective through proper management of the forest reserves a substantial contribution is made by farmers through plant domestication. However, these two systems seem not to interact, with the exception of law enforcement on prohibited trees in the farms. The lack of interaction results from management decisions made in isolation. Table 29 also shows that while some activities have positive impacts on both the environment and the community, the majority involve some kind trade-off, in which positive impact on the environment implies a negative impact on the people. Wherever such trade-offs occur they definitely call for a more participatory kind of management, in order to minimize conflicts. A first step is to recognize that regular and repeated review and negotiation is required. Some ideas on this point are developed below.

9.3 **The Stakeholders Reconciliation Model (SRM)**

Previous sections in this chapter have discussed the different perceptions and values of stakeholders and the likely significance of these differences on forest conservation. More clear even has been the conflicting interests between different stakeholders and the necessary tradeoffs required if at all a harmonious conservation and development environment is to be created. The stakeholders reconciliation model presented in this section is an attempt to lay down management paths through which stakeholders in the East Usambaras and other conservation areas could find the necessary harmony for the betterment of biodiversity conservation.

Table 29 Forest/tree management and utilization activities and their implications for local communities and the environment in the East Usambaras

Activity	Impact on the people	Impact on the environment
Forest products collection (Poles, withies, medicines etc)	Improve household welfare	Some, e.g. pole cutting, have adverse effects on the forests.
Domestication of forest species	Ease the supply of various forest products at household level	Contribute to environmental protection through soil erosion control, nutrient cycling and ex-situ conservation of species
Commercialization of forest products	Improve household welfare	No evidence of forest destruction because: • Quantities collected are small, • Diverse source areas within the region
Gazettement and compensation	Adversely affects the land available at household level. Unrealistic compensation.	Enhance the conservation initiatives such as the establishment of a nature reserve and wildlife corridors.
Inclusion of tea estate forests into the reserve	Reduce available areas for local people to collect forest products	Enhance conservation initiatives
Community based forest management initiatives	Improve community control of resources in their area	Enhance conservation and sustainable utilization outside the forest reserves.

9.3.1 **The model in skeletal structure**

The SRM is a simplification of reality aimed at better understanding of that reality. Because of the complexity of human behaviour and interactions, the modelling process inevitably focuses on the most crucial variables defining the situation and has to do away with less important variables. Results from this research suggest that four main variables need to be considered if stakeholders' interests are to be reconciled in a conservation area. These include policy formulation, land use planning, institutional set up and communication between stakeholders. The relationships between these variables and the process of stakeholders reconciliation are summarized in the SRM presented in Figure 10.

The key feature in the SRM is the importance of communication between stakeholders, to encourage stakeholder participation in crucial activities such as land-use planning. This communication involves negotiations, bargaining and compromises associated with trade offs. Participation in this context entails genuine involvement in the planning process. The

communication process is facilitated both by policy makers and local people. While policy makers have to create the policy environment and provide communication mechanisms, the right institutions at local level need to be in place if at all local people are to be effectively involved in the process. Civil society institutions stand a better chance to defend the interests of local people. For situations like in the East Usambaras village governments which are essentially pro-central government and are very much influenced by the political system in power need to be backed up by informal civil society institutions. The institutional set up also has to provide for the forum where all stakeholders feel at home. In situations where this forum does not exist some level of social "engineering" might be necessary.

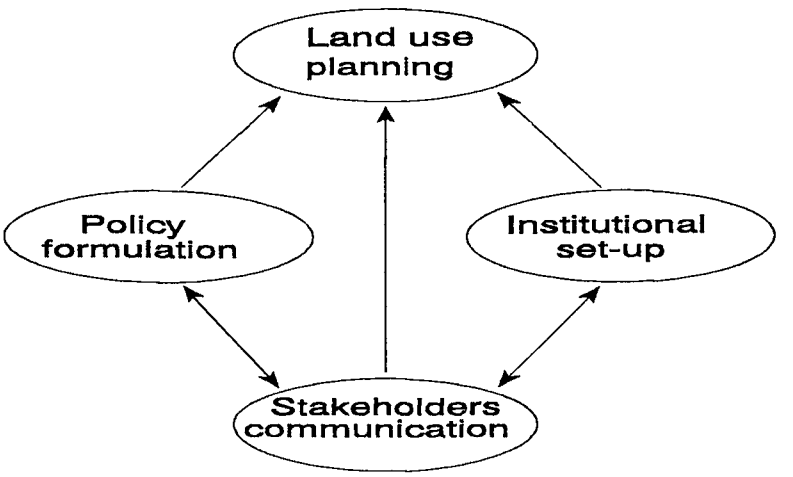

Figure 10 The Stakeholders' Reconciliation Model

9.3.1.1 **Policies in favor of reconciliation**

The gap between stakeholders is largely contributed to by the policy environment which governs activities on the ground. For example, forest officers in charge of conservation activities in the field are accountable to their employers (the Forest Division in the East Usambaras case) and are judged according to what the forestry policy requires them to pursue. From the aforesaid, policy formulation should aim at formulating policies which are enabling in nature. The need to conceive the stakeholders' reconciliation process as a "give-and-take" process can not be overemphasized. What the forest managers can safely give in this process depends largely on what the forest policy dictates. This underscores the need for formulating and updating policies which favor reconciliation. But the policy environment must offer rewards to forest officers for successfully facilitating flexible dispute resolution, for example. Currently, they are better rewarded for executing orders. Dispute management should feature in training.

9.3.1.2 **Institutions in favor of reconciliation**

One of the most marginalized stakeholder group in forest conservation is that of local people. Conservation initiatives have for decades constantly alienated local people in decision-making processes as well as in utilizing forest resources. As pointed out earlier involving local people in the reconciliation process requires well-established and relevant local institutions. It does not really help to have well-established institutions in place which are not necessarily relevant. Take as example the point already made that village governments may not be the only or best local institutions to reflect popular interests. They are well-established to handle some issues such as mass mobilization and tree planting campaigns but when it comes to reflecting indigenous technical knowledge in land use planning they might not be at all conversant. An informal but organized group of traditional healers might contribute substantially when the planning process requires some inputs from indigenous technical knowledge. A similar point might apply to indigenous cultural and religious aspects of conservation. This underscores the importance of backing up village governments by helping build or strengthen a range of local informal institutions.

The less marginalized stakeholders in most cases are already well-established institutions either governmental, non-governmental or private. These can sometimes afford to make their decisions in isolation if they are not satisfactorily involved in conservation initiatives. An example in case of the East Usambaras would be the commercial estates and the array of governmental and non-governmental projects operating in the area. Making decisions in isolation potentially involves duplication of efforts in case of development projects and creating situations deleterious to other stakeholders objectives. Often the process of stakeholders reconciliation is not observed under such situations mainly because the various actors lack the platform for bargaining and negotiating. A platform is needed where their interests can be understood by others, and which provides the opportunity for them to understand other stakeholders interests.

9.3.1.3 **Programmes seeking for alternatives**

Sustainable conservation of forest resources requires initiatives geared towards identifying alternative sources of forest products outside conservation areas. Often the demand for forest products is so high as to defeat sustainable utilization of forest resources in conservation areas no matter how stakeholders try to reconcile their interests. One example might be the demand for building materials of forest origin in conservation areas with large and growing human populations. Under such circumstances the reconciliation process should also try to elicit ideas about how population growth trends can be reversed and alternative areas from which forest products can be drawn. It is at this juncture that indigenous forest /trees management strategies and farm/community based tree-planting activities offer opportunities in the process of seeking alternatives. Observed activities, such as forest plant domestication initiatives by the East Usambara farmers, need to be supported technically and materially to maximize their rewards.

9.3.2 **Reconciliation in the East Usambaras**

The SRM described in the previous section was focused on the East Usambara situation with the intention of examining the operational aspects entailed in the reconciliation process. For the purpose of stakeholders reconciliation in the East Usambaras two main variables namely land use and stakeholders communication were taken into consideration in relation to a third factor, existing institutions. Among the land use types considered are farms, estates, natural

forests, public lands and plantations/woodlands. These can broadly divided into two categories, namely agricultural systems and forest resources, both of which relate to the local community. Three main stakeholders are represented in the model namely the villages, the tea estates and the Forest Division (described earlier as brokering interests across a range of other stakeholders including international interests). Stakeholder communication can be facilitated through what is referred to in the model as a stakeholders' platform (a permanent institution, or temporary platforms such as stakeholders' workshops). The platform serves as a melting pot where all stakeholder's interests are discussed and practical recommendations on future courses of action deliberated. As presented in the model (Figure 11), local peoples interest would mostly focus on use of resources (**A**) while the Forest Division might be more interested in conservation matters (**B**). On the other hand the estates will tend to focus more on the performance of their enterprise and how it might be affected by an adverse environment (**C**). The model therefore suggests that the platform should come up with recommendations on conservation strategies (**D**) on the natural forests as well as give due consideration to local people's interests in forest products and rural development (**E**). Given the current state of affairs in the East Usambaras, these are the first priority areas as illustrated by the thick arrows in Figure 11. Other practical recommendations would have to do with sustainable land use practices on the public lands, management of forest plantations and advancements in village woodlots in relation to conservation and finally the relationships between productivity in the estates and forest conservation initiatives.

