



**Rural Livelihoods and Forest Reserves Encroachment in Tanzania: A Case of Biharamulo Forest Reserve in Biharamulo District, Kagera Region**

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**Abstract**

The study on rural livelihoods and forest reserve encroachment was conducted in Biharamulo District – Kagera Region. The general objective of the study was to examine the linkages between rural community livelihood and encroachment of forest reserves by the communities living in the villages in the vicinity of the Biharamulo forest reserve. The specific objectives were to study socio-economic activities of the community around the forest reserve; to examine the effects of the communities' socio-economic activities on forest reserve; and to examine the approaches and strategies used to curb encroachment of the forest reserve.

A sample of 81 respondents was taken from Lusahunga, Bwera and Butengo-Lumasa villages around the forest reserve. The methods used in data collection were documentary review, interviews through questionnaires and observation. The study established that forests are the major source of livelihood in the study area. Forests are the main source of energy for cooking and lighting. Forests also form a major part of livestock grazing land. Further more, forests are the source of timber and poles for housing construction. Lastly, forests are the major source of non-farm income. This situation has resulted in forest reserve encroachment including excessive tree cutting and destruction through bush fire. This endangers the survival of the forest resources.

The current approaches used to control the encroachment of the forest reserve cannot sustain forest reserve conservation. The study recommends

the following measures to achieve sustainable forest conservation: The District Council should facilitate the villages to formulate, implement and maintain village land use plans, the District Forest and Agriculture Departments in collaboration with other stakeholders should facilitate and encourage crop farmers and agro-pastoralists to practice agro-forestry and woodlot establishment, financial institutions such as National Microfinance Bank, (SACCOS) and other development practitioners should interact with communities around the reserve to diversify their source of livelihoods, and the District Council should effectively involve communities in forest conservation activities and ensure that benefits from conservation activities are also accrued to the communities in the villages around the forest reserves.

## **1.0 Introduction**

### **1.1 The Research Problem**

Livelihoods have been defined as the assets, activities and access determining the living, or set of outcomes, gained by individuals or households. On the other hand, livelihood strategies include measures undertaken by people in a particular environmental setting to earn their daily living (URT, 2005:8). A livelihood comprises the capabilities, assets (both material and social resources) and activities required for a means of living (Carney, 1998:4). Encroachment is defined as an action of trenching or intruding usurpingly on the territory or rights of another (Onions, 1986).

Over 80 per cent of Tanzania's population live in rural areas and depend basically on the land for their livelihood. These people need sufficient arable land to cultivate, pasture their livestock, adequate woodland to supply them with fuel wood and water sources within reasonable distances (DTU, 2003:148).

The natural resources in Eastern Africa, Tanzania in particular, are undergoing severe stress and degradation that may result in environmental and economic disaster. The main cause of degradation is extensive exploitation of forests for charcoal and encroachment by cultivators and grazers. In Kenya natural forests are shrinking at the rate of 0.3-0.55 percent per year, and in Tanzania at the rate of 1.2 percent per year. In Uganda, only 21 percent of natural forests still exist (Okwemba, 2004).

In her efforts to conserve natural forests, Tanzania has set aside 22 per cent of the main land surface (94.3 million ha) as national forest reserves. Some of the reserved forests have high opportunity cost as it is estimated that about 15 percent of the land under reserve is suitable for cereals production (World Bank, 1994). Although, in Tanzania there is no reliable data on deforestation, it is estimated that deforestation ranges from 130,000 to 500,000 hectares per annum (URT, 1998).

In Biharamulo district population growth rate is 4.9 percent per annum and the population is estimated to have increased from 409,389 in 2002 to 498,042 in 2006. At the same time, cattle population has increased from 60,000 in 2002 to 88, 517 in 2006 (Biharamulo District Council, 2006). According to the Biharamulo District data bank, the district has about 500,000 hectares of forest and woodlands of which about 300,000 hectares are forest reserves.

Due to the increase in population pressure, expansion of agricultural activities has been recorded in forest reserves. Biharamulo Forest Reserve has been encroached by both crop farmers and pastoralists (Yanda *et al*, 2001). Due to this encroachment, deforestation takes place at an alarming rate due to excessive deforestation for crop cultivation (encroaching farmers), tree cutting for charcoal production and gold mining by squatters; bush fires for farm land clearing and honey harvesting, bark stripping for the construction of bee-hives and overgrazing in forest areas. According to the Biharamulo District Profile (2005), tobacco cultivation has resulted in excessive cutting of trees for curing harvested tobacco.

