HUMAN-WILDLIFE CONFLICTS IN MONDULI DISTRICT, NORTHERN TANZANIA

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ABSTRACT

An assessment of land use conflicts was conducted in 2005 in three semi-arid villages adjacent to the Lake Manyara National Park, within the Tarangire-Manyara ecosystem. The three villages: Esilalei, Barabarani and Migombani are important wildlife dispersal areas and migratory routes linking Ngorongoro Conservation Area, Tarangire, Serengeti and Lake Manyara National Parks. Data were collected through household and extension staff interviews, archive data from village government offices and field visits. Conflicts varied across villages and were mainly boundary conflicts with Manyara National Park, crop and livestock depredation by wild animals, land scarcity, loss of land to Tanzania Lands Conservation Trust (TLCT) formerly Manyara Ranch, restrictions to graze in TLCT land and insufficient buffer zone. Several mitigation measures were suggested by both local communities and field extension staff. These include realization of economic benefits from wildlife related enterprises, relocation of people to low density areas, implementation of compensation schemes for destruction made by wildlife, intensification of patrols, fencing of the park, need for land use plans and the need for villages to formulate their own natural resources management by-laws.

INTRODUCTION

Expansion of human settlements and agricultural croplands across migratory pathways, together with hunting and destruction of wild animals that feed in croplands, increasingly cause conflicts and pose barriers to migration and wildlife dispersal, leaving species unable to thrive. The long-term viability of protected areas can only be ensured through effective management of wildlife outside the protected area boundary, in the dispersal areas and wildlife corridors that connect a coherent pattern of well managed protected areas at national and regional levels. Lake Manyara National Park is one of the parks in Tanzania currently facing sustainability challenges due to anthropogenic factors. The objective of this study was to assess the status of land use conflicts in the area and suggest mitigation measures.

MATERIALS AND METHODS

Study area

Esilalei (300 km^2), Migombani (15 km^2) and Barabarani (29 km^2) are in Monduli District, Arusha Region. These villages form the Northern Tanzania protected areas lifeline serving both as migratory routes and dispersal areas. Barabarani and Migombani form *Mto wa Mbu* sub-township. According to Rohde and Hilhorst (2001), the socio-cultural and linguistic congestion of the population living in these two villages is probably more complex than in any other part in East Africa. Currently, there are more than 25 ethnic groups in these villages, a quarter of the total number tribes in the country (Kaswamila, 2006). Esilalei is a Maasai dominant village.

Climatically, the average annual rainfall ranges between 500 and 642 mm/annum and almost half of this falls in March and April (Yanda *et al.* 2001). The rainfall pattern is bimodal with short rains from November to January and long rains from January to April (*ibid*). The mean monthly maximum temperature is more or less uniform throughout the year, ranging from 22º C to 25º C. Barabarani and Migombani are drained by Kirurumo, Mto wa Mbu and Njoro ya Gunda

Rivers which originate from Ngorongoro highlands while Esilalei is drained by two minor seasonal rivers: the Makuyuni and Oltukai and both drain into Lake Manyara.

In terms of land use, livestock production is the main economic activity in Esilalei. Some residents also do practice subsistence agriculture (beans and maize). In Barabarani and Migombani, the main economic activity is agriculture (rice and bananas) and petty business (curio-shops, hotels, kiosk-shops etc.). These two villages have sub-urban characteristics.

Data collection

Different methods and techniques were used in data collection. These included household questionnaire surveys, interviews with village extension workers, archive data from respective village offices and field visits.

Household questionnaire survey

Semi-structured questionnaires were administered to 261 local residents using simple random sampling method. The sample size in this study represented 13% of the households and 2.5% of the population. Simple random sampling was chosen over other sampling methods for two reasons. Firstly, the method ensures the likelihood of any individual element in the population having an equal chance of being selected and being representative, hence minimising sampling biases (Henn *et al.* 2006). The second reason was the homogeneous nature of the population i.e. dependency on natural resources for their livelihood. According to Walliman (2005), simple random sampling is used when the population is uniform or has similar characteristics e.g. in terms of main economic activities.

