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Socio-economic Effects and Constraints in Forest Management: Tanzania

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Socio-economic effects and constraints in forest management: Tanzania

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INTRODUCTION

Tanzania is situated on the east coast of Africa, roughly between latitudes 1° and 12°S. It occupies an area of 945,000 km^2 of which 55,000 is inland water (Lakes Victoria, Tanganyika, Nyasa and Rukwa). Physiographically, the country can be divided into:

(1) *the coast region,* made up of a narrow zone of coastal coral platforms and sediments and a low dissected plateaux hinterland, mostly composed of resistant layers of Jurasic and Cretaceous sandstones;
(2) *the highland plateaux regions;* these cover by far the largest area of the country, being mainly vast inselberg plains; they are made up of various crystalline rocks; the altitude is normally between 500 and 1500 m;
(3) *the Rift Valley volcanic highlands,* separated in Tanzania into two distinct areas—a northern one associated with the Gregory Rift including the volcanic peaks of Mt Meru and Kilimanjaro, the highest peak in Africa (5895 m), and a southern one along Lakes Tanganyika, Rukwa and Nyasa;
(4) *block mountain massifs* formed through faulting and uplifting on the crystalline peneplains; they often rise steeply up to around 2000 m altitude; the most important ones are the Usambara Mts, the Uluguru Mts, and the Southern Highlands (including Sao Hill).

The vast interior high plains are dry or very dry with an annual rainfall varying from 400 to 1000 mm, falling normally in one season with a severe and prolonged dry season. Higher rainfall is encountered on the coast, in the Lake Victoria basin and in association with the uplifted mountain areas and volcanic peaks, where orographic precipitation up to 2000 mm is common. In the most northern parts of the country, close to the equator, the rain falls in two seasons. Temperatures are uniformly high throughout the year except in the higher mountain ranges where temperatures may be very low and frosts occur.

The crystalline plateaux highland soil catenas are dominated by weathered and leached ferralitic and ferruginous soils with various alluvial, vertisolic and calcic soils developed in areas of specific topography, hydrology, geology and climate. Andosols of various ages and degree of development are found in the volcanic highlands and mountains, whereas the block mountain massifs have mixed lithosolic and ferrisolic soils.

The distribution of the vegetation is predominantly governed by climate, soil and human activities. The drier parts of northern and central Tanzania are covered by savanna communities with various degree of tree and bush cover (bushland, wooded/bushed grassland, and grassland). In the western and south-eastern plateau country the most widespread vegetation type is 'miombo' woodland, which is a deciduous forest type with a light canopy, dominated by leguminous trees (*Brachystegia, Julbernardia* and *Isoberlinia* spp.). It is often associated with *Pterocarpus angolensis*, one of Tanzania's major commercial timbers. A very small part of the country, less than 2 per cent, or about 15,000 km^2, is covered by closed evergreen forest communities. Most of these are found in the mountains. Very limited areas of lowland and intermediate rainforests remain. In appearance the montane forest is similar to that of lowland forest except for a smaller number of buttressed trees and fewer of the great giants. The best known and most useful dominant trees are *Podocarpus* spp. (conifer) and *Ocotea usambarensis* (East African camphor). In the drier ranges of the mountains another valuable conifer, *Juniperus procera* (East African pencil cedar), is common. Dense thickets of mountain bamboo (*Arundinaria alpina*) occur on some mountains.

POPULATION AND LAND-USE

In 1978 the total population of Tanzania was 17.5 million with an annual growth of 3 per cent. Most people, 87 per cent, live in rural areas and the remaining 13 per cent in towns. The average population density was 19 persons per km^2. The distribution of the rural population is uneven with strong concentrations in some areas, contrasting with large parts of the country which have very low densities. More than 75 per cent of the population

concentrate in less than 15 per cent of the total land area. The main regions with dense population are near the coast, in the vicinity of the great lakes (particularly Lake Victoria), and in the mountainous areas, a distribution that coincides well with areas of high rainfall (Nieuwolf, 1977).

Other factors which exert an influence on population distribution are the occurrence of tsetse flies which, in combination with poor soils and lack of water, makes the vast tracts of miombo woodlands very sparsely populated in spite of comparatively high rainfall. Also historical events have partly influenced the present population distribution, particularly tribal wars, migrations and slave trade during the eighteenth and nineteenth centuries.

Since the late 1960s a considerable local redistribution and concentration of the rural population has occurred as a result of the so-called 'villagization programme'. Among the aims of this programme has been to render social services to the rural population, which was difficult when people lived in scattered homesteads over vast areas. Another has been to facilitate more efficient introduction of improved farming techniques. The enormous magnitude of this programme is evidenced by the fact that, since 1973, 12 million people were moved into 8000 villages (Mnzava, 1980).

