



## ARE FARMERS IN THE ULUGURU MOUNTAINS POOR BECAUSE OF CONSERVATION? A CASE OF CONSERVATION COSTS TO RURAL COMMUNITIES IN TANZANIA

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### ABSTRACT

This paper describes the problem facing human livelihoods near forest reserves in Uluguru Mountains due to their conflicts with wildlife. A total of 166 household heads in four villages and 96 pupils in two primary schools were interviewed. Eighty nine percent of the respondents reported crop damage by wildlife from the forests as the most serious problem. The estimated loss of yield due to crop raiding by wildlife amounted to 41.1%, 24.6%, 22.4%, 22.1% and 12.5% of the harvest of maize, pineapple, bananas, millets and vegetables respectively. Farmers are using traditional means to overcome the problem, which include guarding their farms during the day and night, setting traps as well as lighting fires around their farms. On the other hand, agricultural expansion due to population growth threatens wildlife in the forests of Uluguru Mountains. The conflicts of land use in the mountains are complex and require government and other actors to intervene. Suggested interventions include introduction of non-lethal techniques of wildlife control like use of dogs and wire-gauze, improved storage facilities and control of human population increase agricultural expansion.

### INTRODUCTION

The conflicts between conservation and communities living adjacent to conservation areas are prevalent world wide. In Africa, people are increasingly encroaching wildlife areas. Consequently, competition between humans and wildlife for space and resources is on the increase. Individual farmers in the communities neighbouring forests and wildlife protected areas suffer economic losses due to crop damage. These farmers are poor and revolve in poverty cycle (Sekhar 1998; Rao *et al.* 2002). In Tanzania, such farmers are not compensated for

the economics losses they suffer. Uncompensated losses make communities antagonistic and intolerant towards wildlife or resistant to conservation programmes. For example, wild animals such as birds, bush pigs, baboons and monkeys in the biodiversity richness areas like the forest reserves in the Uluguru Mountains are considered vermin, thus undermining and impeding conservation strategies (Nyhus *et al.* 2000; Shemweta and Kidegesho 2000). However, in order to conserve wildlife and their habitats sustainably, it is important to understand the costs of living adjacent wildlife conservation area.

The conflicts around the remaining forest patches on Uluguru mountains in Tanzania reveal the costs of conservation to poor farmers. The Uluguru Mountains which form an outlying ridge east of the main range of Eastern Arc Mountains' forests are a well known biodiversity hotspot. The mountains are ranked sixth in mainland Africa for their vertebrates and 15<sup>th</sup> for their birds (Burgess *et al.* 1998). The extremely variable forests and landscape forms provide numerous habitats for wild animals. The forest remnants are in five patches, with 65% of their original forest cover lost due to deliberate seasonal fires, agriculture and logging, charcoal making and human settlements (Newmark 1998; Lulandala 1998). Based on species-area relationship, a loss of 65% of original forests in Uluguru Mountains suggests that approximately 31% of the species in the area have become extinct or are in danger of extinction. The biological richness of Ulugurus and the high rate of degradation raises a conservation concern among the local and international conservation actors.



## **Conceptual issues**

### ***Crop damage by wildlife***

Crop raiding, which is defined as feeding on cultigens, causes substantial financial losses to farmers (Epimack and Kabigumila, 2002). Crop damage in Tanzania is the main form of human-wildlife conflict and costs to communities bordering conservation areas. Kabigumila (1992) reported a significant damage of life and property in the villages around Mkomazi Game Reserve in Tanzania. Other studies (Khisa 2001; Hill 1997; 2000) in Kenya and Uganda found that the most frequently damaged crops are bananas, cassava, and beans.

The recent increase in crop raiding incidences around the world, particularly in Africa has been associated with human population growth and wildlife habitat losses through farming and logging.

The population dynamics of a particular area close to a wildlife protected area or forest reserve contributes to the human wildlife conflicts. This can be explained in terms of more land needs for settlements as the number of people increases, and expansion of agricultural farms for food production. As a result of increased clearance of forests and encroachments of wildlife habitats, wildlife remains with no food options except raiding crops in the farms. Crop farming is however not compatible with wildlife conservation, because wildlife does not recognize reserve boundaries.

Furthermore, local traditions towards wildlife are an important factor in conservation, because a positive attitude of local people towards wildlife favours conservation and "vice versa". The hunting communities prefer wildlife as compared to crop farmers. Conservation policies and by laws which deny the people access to the benefits of protecting wildlife, as a form of land use again influence the perception of local communities on wildlife conservation.