Extension staff interviews

Six local extension officers with duties related to natural resources management and community development were interviewed as a means of triangulating the collected information obtained from other sources. They were also interviewed in order to capture their views and experience in relation to human-wildlife conflicts in their respective working stations. The evaluation checklists in both questionnaires included aspects such as socio-economic, nature of conflicts and suggestions to minimise conflicts and/or encroachments.

Physical field visits

Site visits were undertaken in each village to assess the level of land degradation, human encroachment on wildlife habitats/dispersal areas and crop destruction by wild animals.

Data analyses

Data collected were mainly qualitative in nature, thus necessitating the use of qualitative data analysis techniques and descriptive statistics such as frequencies, means, cross-tabulation and Chi-square. Descriptive statistics were derived using the Statistical Package for the Social Sciences (SPSS) for Windows, version 12.0.

RESULTS

Main types of conflicts

About 80% (n=261) of interviews responded to the question on the main types of conflicts and they varied across villages (Table 1). In Barabarani and Migombani the main conflicts in order of importance were boundary disputes with Lake Manyara National Park, land scarcity and crop depredation by wild animals. However, in Esilalei, the conflicts in order of importance were loss of land as a result of establishment of the Tanzania Lands Conservation Trust (TLCT) formerly known as Manyara Ranch, restrictions on grazing in the TLCT land, and depredation of crops and livestock by wild animals.

Table 1 : Main land-use conflicts (%)

Main conflicts	Esilalei n=61	Barabrani N=99	Migombani N=101
Crop/livestock depredation	11	36	10
Land scarcity	n.r	29	25
Land taken by TLCT	70	n.r	n.r
Restrictions to graze into TLCT	19	n.r	n.r
Unfair distribution of irrigation water	n.r	5	4
Boundary disputes with park	n.r	28	58
Restrictions to harvest forest and non-forest products	n.r	2	3

n.r=not relevant

As for extension workers interviewed, all the six interviewed experts were of the opinion that land-use conflicts is a problem. They mentioned crop and/or livestock depredation and restrictions to use both forest and non-forest products as the major types of conflicts in the study area.

Gender-conflicts association

Gender (independent variable)-conflicts association was analysed using cross-tabulation technique for the three villages. Associations varied among villages (Table 2).

In Esilalei where the main economic activity is livestock production, women more commonly identify establishment of TLCT as a conflict and men are more associated with crop and livestock depredation. Women's association with the establishment of TCLT could be explained by the by-law which restricts harvesting of forest products from the conserved area, particularly firewood which is the main source of domestic energy. Also, due to the high poverty level, women are in most cases involved in selling curio items as a means of supplementing household income. However, the restrictions imply denial of access to the natural resources that provide the materials for this extra source of household income. With this background, women are likely to have a negative attitude towards the establishment of the TLCT. Before the establishment of the TLCT, women used to harvest freely both forest and non-forest products.what are these? On the other hand, the livestock association with men could probably be due to the time spent in during daytime and at night guarding their livestock against destructive wild animals.

Table 2 : Cross-tabulation of conflicts and gender (%)

Land-use conflicts	Esilalei -n.s.		Barabarani – n.s.		Migombani – n.s.	
	M	F	M	F	M	F
Crop/livestock depredation	14	0	32	43	14	3
Establishment of TLCT	62	100	n.r	n.r	n.r	n.r
Restrictions to graze into TLCT	24	0	n.r	n.r	n.r	n.r
Land scarcity	n.r	n.r	32	35	26	24
Unfair distribution of irrigation water	n.r	n.r	4	7	6	0
Restrictions to harvest forest and non-forest products	n.r	n.r	2	4	4	0
Boundary disputes with park	n.r	n.r	30	11	50	73
Total	n=46	n=15	n=63	n=36	n=62	n =39

Null hypothesis: there is no relationship between gender and conflicts.
n.s. = not significant at 0.05 level n.r = not relevant

In Barabarani, women more commonly identified crop destruction by wild animals and land scarcity while men were attached more importance to boundary disputes, land scarcity and crop depredation. It is clear from this association that both genders are affected by the availability of land for different activities including irrigation agriculture and residential areas. In Migombani, both men and women more commonly identified boundary disputes with Lake Manyara National Park and land scarcity as a problem. The loss of Migombani land to pave way for the construction of the park's headquarters and staff quarters could be one of the reasons as to why both genders gave it more weight. In addition, the sub-township characteristics of these two villages and the high population density could explain this scenario. The population density for Barabarani and Migombani is estimated at 241 and 380 people/km^2 respectively.

