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Are Poverty and Illiteracy to Blame for Forests Degradation? A Case Study of Mbeya Range Forest Reserve. Mbeya-Tanzania

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ABSTRACT : In this study, a total of 350 households contained 700 individuals in Iganzo village were surveyed to study their literate and poverty levels and their impacts to conservation of the Mbeya Range Forest Reserve. The study included 350 women and 350 men. The majority of respondents were between the ages of 31-40 years old (53%), while the rest were between 41-50 years old (25%) and 21-30 years old (22%). The total income per day per household was calculated and averaged to 4,570 Tanzanian shillings that is equal to about 3 U.S. dollars. The average number of members per household was seven. It was reported that, there is a tremendous decrease in biodiversity composition of the reserve mainly due to poverty (80%) and ignorance (76%) of the people on the importance of the reserve. Other causes for this decrease were reported to be grazing of livestock in the reserve (23%), poor farming systems (68%), which resulted in soil erosion, encroachment (64%) through expansion of farms towards the reserve boundary and charcoal burning (34%). Respondents from Mbeya Urban Water Supply Authority and District Forest Office mentioned lack of funds (49%) and lack of experts (56%) as challenges that face the conservation of the reserve. It was revealed that 25% of respondents had never gone to school, 53% had primary level of education as their highest level of education, 20% had secondary education and 2% had first degree. The null hypothesis that poverty and illiteracy have a positive correlation to forest degradation was accepted based on these findings at a probability of $p > 0.85$. Thus, it was concluded that poverty and illiteracy among Iganzo village residents are the main causes for the degradation of biodiversity in Mbeya Range Forest Reserve.

Keywords : Degradation, Household, Income, Illiteracy, Management, Poverty

INTRODUCTION

Forests have been vanishing, in the course of the last 8,000 years, the earth's forest cover has been reduced by almost half from 62 million square kilometers to 33 million square kilometers, and much of this loss has occurred in the last three decades (Sunderlin *et al*., 2005). The concern on biodiversity and its loss have become a global issue and in 1992, the Global Community met in Rio-de Janeiro, Brazil to discuss global problems and concerns of environment and development. One of the end results of the United Nations Conference on Environment and Development (UNCED) was the adoption of a text for an international convention on the conservation of Biodiversity. Since that time, over 160 nations have ratified the convention (Swanson, 1997).

Tanzania, like most African countries, is endowed with large and valuable forest resources. About 38% of the country's total land area of 945,000 square kilometers is covered by forests and woodlands that provide wildlife habitats, unique natural ecosystems and water catchments. However, according to the Ministry of Natural Resources and Tourism Report (MNRT, 2001) these forests are facing an alarming deforestation rate of 130,000 to 500,000 hectare (ha) per annum. The demand for fuel wood, charcoal and the hunt for an array of Non Wood Forest

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Products (NWFPs) by local communities surrounding forest reserves were reported to be the main factors that contribute to the current pressure exerted on the natural forests of Tanzania, while the key factor is increased rate of urbanization as a result of human population growth. Other factors were reported to be agricultural expansion, livestock grazing and wildfires (MNRT, 2001).

The Mbeya Region of Tanzania's Southern Highlands contains 28 forest reserves of 1,350 $km^{2,}$ including Mbeya Range Forest Reserve (MRFR). These forests have low levels of management and are often subjected to illegal pit sawing, fuel wood collection, grazing, hunting, and uncontrolled burning. Many of these reserves are completely surrounded by villages and somewhat encroached upon by cultivation (McKone and Walzem 1994). Although many of these reserves are no longer maintained, and are under an increasing pressure from cultivators, there is evidence suggesting that they could play a valuable conservation role if appropriately supported by government (McKone, 1995).

This study was conducted to determine if poverty and illiteracy of the local people surrounding Mbeya Range Forest Reserve (Iganzo vilage) are to blame for the degradation of the reserve. The current study generated some baseline information to answer this challenging question and form a base for management and conservation decision makers.

MATERIAL AND METHODS

Site description

Mbeya Range Forest Reserve is located adjacent to Mbeya city between 8^0 $44^{/}$-$8^0 53^{/}$ S and $33^0 10^{/}$ - $33^0 28^{/}$ E and accessed from the south of Mbeya city by foot from Mbowo village along the Chunya - Mbeya main road. The southwest border is accessed via the Mbalizi road running northwest from Tanzania - Zambia highway. The reserve is mostly southwest and faces escarpment running 25 km NW-SE, the range of elevation from 1300 m on the southwest boundary to 2818 m at Mbeya peak. Several peasantry villages surround the reserve (Fig. 1).

