# RECONSIDERING HUMAN-WILDLIFE CONFLICTS IN COMMUNITIES AROUND WILDLIFE PROTECTED AREAS OF TANZANIA

**S.L.S. Maganga[1], T.M.C. Tarimo[1], F.T. Magayane[2], E.M. Senkondo[3] J. R. Kideghesho[1]**

*[1] Department of Wildlife Management,*
*Sokoine University of Agriculture, P.O. Box 3073 Morogoro, Tanzania*

*[2]Department of Agricultural Education and Extension,*
*Sokoine University of Agriculture, Morogoro, Tanzania*

*[3]Department of Agricultural Economics and Agribusiness,*
*Sokoine University of Agriculture, P. O. Box 3012 Morogoro, Tanzania*
*Email smaganga@suanet.ac.tz and thadeotarimo@yahoo.com*

## ABSTRACT

Tanzania has a number of wildlife protected areas (WPAs), surrounded by rural communities undertaking various socio-economic activities. These communities are constantly in conflict with wildlife because of the damage they cause. Surveys in some WPAs indicate that the damages of major concern include crop predation and attacks to people and livestock. These damages have social and economic implications to communities in terms of food security. This situation has existed for long without any satisfactory ways of addressing it. Recently, Community-Based Wildlife Conservation (CBWC) through established Wildlife Management Areas (WMAs) has been envisaged as an approach to mitigate the conflicts. This approach is still under experimentation in Africa. However, there are indications that it may not be a plausible solution instead it may worsen the problem. Moreover, CBWC is feasible only where WPAs are large enough to establish WMAs. Another complication is that the wildlife policy clearly states that there is no intention of introducing a compensation scheme for wildlife based damages. It is high time this problem is reconsidered for example by instituting a compensation scheme. This would help the poor rural communities who bear the cost of wildlife conservation.

**Keywords**: Conservation - rural communities - community based wildlife management - conflict

## INTRODUCTION

Tanzania has a vast network of WPAs, which include 13 NPs (NP), 31 Game Reserves (GRs), 38 Game Controlled Areas (GCAs) and the Ngorongoro Conservation Area (NCA) (MNRT, 1998 Figure1). About 19% of the land area is NPs and GRs with no human settlement whereas 9% of the land area is covered by GRs where wildlife co-exists with people (MNRT, 1998). During the advent of establishing wildlife Protected areas (WPAs) in Africa, the conservation philosophy was based on ecological principles of making the WPAs ecological entities or ecosystems (Curry-Lindhal, 1974). To comply with this conservation philosophy, it was sometimes necessary to remove and resettle indigenous people somewhere else to give way to wildlife conservation. This is a clear indication that potentially, WPAs could or can be used for other forms of land use such as agriculture, livestock ranching, forestry and mining. Apart from that, adjacent areas surrounding WPAs are used for these other forms of land use. Therefore, most wildlife conservation areas were not ecological entities as it was envisioned when they were established. Consequently, interactions between the different forms of land use and WPAs have been inevitable resulting into human-wildlife conflicts.

There is a wide range of conflicts between human and wildlife. The conflicts arise due

to people illegally killing or poaching undetermined number of animals and destroying habitats in various ways. These activities ultimately have had detrimental impacts on wildlife populations in the long run. On the other hand, wildlife affects people by raiding their crops, attacking people and livestock resulting into injury or death, and spreading diseases to livestock and humans. Other conflict that may arise include wildlife-livestock competition for grazing land and other resources including water, conflict between communities and protectors such as game officers and others (Kideghesho *et al* 2005)

The conflicts have been exacerbated by the increasing population growth and the associated extension and intensification of agriculture (Kiss, 1990). Furthermore, as human populations increase, the demands for resources grow increasing the frequency and intensity of conflicts between protected areas and rural people (Newmark *et al.*, 1993). This situation places a heavier burden to the poor rural communities who live in areas surrounding protected areas (Nepal and Weber, 1995). These people suffer from wildlife based damages but they are generally unable in controlling the wildlife. These are the people who bear the cost of wildlife conservation but with little individual tangible benefits or gain to raise their standards of life. Consequently, people complain that their rights, interests and values are neglected in preference of wildlife protection.

The country is, however, faced with human-wildlife conflicts mainly the damage that leads to loss of property and injury or death of livestock and people. Ways of dealing with such situations amicably to compensate for the damage caused by wildlife has been a concern and dilemma for wildlife departments or organizations for a long time.