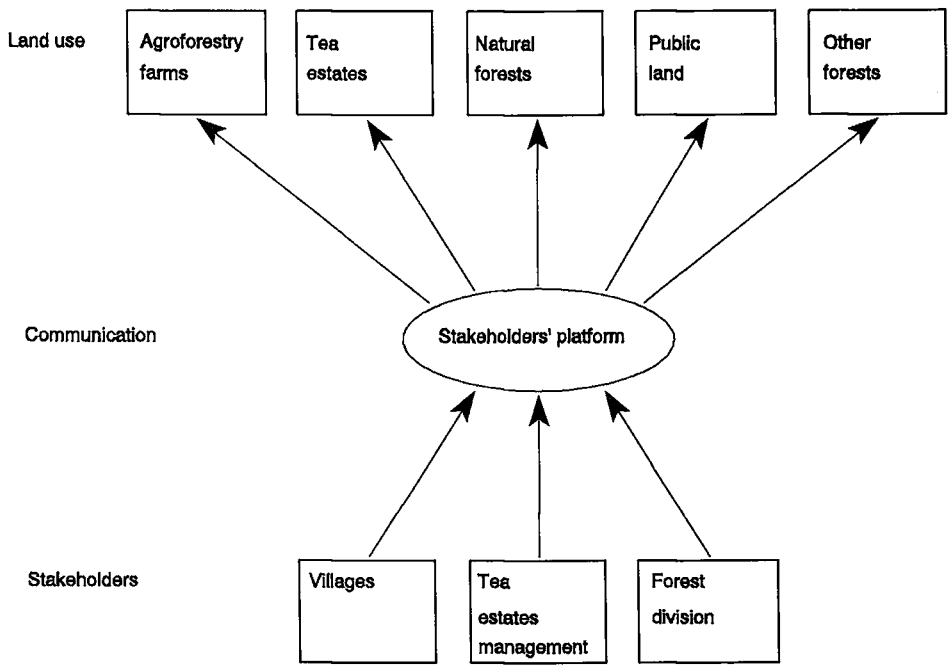

Figure 11: Extended Stakeholders' Reconciliation Model for the East Usambaras

On the agricultural system, particularly on local people's farms, attention has to be given to the development of the existing agroforestry systems and improvement of soil fertility (e.g. use of manure). Attention also needs to be directed to the forest species domestication process that has been initiated by farmers, together with other farmer's experiments like cardamon cultivation in agroforestry systems. Other development activities such as employment opportunities and crop marketing strategies should as well form part of the rural development strategy. The conservation strategy on the other hand should seek focus on conservation with regulated utilization of forest resources. Resources in the public lands and plantations/woodlots should contribute to reducing the pressure on natural forests but they first need to be assessed (especially the public lands). Essentially, the stakeholders' platform would be participating in developing resource conservation (forests) and utilization zones forests and farmlands). The main bottleneck in the application of this model in the East Usambaras for the time being is the policy environment. With the slow process of policy review in Tanzania it might take years before anything is done if all stakeholders wait for policy changes. It is worthwhile trying to identify good starting points for the reconciliation process even within the current set up.

9.3.3 **The starting point**

Often the divergence in values and perceptions among stakeholders places them in a deadlock where they can even fail to utilize the existing institutional framework as a starting point in the negotiation process. The situation can be worsened if differences in personalities come into play. However, if the main actors can overcome these obstacles opportunities to initiate the bargaining process are often existing, yet times obscure. For example it is possible to find policies to foster informal dialogue and communication between stakeholders no matter how alienating the formal structures might be. Even the most formalized management structures have informal structures within them. Often there are areas where different stakeholders interact (for example in regional and district meetings and in politically motivated campaigns) even if the interactions do not have a direct conservation agenda. Such interactions offer opportunities to develop platforms through which future conservation agendas can be discussed and reconciliation take shape. In my opinion, therefore, genuine informal linkages between stakeholders provide a good starting point for more formalized negotiations. Further, the existing formal structures involving good number of stakeholders could serve as stepping stones towards more conservation oriented fora if the willingness to reconcile exists amongst stakeholders. Together with these informal initiatives, the most crucial ice breaking points are activities within stakeholder groups. These mechanisms should persuade those at policy level to move towards the formulation of policies which enable reconciliations with other stakeholder categories. For example in the forestry sector policy makers might need convincing evidence that the existing policies do not deliver the required outcomes in conservation terms. They might also need local evidence that community-based initiatives are reliable options in conservation. The same applies to local people whose sense of alienation from existing conservation approaches might have destroyed their trust in other stakeholders. Whereas studies like the one reported in this book tend to benefit literate stakeholders, local people might find attention to the strengthening of genuine civil society institutions more beneficial. Stakeholder's workshops might serve to bridge between the two, as opening grounds for the reconciliation process as well as raising different stakeholders awareness of the full range of interests in conservation.

CHAPTER 10
LESSONS AND PROSPECTS

10.1 Conflicts between conventional and local views on biodiversity conservation

The study has demonstrated that conventional conservation approaches consistently marginalize knowledge and value systems of significant stakeholders, particularly local people. Further, it has been shown that stakeholders' values and perceptions on biodiversity vary. The study has shown that while conservationists value forest biodiversity in terms of its scientific and potential utilization aspects, local people value the forests in a more utilitarian way. At the same time privately oriented enterprises tend to value the forests in terms of what they contribute to enhance productivity of such enterprises. These values are reflected in the activities and decisions that stakeholders make in relation to forest resources. The process of local stakeholder marginalization through standard forest protection approaches, for example, tends to short-circuit the very conservation initiatives resulting in biodiversity erosion. This is particularly true when, for example, conservation initiatives which neglect peoples' values discover that in reality illegal collection of forest products causes tremendous deforestation in protected areas because of unplanned utilization. At the same time, similar initiatives fail to tap valuable indigenous forest/tree management knowledge, as the domestication case in the East Usambaras has shown. This failure mainly reflects professional prejudice. The conflicts of interest amongst stakeholders result in antagonism between conservationists and the communities living around protected areas. This leads to opposite decisions being made, which contribute to biodiversity erosion. The stakeholders' reconciliation model (SRM) proposed in this study suggests modalities through which the process of reconciling stakeholders' interests might take shape. As indicated by the SRM key determinants of sustainable biodiversity conservation are harmonious settlement of conflicting relationships among stakeholders, genuine involvement of stakeholders in land-use planning, and a proper institutional and policy environment.

10.1.1 Community shaping of biodiversity

The study has revealed that the communities surrounding the East Usambara forests continuously shape forest biodiversity through their different activities. These activities include forest products collection, indigenous forest/tree management and economic activities (mainly subsistence agriculture). These are discussed briefly in this section.

Through collection of forest products the local people continuously affect the forest stock in terms of available species and their volumes. Previous chapters have revealed that some of the forest products collected for various uses come from endemic species. For example collection of building materials, which can be described as the most destructive form of forest product collection, involves about 30 species, of which about 20% are endemic or near endemic. The forest survey also revealed that 12% of encountered coppiced trees and 9% of dead stumps were from endemic forest species, suggesting substantial use by local people. In those areas most affected by collection of building materials, like the forest edge, the stocking level in terms of stems per hectare is lower and regeneration is continuously disturbed, as confirmed by the observed coppiced trees and dead stumps in the forests. Much as biodiversity conservation tries to avoid "prejudice" in terms of giving more attention to some species than others, the fact still remains that endemic species receive more attention because of their limited distribution. To the local user searching for building materials it

matters not whether some species are endemic, the chances of it being cut are not different from other species. The challenge to the future management of the forests, therefore, remains to pay attention to these kinds of social selective factors and to shaping of biodiversity, provision of alternatives and provide some technical input to the collection of a range of forest products through cooperation and continuous interactions with the local people. The proposed SRM provides some ideas as to how these interactions might create a more harmonious conservation environment.

Another important area where local people influence forest biodiversity is in the forests in the public domain. Because of poor control over the public lands and poorly defined land ownership conditions some forest patches have been cleared for farming activities although some species are left behind for particular purposes. Estimates put forward by AFIMP (1988) show that about 47% of the public land forests have been encroached by farmers. Indeed the situation as it is now presents much difficulty when one tries to clearly demarcate public forest areas and individually owned forest areas because of the encroachment. Some individual farmers have assumed ownership over pieces of land in the public domain just because the areas are not closely monitored and it is ambiguous as to which portions of the public lands are controlled by village authorities and which ones are controlled by district authorities. It was observed during the study that individuals who have assumed ownership over some public land areas gradually convert them to farms as need arises. This situation requires well-defined land-use plans. As suggested by the SRM the land-use planning process ought to involve negotiations and compromises among different stakeholders if at all the resulting plans are to be respected by all interested parties.