Other factors like environmental changes (drought and floods) may aggravate the conflicts. Droughts and floods lead to fall in crop production. If the little expected harvest is raided by wildlife, farmers tend to forget the impact of adverse climatic and blame the losses to wildlife. National, regional and global policies

in conservation and land use, which control the use of wildlife sometimes worsen the conflicts between wildlife and local communities.

Technology and economic changes play a role in human-wildlife conflicts as well. Advanced technology has weakened the traditional land base natural resources management systems. According to Mbilo (2002), traditional systems have a limited capacity to absorb new technologies due to poverty and low level of literacy. Nevertheless, where technology like tractor can be adopted, there is an increase in the demand for land, which results in more wildlife habitat being destroyed, thus increasing the conflict.

### ***Tanzania government efforts to help farmers bordering conservation areas***

There have been deliberate efforts in Tanzania to make wildlife a positive development factor through changing it to a more economically rewarding land use (MNRT 1998a). The efforts are based on the principles that those who benefit from wildlife resources should pay higher costs in order to ensure adequate resources to also support development of communities neighbouring conservation areas. It is also vital that poor farmers around conservation areas who suffer losses due to wildlife raiding are provided with economic incentives to motivate them to forego the economic activities that are not compatible with conservation (Kideghesho 2001).

Tanzania's commitment to balance wildlife related costs borne by individuals in the rural communities with benefits are verified by strategies stipulated in national conservation policies (Wildlife and Forest) of 1998 (MNRT 1998a, MNRT 1998b). The policies promote community based conservation through Wildlife Management Areas (WMAs), Community Based Forest Management (CBFM) and Joint Forest Management (JFM) as means of involving rural communities in conservation and determining the distribution of revenue and benefits among conservation actors (MNRT 1998). Furthermore, the government, through Tanzania National Parks Authority (TANAPA), initiated the Community Conservation Services (CCS) programme, to improve relationships with communities living adjacent to protected areas



and pay for damages incurred by investing in the social services (TANAPA 1994).

The contribution of the government to the development of people living in proximity to national parks through Tanzania National Park Authority (TANAPA) is regarded as the form of compensation against the costs that are caused by wildlife (Kideghesho 2001).

However, the Tanzania government efforts have achieved little, if any, in reducing the conservation costs to rural poor farmers, because after 13 years of implementing the community based conservation policies and CCS, the farmers' complaints are increasing rather than decreasing (Nyinondi, Personal Observation). The CCS, WMAs, CBFM and JFM are communal interventions and have less meaning to the individuals or their households. This is because the crops are privately owned and the consequences of crop raiding are incurred differently by the respective households in terms of food security and income. Therefore, food insecurity and poverty will again deny the victim farmers and their households equitable or corresponding benefits of communal compensation.

## MATERIALS AND METHODS

### *Study site*

The Uluguru Mountains are found within three districts of Morogoro region, namely Morogoro Rural, Mvomero, and Morogoro Urban. The main Uluguru mountains range is a ridge running approximately north-south and rising to 2,630 m altitude at its highest point. On the main Uluguru range, 50 villages with a population of 151,000 people touch the forest boundary with high densities at higher altitudes.

The vegetation of the Uluguru main ridge and the outlying blocks is extremely variable. It ranges from drier lowland coastal forest habitats, to transitional rain forests, to sub-montane, montane and upper montane forest types. It also includes an area of afro-montane grasslands.

In terms of biodiversity, the Uluguru Mountains possess flora and fauna of endemic species of high conservation priority. Among them are 14 strictly endemic vertebrate species with at least 3 additional species that have not yet been

described. A further 16 Eastern Arc Mountains endemic species have also been identified in the Uluguru mountains. There are also at least 26 Eastern Arc Mountains endemic trees. The forests of the main ridge are well known biologically, although each new survey continues to find additional species.

The Waluguru people who inhabit the area are traditionally peasant farmers, producing crops for food and sale. Main crops are bananas, maize, cassava, rice, cocoyam, oranges and pineapples. Farming methods commonly practiced are mixed cropping and intercropping.

### *Data collection and analysis*

In addition to various secondary data sources, the study was based on household interviews, interviews of pupils in primary school, checklist interviews and field observation conducted between May 2006 and April 2007.

The questionnaire for household interviews included basic household data, agricultural activities, and attitudes towards wildlife. Still-photos of wild animals were used to facilitate discussions. A multi-stage random sampling procedure was employed. Out of a total of 50 villages bordering and located in Uluguru Mountains' forests, four villages were selected randomly. Within each village, 30% of the ten cell units were selected randomly for the study.

Within each ten-cell unit, 20% of the households were randomly selected for household interviews. This procedure gave a total of 166 household interviews. In addition, 96 pupils were selected for interview from primary schools by using simple stratified random sampling techniques.