In Tanzania all land is owned by the state, although there are still some larger cash-crop estates (coffee, tea, wattle, sisal) held under long-term leases. The total area of these estates is insignificant but they are normally situated on high-potential land. In some parts of the country, particularly in wet upland, high-potential areas, land is still *de facto* regarded as private and is inherited between generations (Mnzava, 1980). The fragmentation of such land has reached a critical stage in many upland areas (e.g. Kilimanjaro, Meru, Usambara, Uluguru, Mbeya) a factor that strongly contributes to the pressure on adjacent forest reserves.

In the drier and more marginal land shifting cultivation was until recently the traditional form of land-use. The villagization programme, in combination with certain legal measures to prevent people from reverting to traditional forms of living, has led to a considerable decrease in shifting cultivation over the last decade. In many places the result has been a serious pressure on land resources near the villages. Trees have been cut in large circles around the villages, both through clearings for agriculture and for fuelwood. Already after a few years many newly established villages suffer from erosion and declining land productivity.

It has been estimated that only around 5 per cent of the total land area is under small-scale agriculture (large-scale less than 1 per cent). The major staple food crops are maize, bananas and beans in the wetter areas; and maize sorghum, millet and cassava in the drier areas. Among the more important smallholder cash crops are coffee, tea, pyrethrum and vegetables in the mountains; and cotton, tobacco and groundnuts on the arable plains. Along the coast there is a high production of cashew nuts. The vast savanna areas,

almost 50 per cent of the total land area, are mostly used for extensive grazing, where they are not set aside as national parks of game reserves. Except for some expanses of swamps the remaining area, or roughly 40 per cent of the country, is classified as forest and woodland (Berry, 1971).

FOREST LAND-USE

The pre-colonial history of forest land-use in Tanzania is not well known. Shifting cultivation was practised in the woodland and moist savanna areas, but due to the sparse population the effect on the vegetation was probably slight. In the miombo woodland the occurrence of tsetse flies prevented large-scale habitation, and hunting and honey-collection were the main forms of utilization. In the drier areas, however, the influence of pastoralists on the tree vegetation, through grazing and the systematic use of fire, was certainly much more profound.

There are strong indications that mountain forest areas were cleared for cultivation during earlier dry periods, e.g. around A.D. 1000, and then kept open by fires and grazing (Lundgren and Lundgren, 1972). The mountain forests were often also used as temporary refuges during times of war and it is likely that a few permanent settlements have always existed in the mountain forests. Large-scale movements of population up the mountain slopes occurred first during the eighteenth century, primarily as a result of the invasion and occupation of the plains by the cattle-raising Masai. This forced the agriculturalist Bantu tribes to settle in the mountains where they could better defend themselves. They cleared the forest on the lower slopes and, depending on skill and land potential, different forms of permanent and semi-permanent agriculture developed. Some of these mountain tribes developed into powerful and well-organized societies during the eighteenth and nineteenth centuries, e.g. the Chaggas of Kilimanjaro and the Sambaa of Usambaras.

When the first Europeans came to Tanzania in the late nineteenth century, forests were still widespread in the mountains and in the wet parts of the country. The country became a German colony in the late 1890s and in 1897 organized forestry activities had already started. The main priority was protection and reservation of natural forest, with a dual aim of protecting the water catchments and securing production of timber. Up to 1914, 231 forest reserves were delineated with a total area of more than 750,000 ha. The reserves were mainly montane and mangrove forest. Although some people were probably evicted from the forests during this reservation, as evidenced in the occurrence of secondary forests within the reserves, it is likely that most forests brought under protection were uninhabited (B. Lundgren, 1978).

During the German time some sawnmills were erected for exploitation of the valuable montane trees. Plantation trials, both of indigenous and intro-

duced trees—teak, for example, was brought into the country in 1898—were initiated, but plantation forestry never achieved importance (only 700–800 ha were planted before the outbreak of war (Grant, 1924).

Forestry activities were resumed again in the early 1920s after a complete standstill during the war, when a considerable encroachment took place into the reserves by people trying to escape enlistment into the German colonial army. The first task for the new British administration was therefore to reclaim the old montane forest reserves. In the 1920s and 1930s reservation was also made for large tracts of miombo woodland to secure the supply of the valuable *Pterocarpus angolensis*. At the end of the British time the areas under forest reserves were practically the same as today. The total area of reserves is 130,000 km^2, of which only 9300 km^2 are high forests and the bulk of the remainder is miombo woodland (Parry, 1962; B. Lundgren, 1978).

The major forestry development during the British time was the systematic introduction and trial of exotic trees suited for plantation production of timber, firewood, and later pulpwood. Large-scale planting started in the early 1950s, mainly in highland forest reserves. The major species were pines, cypresses and eucalypts. This plantation activity has continued and accelerated after the country became independent in 1961. Today there are some 70,000 ha of fast-growing industrial plantations, with an additional 4000 ha being established every year. A major share of Tanzania's industrial wood need is now met from these plantations. The balance still comes from logging in the natural forests, mainly the miombo woodlands (B. Lundgren, 1978).

