CONSERVATION OF PRIMATES IN NORTH PARE, TANZANIA

By

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1.0 Introduction

Crop damage by wildlife occurs throughout Tanzania. The most seriously affected areas appear to be those adjacent to protected areas. In a 1987-1989 survey of over 1,000 people living adjacent to protected areas in Tanzania showed that over 71% of respondents had difficulties with wildlife, of which 86% reported crop raiding as a main problem. The same study revealed that 51.7% of respondents perceive primates to be the most notorious crop raiders (Newmark *et al.* 1994). Nyinondi (2008) argued that farmers tend to exaggerate the loss. In his case farmers in Uluguru Mountains estimated crop raiding incident to be 37.8% causing a loss of 41% of total yield. The estimate which was later found to be high compared to crop raiding incidence of 33.5% leading to the loss of 22% of crop damage, following scientific study. Kabigumila (1992) reported significant damage of life and property in the villages around Mkomazi Game Reserve in the Pare Mountains. In the same survey farmers estimated crop destruction associated by primates to be over 37%. The literature review clearly show the gap on scientific study covering a wide range to quantify crop loss due to crop raiding by wildlife, both in actual yield and economic terms in Tanzania.

Therefore, this project aimed at promoting primate conservation in North Pare. Specific of objectives of this project are (i) use dogs to protect crops, (ii) provide conservation education/awareness, and (iii) form partnership with local institutions working in Northern pare to influence the conservation of the remaining primates population.

2.0 Study Area and Methods

2.1 Description of the study area

2.1.1 Geographical location

The North Pare Mountains are one of 13 mountain blocks that comprise the Eastern Arc in Tanzania. The Eastern Arc is a chain of block-faulted, crystalline mountains under the climatic influence of the Indian Ocean (Lovett, 1985; Figure 2). The North Pares are located in Mwanga district, Kilimanjaro region, Tanzania between coordinates 03°35´ and 03°46´S and between 37°33´ and 37°40´E, 220 km away from the coast of Tanzania (Lovett and Pócs, 1993; Cordeiro and Kiure, 1995; Figure 3). This study was carried out in four villages namely Lambo, Mamba, Shighatini and Msangeni. It covered three forests namely Kwa Matange sacred forest, Ngwale village land forest reserve and Kyungu church forest.

The North Pare Mountains with an area of 45,340 ha, lie just 30 km South-East of Mt Kilimanjaro, but their geological affinities are with the Eastern Arc Mountains, of which they represent the northernmost tip within Tanzania. To the South-East of the North Pare Mountains lie the South Pare Mountains while to the North-East lie the Taita Hills in Kenya. The central plateau area has been settled for many years and most of the forest is long gone, having been replaced by local farms and exotic trees.

In the North Pare Mountains there are 230 sacred forests that cover 371 ha (Mwihomeke *et al.,* 1998). There are also six Central Government Forest Reserves which include Mramba (3,355 ha), Minja (520 ha), Kindoroko (885 ha), Kamwala I (117 ha), Kamwala II (293 ha) and Kiverenge (2155 ha) totalling 7,325 ha (Figure 4) (Baker and Baker 2002).

2.1.2 Land area and population characteristics

The mountain ranges from 1,000 to 2,000 m above sea level. Of the 2,640 km2 total area of Mwanga District, The Mountains comprises 810 km2 (31%), whereas East and West Plains comprise 1, 200 km2 and 600 km2, respectively. By land use, there are forest reserves 207 km2, game reserves 445 km2, cultivated land 44 km2, residential areas 119 km2, and grazing areas unsuitable for agriculture 1,207 km2 (Figure 4).