While the relationship between local people and the forests is often described as deleterious to forest biodiversity, the study has also shown that some indigenous forest/trees management strategies have positive conservation impacts. For example, ritual forests and sacred trees contributed to conservation. However some indigenous management strategies, such as the management of ritual forests, are deteriorating, as the Mpanga case study has revealed. In some areas the ritual forests have been included in the forest reserves. The deterioration of these traditional management strategies proceeds without any obvious replacement, in the sense that new local initiatives to conserve specific portions of the forests are not evident, mainly because forest management in the area is controlled by the Forest Division. The only exception to this are evolving community based forest conservation initiatives like the Mpanga case presented in previous chapters. The study has shown further that plant domestication by farmers contributes to the shaping of biodiversity by conserving species under ex-situ conditions. Estimates indicate that over 10% of the species of forest origin which are domesticated are endemic or near-endemic species. Surprising to see that least attention has been given by the professional foresters to these kind of farmers' initiatives. These initiatives need technical support because not only do they contribute in easing the pressure on the natural forests but also they contribute to conservation and play a vital role in processes such as soil erosion control and nutrient cycling in farmers' plots. The current state of affairs suggests that the only interaction between the foresters and local people as far as on-farm trees is concerned involves the promotion of exotic tree planting and the control of prohibited species such as *Milicia excelsa*. These kind of interactions fail to utilize a large indigenous on-farm tree management knowledge embodied in farmer's livelihood strategies because of professional prejudices, a situation which the proposed SRM seeks to reverse.

10.1.2 **Institutions and participation**

Previous chapters have disclosed the fact that despite the existence of an array of both formal and informal institutions in the study area with apparent potential for use in conservation initiatives, little has been done to involve these institutions in conservation activities - especially the informal institutions. The most frequently involved institution is the village government. Even with this institution the level of involvement is rather low. Most of the conservationists and projects in the area use village governments as "middlemen" to convey their messages to the people just because the village governments are respected institutions. The only initiative that has involved dialogue between forest officials and local people is the reported Mpanga case and the compensation issue. For the latter the discussions were necessary as villager's anger over their confiscated land increased.

From the aforesaid, local participation observed in the East Usambaras is passive; only in very limited cases it is interactive. Local people are only involved in forestry-related activities when the forest authorities in the area need their support. The following examples illustrate the situation. When there is a forest fire in the area, the villagers are mobilized by village leaders to fight the fire. When the foresters are convinced that tree planting will reduce the pressure on the existing natural forests extension is intensified and villagers are mobilized to plant trees. When the forest authorities want to establish a nature reserve in the area or expand the size of the existing reserves through land gazettement, intensive extension campaigns are designed and village leaders become the "go between" in the dialogue between forest authorities and villagers. And when the forest authorities need the forest boundaries to be cleaned, they hire local people to do the job. Even when the villagers fail to agree on the management of a village forest like Mpanga not under the control of the Forest Division, the forest authorities are apt to involve themselves in trying to settle such a local conflict. But when the villagers need an extra day of fuelwood collection in the forest reserves there is no platform to air their views. A similar situation exists in the relation between the conservationists and other stakeholders in the area: a forum for bargaining does not exist.

One can therefore conclude that a certain degree of social engineering is necessary if the stakeholders are to be reconciled as the SRM proposes. The concept of social engineering as described by Cernea (1990) involves the process of forming social organizations geared towards pursuing common conservation goals in areas where such organizations do not exist. For the purpose of this study the concept is further extended to include the mobilization of existing formal and informal institutions to be actively involved in conservation initiatives. The process is therefore viewed at two levels namely the formation and the mobilization levels. At the institution formation level both regional institutions and local institutions need some consideration. At a regional level the stakeholders' platform might take the form of something like an "East Usambaras Roundtable" (EURT), while at village level user-group cooperatives and professional indigenous knowledge groups might be considered. The function of EURT would be that of facilitation and planning, as illustrated in discussion of the stakeholder's platform concept in Chapter 9.3.2. The institution mobilization process ought to involve institutions such as village governments, production institutions such as the tea company and informal institutions such as football teams, traditional dancing groups and ritual clans.

10.2 Important lessons from the study

A number of lessons can be learnt from the study in relation to sustainable management of forest resources in the East Usambaras. Already in previous chapters some of these lessons have been highlighted. However this section summarizes the main lessons of practical significance to forest management authorities on the ground as follows:

- Much as the Forest Division is a key stakeholder for the management of the East Usambara forests, there are other stakeholders including local people and tea estates with a lot of influence over the success of conservation initiatives. One of the central lessons of this study is that biodiversity conservation is essentially a negotiation process involving key stakeholders. This negotiation is lacking in the East Usambaras and is jeopardizing the conservation efforts.

- The research has revealed the existence of potential to form more organized user-group cooperatives at village level. These could be organized around specific interests, like those shared among local specialists such as herbalists, basket makers, wood carvers, hunters and house builders. This would provide better control over some illegal activities taking place in the area. Through such organized groups it would be easier to give the collectors of various products some technical support to minimize forest destruction. Through discussions with the user groups, village authorities and other administrative bodies in the area a mild tax might be imposed on products to ensure government revenue, but this should not be so high as to act as a strong disincentive. Pilot studies should form the basis for wider application.

- The process of seeking alternatives involving local communities is a long one and requires support and coordination amongst different stakeholders. The current level of reliance on the natural forests for building materials and fuelwood for example cannot be sustained with increasing populations and tightening of access rules. This will definitely provide more conflicts in future. Putting more emphasis and resources into developing farm forestry and village woodlots in areas where land tenure is well defined is likely to yield positive results. In areas like the public land where land tenure is poorly defined deliberate actions to define the tenure should be undertaken for better management of the forests in the public domain. While encouraging the development of forest product sources outside the forests deliberate action is also needed to encourage and support local people in lifestyle changes. The use of more environmentally-friendly energy sources and alternative building materials such as simple mud and concrete blocks need to be pursued. Already a biogas project exists in the area but because interventions are run in isolation little support is directed to this initiative from other stakeholders such as the EUCFP. Agricultural intensification through agroforestry is likely to be a key area for technical innovation in the East Usambaras. The poorly developed livestock component is, however, a hinderance. The UWAMA initiative needs more support and encouragement from the forest management side.

- More dialogue is needed with local communities before an intervention is recommended. This would reduce frustrations currently experienced by both projects and villagers on compensation issues. Further, coordination among stakeholders (e.g. between projects, companies and villagers) is essential in order to know "Who is

doing what" in the Usambaras and to avoid duplication and complementarity of effort.

- Further proliferation of community based village forest reserves like the Mpanga, Ntusa, Msasa ABC should be encouraged. However, the resulting village forest reserves are quite fragile, in the sense that they lack in-built incentives to sustain them. This is an area in need of urgent attention.

- The study also revealed that some young villagers expressed their willingliness to establish themselves in other parts of Tanzania and reduce the population pressure in the area on condition that alternative areas are identified and their take-off in the new areas is properly taken care of. While such relocation might serve as a long term solution it would require careful planning and much commitment from both government and support institutions.

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SUMMARY

The importance of conserving biological resources and the need for managing these resources for present and future generations has been given much attention internationally in the past three decades. These ideas have been emphasized in key documents such as the Brundtland report as well as in international conventions such as the global convention on biodiversity which followed the Rio meeting in 1992. The challenge in implementing these ideas lies in finding the proper trade-offs between current and future utilization of natural resources. Their success depends very much on the kind of policy reforms undertaken by nations to accommodate both local and international interests. Relevant policy adjustments are rarely observed in developing countries. For example, in Tanzania forest policies of the 1950s and early 1960s are still in use despite the recent developments in thinking about forest conservation issues. Conventional conservation approaches still dominate despite current emphasis on the need to involve all relevant stakeholder groups in preparing forest conservation plans. This approach often neglects the interests and value systems of the different groups of stakeholders with ultimate deleterious impact on forest resources.

This study was conducted to examine the values, perceptions and actions with respect to forest resources of various stakeholders in the East Usambaras in Tanzania. This forest area has a high degree of species diversity and endemism that is threatened by increasing human pressure on resources. Conceptually the research was based on the appreciation of the existence of varying value systems between different stakeholders in relation to forest resources in the East Usambarasas, e.g. conservationists, estate holders and local villagers. The research focused on the collection of empirical evidence to substantiate the disparity of value systems amongst different stakeholders, and on the analysis of the impact of this disparity and possible modalities for reconciliation. The objective of the study was to investigate the potentials and limitations of involving local communities and other stakeholders in conserving the East Usambara forests, and to propose appropriate development strategies for harnessing such potentials. In order to reach this objective, the nature of various stakeholders' activities in relation to the forests was studied and the impact of such actions on long-term biodiversity conservation prospects in the area was assessed.

An extensive literature search indicated a variety of arguments concerning the nature and extent of problems in natural resource management and the range of recommended approaches in solving such conservation problems. Different perceptions on fundamental concepts in biodiversity conservation exist; these reflect the diversity of values that individuals and social organizations attach to natural resources. For effective management of conservation areas these perceptions should be reconciled, and global and local interests should be balanced. This indicates the need to assess the significance of indigenous forest management systems and to augment the conventional approach to managing nature reserves with community management of forest resources. These ideas were used to formulate the key concepts and analytical framework for this study.

The research consisted of the collection of information on both technical and sociological aspects of forestry. Because of this, a variety of research methods were deployed such as participatory rural appraisal, a general questionnaire survey and several more specialized surveys. The specialized surveys consisted of (a) several assessments of the different types forest products collected by local people, (b) a forest survey to ascertain the impact of human

activities on the natural forests, and (c) a survey to assess the nature and extent of domestication of forest plants by local people. Additional information was collected through in-depth interviews with key informants, field observations and study of secondary data.

The research started with a reconnaissance of twenty villages out of the total of fifty-four villages in the East Usambaras. These rapid village appraisals entailed both formal and informal discussions. The investigation aimed to expose the general characteristics of different villages and to provide the basis for selection of case study villages. Six villages were subsequently selected as case study villages representing the various ecological conditions in the area. These included Kisiwani, Mikwinini, Kwamzindawa, Potwe-Ndondondo, Hemsambia and Vuga.