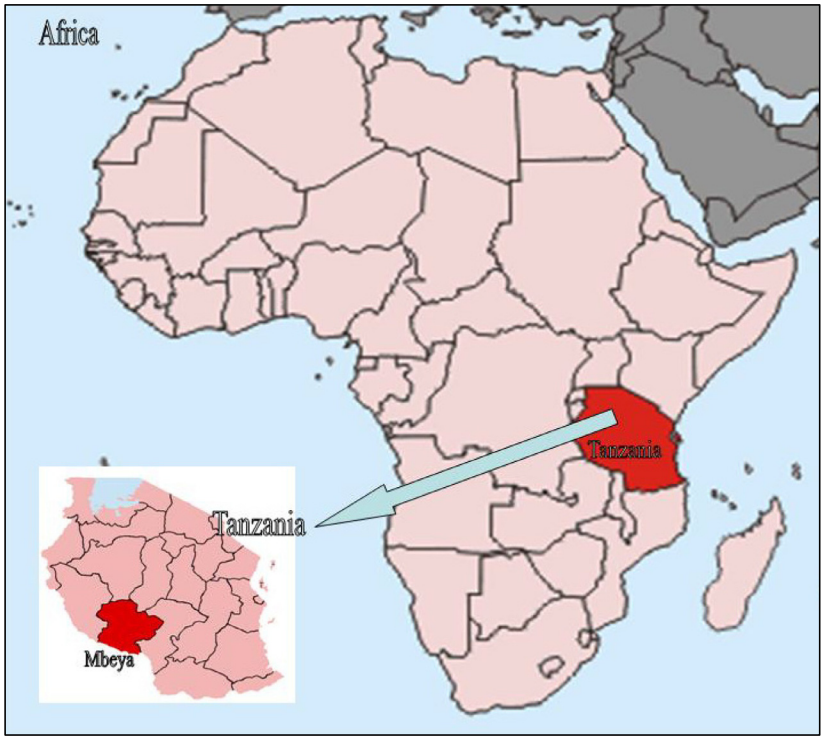

Fig. 1. Map of Africa showing the location of Tanzania and Mbeya region

Data collection

Due to the nature of information needed in this research, a multi method approach was employed to facilitate the smooth operation of the research. These included interviews, participant observation and informal discussion with local community and officials.

Questionnaire

The structure of questionnaires was designed for residents of Iganzo village in order to provide answers to specific issues of the study. The questionnaires were consisted of two main categories of questions; closed-ended and open-ended questions. In the closed- ended questions, a number of alternative answers were provided and respondents were needed to choose from a set of answers. Open-ended questions on the other hand, were designed to allow the respondents to provide their own answers. Questionnaires were administered to at least 5% of the population in the selected village.

Focused group discussion

Focused group discussion was administered to local people (The Iganzo village chairperson, key informants with experience in the area) and officers in Mbeya Urban Water Authority and District Forest Office.

Data analysis

The quantitative data (questionnaires) was coded in a form suitable for addressing the main research questions and analyzed using Statistical Package for Social Science (SPSS) to derive descriptive statistics. The components of verbal discussion (qualitative data or information) were analyzed in detail with the help of content analysis.

RESULTS

Vegetation structure of Mbeya Range Forest Reserve

The reserve contained Miombo woodland at lower and middle elevations, strips of upper montane forest along major streams, grassland at higher elevations and approximately 740 ha of plantation, mostly near the Kawetire Forest Project. Nearly half of the reserve is covered in Miombo woodland up to an elevation of 2000 m. The major vegetation types and plant species found in Mbeya Range Forest Reserve are as in Table 1.

Characteristics of the respondents

Age is among the critical factors in revealing knowledge richness within a person. To capture these skills and knowledge, various age groups were involved in the survey. The majority of Iganzo village respondents were between 31-40 years old (53%), while the minorities were between 41-50 years old (25%) and 21-30 years old (22%). In order to capture useful information from both sexes equal chances were given to both males and females for interview. It was expected that the level to which the respondent was educated will influence the conservation efforts in the study area. The study revealed that 175 respondents (25%) have never gone to school, 371 respondents (53%) had primary level of education as their highest level of education, 140 respondents (20%)

Table 1. Major vegetation types and plant species found in Mbeya range forest Reserve.