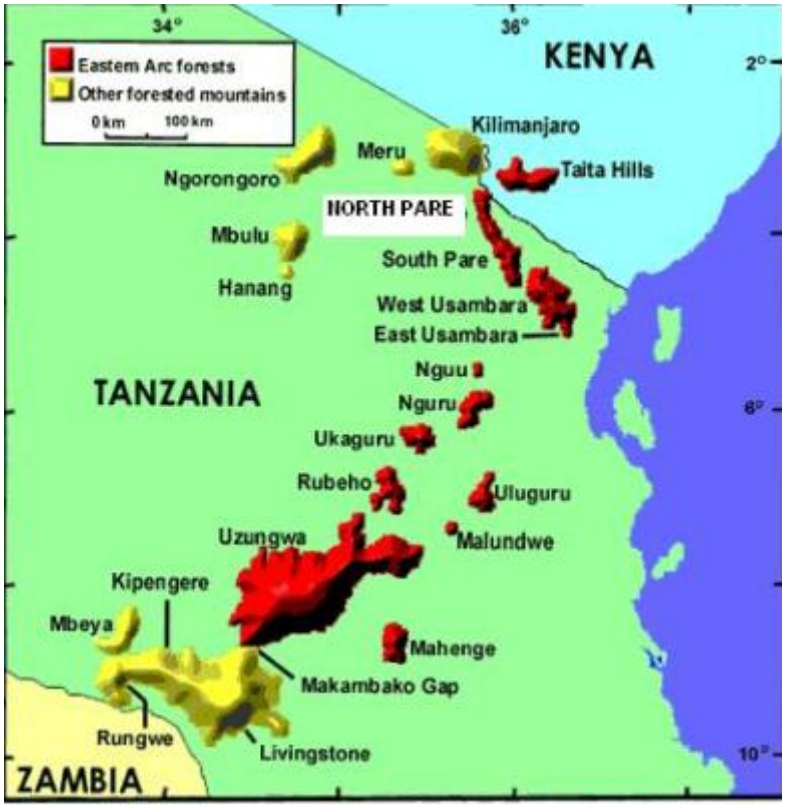

Figure 2: Map showing location of North Pare Mountains
Source: www.easternarc.org