In all case study villages an open ended questionnaire was administered to solicit data on socio-economic conditions, forest products utilization trends, and local people's perceptions on a variety of conservation and development aspects. In each village a random selection of 20% of the households was made; in total 292 households were surveyed. Also several surveys on the use of forest products were carried out. An investigation of the different building materials of forest origin commonly used by villagers was done in five out of the six case study villages. The species used for building purposes and their quantities were estimated by surveying 41 houses which were under construction. In five villages a study was made of items of forest origin used at household level. In a sample of 10% of the households (135 households) all utensils derived from materials of forest origin were recorded. Also a market survey was carried out to collect information on the nature and amounts of both wood and non-wood forest products which are commercialized. On three markets 16 merchants were interviewed and their supply of products measured. A study was also made about the extent of human disturbance to the forest reserves as a result of forest products collection. The extent of the disturbance resulting was assessed in 150 sample plots of 0.1 ha in size established at 100 to 200m, 500m and 1000m from the forest edge. In these plots forest characteristics such as species composition, signs of human impact and forest regeneration were recorded. Finally, in three villages a farm survey took place to record the presence and use of plants of forest origin on farmer fields.

Data analysis was both quantitative and qualitative. The findings from the reconnaissance survey and rural appraisals were analyzed to provide insight for the more detailed surveys which were to follow. Information collected through the questionnaire survey was coded and analyzed with the SPSS statistical program for social sciences. The coding involved structuring the responses from the open-ended questionnaire and assigning them nominal values for analytical purposes. Considering the nature of the study mainly descriptive statistics were used. Data collected from the building materials survey, survey of household used items, market survey, forest sampling and domestication survey were analyzed using the Q&A4 database and Harvard Graphics 3.0 programs. Species names and synonyms were cross-checked using Kewensis database. Content analysis was used to analyze qualitative information from indepth interviews, and participant observations.

The research findings presented in this book focus on the socio-economic conditions in the area, the values of the forests for local people, the effects of forest utilization, and the need to search for alternatives in managing the forest reserves and conserving their biodiversity.

In the East Usambara basically three types of (agro)forestry systems are present: natural forests, forest plantations and on-farm tree growing systems. These forests are under the management responsibility of either the state, district or village institutions, estates or private persons. The natural forests are surrounded by a countryside occupied by very heterogenous human population, which is increasing rapidly because of both natural growth and immigration. Both subsistence and commercial agriculture is taking place. Commercial agriculture is dominated by tea and sisal estates, while subsistence agriculture consists of mixed cropping systems on farms of about three hectares in size. Farmers practice shifting cultivation using short fallow periods and local farming techniques. In some cases when shade trees are required such as for the cultivation of cardamom, or when locally-valued trees are present, not all trees are removed. But in general, due to poor soils the agricultural practices are often detrimental to the environment. In addition farmers also cultivate permanent homestead plots. A range of formal and informal institutions governing land use practices were discerned in the area. However, these institutions are not harmoniously organized to pursue conservation initiatives.

Forests are very valuable to local communities in terms of both cultural and utilitarian benefits. Many different tree products are collected either for household use or sale. Forest plants provide fuelwood (33 species), poles (35 species), withies (32 species), ropes (11 species), foods (28 species), medicines (185 species) and household utensils (83 species). The annual per capita consumption of fuelwood was estimated at 1.7 cubic meters while the annual consumption of forest vegetables was estimated to be about 12 kg per household. The different products are collected either from the forest reserves, estate plantations or privately grown trees; collection in the forest reserves still predominates. Besides these utilitarian functions the local people also value forests for religious (e.g. traditional rainmaking ceremonies) and environmental values. The role of forests for regulating hydrological and micro-climate conditions and its significance for agricultural production are well recognized.

The management of the forest reserves is still dominated by a conventional conservation approach that tends to alienate communities from conservation areas. Despite conservation regulations, human activities in the forest still continue. Illegal collection of forest products has affected the composition and structure of the forests adversely. The destruction of trees is most intensive near the forest edge, while animal trapping becomes more intensive with increasing distance from the forest edge. The harvesting of forest products by local people has resulted in the reduction of stocking level of trees from the estimated normal tree density of 650 stems/hectare to about 500 stems per hectare. The diameter distribution of trees has also been affected: trees with small diameters dominate close to the forest edge (up to 200m from the forest edge), whereas trees have a larger diameter deeper in the forest. Near the forest edge also many coppiced trees are present: respectively 49% and 42% of all coppiced trees were found in the 100-200m and 200-500m range from the forest edge, against about 9% deeper into the forest. Also the number of dead stumps decreases as the distance from the forest edge increases, but the reverse is the case for debarked trees. Illegal collection of forest products affected both endemic and non-endemic species.

The local villagers are not just using the forest resources, they have also developed various management practices for the forest resources valued by them. For instance, villagers from Vuga and Hemsambia communally manage about 30 hectares of natural forest in the public lands. This forest was traditionally used for ritual purposes, but had been mismanaged by

irresponsible village leaders. To prevent further depletion of this forest, the villagers agreed on a set of rules and regulations governing the utilization of resources in this forest and appointed a forest management committee. These initiatives were complementary to the conservation efforts by the Forest Division in other forest reserves in the area. Another example of local management efforts is the on-farm cultivation of tree species of forest origin for both consumptive and non-consumptive use. Such domestication concerns trees providing food, medicine, construction, lumber and local tools, or providing ecological services such as water conservation, shade and support to crops. About 10% of the domesticated species are endemic or near endemic.

Although the needs and perceptions of the local farmers and conservationists are not always contradictory, in practice substantial gaps between the values and perceptions of various stakeholders interests in forests exist. Different interest groups have different perceptions of what biodiversity entails and how it should be conserved. Most professionals, donor agents and the educated elite understand and appreciate the importance of biological diversity from ecosystem down to genetic level. Their evaluation of the need for biodiversity conservation tends to focus specifically at ecosystem and species level. But the local people view the importance of the biodiversity of forests in terms the products and services that they can derive from the forests. Both professionals and local people consider the need for intergenerational flow of benefits from forests. However, professional conservationists are predominantly occupied with endangered species, centers of endemism, future prospects of new commercial, e.g. pharmaceutical, products and future use of genetic resources. Whereas local people are considering the livelihood of their descendants in terms of availability of rainfall, traditional medicines, fuelwood and building materials. This contrast in perception on the relevance of biodiversity is illustrated by the fact that conservationists pay more attention to the fact that 25% (about 710 species) of all vascular plant species and 18% (48 species) of all tree species are (near) endemic in the East Usambara, than to the fact that about 350 tree species (of which less than 6% of the endemic species) are used by the local population. Nor do they appreciate the fact that local people have taken conscious efforts to conserve around 100 tree species (of which about 20 endemic species) by cultivating them.

A third interest group with specific perceptions on the conservation of the natural resources in the Usambaras consists of the private commercial estates, particularly the tea estates. This interest group focuses specifically on two important forest benefits: rainfall and fuelwood. While rainfall boosts production, fuelwood supplies energy to company boilers. Future management of the forests in the area, as far as this interest group is concerned, should pay attention to the catchment potential and supply of fuelwood from various sources, including plantations outside the forest reserves.

Obviously, all three interest groups value the forests, be it for different reasons. Thus, they have at least in common that no group is in favor of forest depletion. The central challenge to the management of the forests is to build cooperative alliances between these groups, taking full account of the different value frameworks they bring to forest conservation. It is only when the specific interests of each group of forest user is considered, that these groups will develop interest in cooperation with the Forest Division in managing the forests. The main weakness of the current forest management is that it provides neither the forum nor the opportunity for different stakeholders to express their interests in relation to the forests. It is only when such a framework for expressing, debating, contesting and resolving differences of interest is in place that each interest group will respect the interest of other groups and

develop cooperative norms. The study ends therefore with the outlining of a Stakeholder Reconciliation Model (SRM), which serves to address key issues such as policy formulation, land-use planning, communication and reconciliation of competing stakeholder claims. It is suggested, that this is an essential institutional prerequisite for achieving sustainable conservation of the forest resources in the East Usambaras.

SAMENVATTING

Gedurende de afgelopen drie decennia is internationaal veel aandacht besteed aan het belang van het behoud en duurzame beheer van natuurlijke bestaansbronnen voor huidige en toekomstige generaties. In diverse internationale documenten zoals het Brundtland rapport en internationale conventies zoals de conventie tot behoud van biodiversiteit is deze noodzaak benadrukt. De uitdaging bij de uitvoering van deze voornemens is om een goede verhouding tussen het huidige en toekomstige gebruik van natuurlijke bestaansbronnen te vinden. Het succes ervan is in belangrijke mate afhankelijk van de afstemming van het nationale beleid op zowel lokale als internationale belangen. In de ontwikkelingslanden is tot nog toe slechts zelden sprake van een dergelijke beleid. In Tanzania bijvoorbeeld is in weerwil van de veranderde ideeën over conservering van de natuurlijke bestaansbronnen de bosbouw-wetgeving uit de jaren 1950 en 1960 nog steeds van kracht. De conventionele benadering van natuurbehoud is nog steeds dominant, ondanks de nadruk die tegenwoordig gelegd wordt op de noodzaak om alle relevante belangengroepen te betrekken bij de planning van conserveringsprojecten. Hierdoor worden de belangen en waarden van de verschillende groepen betrokkenen vaak veronachtzaamd met een uiteindelijk schadelijke gevolg voor het bos.