Forest policy and legislation are practically the same today as they were laid out in colonial times. Emphasis is laid on protecting and managing the reserved forest in order to achieve perpetual production of wood for the country's need and to secure ecological and hydrological stability of major watersheds. People are not allowed to reside in forest reserves or to use any products from them, although locally customary rights have developed, whereby people residing near the reserves are allowed to collect branches as firewood or to herd cattle through the reserves along special tracks. The Forest Department and its staff have, in the eyes of the rural people, often been regarded as representatives of higher authorities with a policing task to prevent people from using land and wood resources. Only during the last few years, in connection with the villagization programme, has the Forest Department taken a more active part in educational and extension efforts, aiming at informing people on the benefits of forests and trees. The policy is currently undergoing some revision, which will concentrate on forestry not only for, but also by, the rural communities (Mnzava, 1980).

There has, however, been one significant activity whereby people have benefited in the recent past from forestry in reserved areas, apart from direct employment opportunities in forestry and forest industries. The 'taungya' afforestation system has been widely used in establishing most of the pres-

ently existing highland plantations. It was first used by the Germans but it was not until the 1950s, with the expansion of plantation establishment, that it began to exert an important socio-economic influence in the densely populated mountain areas. In this system the forester assigns pieces of natural forest land to licensed cultivators, normally 2–5 ha per family. The farmer clears the forest (after valuable trees have been extracted by the Forest Department), burns the slash and cultivates his crops, normally maize, beans, peas, potatoes (Irish), and pyrethrum (only annual crops are permitted) for 3–4 years. In the first or second year the Forest Department plants seedlings at regular intervals in the farm, and these are thus intercropped with the farmer's crops for 2–3 years when the canopy closes and the farmer is allotted a new piece of forest. It is the farmer's responsibility to tend the young trees (weeding, protecting them from animals, etc.), while he cultivates the land in between. The benefit to the Forest Department is obvious–land clearing and weeding obtained at no cost.

During the last few years the system has, however, been discouraged on social (temporary houses, poor service to the farmers), political (making the villagization programme difficult etc.), ecological (natural forests should be preserved), and forestry (people damage trees and refuse to move from farms) grounds. Still, it has been shown that the economics of the system are beneficial, not only to the Forest Department, but also the farmer (Hofstad, 1978). The reason is that mountain forest land is the most fertile land available in the country and a good farmer can obtain better harvests on a 'taungya' plot than in most other places.

The exact figure for fuelwood consumption in the country is not known. Estimates vary between 20 million m^3 (r) (Gilliusson, 1976) and 35 million m^3 (Mnzava, 1980), an indication of the difficulty of obtaining reliable information. This represents between 85 and 95 per cent of the total wood consumption. Most of this wood, probably more than 90 per cent, comes from unreserved forests, woodlands and savannas. It is safe to assume that the local and regional rate of increase in fuelwood consumption has been very high in the last decades. There are three main reasons for this. The most apparent one is the increased population. Secondly, the concentration of people in villages has resulted in large local deforestation as a result of clearing forest for cultivation, collection of fuelwood and the momentary need for large amounts of construction timber and poles when erecting the villages. The third reason is the expansion in certain regions of tobacco-growing and curing which requires large quantities of fuelwood. In Tabora Region, the main tobacco-producing region, 1.7 million m^3 of fuelwood was used in the 1977/78 season for curing the tobacco. It is estimated that the 1980/81 tobacco production target in the region will require the clear-felling of 35,000 ha of miombo woodland just to meet the need of fuelwood for curing tobacco (Temu, 1979).

There is little doubt that the rate of deforestation is rapidly increasing. The often-quoted figure of 300,000 km^2 being under unreserved forest (mainly miombo woodland) does certainly not hold true any longer. In the semi-arid areas the situation is already very serious with erosion and other land degradation problems, as well as serious socio-economic implications for the rural population. As wood becomes scarce fuelwood collection for the household becomes a burden and progressively more labour is diverted, especially for women. Health hazards as a result of bad cooking and fatigue increase.

THE MOUNTAIN AREAS

The highlands of Tanzania have a considerably higher potential for crop production than any other biogeographic region of the country (Lundgren, L. and Lundgren, B. 1979). This fact is due to a combination of favourable rainfall, soil and photosynthesis conditions. The mean rainfall is adequate for rain-fed cultivation of most crops. Soils generally have a high cation-exchange capacity, a high base saturation and a higher organic matter content than soils of lower altitudes. This is valid also for the mineralogically rather poor soils derived from basement rocks, e.g. those of the Usambara and Uluguru mountains. Finally, the potential photosynthesis is higher due to the lower respiration rates resulting from the lower temperatures. Estimates have been made that the highland – lowland difference in potential photosynthesis give a 2 to 1 (possibly even greater) advantage of the highland areas over the lowland areas with respect to grain yields (Porter, 1979).