Human encroachments

Encroachment is the most well known form of land alteration, which leads to destruction of natural areas through land clearance. Households were asked if human encroachments were a problem and if so, what types were common in their respective villages. Encroachments varied among villages. In Esilalei, the types of encroachments observed were grazing (63%), agriculture (26%) and settlements (9%). In Barabarani, the main types were blockage of wildlife corridors for residential (45%) and agriculture (55%) while in Migombani almost all (99%) respondents said there is no encroachment. This assertion may be true taking into account the fact that the park and the village are separated by the Arusha-Ngorongoro Road.

During physical visits, habitat degradation and blockage of wildlife migratory routes and/dispersal areas were evident. For example, in Esilalei, there were no clear boundaries between the village and TLCT (no sign posts), insufficient buffer zone between TLCT and the village (in certain areas less than 10 m), grazing within the TCLT, deforestation, uncontrolled fires, and crop destruction by elephants. Some of these observations were aired by local communities as sources of conflicts. In Barabarani, some residential areas and farms were within the area set as wildlife migratory routes and/or dispersal areas.

Household suggestions to mitigate conflicts

Suggestions to mitigate conflicts differed from one village to another (Table 3). In pastoral Esilalei village emphasis (50%; n=52) was on the intensification of ranger patrols by Tanzania National Parks (TANAPA), Wildlife Division, and Tanzania Lands Conservation Trust (TLCT) and the active involvement of local people in preparing the village land-use plan (50%). The participatory land use plan for Esilalei was prepared in 2003 by WWF in collaboration with Monduli District Council. In Barabarani and Migombani, stress was on the government to relocate people to areas with low population and the need for the village to have a land-use plan. These suggestions to a greater extent are related to the sub-township nature and high population density of Barabarani and Migombani villages. Other suggestions include the need for the government to pay compensation for the destructions made by wild animals, to fence the Lake Manyara National Park and the park to improve relations with local communities (See Table 3).

Table 3: Household suggestions to mitigate conflicts (%).

Suggestions	Esilalei n=61	Barabrani N=99	Migombani N=101
Intensify ranger patrols	50	n.r	n.r
Involve local people in land-use planning	50	n.r	n.r
Relocate landless people	n.r	46	46
Fence park	n.r	19	3
Land-use plan needed	n.r	21	48
Compensation scheme	n.r	5	0
Park to improve relations with locals	n.r	9	3

n.r=not relevant

Association between gender and households suggestions was explored in each village (Table 4). In Esilalei, women commonly identified intensification of patrols (71%; n=52) while men emphasised the need to involve them in planning. In Barabarani, both women and men more commonly identified relocation of people while in Migombani both gender emphasised relocation of people and the need to have a land-use plan.

Extension staff suggestions to mitigate conflicts

Six village extension workers gave their suggestions. These included the need for conservation awareness education, tangible economic benefits to locals, Lake Manyara National Park to initiate study tours, and villages to have qualified wildlife officers and/or rangers. The other suggestion is the need for the villages to formulate their own natural resources by-laws as currently the village by-laws are imposed from above. The operational village by-laws in Tanzania are based on the Local Government Act of 1982 (URT 1982), which seems to be out-dated. In addition, these laws are similar as if the socio-economic, cultural and environmental characteristics are also uniform.