Vegetation type	Dominant plant species
Miombo woodland	*Acacia albida* Delile, *Brachystegia boehmii* Taub, *Brachystegia manga* De Wild, *Brachystegia spiciformis* Benth, *Combretum molle* R.Br ex G.Don, *Cussonia arborea* Hochst, *Pterocarpus angolensis* DC, *Uapaca kirkiana* Mull.Arg., *Faurea saligna* Harv, and *Erica spp*
Upper montane forest	*Albizia gummifera* (J.F. Gmel.) C.A. Sm, *Albizia versicolar* Welw. Ex Oliv, *Allophylus sp, Trichilia prieuriana* A. Juss and *Trilepisium madagascariense* DC.
Grassland	*Hyperhenia spp*, *Panicum sp*, *Sacciolepsis spp*, *brevifolia and Protea spp*

Table 2. Respondent's age classes and education levels.

Age class	No. of respondent	Education level	Percentage
21-30	154	Secondary education (140)	20%
		First degree (14)	2%
31-40	371	Primary education	53%
41-50	175	Never gone to school	25%

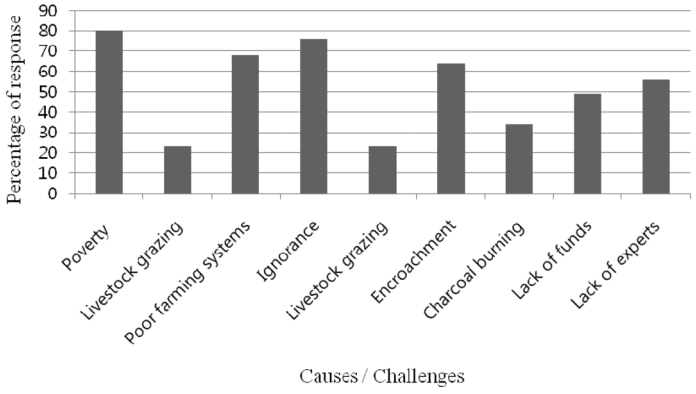

Fig. 2. Causes of Biodiversity loss in Mbeya Range Forest Reserve.

had secondary education and 14 respondents (2%) had first degree (Table 2).

Biodiversity of the reserve

It was reported that, there is a tremendous decrease in biodiversity composition of the reserve mainly due to poverty (80%) and ignorance (76%) of the people on the importance of the reserve. Other causes for this decrease were reported to be grazing of livestock in the reserve (23%), poor farming systems (68%), which resulted in soil erosion, encroachment (64%) through expansion of farms towards the reserve boundary and charcoal burning (34%). Likewise respondents from Mbeya Urban Water Supply Authority and District Forest Office mentioned lack of funds (49%) and lack of experts (56%) as the main challenges that face the conservation of Mbeya Range Forest Reserve (Fig. 2).

Major activities carried out by Iganzo village residents and their generated income

The majority of households were engaging in agriculture (53%), mainly farming. Other activities were reported to

Table 3. Major activities carried out by Iganzo village residents and their generated income.

Type of activity	No. of Respondents	Percentage (%)	Uses	Average Income (Tshs)	Average Income (U.S.A dollars)
Agriculture	375	53	Subsistence	-	-
			Selling	6,250	4.14
Charcoal burning	236	34	Selling	4,820	3.20
Firewood collection	89	13	Domestic (fuel)	-	-
			Selling	2,640	1.75
			Total average income	4,570	3.03
			Average daily income per individual	652.86	0.43

be charcoal burning (34%) and firewood collection (13%). Farming was reported to be of two types; for subsistence and for cash. Farming for cash was found to generate an average daily income of 6,250 Tanzanian shillings followed by charcoal burning and firewood collections which generated daily average incomes of 4,820 and 2,640 Tanzanian shillings respectively. The study further revealed that the overall average daily household income generated from these activities was 4,570 Tanzanian shillings (3 U.S. dollars) while the total daily income per individual was 652.86 Tanzanian shillings (0.43 U.S.A dollars) (Table 3).