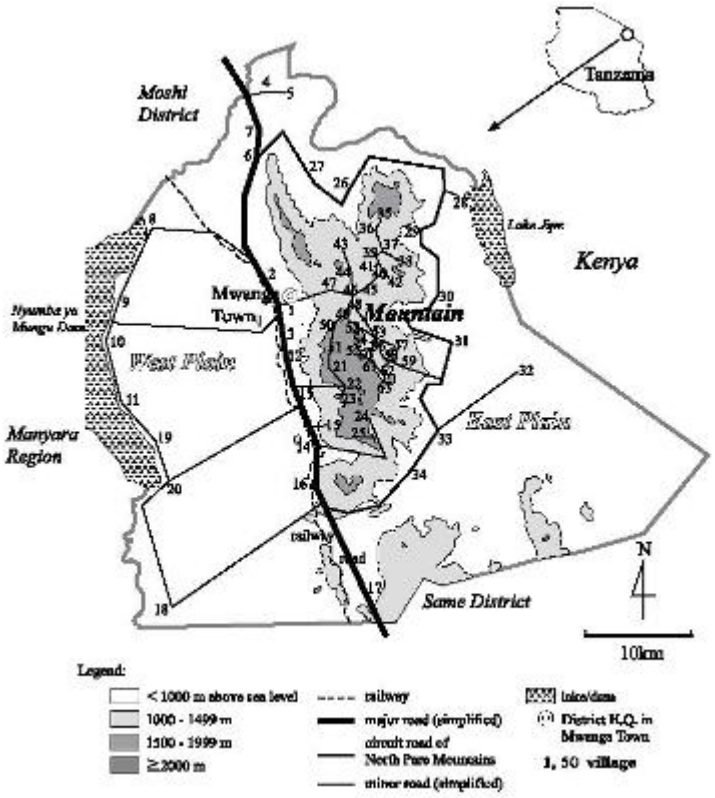

Figure 3: Map of Mwanga District

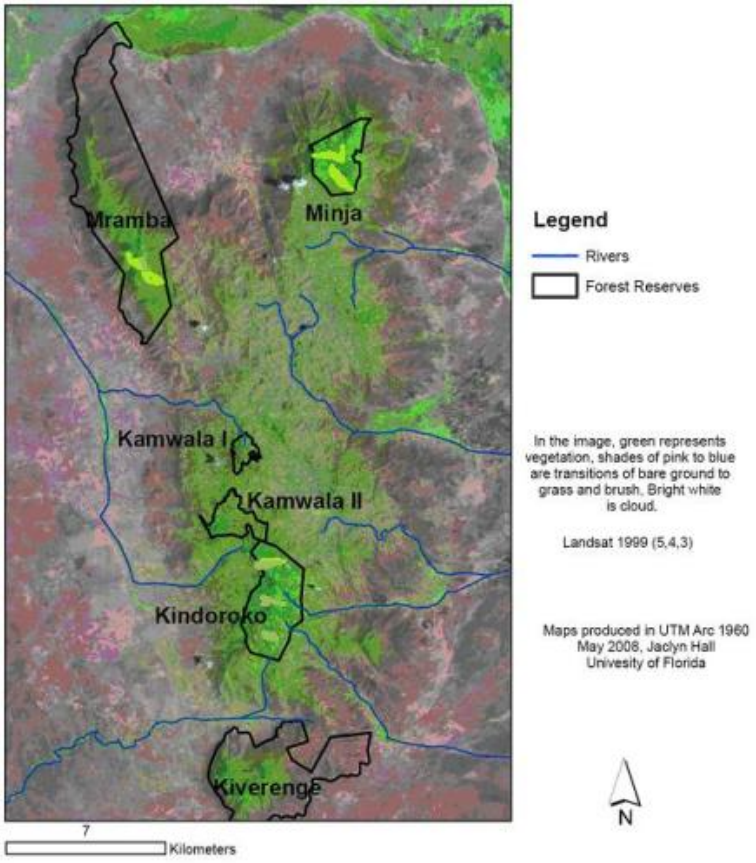

Figure 4: Satellite image of North Pare Mountains showing vegetation cover

The landscape is dominated by slopes, sometimes very steep. The Eastern side of the mountains slope gradually to the Eastern plains. From eastern plain a green crown of crops and forests is evident on the mountain slopes. The steepness of the slopes gives the western side an inhospitable face. The rocks on the surfaces in many places make cultivation difficult and very little sign of human settlement.

The highlands divide the lowlands into the Eastern and Western lowlands. The Eastern lowland comprise of Kwakoa ward (Lembeni division) and Jipe ward (Mwanga division).

The Western lowland includes Kileo, Mwanga and Lang'ata wards (Mwanga division) and Kirya ward (Lembeni division) (Figure 3). These lowlands are fairly flat with undulating topography and valleys. The foot slope of the Pare Mountains where most of the cultivation is done has a gentle slope to almost flat topography with slopes decreasing from about 4% to 1%. The 2002 population census identified 115,145 persons in the district, distributed in Mountain (54,954), West Plain (49,826), and East Plain (10, 650) (URT, 2003).

2.1.3 Geology and soils

The geology of Mwanga district can be divided into highlands and lowlands. On the highlands, the metamorphic rocks of the North Pare Mountains are assigned to the Usagaran system of the Precambrian. The main rock types are high-grade metamorphic rocks, predominantly granulites and granulitic gneiss (Mwanga District Council, 2002). On the lowland plains, however, the Precambrian rocks are extensively covered by superficial Neogene deposits, which include calcareous, tuffaceous material derived from the volcanic activity of neighbouring Mount Kilimanjaro (Mwanga District Council, 2002). According to Lovett and Pócs (1993), the soils of the North Pare Mountains consist of acidic lithosols or ferralitic latosols.

2.1.4 Climate

The climate is characterized by oceanic rainfall with oceanic temperatures (Lovett and Pócs, 1993). The nearest rainfall stations are at Kilomeni Mission, Kisangara Sisal and Shigatini Mission. The rainfall pattern in Mwanga District is bimodal, with "short rain" (Vuli) from November to December/January and "long rain" (Masika) lasting from March to May/June. Rainfall amounts vary widely from year to year. Usually, the short rain season is the main agricultural period in the mountains, whereas the long rain season is important in west and east plains.