Several efforts have been made by Biharamulo District Council to evict people from carrying out their harmful activities in the forest reserve. Among the initiatives made include imposition of a fine of TShs. 2.500 per cow caught grazing in the reserve. Also, several surprise reserve patrol are being made occasionally to reduce illegal harvesting of forest reserve products. However, despite all these efforts little success has been realized till this time.

The backbone of the problem lies on the fact that in Biharamulo many of the areas which were converted in the forest reserve areas, formally were used communally by people as common land for obtaining wood fuel, building materials, medicinal plants, grazing of livestock and as cultural sites.

Therefore, after conversion of the land into the forest reserve, the community was denied the traditional privilege of accessing the forest resources without being given the alternative sources for the benefits from the communal forest land accrued hitherto. This has caused the conflict of interest between forest reserve authorities and the community.

## **1.2 Objectives of the study**

The main objective of this study was to examine the linkages between rural community livelihood and encroachment of forest reserves.

Specific objectives included:

- i. To study socio-economic activities of the community around the forest reserve.
- ii. To examine the effects of the communities' socio-economic activities on forest reserve.
- iii. To examine approaches and strategies used to curb encroachment of the forest reserve.

## **1.3 Research questions**

- i. What are the socio-economic activities performed by communities around the forest reserve?
- ii. How the communities' socio-economic activities contribute to encroachment of the forest reserve?
- iii. Are the approaches and strategies used by forest reserve authorities to curb deforestation able to improve the situation?

## **2.0 The Study Area and Methodology**

### **2.1 The Study Area**

Biharamulo District is one of the six districts comprising the Kagera Region in the North-West of Tanzania. It is situated between 2°15' and 3°15' South and between 31°00' and 32°00' East. The District has an area of 9,199 square kilometers which is equivalent to 32 percent of the total area of Kagera Region. The District shares boundaries with Muleba and Karagwe Districts in the north and Geita district in the east. Bukombe District adjoins it in the south whereas Kibondo and Ngora Districts are on the west. The

distribution of rainfall is bimodal and precipitation is variable across the area temporally and spatially. Total annual rainfall is in the range of 800-10,000mm. The eastern part gets the lowest rains whereas the west received a reasonably reliable minimum of 500mm. Maximum and minimum temperatures are 26.5°C and 30.5°C respectively. The altitude of Biharamulo District is in the range of 1,135-1,650 metres above sea level. Land formation is flat, with undulating rolling and hilly landscapes.

According to 2002 Population and Housing Census, the District had population of 409,389 people of which 205,951 are female and 203,438 are male, with 76,131 households and the average household size of 6.1 persons.

The main land-uses of the District include farm lands (55 percent), range lands (12 percent), lake shore zone (3 per cent) and forest/game reserve (30 percent).

## 2.2 Methodology

Primary and secondary data were collected and analysed in this study. Primary data were gathered through a survey while secondary data were obtained from various documents at village and district level offices. In the case of primary data, a simple random sampling method was applied to obtain respondents. The sampling unit was a household. The survey villages were purposively selected from the list of villages surrounding the forest reserve based on convenience with respect to accessibility. The sampled villages included Lusahunga, Bwera and Butengo-Lumasa.

The sampling frame was a list of all households in the selected villages. A sample size of 81 respondents was obtained and interviewed using structured questionnaires. The distribution of respondents at a household level in sampled villages was as follows: 27 village members from Lusahunga, 27 from Bwera and 27 from Butengo-Lumasa.

Two district officials, the District Agriculture and Livestock Officer (DALDO) and the District Forest Officer (DFO) were purposively selected for the interview. Six village leaders, two from each village, the Village Executive Officer (VEO) and Chairman were also purposively selected and interviewed. This made a total of 90 respondents.

Focus group discussion, structured questionnaire, check-list and observation were used to collect primary data while documented information was collected from villages and district officers.

### 3.0 Study Findings and Discussion

The study focused on major areas including the socio-economic activities of the community around the forest reserve; the effects of socio-economic activities on the forest reserve; and the approaches and strategies used by forest reserve authorities to curb encroachment of the reserve.