Deze studie werd uitgevoerd om een inzicht ter verkrijgen in de waarden, percepties en activiteiten met betrekking tot het bos van verschillende groepen belanghebbenden in de East Usambara's in Tanzania. De bossen in dit gebied worden gekarakteriseerd door een grote diversiteit aan soorten en een hoge mate van endemisme, maar deze worden bedreigd door de toenemende menselijke druk op het bos. Het uitgangspunt van het onderzoek was dat er verschillende bevolkingsgroepen zijn die belang hebben bij het bos, zoals natuurbeschermers, plantagehouders en lokale dorpsbewoners, en dat elk van deze belangengroepen het bos op hun eigen wijze waarderen. Het onderzoek richtte zich op het verzamelen van empirische gegevens over dit verschil in waarde-systemen, het analyseren van de gevolgen hiervan en het identificeren van mogelijkheden om een gemeenschappelijke basis te vinden voor conserverings-aktiviteiten. De doelstelling was om potentiële mogelijkheden en beperkingen voor het betrekken van de lokale bevolking en andere belanghebbenden bij het bosbehoud in de East Usambara's te onderzoeken en om voorstellen te ontwikkelen voor relevante ontwikkelings-strategieën. Om deze doelstelling te verwezenlijken werden de verschillende vormen van bosgebruik en -beheer bestudeerd en werd de invloed van deze activiteiten op de conservering van biodiversiteit beoordeeld.

Uit een uitgebreide literatuurstudie bleek dat er een grote verscheidenheid aan ideeën bestaat ten aanzien van de aard en omvang van natuurbeschermingsproblemen en de geëigende maatregelen om deze op te lossen. Het begrip biodiversiteitsconservering wordt op verschillende wijzen geïnterpreteerd; deze verschillen weerspiegelen de verscheidenheid in waardering van individuen en maatschappelijke organisaties ten aanzien van natuurlijke bestaansbronnen. Om tot een doelmatig beheer te komen is het nodig dat deze verschillende percepties in overeenstemming met elkaar worden gebracht en dat lokale en globale belangen op evenwichtige wijze aan bod komen. Dit vereist een goede analyse van de inheemse vormen van bosbeheer en een uitbreiding van de conventionele staatsaanpak van natuurbescherming met lokale beheersvormen. Het analytische kader voor de studie is op dit uitgangspunt gebaseerd.

In het kader van het onderzoek werden zowel technische en sociologische gegevens over bosgebruik en -beheer verzameld. Hiervoor werden verschillende onderzoeksmethoden toegepast zoals 'rapid rural appraisals', gestructureerde interviews en inventarisaties. Deze laatsten betroffen (a) inventarisaties van verschillende soorten bosprodukten die door de lokale bevolking verzameld worden, (b) een inventarisatie van de menselijke invloed op de samenstelling van het bos, en (c) een inventarisatie van de mate waarin de lokale bevolking bepaalde boomsoorten gedomesticeerd heeft. Aanvullende informatie werd verkregen door middel van interviews met lokale deskundigen, veld-observaties en bronnenstudie.

In de eerste fase van onderzoek werd in 20 van de 54 dorpen die in het onderzoeksgebied aanwezig zijn een verkenning uitgevoerd om de algemene sociaal-economische en geografische situatie te leren kennen. Hierbij werden zowel formele als informele interviews gebruikt. Aan de hand van deze gegevens werden zes dorpen uitgekozen voor verdere studie. De geselecteerde dorpen Kisiwani, Mikwinini, Kwamzindawa, Potwe-Ndondondo, Hemsambi en Vuga liggen in verschillende ecologische zones.

In elk van deze dorpen werden gedetailleerde gegevens verzameld over de sociaal-economische gesteldheid, het gebruik van bosprodukten en de percepties van de lokale bevolking ten aanzien van bosconservering en streekontwikkeling. Hiertoe werd in elk dorp op basis van een a-selecte steekproef 20% van de huishoudens geïnterviewd, in totaal 292 huishoudens. Tevens werden diverse surveys uitgevoerd. In vijf dorpen werd nagegaan welke boomsoorten en hout-hoeveelheden gebruikt werden bij de 41 in aanbouw zijnde huizen. Ook werd in vijf dorpen op basis van een steekproef in 10% van de huishoudens (135 huishoudens) nagegaan welke en hoeveel gereedschappen gebruikt worden die vervaardigd zijn uit bosprodukten. Op drie markten werd een survey uitgevoerd om te bepalen welke houtige en niet-houtige bosprodukten verhandeld worden; hiervoor werden 16 kooplieden geïnterviewd en hun voorraden bepaald. Verder werd de invloed van het verzamelen van bosprodukten op de vegetatie bepaald. Hiertoe werd in 150 proefplots van 0.1 ha gelegen op een afstand van 100-200, 500 en 1000 m van de bosrand gegevens verzameld omtrent de soorten-samenstelling, indicaties van menselijke ingrepen en regeneratie. Tenslotte werd in drie dorpen een inventarisatie uitgevoerd naar het voorkomen van bosplanten op landbouwvelden.

Voor de analyse van de verzamelde gegevens zijn zowel kwantitatieve en kwalitatieve methoden gebruikt. De gegevens van de verkennende survey werden benut bij het opstellen van de meer gedetailleerde surveys. De resultaten van de huishoudinterviews werden geanalyseerd met behulp van het SPSS-analyseprogramma voor sociale studies; de nadruk lag hierbij op het generen van beschrijvende statistieken. Hiertoe werden de antwoorden van de open vragen omgezet in nominale waarden. De gegevens van de diverse surveys werden geanalyseerd met behulp van de Q&A4 database en Harvard Graphics 3.0 computerprogramma's. De wetenschappelijke namen van de boomsoorten werden gecontroleerd met behulp van de Kewensis database. De kwalitatieve informatie van de diepte interviews en observaties werd onderworpen aan een inhoudsanalyse.

De resultaten van het onderzoek betreffen de sociaal-economische situatie in het onderzoeksgebied, de waarden van het bos voor de lokale bevolking, het effect van bosgebruik, en de noodzaak tot het ontwikkelen van alternatieve systemen voor het beheer van bosreservaten en het behoud van hun biodiversiteit.

In de East Usambara's komen drie verschillende typen van houtige vegetatie voor: natuurbossen, bos plantages en bomen op landbouwvelden. Deze verschillende vegetatietypen worden beheerd door de nationale overheid, lokale districten of dorpen, commerciële ondernemingen of lokale boeren. Het bos ligt in een gebied met een zeer heterogene bevolking die snel toeneemt als gevolg van bevolkingsgroei en immigratie. De bevolking is werkzaam op commerciële thee- en sisalondernemingen en in de zelfvoorzieningslandbouw. OP bedrijven van gemiddeld drie hectare worden voedselgewassen geteeld in semipermanente landbouwsystemen met een korte braak periode. In sommige velden laat men bomen staan voor schaduw en leverantie van waardevolle boomprodukten. Daarnaast hebben boeren vaak ook een erftuin. De bodems zijn over het algemeen arm en de lokale teeltmethoden leidden vaak tot landdegradatie. Er bestaan in het gebied een veelheid aan formele en informele instituties voor regulering van landgebruik; deze instituties zijn echter niet zodanig georganiseerd en gecoördineerd dat zij bijdragen aan conservering van de natuurlijke bestaansbronnen.

De bossen zijn van groot belang voor de lokale bevolking zowel in utilitair en cultureel opzicht. Een grote hoeveelheid bosprodukten worden verzameld voor huishoudelijk gebruik of verkoop. Bosplanten worden benut als brandhout (33 soorten), paalhout (35 soorten), twijghout (32 soorten), bindmateriaal (11 soorten), voedsel (28 soorten), medicijnen (185 soorten) en huishoudelijke gebruiksvoorwerpen (83 soorten). De gemiddelde jaarlijkse brandhout-consumptie bedraagt 1,7 m^3 per persoon, en de jaarlijkse consumptie van bosgroenten ongeveer 12 kg per huishouden. De verschillende producten worden zowel verzameld in bosreservaten en plantages als van bomen op landbouwvelden; het merendeel is uit de bosreservaten afkomstig. Behalve de gebruiksmogelijkheden waardeert de bevolking het bos ook vanwege religieuze en milieu-motieven, bijvoorbeeld voor het uitvoeren traditionele regen-ceremonieën. De rol van het bos voor het handhaven van een goede hydrologie en een goed microklimaat, evenals het belang daarvan voor de landbouw, zijn algemeen bekend.