Table 4 : Cross-tabulation of household suggestions to mitigate conflicts (%)

Suggestions	*Esilalei - n.s.*		*Barabarani – n.s.*		*Migombani – n.s.*	
	M	*F*	*M*	*F*	*M*	*F*
Involve people in planning	*65*	*29*	*n.r*	*n.r*	*n.r*	*n.r*
Intensify patrols	*35*	*71*	*n.r*	*n.r*	*n.r*	*n.r*
Relocate people	*n.r*	*n.r*	*43*	*52*	*43*	*50*
Fence park	*n.r*	*n.r*	*23*	*9*	*5*	*0*
Land-use plan needed	*n.r*	*n.r*	*17*	*30*	*49*	*45*
Compensation scheme needed	*n.r*	*n.r*	*8*	*0*	*0*	*0*
Park to improve relations with locals	*n.r*	*n.r*	*9*	*9*	*3*	*5*
Total	*n=31*	*n=21*	*n=53*	*n=23*	*n=37*	*n =22*

Null hypothesis: there is no relationship between suggestions to minimise land-use conflicts and gender.
n.s. = not significant at 0.05 level n.r = not relevant

DISCUSSION

Land-use conflicts

This study shows three main land-use conflicts prevailing in the three villages, namely loss of land as a result of establishment of TLCT; crop/livestock depredation, and lack of tangible benefits.

The establishment of TLCT

The establishment of TLCT is meant to preserve the wildlife migratory routes/dispersal areas between Tarangire and Lake Manyara National Parks (WWF/TPO, 2002) and sounds appealing. Why then, do local people perceive the formation of this institution as one of the causes of conflicts? There are two likely reasons.

The first concerns the amount of land that villagers lost during the establishment of TLCT. Its establishment led to loss of 59% of the total Esilalei village land (WWF/TPO, 2002). This area was formerly used for grazing, agriculture and other activities but after establishment of TLCT, local people were no longer allowed to graze, cultivate or harvest forest products from the area freely. In order to graze or harvest forest products, persons needed to acquire a permit from the village government office and be escorted in the conservation areas by Village Game Scout(s). The establishment of TLCT therefore increased pressure on resources as perceived by local villagers.

According to local government by-laws (village governments) no. 7 of 1982 is this a by-law?, there are eight activities which are forbidden in areas set aside as community reserves. These are restriction to harvest forest products, mining, subsistence hunting, felling of any tree, bee harvesting, charcoal making and uncontrolled fires (URT, 1982). The village by-laws further stipulate activities which are allowed in reserves, subject to permission from the village government offices. These include: collection of dead wood for use as energy source, pruning of tree branches to be used in charcoal making, harvesting of forest fruits, and fishing. Escort by village game scouts is necessary in these cases also. The perceived loss of large areas of land, and restrictions on the use of natural resources without alternatives at hand has had serious negative consequences on people's livelihoods. As a consequence, local people have seen the establishment of the TLCT as a disincentive to conservation, thus fuelling antagonism between the local people and conservationists.

The second reason for regarding the TLCT in a negative light, was the natural resources use restrictions. Despite the presence of a Memorandum of Understanding (MoU) between AWF and the two villages (Esilalei and Oltukai), local people complained of being harassed when caught grazing in the TLCT land. They also complained about being fined up to TZS 60,000 (US $ 60) for a grazing offence, and there being a lack of assistance from the TLCT administration (Boniface Ngimojino, Sub-village chair, pers. comm.-). Such disputes suggest that it was not the consensus of many local people to turn the area into a Trust land.

One of the strategies to resolve the current conflicts between local communities and TLCT could be to widen the representation of local people in the Board of Trustees. The current Board structure (composed mainly of politicians and Directors) does not give sufficient room for local people to air their views. The Board is under the chairmanship of the Member of Parliament for Monduli constituency. Other members are the AWF coordinator, TANAPA Director General, National Ranching Company (NARCO) Director General, United Nations Development Programme (UNDP) representative, the Monduli District Commissioner, Monduli District Council Chairman, Maasai elder (Laibon) and two sub-village chairpersons (ibid.). Another strategy would be to employ residents from the two villages in the administration department. Currently, there are no locals in the department (Dr. Mwachang'a, pers. Com - TLCT Veterinary Officer). The third strategy might be to hand over the administrative role to villagers. However, basic training in enterprise and wildlife management would be necessary prerequisites for this.