This paper examines human-wildlife conflicts occurring in some rural communities that live within or around some wildlife conservation areas. It specifically discusses the major wildlife caused damages and the approaches used or envisaged to alleviate these conflicts.

## MATERIALS AND METHODS

This is basically a synthesis of the literature review and experiences by the authors on similar assignment. The literature used is based on survey data mostly done by the authors. The survey data used covered villages surrounding WPAs. These included the following: Villages around Mikumi NP (Mbaruka *et al*; 1996; Maganga *et al.;* 1997)

Villages around Udzungwa Mountains NP (Maganga *et al.;* 1997). Villages around Serengeti NP (Mangora and Maganga in preparation). Villages within Kilombero Game Controlled Area (Haule *et al.*; 2000)

Bird damage assessment done around Arusha, Tarangire, Manyara, and Mikumi NP (Survey done by Tarimo between 1997/98 and 2004/2005 cropping seasons). These surveys also covered Kilimanjaro NP and RAU Forest Reserve in Kilimanjaro region, Mkomazi Game Reserve in Same, Kilimanjaro which is also adjacent to Tsavo NP of Kenya. Tarangire, Manyara and Arusha NP and Manyara ranch are in Arusha region. The survey done by Tarimo also included taking samples of birds to ascertain whether they had eaten grains of crops especially in villages adjacent to Mkomazi Game Reserve. The study was also stimulated by the surveys commissioned by the Ministry of Natural Resources and Tourism (MNRT; through the Wildlife Division baseline information of pilot of Wildlife Management Areas (WMA) (Maganga *et al.,* 2003).

Figure 1: Map of Tanzania showing protected areas (see map as a separate document)

## RESULTS AND DISCUSSION

### *Damages of major concern*

Tables 1 to 3 and figure 1 show the various damages observed during the study. As earlier mentioned, wild animals cause different damages that are associated with people living next to WPAs. The damages include raiding crops, predation and spreading diseases to people and livestock. Animals that cause these damages vary from insects, birds, rodents, as well as large mammals especially buffaloes and elephants. Apart from these damages, wild animals can also be notorious to natural resources for example damaging trees in forests (Maganga and Wright, 1991; 1992) affecting the final timber quality. Damage caused by wildlife which have been of great concern to rural communities are raiding crops and marauding human beings and livestock. Studies have shown that damage of crops by wildlife has always been identified and ranked as the number one problem in communities adjacent or close to wildlife protected areas (Newmark *et al.*, 1994; Songorwa, 1999; Mangora and Maganga, in press.).

These damages have significant social and economic costs or impacts to rural communities in terms of household food security and income including the loss of workforce and family members or relatives. When livestock and human beings are killed by animals such as lions, leopards, hyenas, elephants, buffaloes or any animal originating from nearby WPAs, the losses are unrecoverable and the effects to owners of livestock and relatives of the persons killed by animals become long lasting. It also creates a condition of fear and insecurity in the communities. Because of the two types of damages, rural communities have for a long time perceived wildlife as a liability and not an asset and this will continue to be so if these problems or conflicts are not properly addressed.

### *The situation of selected cases*

There has been several surveys conducted by different people in selected villages adjacent to Mikumi, Udzungwa and Serengeti NPs, and villages within Kilombero Game Controlled Area to determine the situation of wildlife causing damage in these communities.

#### *Villages around Mikumi NP*

In a study of four villages, namely, Maharaka, Doma, Kilangali and Ruhembe, which are all within eight-kilometre zone from the park boundary, the leading wildlife caused problem was crop raiding (Mbaruka *et al*, 1996). In each village, over 50% up to 100% of the households sampled pointed out that they were faced with crop raiding by wild animals during the 1994/95 growing, and overall 79% households in all the villages had this problem (Table 1). On the other hand, predation on livestock by wildlife accounted for only 2%. The crops that are destroyed are sorghum, maize, paddy and millet, and animals that are responsible are elephants, wild pigs, buffaloes, baboons and monkeys. Crop raiding was ranked as number one problem during another survey carried out in Maharaka and Msongozi villages (Maganga *et al.*, 1997). Of all the households interviewed, 31.4% and 28.5% in Maharaka and Msongozi, respectively, reported to have the problem. Also, 41.5% and 38.0% of households in the villages, respectively, cited predators attacking livestock as another problem.