Het beheer van de bosreservaten wordt gedomineerd door een conventionele benadering voor natuurbeheer, waarbij de lokale bevolking grotendeels uit het bos geweerd wordt. Ondanks de beschermingsmaatregelen gaan de lokale activiteiten in het bos echter door. Het illegaal verzamelen van bosprodukten heeft de bossamenstelling en structuur aangetast. De achteruitgang in boombestand is het grootst aan de bosrand, maar de invloed van de jacht op de bosfauna is groter binnen het bos. De oogst van bosprodukten door de lokale bevolking heeft ertoe geleid dat de boom-dichtheid is afgenomen van gemiddeld 650 tot ongeveer 500 stammen/ha. Ook de diameter-verdeling van bomen is beïnvloed: in de bosrand (tot 200 m) hebben de bomen een kleinere diameter dan dieper in het bos. In de bosrand komen ook meer boomstronken en aangekapte bomen voor dan dieper in het bos; 49% van alle gekapte bomen met nieuwe uitlopers werd aangetroffen in de bosrand. Een tegenovergestelde tendens werd echter gevonden voor bomen waarvan de bast was geoogst; deze werden veelal dieper in het bos gevonden. De illegale kap betrof zowel endemische als niet-endemische soorten.

De lokale bevolking verzamelt niet alleen boomprodukten, maar heeft ook diverse maatregelen genomen om het bos als bestaansbron te handhaven. Zo beheren de inwoners van Vuga en Hemsambia gemeenschappelijk een terrein van 30 hectare natuurbos binnen het staatsbosgebied. Dit bosgebied werd traditioneel benut voor ritueel gebruik, maar werd recentelijk misbruikt door onverantwoordelijke dorpsleiders. Om verdere aantasting van dit

bos te voorkomen stelden de dorpelingen een serie regels op voor het gebruik van dit bos en benoemden zij een lokaal bosbeheers-comité. Deze maatregelen waren complementair aan de conserverings-maatregelen die de bosdienst in andere bosgebieden had ondernomen. Een tweede voorbeeld van lokaal beheer van de houtige vegetatie wordt gevormd door de teelt van bosbomen op landbouwvelden; deze bomen hebben zowel een productie- als milieufunctie. De gedomesticeerde bomen worden gebruikt voor het leveren van voedsel, medicijnen, constructiehout en lokale gebruiksmiddelen, of voor het vervullen van ecologische functies zoals waterconservering, beschaduwing en ondersteunen van klimplanten. Ongeveer 10% van de gedomesticeerde soorten zijn (bijna) endemisch.

Hoewel de percepties van lokale boeren en natuurbeschermers ten aanzien van het nut van biodiversiteitsconservering niet altijd in tegenspraak met elkaar hoeven te zijn, bestaat er in de praktijk een belangrijke tegenstelling in de waardering van het bos door de verschillende belangengroepen. Deze verschillende percepties betreffen de operationele betekenis van het begrip biodiversiteit en de wijze van biodiversiteitsconservering. Professionele natuurbeschermers, donor organisaties en de geschoolde (stads)bevolking hebben met name aandacht voor het belang van biodiversiteit op ecosysteem-, soort- en genetisch-niveau. De lokale bevolking waardeert biodiversiteit in termen van producten en diensten die het bos kan leveren. Zowel de professionele beheerders als de lokale bevolking erkennen het belang van het handhaven van de bossen voor toekomstige generaties. De professionele beheerders zijn echter het meest geïnteresseerd in endemische soorten en de toekomstige mogelijkheden tot ontwikkeling van nieuwe, bijv. farmaceutische, producten en genetisch materiaal. De lokale bevolking is daarentegen geïnteresseerd in het handhaven van de gunstige invloed van het bos op de levensomstandigheden van hun kinderen. Hierbij gaat het om beïnvloeding van microklimaat en productie van medicijnen, brandhout en bouwmateriaal. Deze tegenstelling in perceptie ten aanzien van biodiversiteit wordt geïllustreerd door het feit dat natuurbeschermers meer aandacht geven aan het feit dat in de East Usambara's 25% (ongeveer 710 soorten) van alle plantensoorten en 18% (48 soorten) van alle boomsoorten (bijna) endemisch zijn , dan aan het feit dat er ongeveer 350 boomsoorten (waarvan minder dan 6% endemisch zijn) gebruikt worden door de lokale bevolking. Voorts gaan de natuurbeschermers voorbij aan het feit dat de lokale bevolking bewuste maatregelen heeft genomen om ongeveer 100 boomsoorten (waarvan 20 endemisch) te beschermen door deze aan te planten.

Een derde groep die belang heeft bij het behoud van de natuurlijke hulpbronnen in de East Usambara's wordt gevormd door de particuliere, commerciële plantagehouders. Vooral de eigenaren van de thee-ondernemingen hechten belang aan de gunstige invloed van bos op regenval en brandhoutvoorziening. De regen zorgt voor goede productie, en het brandhout is nodig voor het drogen van de thee. Volgens deze groep dient het toekomstige bosbeheer zich vooral te richten op stroomgebiedsbeheer en de productie van brandhout in bossen en houtplantages.

Het moge duidelijk zijn, dat elk van de drie verschillende bevolkingsgroepen belang hecht aan bosconservering, echter om verschillende redenen. Een gemeenschappelijke uitgangspunt is dat geen van de groepen voorstander is van het verdwijnen van het bos. De belangrijkste uitdaging voor het bosbeheer is derhalve om een alliantie tussen deze verschillende groepen te creëren. Hierbij moet aandacht besteed wordt aan hun verschillende waarden-systemen ten aanzien van bos-conservering. Alleen indien aandacht wordt besteed aan de specifieke

interesses van de verschillende groepen, zullen zij bereid zijn om in samenwerking met de bosdienst het bos te beheren. De belangrijkste tekortkoming in het huidige bosbeheerssysteem is dat er geen forum is waarin de verschillende belangengroepen de mogelijkheid hebben hun interesse ten aanzien van bosbeheer kenbaar te maken en te bespreken. Alleen indien er een mogelijkheid bestaat om met elkaar te debatteren en te onderhandelen over de verschillende interesses ten aanzien van bosbeheer, zullen de verschillende belangengroepen de meningen van de andere leren respecteren en bereid zijn tot samenwerking op basis van gemeenschappelijke waarden. Het boek eindigt derhalve met de beschrijving van een model voor belangen-afstemming tussen de betrokken groepen. Hierbij wordt aandacht besteed aan aspecten van beleidsformulering, landgebruiksplanning en communicatie. Een goede afstemming van de wensen ten aanzien van bosgebruik en -conservering van de verschillende belangengroepen is een essentiële voorwaarde voor duurzaam bosbeheer en biodiversiteitsconservering in de East Usambara's.

APPENDIX 1

QUESTIONNAIRE FOR HOUSEHOLD SURVEY.

Village..... Ward..... Division..... District..... Region.....
Name of household head..... Age..... tribe.....
Name of housewife(if applicable)..... Age..... tribe.....

GENERAL INFORMATION:

1. Total number of household members.....
   Breakdown:
   Adults: Males.....Females.....
   Children(below 18yrs): Males.....Females.....
2. What is the relationship between the household head and the other members? (eg. children, uncle, servant etc)
   .....
   .....
3. What are the main activities of the household head and other adults in the household? (including off farm activities).
   Household head .....
   Housewife .....
   Other adults .....
   .....
4. What are the main problems in pursuing these activities?
   .....
   .....
   .....
   .....
5. Are all the children attending school? If no, why?
   .....
   .....
   .....
   .....
6. Can you please tell us a bit of the background of your household? (Origin, migrations, settlements etc)
   .....
   .....
   .....
   .....
   .....
7. How much land do you have? Is it enough?
   .....
   .....
8. Can you please tell us briefly how you or your forefathers acquired the land which you use now?
   .....
   .....
   .....

9. Which crops do you grow? (cash and food crops, vegetables etc.)
Any crops/vegetables with forest origin?)
.....
.....
.....
.....

10. Do you keep livestock in your household? Which ones?
.....
.....
.....

PERCEPTIONS ON BIODIVERSITY

11. Comparing a natural forest and a monocrop forest plantation which one do you think is more important to your household and why?
.....
.....
.....

12. What in the natural forests around your village do you consider too important to be lost if the forests were to be cut?
.....
.....
.....

13. a. Do you know these tree species (showing a few endemic species)
.....
b. Does your household use these species for different purposes
.....
.....
.....
c. Do you know that these species are only found in the East Usambara forests?
.....

14. If you were told that these species are only found in the East Usambaras would you consider them more important then? Why?
.....
.....

15. In your opinion what do you think are the most destructive activities to the surrounding forests?.....
.....
.....

FOREST PRODUCTS UTILIZATION:

16. Which of the following forest products are used in your household? (Use the forest products form 1 attached)

17. Can you please tell us briefly if your household is involved in trading some of these forest products? (who is involved, which products, from where, sold where, availability, pricesetc).....
.....
.....
18. How important is the income from such a trade to your household compared to other sources of income? .....
.....
.....
19. Do you sometimes get treatment or buy products from specialists such as herbalists and hunters? (Please explain briefly!).....
.....
.....

FOREST MANAGEMENT ISSUES

20. Before the surrounding forests were gazetted as forest reserves by the government how were they managed? .....
.....
21. Do you know of any special places in the forests which were meant for special activities? Please explain briefly what was taking place in these areas and how they were respectedormanagedforthatpurpose.....
.....
.....
22. Can you please comment briefly on the importance and the condition of these places now?.....
.....
.....
23. Were there any traditional laws preventing people from entering the forests or collecting some products?.....
.....
.....
24. Are you satisfied with the current rules used in managing the forests? Why?
.....
.....
25. Has your household ever requested for a permit to harvest timber or other forest products from the forests? Was it a success or failure? (Please explain briefly)
.....
.....
26. Have you ever been involved in making suggestions or decisions geared towards forest management? Please comment briefly.....
.....
.....
27. How best do you think you could participate in forest management activities?
.....
.....