These factors have resulted in high population densities. Over the last 80 years the population in the West Usambara Mts has, for example, increased from an estimated 15,000 in 1900 to 286,000 in 1978 (L. Lundgren, 1980). As a result, deforestation has taken place on a large scale on the mountain slopes. The impact of land-use practices—predominantly small-scale arable farming—has become progressively more intensive. This over-cultivation has, in turn, led to severe soil erosion and land degradation in many mountain areas. Erosion and fertility decline are obvious limiting factors to land utilization in these regions. Different types of erosion hazard are important on deforested and over-cultivated tropical mountain slopes, viz. splash erosion and rill erosion occurring every year and landslides triggered off in years of extreme rainfall.

It must also be borne in mind that vast areas surrounding the mountains are dependent on the water quality and flow characteristics of the permanent rivers that rise in the highlands. Finding forms of land-use which will give the best yields of food and cash crops on a sustained basis, while at the same time preventing erosion and maintaining a favourable hydrological balance, is an urgent need.

In the 1930s the deterioration was already obvious and the British

administration launched soil conservation and rehabilitation schemes. Important schemes in this area were the Mlalo Basin Rehabilitation Scheme and the Usambara Development Scheme in the Usambara Mts, and the Uluguru Land-Use Scheme in the Uluguru Mts, all being conducted in the post-war time. Both the Usambara and the Uluguru Schemes were unsuccessful and had to be given up in the middle 1950s. The failure can be attributed to unsound and unwise implementation and practices that were badly adapted to traditional social and cultural systems. In addition, growing unrest as independence approached contributed to resistance towards the Colonial Administration, including the conservation schemes (L. Lundgren, 1978, 1980; Temple, 1972; Watson, 1972).

Another result of this development—increasing population and land deterioration—is that pressure on the forest reserves is considerable. In 1963 politicians yielded to this pressure and excised 12,000 ha of a forest reserve in the Usambara Mts. Today this area is totally deforested, also on the steepest slopes, and erosion is very severe, indicating the speed of land degradation. A smaller area of 500 ha, already planted with cypress and pines, had to be given up 1971–72 by the Forest Department after the taugya farmers refused to leave the area (B. Lundgren, 1978). Another example is from another part of the Usambara Mts. In this area the natural montane forest of a catchment belonged to two different tea estates, bordering on forest reserves. As one of the estates was nationalized, the forest—being one of the most luxuriant in Tanzania and unique in connection with the rest of the catchment forest—was opened for local cultivators in the early 1970s. The other part, previously owned by the other estate, was donated to the University of Dar es Salaam just before the pressure for releasing it for local cultivation arose. This University Forest Reserve (Mazumbai), although small (400 ha), is one of the most important baseline research areas in East Africa today.

It is of fundamental importance that the changes and intensifications in land-use practice which occur as a result of the rapid population increase are based on evaluation of interactions between land management, vegetation (including crops), soils and climate, if the full land potential of the highlands is to be realized. Misjudgements or ignorance may easily have devastating results, not only on the highlands themselves but also on its surrounding low-lands which depend on the mountains for their water supply.

THE SITUATION TODAY

In summary, the following issues are relevant when evaluating the socio-economic effects and constraints in forest management in Tanzania today:

(1) The villagization programme has in a short time created enormous concentrated pressures on forest and wood resources throughout the coun-

try, but particularly in the drier areas on the high plains and in the Lake Victoria area, where deforestation was severe even before villagization.

(2) The dense and rapidly increasing population in the high-potential mountain areas exerts a considerable pressure on land resources and the continued protection of the essential catchment forest reserves is endangered.

(3) In some regions the rapid expansion of agricultural uses such as tobacco-growing has resulted in a very rapid large-scale deforestation.

The Tanzanian Government and Forest Department are aware of these problems and over the last few years considerable emphasis has been given to develop village forestry programmes. The aim is to make the new villages self-supplying in wood on a sustained-yield basis by establishing village woodlots. The Forest Department has increased its extension efforts by producing plants free of charge, education programmes via primary schools, and tree-planting campaigns. Resources are, however, quite insufficient to keep pace with the rapid development of this enormous problem.

The rapidly deteriorating situation in some mountain areas is not fully appreciated yet. These problems are complicated and their solution, or at least the prevention of further deterioration, will require integrated efforts spanning over geographical, administrative, departmental and other boundaries.

Research is going on, although on a small scale, to find management methods that will secure a sustained supply of curing fuel from the miombo woodland and from fuelwood plantations for the tobacco-growing villages (Temu, 1979).

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