#### 3.1 Socio-Economic Activities of the communities around the Forest Reserve

We investigated whether the villagers' socio-economic activities are closely tied to the existence of the forest reserve in the vicinity of their villages. We found that socio-economic activities of the communities in the study area include: food crop production, trade, livestock production, woodlot planting, timber making, brick making, fire-wood collection, tobacco cultivation and curing, gardening, charcoal making, cutting trees for construction poles, grass cutting for thatching houses, cotton production, bee-keeping, coffee production and carpentry. Table 1 below shows the number of respondents/households per each activity.

Table 1. Socio-economic activities in the study area

Activity	Number of respondents/ households	Percentage of respondents
Crop production	75	92.6
Trade	8	9.9
Livestock keeping	50	61.7
Wood lot planting	5	6.2
Timber making	15	18.6
Burnt making	10	12.3
Fire wood collection	50	61.7
Tobacco production	14	17.3
Gardening	1	1.2
Charcoal making	24	29.6

Cutting trees for construction poles	38	46.9
Grass cutting	31	38.3
Cotton production	21	25.9
Bee keeping	9	11.1
Coffee production	5	6.2
Carpentry	2	2.4

NB: The total responses exceed the sample size due to multiple responses.

Source: Field Survey, July 2006.

### (a) Crop Farming

Crop farming is the major economic activity in the study area. Together 93 percent households in the study area were involved in food crops production. Crops produced include: maize, cassava, beans, finger millet, ground nuts, and sorghum. Banana is produced only in Lusahunga village. Cultivation of such crops as maize and cassava involve slash and burning of trees and grasses which leads to deforestation and land degradation. The main cash crop is tobacco which was practiced by 17 percent of households.

### (b) Livestock keeping

Livestock keeping is one of the major economic activities in the study area. According to information from the sampled villages' offices, cattle populations in these villages are 2,111 in Butengo-Lumasa, 6,327 in Lusahunga and 2,900 in Bwera. The study has shown that 62 percent of households are livestock keepers, 78 percent of these households depend on forest reserve for grazing.

### (c) Non-farm Activities

We found that, only 10 percent of respondents were involved in trade and 12 percent were engaged in bricks making as off-farm activities. This indicates that most of the people in the study area have no alternative income generating activities.

### 3.2 The effects of socio-economic activities on the forest reserve

We studied community livelihood activities that are directly associated to the encroachment of the reserve. According to our findings the following activities to a large extent have contributed to encroachment and deforestation in the forest reserve.

#### (a) Farming activities

Farmers, especially of cassava, maize and groundnuts growers, reported that their crops are affected by vermin from the forest reserve. According the District Agricultural Office, the estimated cumulative losses of various crops per annum ranges from 20 to 200 kg.

Tobacco production, into which 17 percent of the respondents are engaged, has a very significant effect on the forest reserve. It uses a lot of forest products (logs and woods) during construction of bans and curing of leaves.

#### (b) Livestock keeping

Livestock keepers in the villages that border the forest reserve depend on it for pasture. Due to increase in livestock number in the sampled villages livestock keepers are forced to graze their cattle in the forest reserve. Over-grazing has caused some parts of the reserve to loose the vegetation cover and therefore subjected to land degradation.

Specifically, the reasons that were given by respondents for grazing in the forest reserve include: No specific area allocated for livestock grazing in the village. Intruders from other villages in the district and neighbouring districts exacerbate the problem of inadequate land.

Crop farmers have encroached the traditional communal grazing land and stock routes in the village, thus, the remaining area is too small to current livestock number. During dry seasons there is scarcity of water and pasture, the condition which forces livestock keepers to graze in the forest reserve area. Lack of land purposively earmarked set aside for livestock grazing.

According to the Biharamulo District Agricultural Office, currently, the land that can be used for grazing is 353,610 ha. The recommended grazing area in



Tanzania is 0.3 Tropical Livestock Unit (TLU) /ha /annum. Taking into account the that currently 1TLU is 250 kg body weight or 1.43 cows or 10 goats/sheep (FAO, 2004) and that currently the District has 80.554 TLUs which would require 265,828 ha of land for grazing, it means that the land for grazing in the District should still be adequate. However, the cattle number grows at an average rate of 10 percent per annum (see Table 2 below). As such proper grazing land planning and management in the District is of paramount importance for sustainable livestock keeping and development.