28. Do you know of any local institution that could work with foresters in managing the forests for the benefits of the people? .....
.....
.....

CURRENT FOREST DEVELOPMENT ASPECTS:

29. a. Are you aware that some forests around the village are proposed to form a nature reserve where nobody in the village can enter? .....
.....
.....

b. Were you involved or asked your suggestions about this decision?
.....

c. Please comment briefly on what you think will be the impact of this decision to your household.....
.....
.....

(QUESTION 29 FOR KISIWANI VILLAGE ONLY).

30. a. Are you aware that the CDC forests have been taken by the Forest Division?
.....
.....

b. What do you think will be the impact of this decision to your household?
.....
.....

(QUESTION 30 FOR MIKWININI VILLAGE ONLY).

31. a. Are you satisfied with the decision to gazette part of the village land and compensate the farmers? .....

b. Was your farm taken?.....

c. Were you compensated to your satisfaction? Any comments please? .....
.....
.....

(QUESTION 31 FOR POTWE NDONDONDO AND KWAMZINDAWA VILLAGES ONLY).

32. a. Do you support the decision to gazette the Mpanga forest?.....
.....
.....

b. What do you think will be the impact of this decision to your household?.....
.....
.....

c. Are you currently using forest products from the Mpanga forest? .....
.....
.....

d. Which issues made it necessary for your village to request for the gazettement of the Mpanga Forest? .....
.....
.....

(QUESTION 32 FOR VUGA AND HEMSAMBIA VILLAGES ONLY)

APPENDIX 2

SURVEY OF BUILDING MATERIALS IN THE EAST USAMBARAS.

Name of h/hold head.....Village.....

	Total No.	Breakdown						
Poles		Spp	Spp	Spp	Spp	Spp	Spp	
Withie		Spp	Spp	Spp	Spp	Spp	Spp	
Rafter		Spp	Spp	Spp	Spp	Spp	Spp	

Are nails used in the building.....Yes/No
Are sisal ropes used.....Yes/No
Are forest ropes used.....Yes/No. If Yes, which species.....
.....
.....
Any other Observations.....
.....
.....
.....
.....

APPENDIX 3

HOUSEHOLD SURVEY OF UTENSILS AND EQUIPMENTS OF FOREST ORIGIN.

Name of h/hold head.....Village.....

ITEM	PLANT OF ORIGIN	QUANTITY AT HOME	HOW ACQUIRED	USES	EXPECTED LIFETIME

APPENDIX 4

COMMERCIALIZATION OF FOREST PRODUCTS - MARKET SURVEY.

Market.....Merchant's name.....

M/F.....Tribe.....Date.....

Species-local name specified	Part used (Processed?)	Quantity in Market	Source areas	Uses	Other Information eg prices, how acquired etc.

APPENDIX 5

FOREST SAMPLING

FOREST RESERVE(NAME).....
PLOT NO.....SIZE.....DISTANCE FROM EDGE.....

SPECIES - LOCAL NAME SPECIFIED	WOODY SPP.		KNOWN LOCAL USES	REMARKS: EG. - Damaged (root,bark, stem, dead stump) - Copicing - Saplings
	DBH	BAD		

APPENDIX 6.

SURVEY ON DOMESTICATION OF FOREST SPECIES.

Name of h/hold head.....
Village.....
Farm size.....
Main crops in the farm.....
.....
.....
.....
.....

Species of forest origin domesticated:

SPECIES (reported in local name and identified by a botanist)	LOCAL USES (Why domesticated)

APPENDIX 7

DOMESTICATED SPECIES, THEIR USES AND ENDEMIC STATUS

Key: F=Food, M=Medicines, C=Construction, T=Tools, NC=Non-Consumptive use, Syn=Synonym

Family	*Species*	*Endemic status*	*Domesticated for*				
			F	*M*	*C*	*T*	*NC*
Anacardiaceae	Sorindeia usambarensis	endemic	x	x	x		
Annonaceae	Enantia kummeriae	endemic			x	x	
Annonaceae	Uvaria acuminata	non-endemic	x	x			
Annonaceae	Annona senegalensis	non-endemic	x	x	x	x	
Apocynaceae	Funtumia africana	non-endemic			x		
Apocynaceae	Rauvolfia mombasiana	endemic		x	x		
Bignoniaceae	Stereospermum kunthianum	non-endemic		x	x		
Bignoniaceae	Markhamia hildebrandtii	non-endemic		x	x	x	
Caesalpinaceae	Tamarindus indica	non-endemic,	x	x		x	
Chailletiaceae	Tapura fischeri	non-endemic		x			
Chenopodiaceae	Basella alba	non-endemic	x				
Combretaceae	Terminalia kilimandscharica	endemic		x			
Compositae	Vernonia subuligera	non-endemic			x		
Compositae	Microglossa densiflora	non-endemic			x		
Compositae	Microglossa oblongifolia	non-endemic		x			
Compositae	Bidens pilosa	non-endemic	x				
Compositae	Lactuca capensis	non-endemic	x				
Compositae	Vernonia coronata	non-endemic		x			
Connaraceae	Byrsocarpus orientalis	non-endemic	x				
Cucurbitaceae	Telfairia pedata	non-endemic	x	x			
Ebenaceae	Diospyros mespiliformis	non-endemic				x	
Euphorbiaceae	Phyllanthus muelleranus	non-endemic		x			
Euphorbiaceae	Erythrococca fischeri	non-endemic	x				
Euphorbiaceae	Securinega virosa	non-endemic				x	
Euphorbiaceae	Cluytia mollis	non-endemic		x			
Euphorbiaceae	Ricinus communis	non-endemic		x			
Euphorbiaceae	Acalypha ornata	non-endemic		x			
Euphorbiaceae	Bridelia micrantha	non-endemic		x	x	x	

Appendix 7 continued

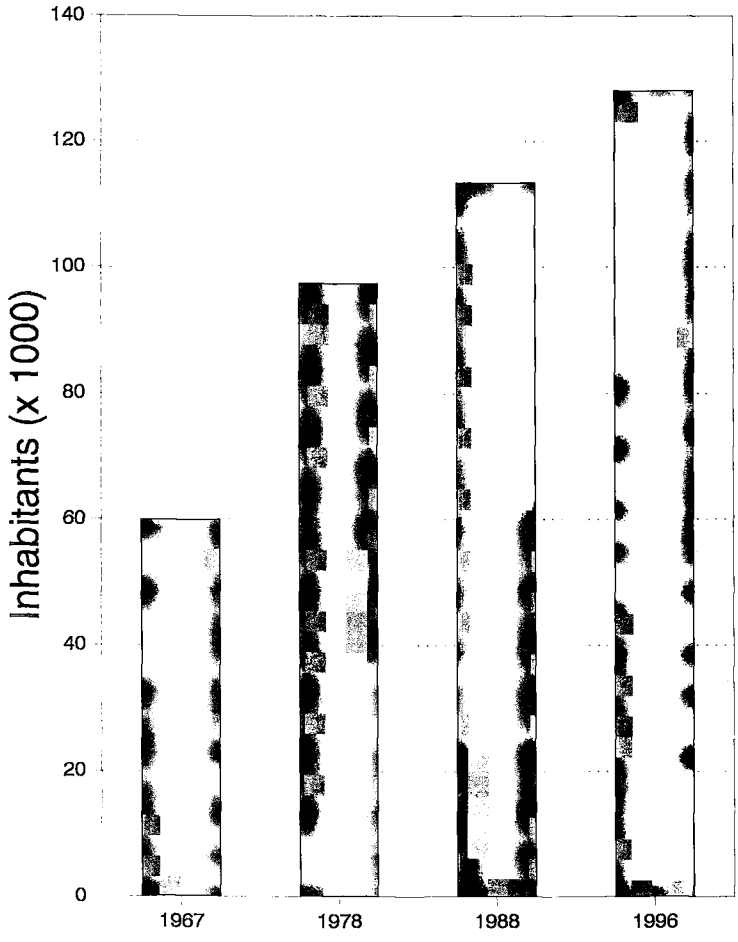
Family	*Species*	*Endemic status*	*Domesticated for*				
			F	*M*	*C*	*T*	*NC*
Guttiferaceae	Allanblackia stuhlmannii	endemic	x				
Hypericaceae	Harungana madagascarien-	non-endemic			x		
Labiatae	Plectranthus amaniensis	endemic		x			
Labiatae	Ocimum suave	non-endemic		x			
Labiatae	Platystoma africanum	non-endemic	x				
Leguminoseae	Senna siamea	non-endemic		x	x		
Leguminoseae	Julbernardia globiflora	non-endemic			x		
Liliaceae	Dracaena deremensis	endemic		x			
Liliaceae	Dracaena steudneri	non-endemic		x			
Loganiaceae	Anthocleista zambesiaca	non-endemic		x	x		
Loranthacaceae	Loranthus spp.	non-endemic		x			
Malvacaceae	Sida acuta	non-endemic	x				
Malvacaceae	Hibiscus fuscus	non-endemic		x			
Malvaceae	Ceiba pentandra	non-endemic					x
Menisperma-	Dioscorephyllum volkaensii	non-endemic	x				
Mimosaceae	Albizia versicolor	non-endemic				x	
Mimosaceae	Albizia glaberrima	non-endemic			x	x	
Moracaceae	Ficus capensis	non-endemic		x			x
Moraceae	Milicia excelsa	non-endemic		x			
Myrtacaceae	Psidium guajava	non-endemic,	x	x	x	x	
Papilionaceae	Pterocarpus angolensis	non-endemic					x
Papilionaceae	Lablab niger	non-endemic	x				
Papilionaceae	Dalbergia melanoxylon	non-endemic					x
Papilionaceae	Erythrina abyssinica	non-endemic		x			
Papilionaceae	Ormocarpum bibracteatum	non-endemic	x				
Papilionaceae	Eriosema psoraloides	non-endemic	x				
Papilionaceae	Cajanus cajan	non-endemic,	x	x			
Piperaceae	Piper capense	non-endemic		x			
Portulacaceae	Talinum cuneifolium	non-endemic	x				
Rubiaceae	Vangueria infausta	non-endemic	x	x	x		
Rubiaceae	Pentas bussei	non-endemic		x			