DISCUSSION

Illiteracy

The lower education levels of the majority of Iganzo villagers (53%) and high illiteracy (25%) have contributed much to the decrease in biodiversity composition of the Mbeya Range Forest Reserve. It is relatively difficult for new innovations in conservation to be adopted by an illiterate person or those with lower education level. Level of education tends to influence the rate of adoption of new conservation and management techniques of natural resources including forests (Brewer, 2006). The environmentally literate person understands how ecological knowledge is constructed, how values influence this process, how to safeguard against bias, and she/he might be able to apply or support the application of ecological understanding to social needs and problems. Most of the local communities that surround protected areas in developing countries are highly illiterate, not only on ecological processes but also on the formal education. In most communities children have to walk up to 7 km through wilderness to attend to primary and or secondary school, and sometimes these schools lack not only facilities but also staff (Sanderson, 2005). Considering these situations, most of the parents opt to not send their children to school and thus results into increased number of illiterate people who entirely depend on forest for their survival. Preaching about forest protection to such people becomes a great challenge in conservation. These people need first to be educated so that they can at least read and write and later understand what an ecosystem is? What constitutes it? How it works? and how to use it sustainably? Answers to all these questions can only reach them effectively through brochures, news papers, and through literatures only if they can read and write. In order for local communities to actively participate in conservation of the natural resources including forests that surrounds them, the study suggests that adult literate programmes have to be initiated in those areas so that every community member can have at least secondary education as was observed by Baral *et al*. 2007. While it is very difficult for an illiterate person to have an alternative source of income other than activities like shifting cultivation, lumbering and charcoal burning that degrades the forest, it's easy for an educated person to find a job whether employed or self-employed and generate income to support his or her family than entirely depending on the forest. According to Lingani *et al*. 2009, a higher level of formal schooling is associated with less forest cutting due to higher opportunity costs of time and increased social status and economic opportunities. It's easy for a literate person to be impacted with not only environmentally friendly agricultural practices and hence practice a sustainable agriculture than an illiterate one, but also with family planning education so that they can have a small number of children that they can afford to send to school and hence reduce the number of future households that depend on forest for subsistence.

Poverty

Poverty of the local people surrounding forest reserves is another challenge to forest conservation. The majority of households in the study area were very poor with an average of seven members per family and an average total income per day of 4,570 Tanzanian shillings (3.03 U.S.A. dollars).This daily income is very low to support a family, when divided by the average number of hous-

ehold members it gives 652.86 Tanzanian shillings (0.43 U.S.A dollars) as a total daily income per individual. Individuals from such households opt to engage more in agriculture, firewood collection and charcoal production as main activities to sustain their lives. Most families are large in this area, therefore, they clear large areas for cultivation and agriculture to feed these people, they cut more trees to make more charcoal so as to increase the income and feed all family members, they consume more firewood for their daily cooking. Hence, the results of such activities are severe forest destruction and biodiversity degradation. This finding indicates that the larger the number of household members implies the higher the dependency on forest for subsistence, which is consistent with previous reports (Lingani *et al*. 2009; Fisher *et al*. 2006). Due to low house hold income, the majority of families fail to send their children to school, instead they are involved in activities that generate income, which may lead in the long run to an increased pressure on forests due to increased number of illiterate and poor families that entirely depend on forests.

Illiteracy-Poverty link to population growth, encroachment among local communities surrounding protected areas.

Population growth in areas of high resource extraction has an obvious pressure effect on ecosystems, such as increased fuel wood extraction (McNeely *et al*. 2003). Deacon (1994) found that deforestation rates are positively affected by population growth due to increased local pressures such as wood extraction and land clearing for agriculture. However our study revealed that population growth is a secondary factor and is driven by other socio-economic factors. Similar observations were reported by Shiva (1993) and Geist *et al*. 2002. This study revealed that higher levels of illiteracy and poverty among community members are the two main socio-economic factors that cause an increased rate of population growth in a community. Illiteracy leads to an increase in population due to higher numbers of individuals per family as a result of lack of knowledge such as family planning, low reasoning in matters pertaining family welfare that in turn results into poverty due to low income compared to family size which finally leads to clearance of more forest areas for agriculture, charcoal burning and shelter.

Other causes of / challenges to biodiversity loss

Besides poverty and illiteracy, this study further revealed that other causes of biodiversity degradation contribute much in one way or another and have a direct link to poverty and illiteracy. Activities like charcoal burning and firewood collection due to high dependency on wood as an immediate fuel, poor farming systems and raring large numbers of livestock are directly linked to poverty and ignorance. Poverty and illiteracy have further caused lack of funds to manage the reserve and also lack of Foresters to attend to the reserve.

CONCLUSION

The need for an interdisciplinary approach to science has become obvious in recent years and is perhaps most pertinent in the fields of conservation and sustainable development. Due to the linkages between socio-economic systems and ecological systems, issues such as poverty eradication, illiteracy and forest conservation need to be addressed not as an individual phenomenon but rather as whole community programme. The study recommends that, in order for forest conservation goals to be achieved, one has to firstly fight illiteracy. Illiteracy is the root to poverty, poor farming systems, encroachment and other challenges that face forest conservation. Ensuring that community members are literate will not only provide them an alternative means of earning income through other income generating activities rather than depending on forests, but also will help them understand well forest ecosystems and how to conserve them. Moreover, a literate person is able to understand and accept family planning and thus avoid having a large family that he or she cannot afford to attend to, which in turn will reduce the number of poor individuals who have to depend on the forest for their subsistence.

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