These findings are in consistency with the observation by Njau and Soi (2002) in their study on the sustainability of traditional livestock keeping. They found that the actual grazing land yields are small due to the problems of land tenure system. They argued that the basic cause of pasture and water problem is lack of proper arrangements for earmarking and setting aside land for grazing purposes. Such arrangements should ensure that ownership of such land is granted to livestock keepers basing on traditional or legal procedure.

Table 2. Number of Livestock in Biharamulo District from 2002 - 2006

Year	Livestock number	Net increase
2002	60,946	-
2003	65,160	4,214
2004	80,225	15,065
2005	92,517	12,292
2006	99,518	7,001

Source: District Agricultural and Livestock Office, July 2006.

### (c) Timber, charcoal and firewood

Timber and charcoal making in which 19 and 30 percent of respondents are engaged respectively are the major causes of deforestation because they involve in cutting of big trees for commercial purposes. This is based on the fact that 61 percent of the local people in the area use firewood as a major source of cooking energy. The remaining section of people uses charcoal as its main source of energy. Kerosene is used by all households as the main source of lighting. In the study area, no person reported to use alternative energy sources such as solar energy, biogas or electricity.

However, it was noted that most of them use firewood because they cannot afford to purchase charcoal stoves and other alternative sources of energy. This observation concurs with that made by (Mwandosya and Luhanga, 1983) on their study on energy resource flows and end use in Tanzania, that the rural population in developing countries almost totally depend on fuel wood as energy source, as such the loss of forest areas, a traditional energy store is the real energy crisis for the rural areas.

#### **(d) Housing construction**

Cutting of trees for construction materials, such as building poles and bricks burning has also contributed to the observed state of deforestation. Wooden poles and thatch grass are the main traditional building materials in the study area. Though the number of improved houses roofed with corrugated iron sheets is increasing, it was used by only 47 sampled households. The rest use traditional building materials which are mainly forest products.

### **3.3 Approaches and strategies used by forest reserve authorities to contain forest reserve encroachers**

#### **3.3.1 Punitive measures to forest reserve encroachers**

The law prohibits the use of forest resources by the communities around the forest reserve areas as section 26 of the Forest Act 14, 2002. However, the increasing human and livestock pressure in the surrounding villages of the forest reserve cause friction between forest reserve authorities and the neighbouring communities. While the forest reserve officials are there to enforce the law, the communities are forced to harvest and use of forest reserve resources illegally for their survival.

We found through discussion with forest field officers that punishment to forest reserve encroachers include TShs. 1,500 (1US\$ =1,020 TShs) for one piece of timber, TShs.2,000 for one bag of charcoal and TShs. 2,500 per head of cattle caught grazing in the forest reserve. Table 3 below shows some of the cases of cattle found grazing in the reserve and the fines imposed between years 2002-2005. As a way of making sure that fines are paid by culprits, the exercise involve confiscating bicycles of people found encroaching and doing prohibited activities in the forest reserve until the

finer are paid. We observed over 20 confiscated bicycles in the District Forest Office.

Table 3. Some cases of cattle found grazing in the forest reserve and fines imposed for the period of 2002-2005

Date	No of cattle	Fine
13/2/2005	200	500,000
11/2/2005	541	1,352,500
18/10/2003	6,445	16,112,500
08/10/2002	494	1,235,000
30/09/2002	636	1,590,000
19/08/2002	220	550,000

Source: District Forest Division Office, July 2006.

### 3.3.2 Community involvement in forest conservation activities

Local people or communities are those who live within or directly next to forests. Their historical relationship with the forest and their practical proximity to the forest makes them the logical group of citizens best able to keep a sustained and effective management role over the forest (URT, 2001:1).

We found that the only way the communities around the forest reserve are involved in the forest reserve conservation activities is through occasional public meetings conducted by forest reserve officials. During these meetings communities are informed on the necessity and importance of the forest reserve. Also, the officials inform the communities on the types of punishments for the people found encroaching the forest reserve.

This nature of involvement shows that communities are not fully involved in the activities of conserving the forest reserves, but they are just informed what is going on and what they should not do so that they are not punished. When the District Forest Officer was asked on the efforts being done to make the communities fully involved in the forest reserve conservation activities, he said that the District had just launched the Community Participatory Forest Management (CPFM) approach which will ensure the community involvement through sharing of responsibilities and benefits

between forest reserve authority and the communities living around the forest reserve. He remarked that for the moment, it is still too early to see the impacts of the approach as it has just been launched in the District.