**Table 1** Households experienced wildlife crop raiding in 1994/95 in the four villages around Mikumi NP.

| Village | N | % |
|---|---|---|
| Maharaka | 29 | 59.0 |
| Doma | 14 | 71.0 |
| Kilangali | 25 | 100.0 |
| Ruhembe | 21 | 85.0 |
| All Villages | 89 | 79.0 |

***Villages around Udzungwa Mountains NP***

During the same survey in Kisawasawa and Sanje villages, crop raiding by wild animals was ranked as problem number two and three in the villages, respectively (Maganga *et al.,* 1997). Only 24.8% and 12.1% of the households sampled in these villages, respectively, indicated to have faced the problem while 37.1% and 28.4% of the households, respectively, stated predators attacking livestock as a problem.

In a crop raiding study in Mwaya village, it was found that 30.8% of the rice plots and 71.4 % plots of maize were raided by primates, mainly monkeys and baboons (Rinkoski, 2000). This represented about 9.4% of the land area of the plots, 8.7% of the harvest in terms of 100 kg bags, and by value approximately 8.5% of the money (in Tanzanian shillings) was lost through crop raiding by primates.

### 3.2.3 Villages around Serengeti NP

A survey was conducted in eight villages adjacent to Serengeti NP to determine conflicts between wildlife and people. These villages were Bwitengi, Iharara, Koreri, Machochwe, Nyamburi, Nyiberekera, Rwamchanga and Singisi. Results indicated that crop raiding and attack of livestock and people by wild animals are the main conflicts (Mangora and Maganga, submitted). Among all the people interviewed, 100% reported on wild animals damaging of crops, 90.9% killing of livestock, and 36.4% injuring and killing humans (Figure 1). Only only a small portion of the people interviewed pointed out other problems such as wildlife spreading diseases. Furthermore, records from the Serengeti District Wildlife Office on incidences of wild animals damaging crops, killing livestock, injuring and killing humans reported by the villagers had a similar trend to that obtained in the household survey. This demonstrates how these are serious problems facing the rural communities in areas close to WPAs.

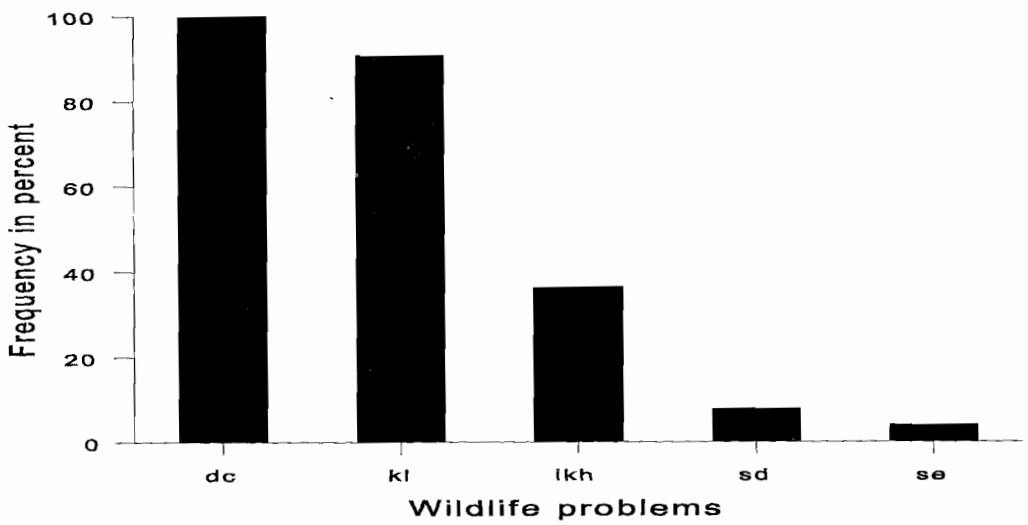


Figure 1 Frequency of wildlife problems reported by local people living adjacent to Serengeti NP in Serengeti district, Tanzania (dc = damaging crops, kl = killing livestock,

ikh = injuring and killing humans, sd = spreading diseases and se = soil erosion)(n = 77).

***Villages within Kilombero Game Controlled Area***

Another survey was carried out in Kilombero Game Controlled Area in five villages, namely, Iragua, Kidugalo, Minazini, Mofu and Mngeta to determine, among other things, the conflicts between wildlife and people (Haule *et al.*, 2002). It was found that the communities were incurring significant losses due to wildlife damage of crops, livestock and attack to humans. Of the households sampled about 63.7% with rice farms and 35.9% with maize farms estimated the harvest loss in 100 kg bags. The loss was 5.1 bags of rice and 4.6 bags of maize per household, respectively. The loss represented 21.9% and 47.8% of the harvest of rice and maize, respectively.