Rainfall ranges between 700 – 1400 mm / year with a mist effect at higher altitudes. Temperatures vary from 25 °C max (March) to 16 °C min (July).

2.1.5 Biodiversity value and degradation

Forest habitat in the North Pare Mountains ranges from montane to dry montane and dry woodlands including species such as *Prunus africana, Albizia gummifera*, and *Newtonia buchananii.*

In the North Pare Mountains, a recent study by the Forestry and Beekeeping
Division (FBD, 2006) indicated that the area under forests has declined from 2880 ha in 1975 to 2720 ha by 1999. This represents a decline of 5.6 % over 24 years. The rate of forest degradation is comparable to 6% over 28 year's national wide (Newmark, 2002).

2.2 Methods

Project implementation was participatory. It involved local people, who practiced nonlethal techniques. The provision of conservation education, which targeted school children, adults and local institutions to facilitated collective actions toward primate conservation. The project in nature was educative, researching, and participatory.

2.2.1 Use of dogs to protect crops

In the first four months, four villages were selected in two wards to re-examine the ability of dogs to control primates direct in the farm, before promoting it to farmers living in North Pare Mountains. This is because the techniques may be useful in one locality and fail in another. The selected villages were Kilya, Kivulini/Kileo, Kambi ya nyani, Mamba and Simbomu. The evaluation of dogs' effectiveness and efficiency goes along evaluation of other available control techniques, and estimate of crop damage caused by primates.

2.2.2 Conservation education/awareness programme

To ensure the project has impacts, we concentrated in 8 villages, with high crop raiding incidences, this included primary and secondary schools found in selected villages. The first two months focused on village education meetings followed by evening primate conservation programme-video film. The third to six month focused on in school children and their teachers. In seventh to tenth month focused on raising awareness on application of non-lethal techniques to control primates.

2.2.3 Establish network and partnership

Throughout the project span, I sought partnership with local institutions to sustain the project impacts. Meetings and workshops was the best means of disusing primate conservation issues.

3. Results

3.1 Evaluation of Primates control techniques

3.1.1 Strategies of crop damage versus primates control

The strategies of crop protection against primates and other wild animals, bush pigs (*Potamochoerus larvatus*) in particular for North Pare, depends on the level of wild animals crop raiding, aggressiveness of wild animals, and location of farms from the forests. The following are the commonly employed strategies:

i. Joint protection "Msalagamba"

Farmers in North Pare, in incidences of large troops of primates, they form "a squad" locally known as "msalagamba"to keep track of the primates' movements and scaring them away from villages.

The joint operation frequencies depend on the population of primate in the neighbourhood. The operation gets the blessing of village leaders and extension officers, as the best way of protect crops.

Dogs, drummers and noise making tools like local trumpets are used for scaring away animals in the process. Further to that spears, bowl and arrows are used to kill some of these primates and pigs. The killing of problem animals is in line with Wildlife policy and Act. The challenge is what is problem animal in limited forests and in cohabitated environments. Are the farmers going to kill all animals?

ii. Family protection

In cases, where the frequency of primates attack is almost daily, then the family protection strategy has to be employed. Families use different approaches, which includes enclosing/building a wall around the farm with thorny trees, common building tree is acacia (Plate 1).

Plate 1: Tree wall around maize farm in Kilya village

Farmers with farm in the proximity of forests are forced by circumstances to build a temporary hut in the farm and stay there for the whole farming season (Plate 2 & 3). This scenario is locally called "*kuhamia*" literally means to reside in the farm. Men normally take a guard tonight while children and women are responsible during the day.