Table 4. The views of respondents on possible measures to improve forest reserve management in the sustainable manner

Views of Respondents	Number of responses	Percent
Villages should allocate land for livestock grazing	43	53
Need assistance of tree seedlings	15	18.5
Boundaries of the reserve be revised to expand village lands	60	74
Large scale livestock keepers be encouraged to reduce number of cattle	7	8.6
A part of the reserve should be set aside for charcoal making and firewood collection	39	48.1
Electricity should be extended to our villages	5	6.2
The tree cutting and planting rules should be strengthened	18	22.2
Large scale livestock keepers should be shifted to other areas	58	71.6

**NB:** The total of responses exceed the sample size due to multiple responses

However, the study managed to capture the views of respondents on possible measures to improve forest reserve management in the sustainable manner, without constraining the livelihood of the surrounding communities (see Table 4 above).

The views by respondents indicate that the majority of the people in the study area are of the opinion that the forest reserve has led to scarcity of available land by occupying areas that could be used productively. Also, communities living around the forest reserve should be allowed in one way or another to access forest products. Since, 74 percent of respondents said that village boundaries should be revised to expand village land. As well 48 percent suggested that cutting of the firewood and charcoal in forest reserve by villagers should be permitted.

The problem of land scarcity for livestock grazing is one of the burning issues in the study area. Altogether 53 percent of respondents suggested reallocation of village land to provide for livestock grazing and 72 percent of respondents suggested the shifting of large herd livestock keepers to other areas. Altogether 19 percent of respondents see the importance of planting trees. Only 9 percent perceived that there is a need to destock livestock.

## **4.0 Conclusion and Policy**

### **4.1 Conclusion**

The main objective of the study was to find out the linkages between rural community livelihood and encroachment of forest reserves. In order to achieve this objective the study started by looking at socio-economic activities of the communities around the Biharamulo forest reserve. In this aspect the study established that most of socio-economic activities of the communities are forest based. The major sources of cooking energy are wood fuel and charcoal. Sales of wood products especially charcoal and timber contribute a major part of income to most of the families. Furthermore, livestock keeping depends on forest reserve for pasture because most of traditional grazing areas have been converted to forest reserve and crop farms. Lack of land specifically allocated for livestock grazing has exacerbated this problem.

Also, the study has established that due the large dependency on forest reserve for livelihoods, the forest encroachment has created great loss of forest cover. Furthermore, the punitive approach used in the Biharamulo forest reserve is not very fruitful as encroachers' cases do not indicate any sign of declining. Lack of effective community involvement in the conservation programmes and distribution of benefits accrued from the forest reserve are the major reason for the failure.

### **4.2 Policy Implications**

District Council should facilitate the villages to formulate, implement and maintain village land use plans. In these plans the village land should be zoned for uses including agriculture, livestock keeping, forest, and other conservation activities. The ownership of the land zoned for grazing should be offered to associations of registered users with the condition to keep the

number of livestock within the carrying capacity of the land. To discourage overstocking the District Council in collaboration with village governments may introduce by-laws that restrict livestock keepers from keeping excessive number of livestock.

The District Council should also use open public land to allocate medium and large scale cattle keeper's private grazing lands. This should include the condition to pay the rent to the District Council and manage the land prescribed by the Council. These farmers should be advised to keep the livestock and apply principles such as improving pasture through sowing of leguminous species, excavation of water charcoal, fencing and paddock. The size of land offered should be determined after survey of actual number of large and medium scale livestock keepers as well as the available land.

The District Forest and Agriculture Departments in collaboration with other stakeholders should facilitate and encourage crop farmers and agro-pastoralists to practice agro-forestry and woodlot establishment. This will create sustainable supply of cooking energy and other wood products. Also, this will protect the soils, hence avoid excessive dependency on forest reserve products. This can be done through supporting small community economic groups that are involved in tree seedling production and conducting tree planting campaigns. This should be backed up by by-laws that require each household to plant and protect a certain minimum number of trees in the farm.

The financial institutions such as National Microfinance Bank, Savings and Credit Cooperative Societies like Mkombozi Biharamulo SACCOS and other development practitioners should direct their efforts to the poor people who live around the forest reserves. The financial assistance to them should support starting non-farm economic activities rather than solely on crop farming and livestock keeping as their major sources of their livelihood.

The District Council should effectively involve communities in forest conservation activities. Conservation should ensure that benefits from conservation activities are accrued to the communities in the villages around the forest reserves.

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