The questionnaire was first pre-tested in two non-sample villages within Morogoro region (Mikese and Kihonda). After the pre-test, adjustments were made in the questionnaire before the main survey was conducted in the four sampled villages, namely Tandai, Bagiro, Magadu and Kilakala. Surveys were held in two primary schools (Kinole primary school situated in Tandai village and Magadu primary school in Magadu village) within the sampled villages.

The respondents in primary schools (52 males and 44) females were aged between seven and



twelve years. A questionnaire was designed to understand how the pupils' daily lives were affected by wildlife. The main reason for conducting interviews with pupils was that the responses given by adult members of household regarding the presence of problem animals are often exaggerated with the intention of attracting political pressure or influencing the study in their favour. Pupils tend to be much more open-minded on these issues.

Field surveys were made in remote parts of the village areas together with village leaders and elderly villagers to explore local knowledge on wildlife feeding behaviour and protective measures. Direct observations in the field were informative on wildlife damage to crops, wild animals' existence, and human impacts on the wildlife habitat.

Different analytical tools were used depending on the type of information and data collected. Quantitative data were analysed using Statistical Package for Social Science (SPSS), while qualitative data was analysed using content and structural functional analysis techniques.

## RESULTS

### *The cost of living close to wildlife and their habitats*

Table 1 shows the average harvest loss which was highest for maize (up to 41.1%), cassava (31.9%), pineapples (24.6%) and bananas (22.4%).

Apart from direct crop damages, farmers have to spend valuable time on protecting crops against wild animals. The household surveys revealed that the majority of farmers leave their houses to stay in the farmland and protect the crops day and night during the cropping season. The school survey showed that 80.2% of the pupils had participated in crop protection, and 66% of those had at least missed school classes once to assist in crop protection.

Villagers also reported predation on livestock. Within the surveyed villages, livestock means mostly chicken, which were kept by 51.9% of the surveyed households, and to some extent ducks, which were kept by 14.1% of the surveyed households. However, in Kilakala and Magadu, some farmers reported to own dairy

Living close to wildlife and forest conservation areas involves costs and conflicts, although wildlife and forests provide important services to local people in the area. The household survey revealed the costs of wildlife in terms of crops damage, livestock predation and threat to human lives.

Damages to crops include trampling, fouling, uprooting, cutting and eating the crop. The respondents of the household interviews were asked to give estimates of harvest losses in terms of 100 kilogramme bags of grain and cereals, and estimate number of bananas and pineapples per harvest season.

**Table 1 : Averages of various crop losses per person in a single harvest season**

Crop	Percentage of Response (n=124)	Average loss/person (%)
Banana	92.9	22.4
Pineapples	70.9	24.6
Maize	69.6	41.1
Other grains	67.0	37.7
Beans	74.5	18.0
Rice	30.4	21.8
Other cereals	57.8	22.1
Vegetables	43.0	12.5
Fruits (excluding citruses)	37.0	9.8
Cassava	77.0	31.9
Sweet potatoes	43.0	7.0
Sugarcane	12.0	20.0

goats, dairy cattle and pigs. An average of 5% of the chicken stocks was killed by predators, according to the household interviews. The most mentioned predators were mongooses, baboons and snakes.

The respondents were also asked to name the animals responsible for the crop damages. The answers are presented in Table 2. Most respondents (97.5%) mentioned monkeys, blue monkeys in particular as crop raiders, and in the list of the most problem animals the cane rat was the least mentioned. The question was further modified, and each respondent was asked to identify one notorious crop raiding animal. Five species were identified with high scores, which are monkeys (37.8%), birds (31.6%), wild rats (19.2%), bush pigs (6.5%) and baboons (4.9%). Interestingly, there was a noticeable difference of crop raiding animals mentioned in Magadu and Kilakala and those mentioned by respondents in Tandai and Bagiro (Table 3). The



differences can be explained by the distribution

of wild animals in Uluguru Mountains.

**Table 2 : Responses on crop raiding animals in Uluguru Mountains, Tanzania**

Crop raiding animals	Response (n=162)	Response (%)
Monkeys	158	97.5
Birds	141	87.0
Wild rats	137	84.5
Bush pigs	124	76.5
Baboons	97	59.9
Dik dik	84	51.9
Cane rat	23	14.2
Others	33	20.4

Nevertheless, most respondents in all four villages reported monkeys as the most notorious crop raiding wild animal. Birds were the second in importance as a problem in Tandai and Bagiro, while Magadu and Kilakala reported wild rats as the second crop damaging animal and birds at the third position. The responses also revealed that the level of crop damage by bush pigs and baboons can be tolerable in Kilakala and Magadu but not Tandai nor Bagiro. Although, this does not mean the levels of loss are negligible in the former villages.