Plate 2 & 3: A typical hut used for crop protection during farming season

ii. Poisoning

The use of chemicals "poisons" to control crop raiding animals is prohibited in Tanzania. Although, some deadly tropical chemicals are permitted to be used in farm to control rodents, rats in particular. The same chemicals have the capacity to kill primates and bush pigs, when eaten. Birds and other insects are of no exceptional. One can easily get chemical with DDT which is prohibited in other world countries. Since the use of chemicals for controlling primates, is by the law prohibited no one publicly report the use of chemicals. However, as one gains trust and believe on researchers, confidentially individual farmers will tell you of knowing a friend farmer or neighbour who secretly use intoxicated baits to kill baboons, which aggressive and sometimes attacking back. There very limited information on

the extent of use of chemical as one claims to control rats, and not at all targeting primates.

iii. Use of dogs to protect farm

The use of dogs to protected farms was not new strategy in North Pare. The farmer use dogs during joint operations. In fact dogs take the major role of searching animals wherever they are and alert the hunting farmers. What this project promoted was to reduce a number of people time for other activities, and tie the dogs on the border of the farm and alert anyone near when there is crop raiding near the farm. Dogs were tied in different farms in four selected villages. They performed well in some area, but the strategy failure in villages with large troops of baboons, which attack the dogs. They are two incidences where tied dogs were killed by the baboon.

3.1.2 The effective and efficiency of techniques

The efficiency of each technique was evaluated in four villages. Three tables below present the results.

Table 1: Msalagamba

Wild Animal	Mean frequency of crop-raiding												
	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
Baboon		2	3	2					1	2	2		12
Monkeys		1	2	2					4	2	3		14
*Galagos		N	N	N					N	N	N		N
* Birds													
Bush pigs		1	1	2					2	1	1		8
Ungulates		0	1	0					0	0	1		2
Total		4	7	6					7	5	7		36

*Galagos: are nocturnal and normally hide in nests, thus was not evaluated under this approach.
*Birds: are scare by using scarecrows and stones.

Table 2: Family protection

Wild Animal	Mean frequency of crop-raiding												
	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
Baboon		4	5	7					1	6	4		27
Monkeys		14	22	20					22	24	22		124
*Galagos		4	3	3					3	4	3		20
* Birds													
Bush pigs		3	5	3					3	6	4		24
Ungulates		5	2	2					4	4	1		18
Total		30	37	35					33	44	34		213

Table 3: Dogs protecting farm

Wild Animal	Mean frequency of crop-raiding												
	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
Baboon		4	4	3					4	5	7		27
Monkeys		9	7	11					14	10	13		64
*Galagos													
* Birds													
Bush pigs		5	4	3					5	4	2		23
Ungulates		4	3	3					2	3	2		17
Total		22	18	20					25	22	24		131

In comparing the three strategies of crop protection, Msalagamba/joint operation seems to be efficient, followed by the promoted use of tied dogs and family operations fall the least efficient (Figure 5).

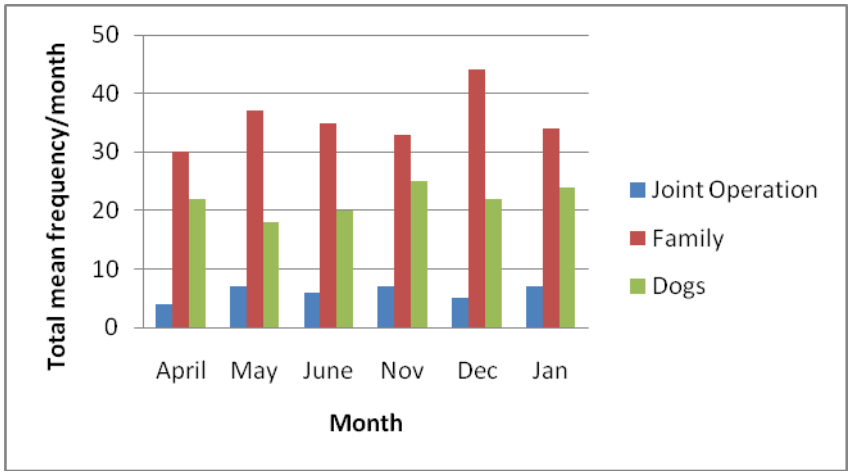

Figure 5: Efficiency of three strategies of wild animal control

The strategies effectiveness and efficient ranking per wild animals remained the same (Figure 6).