The problem of wildlife killing livestock was not very severe in these villages, but wild animals injured and killed human beings. From the survey, 19.9% of the households reported that at least one of their household members was injured or killed by wild animals, particularly lion, buffalo, hippo, elephant or crocodile. This, undoubtedly, is only a fraction of the incidences because illegal fishermen and poachers do not report their cases fearing legal implications.

***Bird damage***

Several bird pest birds cause serious damage to communities around PAs, however, the Red-billed quelea (*Quelea quelea*) is considered to be the number one avian pest that causes major damages to farmers. Queleas occupy almost 65% of the country's grain production area lying between 3 and 8 degrees south, 33, and 37 degrees east. They have been causing damage to sorghum, millet, wheat, rice and sunflower in cultivated areas within and around many proximity villages in Tanzania (Tarimo, 1999,). In some years if not controlled it can cause serious economic losses. The following are example observed bird conflict with local communities adjacent to PAs in Tanzania

***Damage around Arusha, Tarangire and Manyara NPs***

Qualitative and quantitative damage estimate conducted in Arusha and Kilimanjaro in the years 1995 to 2001 showed the following: In 1995 and 1996 an overall loss to wheat was 10, 26.8 and 16% at the Hanang (10,000 ha), Arusha Foundation Seed (600 ha) and Selian Research Institute (200 ha) farms respectively. During the same period, damage to sorghum and maize in Morogoro Rural (Mvomero), Kilosa close to (Mikumi NP) and Arumeru districts ranged from 0.2 to 18 %. During 1997/1998 season individual farms adjacent to Arusha NP in Arumeru and Arusha and Hai and Moshi Rural districts in Arusha and Kilimanjaro region respectively received damage ranging from 12 to 100%. During 1997/1998 season individual farms adjacent to Arusha NP in Arumeru and Arusha and Hai and Moshi Rural districts in Arusha and Kilimanjaro region respectively received damage ranging from 12 to 100 %. In the year 2001, a 44% damage to 2000 ha field wheat at Pop Vriend Farm, more than 50% on 170 ha of one field at Basotu; 100% 40 ha from another field at Mulbadaw and variable damage ranging from 5 to 100 % of small wheat fields at Hanang district because of the Quelea and other bird pests. Damage assessment to sunflower production at Basotu Division and two villages at Singida Arusha border revealed loss ranging from 28.5 to 100 % (personal observation) in the 2001 season. Doves, parrot's, lovebirds and weaver's were the main pests to the sunflower. We also estimated loss to rice at Magugu and Mto wa Mbu at an average of 6 %. Several flocks of quelea were observed at Vilima vitatu, Manyara Ranch, Magugu and Mto wa Mbu. All flocks were coming from Tarangire and Lake Manyara NPs. The

wildlife policy do not allow control activities to take place in NPs

***Kilimanjaro NP and Rau Forest Reserve***

In March 1998, one roost comprising of more than five million birds was seen at the Lower Moshi Irrigation Rice Project (5125 ha) adjacent to Kilimanjaro NP and Rau Forest reserve. The roost consisted of mixed flocks of quelea, chestnut weaver (*Ploceus rubiginosus*) and village weaver (*Ploceus cucullatus*) and some widow birds (*Euplectes spp*) Farmers have earlier reported heavy losses because of this population. The farmers stated that in absence of quelea the average yield is 7.5 tons per hectare. The average yield in 1998 was 5.8 tons per hectares. This is equivalent to about 23 % or 9609 tons loss. Chestnut and village weavers were the main cause of damage to sunflower and maize. The damage to sunflower at Mbatankero and Rundugai (Hai District) was almost 100 %. This is similar to Tarimo 1987 observation in which he reported 100 % damage to a 100 ha field of sunflower at the Tanzania Plantation Corporation.