Appendix 7 continued

Family	*Species*	*Endemic status*	*Domesticated for*				
			F	*M*	*C*	*T*	*NC*
Rutaceae	Toddalia asiatica	non-endemic		x			
Rutaceae	Citrus aurantium	non-endemic		x			
Sapindaceae	Deinbollia borbonica	non-endemic		x			
Sapindaceae	Allophylus africanus	non-endemic	x				
Sapindaceae	Blighia unijugata	non-endemic		x			
Sapotaceae	Pachystela msolo	non-endemic	x		x	x	
Sapotaceae	Afrosersalisia cerasifera	non-endemic			x	x	
Simaroubaceae	Odyendea zimmermannii	endemic		x			
Solanaceae	Solanum nigrum	non-endemic	x				
Sterculiaceae	Cola scheffleri	endemic	x				
Sterculiaceae	Sterculia appendiculata	non-endemic		x			
Sterculiaceae	Cola usambarensis	endemic	x	x			
Sterculiaceae	Dombeya amaniensis	endemic		x	x		
Tiliaceae	Corchorus olitorius	non-endemic	x	x			
Urticaceae	Myrianthus holstii	non-endemic	x				
Urticaceae	Chlorophora excelsa	non-endemic					x
Verbenaceae	Clerodendron	non-endemic		x			
Verbenaceae	Lippia asperifolia	non-endemic			x	x	

APPENDIX 8

POPULATION GROWTH TRENDS IN THE EAST USAMBARAS



1967-1988 data from previous National Census, 1996 data collected during this research.

APPENDIX 9

COMMERCIALIZED SPECIES AND QUANTITIES PRESENT IN MARKETS IN THE EAST USAMBARAS

A. Medicinal products

Species	Quantity (kg/pieces)	Source area(s)	Reported cures
Artemisia afra	0.2 kg	Lushoto	Malaria, extra bile
Jatropha curcas	3 kg	Muheza	Diarhoea
Harrisonia abyssinica	0.25 kg	Muheza	Ear bleeding
Toddalia asiatica	2 kg	Muheza	Swollen legs
Albizia anthelmintica	1 kg	Muheza	Hernia, menstruation
Vitex spp.	1 kg	Muheza	Pain killer
Erythrina tomentosa	4.5 kg	Muheza, Lushoto	Hernia, asthma, stomach pains
Clausena anisata	1.5 kg	Muheza, Maramba	Aphrodisiac, chest pains
Brackenridgea zanguebarica	1 kg	Muheza, Maramba	Ulcers, stomach pains
Bruguiera gymnorhiza	0.5 kg	Lushoto	Blood pressure, hernia
Antiaris usambarensis	2 kg	Lushoto	Menstruation, stomach pains
Terminalia kilimandscharica	0.5 kg	Korogwe	Anaemia, chest pains
Turraea robusta	0.5 kg	Korogwe	Aphrodisiac
Warburgia ugandensis	2.5 kg	Muheza	Stomach, eclepsis
Pavetta mangallana	0.25 kg	Muheza	Rashes
Santalum wightiana	0.5 kg	Muheza	Conception
Ficus exasperata	1 kg	Muheza, Maramba	Stomach, hernia, bilharzia
Piliostigma thonningii	2.2 kg	Lushoto	Flu, appetite, coughing
Cassia kirkii	1 kg	Maramba	Hernia, aphrodisiac
Microglossa oblongifolia	0.5 kg	Lushoto	Acute malaria of children
Myrica salicifolia	2.5 kg	Lushoto, Muheza	Nose bleeding, toothache
Uvaria acuminata	0.25 kg	Muheza	Acute malaria of children
Tapura fischeri	0.2 kg	Maramba	Asthma, malaria, hernia
Mucuna quadrialata	0.75 kg	Amani	Hernia, itching eyes
Annona senegalensis	1.5 kg	Korogwe, Muheza	Hernia
Ximenia americana	7.7 kg	Muheza, Lushoto	Anaemia, conception, kidneys
Lannea amaniensis	1 kg	Muheza	Backache
Cassia didymobotra	1 kg	Lushoto	Asthma, diarrhoea, hernia
Milicia excelsa	0.5 kg	Muheza	Menstruation
Cassia abbreviata	0.25 kg	Muheza	Coughing
Celtis soyauxii	2.75 kg	Muheza, Maramba	Kidneys
Rauvolfia caffra	0.5 kg	Lushoto	Bilharzia, gonorrhoea
Abrus precatorius	0.25 kg	Lushoto	Ulcers, rashes
Triclisia saeleuxii	0.5 kg	Muheza	Aphrodisiac
Cyperus alternifolius	0.5 kg	Muheza	Vomiting

B. Household products

Species	Quantity	Source area(s)	Uses
Phoenix reclinata	15 pcs	Potwe, Muheza	Baskets
Phoenix reclinata	7 pcs	Potwe, Muheza	Mats
Khaya nyasica	4 pcs	Bombani	Graters
Dobera loranthifolia	300 pcs	Maramba	Toothbrushes
Oncoba routledgei, *Parinari excelsa*	23 pcs	Potwe, Muheza	Chapati disks
Tamarindus indica	7 pcs	Muheza	Walking sticks
Tamarindus indica	3 kg	Maramba	Fruits
Albizia spp.	15 pcs	Maramba	Handles
Albizia versicolor	4 pcs	Bombani	Mortars
Afzelia quanzensis, *Albizia* spp.	6 pcs	Muheza	Stools
Solanum nigrum, *Lactuca capensis*	12 kg	Muheza	Vegetables
Cocos nucifera, *Panicum maximum*	50 pcs	Muheza, Bombani	Brooms
Bamboo	14 pcs	Maramba, Potwe	Trays
Bamboo, *Cocos nucifera*	20 kg	Muheza	Raw materis
	6 lts	Handeni	Honey

ABOUT THE AUTHOR

Born on the 5th July 1963 in Kirua Vunjo, Moshi, Tanzania, John Francis Kessy graduated with a bachelor's degree (hons) in Forestry at Sokoine University of agriculture in 1988. As part of his BSc. forestry program he did a research on *Socio-economic implications of improving land use strategies in mountainous areas in Moshi*. He was then employed by Sokoine University of Agriculture as an academic in the Faculty of Forestry where he worked for about a year as a Tutorial Assistant before he was registered for a Master's degree in Management of Natural Resources at the Agricultural University of Norway. While pursuing his MSc. studies, Mr. Kessy went through a professional re-orientation process towards more holistic approaches in solving natural resources management problems. As part of the requirements for the MSc. degree he did a research in Legho Mulo, Moshi on *Socio-economic and Policy aspects of extending environmentally-sound land-use techniques to the rural population*. The research was within the framework of a Ford Foundation funded project aimed to mobilize local people to participate in rehabilitating denuded areas of which the Faculty of Forestry (SUA) provided the technical support. He completed his Msc. studies in Norway in 1992 and returned to Sokoine University where he worked as a Lecturer in the department of Forest Economics. He was registered for PhD degree studies in 1994 to work with both the Department of Forestry and The Working Group Technology and Agrarian Development at Wageningen Agricultural University in The Netherlands.

While at Sokoine University, he worked very closely with the Forests, Trees and People Program (FTPP), based in Uppsala, Sweden with a regional network in East Africa, to promote and strengthen the use of more participatory approaches in community forestry extension and research. It was during this time that he researched on *The tenure and management of communal lands and natural woodlands in Tanzania* making use of participatory rural appraisal methods in selected case study villages in Dodoma Region. He has also served as a consultant to IUCN (The World Conservation Union), East African Regional Office as part of the 1996 Planning mission in the East Usambaras, Tanzania. While in The Netherlands, he offered advisory service to His Royal Highness Prince Bernard of The Netherlands on a community based forestry project based in East Africa.

As a researcher, the author has worked with a number of research and development projects in Tanzania including the NORAD funded *Sustainable utilization of Tanzanian Forests* projects at Sokoine University, the Dutch funded *Dodoma Village Afforestation Project*, the FAO/GEF *Biodiversity project* in East Africa, the *East Usambara Catchment Forest Project in Tanga, Tanzania* and the *East Usambara Conservation and Agricultural Development Project* based in Amani, Tanga. The author has written a number of scientific papers in forest economics, community forestry and forest extension approaches. Mr. Kessy is married to Angela Ganzel and has two children, Blessing and Aika.