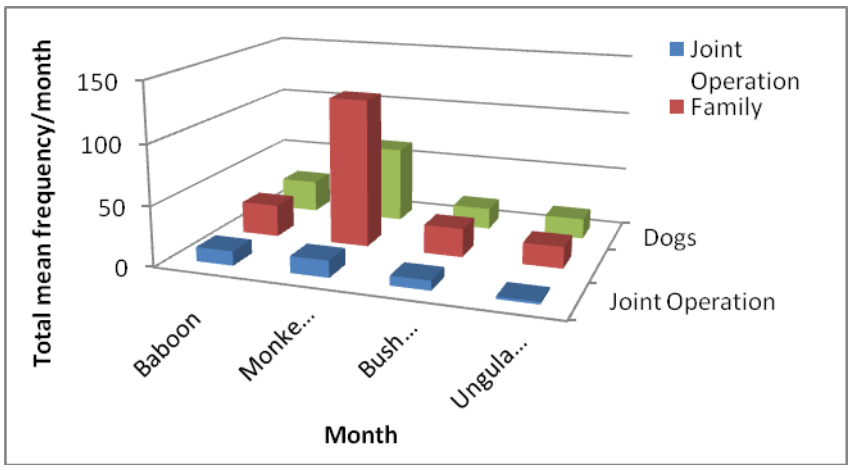

Figure 6: Efficiency of three strategies of wild animals control for different species

The most raided crops are maize, sunflower, beans, cassava, banana, pawpaw, mangoes, pineapple, and groundnut.

It is important to note that some farmers decide to abandon their farms, after severe damage of large part of the farm.

The discussion of these results will be presented on the paper to be published in the near future.

3.3 Conservation awareness and networking

Conservation educations were provided to 200 farmers, and broad villagers through village meetings. Guest presentation were given to in school students in 6 primary schools and two secondary schools, along the presentation, Swahili translated video version of primate were shown to the same students in schools. Networking meeting was conducted as planned and attended by 30 people representing different institutes.

4. Conclusion

North Pare Mountains form the chain of Eastern Arc Mountains, the World Biodiversity Hotspot. Extreme various forests and landscapes forms provide key habitats for primates. However, the Mountains are densely populated with approximately 2,720 ha of forest remaining out of 15,000 ha of the origin forest (Newmark, 1998; Forestry and Beekeeping Division 2006). Most of the remaining forest lies within six reserves (Figure 4) and over two hundred small sacred forests dotted (average 0.4 ha) across the mountain landscape (Mwihomeki *et al.* 1998, Lutatenekwa 2008). The results of biodiversity survey in 2007/2008 revealed the existence of four primates species in the forest patches of North Pare Mountains, these are *Cercopithecus mitis kibonotensis* (Sykes's monkey), *Papio cynocephalus* (Yellow baboon), *Otolemur garnettii* (Garnett's galago) and less common vervet monkeys. Unfortunately, all four species are regarded as crop raiders and thus are in constant conflict with local poor farmers.

The extent of crop damage varies in North Pare. At an individual farmer's level, a frequently crop raiding can be extremely damaging. The farmer may lose the entire crops for the farming season, or a substantial part of it (Plate 5 & 6). Since the majority of people in these mountains are subsistence farmers, such loss is potentially devastating and brings about severe hardship. Doggart *et al.* (2008) report in the biodiversity of North Pare also appreciated the presence of human and primate conflicts. Farmers' estimates 30- 60% of loss associated with primates, depending on the farm location.

Tanzania wildlife policy and Act protect primates from been captured, illegally hunted or killed. However, it permits killing of problem animals including primates. Any animal causing damage to human property or human self is considered problem animal. In that context provides the loophole of killing wildlife. While local people testified the high decrease of yellow baboon populations, the remaining population is still vulnerable because of retaliation after poultry and crops raiding. Specifically, primates are unwanted mammals in the mountains.

5. Acknowledgement

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