***Mkomazi Game Reserve and "Tsavo National Park"***

In the following season, (1999) farmers from Ndungu irrigated rice farms (680 ha) reported a 15 to 20 % loss due to bird pests (quelea). Quantitative damage assessment conducted on 14$^{th}$ March 1999 indicated damage of 18 %. This field does not include an additional 2000-hectares of rice grown at Ndungu, Gonja, Kihurio and Mkomazi areas where damage estimate was not conducted. The loss was extrapolated to about 30 % by mid April. The birds were however, aerial controlled on 20th March. Damage estimate was based on the number of quelea observed feeding on the paddy, from one roost located at the center of the farm and stomach content analysis of 100 birds mist netted while entering the roost site and additional 100 collected the following morning after spraying operation. All birds had paddy in their "crops" (Expanded section of a bird esophagus for food storage) and very few had a mixture of wild grass seeds and paddy. Like the Lower Moshi roost this roost had more than five million birds. In addition to this roost, several flocks of quelea and one roost of about 3 million birds was seen at Mkomazi Game reserve at the end of February. The birds were believed to come from Tsavo NP. They were on the normal North South migration from Kenya on their way to Central Tanzania, only to find adequate amount of food at South Pare.

***Quelea breeding population at Tarangire and Manyara NP and Manyara Ranch and potential crop loss***

During 2004/2005 crop season five colonies estimated to have more than 30 million adult quelea were seen in Tarangire NP, two with a population of more than 10 million birds at Manyara Ranch and one of about three million at Ngososi/Mto wa Mbu village. In addition two abandoned colonies were seen on the southern part of Tarangire NP an area bourdering Kondoa district (Table 3). Although no quantitative damage assessment has been done, these bird populations could cause a loss of more than 95850 tonnes in 45 days. For more than 20 years (1980 to 2002) Manyara ranch acted as a buffer area for quelea control. The area was used by the Northern Zone Plant Protection Health Service Center as a "Strategic Trap roost or colonies.

Birds that complete their breeding in the Central zone (Dodoma, Manyoni, Kondoa, Basotu and Tarangire) stop and breed for a second time (itinerant breeding) or roost for more than a month before their final migration to the wheat lands of Northern Tanzania and Magadi in Kenya. Manyara ranch was used as a strategic quelea control operation area whereby majority of the populations were killed. The ranch has now

been converted to conservation area under the African Wildlife Foundation (AWF). No more control is allowed, therefore the birds will eventually move to the adjacent villages including Mto wa Mbu, Mwada, Magugu, Mdori, Selela Eslalei, Usa, Lower Moshi (paddy growing villages) and, Upper Kitete, Karatu, Monduli, Arusha Foundation Seed Farm and West Kilimanjaro (wheat growing areas) and thus inflict heavy crop depredations.

**Table 2** Percent damage estimate by bird pests in 1995/96 to 2001/2002 seasons in various villages adjacent to Arusha, Manyara, Tarangire Kilimanjaro and Mikumi NPs and Mkomazi game reserve

| Year | Village | Park | Crop | Area (Ha) | % Damage |
|---|---|---|---|---|---|
| 2001/2002 | Lower Moshi | Kilimanjaro | Rice | | 15.3 |
| | Basotu/PV | Manyara | Wheat | 2000 | 44 |
| | Basotu | Manyara | Wheat | 170 | ➢50 |
| | Mulbadaw | Manyara | Wheat | 40 | 100 |
| | Hanang | Manyara | Wheat | 1000 | 5 to 100 |
| | Ziwani (B) | Manyara | Sunflower | - | 28.5 to 100 |
| | Magugu and Mto wa Mbu | Tarangire and Manyara | Rice | 1000 | 6 |
| 1999/2000 | Ndungu | Mkomazi | Rice | 680 | 18 |
| 1998/1999 | Lower Moshi | Kilimanjaro | Rice | 1125 | 23 |
| | Rundugai | Momella | Sunflower | Variable | 100 |
| 1997/1998 | Usa, Majimoto, King,ori | Arusha | Rice and Maize | Variable | 12 - 100 |
| 1995/1996 | HWCF | Manyara | Wheat | 10.000 | 10 |
| | Arusha Seed Farm | Arusha | Wheat | 600 | 26.8 |
| | | Arusha | Wheat | 200 | 16 |

HWCF = Hanang Wheat Complex Farms

**Table 3** Estimate of quelea population at Manyara and Tarangire NPs and Manyara Ranch and Potential Damage to cereal to villages adjacent to the PAs during May 2004

| NP/Ranch | Estimate colony area | Estimate Population | Village | Potential damage in tons |
|---|---|---|---|---|
| Tarangire 1 | > 200 ha | >10 million | Makuyuni, Monduli | 27,000 |
| Tarangire 2 | 20 ha | > 6 million | Makuyuni, Majimoto, | 16,200 |
| Tarangire 3 | 10 ha | > 3 million | Magugu | 8,100 |
| Tarangire 4 | 4 ha | 4 > million | Mto wa Mbu and Selela | 10,800 |
| Tarangire 5 | 6 ha | > 5 million | Mto wa Mbu and Selela | 13, 500 |
| Manyara R1 | 20 ha | > 6 million | Mto wa Mbu. Upper Kitete and Selela | 16,200 |
| Manyara R2 | 10 ha | > 4 million | Mto wa Mbu | 10,800 |
| Manayara NP | 5 ha | > 3 million | Magugu, Mto wa Mbu, | 4 050 |
| Tarangire | Abandoned | | Kondoa | N/A |