**Table 3 : Responses on crop raiding animals in study villages of in Uluguru Mountains, Tanzania**

Crop raiding animal	Response (%)				Average
	Tandai	Bagiro	Magadu	Kilakala	
Monkeys	40.1	43	34.5	33.6	37.8
Birds	38.7	31.9	28.9	27	31.6
Wild rats	5	7.7	34.3	29.7	19.2
Bush pigs	9.7	12.2	1.2	2.8	6.5
Baboons	6.5	5.2	1.1	6.9	4.9
Total	100	100	100	100	100

Furthermore, the survey showed that 42.5% of the households and 23.1% of pupils knew specific places that were traditionally used for sacrifices and pilgrimage, and where all other activities were forbidden. These restrictions had conservation value by preserving key habitat areas such as water catchments. Those who were aware mentioned “Chief of Waluguru” as the source of information. No respondent had received any wildlife extension services.

#### Existing conservation opportunities

In order to capture the existing conservation potentials, the respondents were asked to mention which among the three forest management alternatives they would prefer, i.e. CBFM, JFM or private management. CBFM was described as a transfer of all decision-making on forests and their wildlife resources utilization as well as enforcement of the decisions to the local (community) level. JFM was described as a transfer of some management decisions to local level, while the state would still be responsible for general, overall decisions as well as law enforcement. Private land management was explained as the

transfer of ownership and management of the whole Uluguru forestlands to individuals.

A total of 54% wanted the forestlands to be privatized to individuals from local communities. A total of 42% of respondents wanted the forestland to be jointly managed and the forests be conserved. The prevalent reasons given were preservation of water catchments, source of rainfall and protection of ancestors respect and traditional worship places. Four percent of respondents proposed community ownership of the remaining forests patches.

The households’ survey exposed that currently, there are no efforts employed by the government to help them to curb crop raiding animals as stipulated in Wildlife Conservation Act (1974) and Tanzania Wildlife Policy (1998). However, currently, apart from guarding their farms day and night, they are setting traps and use scaring materials in and around their farms to control crop raiding by wildlife. Pupils also reported the use of fire and poisoned baits.



## DISCUSSION

The costs of forest conservation are far too high for the poor farmers in Uluguru Mountains, because the loss of, for example 41.1 % percent of maize harvest which is equivalent to 320 kg results into food insecurity and severe poverty to such families. The farming cycles in the Uluguru mountains subject to damage by different wild animals. Damages of crops, which include trampling, fouling, uprooting, cutting and eating the crop, starts during planting whereby the seeds are eaten and damaged by birds and rats before sprouting. The survived seedlings are trampled, eaten and damaged by monkeys, rats and ungulates like dik dik. At premature stage, the cereals are vulnerable to birds from the forests, bush pigs uprooting tubers while grains, beans, bananas and pineapples are vulnerable to monkeys. Monkeys and rats have a large range of damage in most crop produced in the Uluguru Mountains. Stored crops are also attacked by rats and monkeys.

Most farmers on the Uluguru Mountains perceive monkeys to cause large amount of crop damages. This perception might be associated with the growing stage of the crops when most of the damage occurs. While farmers normally replant the resow seeds following damage by rats and birds, the damage cause by monkeys occurs when the farmers are about to harvest and have great expectations of high yields. Therefore, little damage caused by monkey at that particular time is perceived as high, forgetting all costs involved in replanting due to rats and birds damage. Furthermore, the damages caused by birds, which farmers referred to most were of cereals crops or fruits such as bananas and pineapples occurring at maturity stage and not that which occurred at planting stage. Respondents in Kilakala and Magadu considered rats to be the second notorious crop raiding animal because they continue causing damage in storage places.

Although the conservation conflict situation around Uluguru Mountains is highly complex and is unlikely to be resolved quickly or easily, there is no single intervention developed that can adequately take care of all costs. Currently, farmers have employed different reactive means. These include

physical guarding, lighting fires, trapping, killing problem animals, scaring animals or active chases. The disadvantage of these reactive approaches in Uluguru Mountains is that they are not organised, hence, they are of low efficiency. The continued crop damage in the area is evidence of inefficiency of the measures. Worse still, some of these means cause forest/wildlife habitat destruction.

## CONCLUSION

This study has established that farmers in Uluguru Mountains are experiencing high conservation costs. This may have adversely economic effects to poor farmers. The conservation society should therefore utilize any opportunity available for developing sustainable conservation which will result into farmers becoming economically compensated for their losses, otherwise, farmers will remain resistant to conservation efforts.

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