## APPROACHES FOR ALLEVIATING WILDLIFE CAUSED DAMAGE

### *Conventional Approaches*

Approaches or measures that have been used by rural communities for along time, to control and alleviate wildlife damage are many. Some of the common measures listed by Newmark and others (1994) include digging trenches, erecting scare crows, chasing using dogs, posting guards, hanging tins, using guns and traps, and contacting a wildlife officer. Haule (1997) adds scaring, fencing and slashing on farm boundary as other approaches to minimize wildlife damage.

The effectiveness of these approaches or measures depends largely on the animal species involved. For small-bodied animals most of the methods could be effective while for large animals like the elephant, buffalo, hippo and lion, special measures must be used. The most common and relatively effective method used to protect or reduce wildlife damage to crops in villages has been posting of guards at the farms throughout the day and night to scare animals. This is a labor intensive and time-consuming activity apart from being a dangerous and risky way of protecting crop raiding by animals. Worse still, this method has a negative effect on the education of children because sometimes they are forced not to go to school so that they can guard crops.

One other approach is the villagers to report about the damage to a wildlife officer at the nearest place so that the problem animal or animals can either be chased, scared or killed by a game officer. This has proved not to work well because the great distances from the villages to the post of the game officer. These ineffective approaches have been and will continue to be applied by the rural communities to control problem animals but at the expense of their crops, livestock and life. This being the case, another way to mitigate this conflict has been proposed and introduced in some areas around the WPAs.

### *An Alternative Approach*

It has been envisaged that if the rural communities are involved and participate in wildlife conservation and management, it possible to reduce the conflict between wildlife and rural communities living around WPAs. This approach is through community-based wildlife management (CBWC) by creating wildlife management areas (WMA) which are managed by rural communities (MNRT, 1998). Communities are expected to benefit from this system and in addition be able to control problem animals themselves using village game scouts without much dependency to wildlife agencies.

This system is possible where there are large buffer areas between WPAs and villages where WMAs can be established. Where villages are very close to WPAs with no buffer zone such as villages on the eastern boundary of Udzungwa NP, Arusha NP, and other similar situations, the system of WMAs cannot work and the conflict between wildlife and people will inevitably continue. Besides, the system of WMA seems to intensify the conflict between the wildlife and communities. According to Songorwa (1999), the system favors the increase of wildlife which the crop damage and predation to livestock and people as has been the case in some villages under the Selous Conservation Programme. This leads to communities to support this approach creating a negative feeling about the whole system because instead for the communities to benefit, as individuals they suffer great losses economically, socially and psychologically. This approach, therefore, is does not and will not address the problem wildlife caused damage in rural communities around and within WPAs.

## CONCLUSION AND RECOMMENDATIONS

Results from the surveyed areas demonstrate that there are conflicts between wildlife and people living adjacent or within WPAs. The main conflicts are wildlife caused damage by raiding crop and attacking people and livestock and sometimes leading to death. In almost all villages surveyed, crop raiding was cited as problem number one. The losses incurred have substantial implications in terms of reducing food security, work-force, and escalating poverty. These conflicts can probably never be entirely eliminated and the control measures have not been as effective. It is clear that the wildlife policy does not provide for compensating for the losses.

Alternative approaches in resolving the conflicts should obviously be able to compensate for or reduce the economic and social losses people suffer due to wildlife damage. Therefore, to minimize the current conflicts of wildlife damage, there is need to introduce a compensation programme where crop, livestock and human loss or injury occurred. However, the compensation programme could be executed in a cautious manner by: (1) Compensating peoples whose crop loss has a certain minimum value and those attacked by animals to cause injury or death. (2) Special committees be created that could include members from both villages and wildlife agencies to scrutinize compensation claims and give a decision on the same. (3) This system could work in a similar manner like the Tanzania NPs through Community Conservation Service. 4). Part of the revenue generated by wildlife conservation agencies could be set aside as for compensation.

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