Crop and/or livestock depredation

Crop depredation, which is defined as the feeding on cultigens by wildlife (Newmark *et al.*, 1994), can cause substantial financial loss to farmers and is a source of conflict between local residents and

protected area authorities (Nahonyo 2001). Crop damage around protected areas results in negative attitudes towards wildlife conservation (Epimack & Kabigumila 2002). Killing of livestock by wild animals is also a major concern in areas where the main economic activity is cattle production (Rabinowitz 2005). According to Nahonyo (2001), agricultural losses due to wild animals are higher in Africa than elsewhere in the world. The average loss is about 40% of all crops that are planted.

The results of this investigation indicates that depredation of crops and livestock by wild animals is a major concern to local people as the problems have in most cases made people economically worse-off each year and at times loss of life and properties has occurred. In Barabarani village for instance, in the 2003 season, maize and rice crops worth TZS. 815,000 (US $ 815) were reported to have been destroyed by elephants only. In Mkonga-Ijinyu adjacent to Mkomazi Game Reserve, between 1999 and 2003 maize and beans crops worth TZS 9,000,000 (US $ 9,000) were destroyed by elephants and buffalo (Kaswamila 2006).

Research findings elsewhere in the country (e.g. Songorwa, 1999; Nahonyo, 2001; Epimack & Kabigumila, 2002) indicate the significance of crop and livestock depredation problem. Studies in villages adjacent to Lake Manyara National Park and Selous Game Reserve have indicated significant crop damage during the night by elephants and Olive baboons (*Papio anubis*) (Songorwa 1999; Epimack and Kabigumila 2002). However, in this previous research, the destruction could not be quantified. Newmark *et al.* (1993) reported that more than 71% of local communities living adjacent to five protected areas in Tanzania (Selous Game Reserve, Arusha, Kilimanjaro, Tarangire and Lake Manyara National Parks) cited problems with wild animals, specifically crop damage. Moreover, people living adjacent to the Selous Game Reserve and Tarangire National Park reported significant problems with wild animals compared to those adjacent to the other three Parks (ibid.).

Kabigumila (1992) reported significant damage to life and property in villages around Mkomazi Game Reserve (MGR). The most frequent damage was destruction of crops, mainly bananas, cassava and beans. Other less common forms included predation of livestock and loss of human life (ibid.). Nahonyo (2001) showed that crop damage by elephants in the Greater Ruaha ecosystem in Southern Tanzania involved both raiding and trampling. Over the whole Greater Ruaha ecosystem, most incidents involved damage to maize, sweet potatoes, bulrush millet, common millet and rice, with damage to sweet potatoes and rice being common in areas around Ruaha National Park (ibid.).

This discussion has revealed how crop/livestock depredation impacts on the livelihood of local communities living in abject poverty. In this state of affairs, it is difficult to expect people to have incentives to conserve. The situation is more alarming due to the failure of wildlife policy to accommodate compensation schemes for depredation by wild animals (URT 2007). The use of compensation schemes as a means to minimize human-wildlife conflicts is debatable, however, in areas where majority of the population live below the poverty line, such a measure is probably indispensable. Another alternative is for the government in collaboration with international conservation agencies to pay some form of allowances to local residents as a disincentive to incompatible land-uses in rangelands. However, this requires further research before its implementation.

Benefit sharing

Benefit sharing in this study is described as mutual socio-economic gains realised from partners in business namely local investors (e.g. hunting companies, photographic safari, campsites, lodges, eco-tourism etc.) and local communities in villages with wildlife resources i.e. Wildlife Management Areas (WMAs), TLCT and villages within the Game Controlled Areas (GCAs).

TANAPA and wildlife policies provide guidelines on benefit sharing in WMAs and GCAs (Kaswamila 2003; WMA 2005; URT 2007). According to WMA regulations, investors, local or foreign are required to contribute to the improvement of livelihoods in the villages, and in the process help in reducing and eliminating poaching. Furthermore, the wildlife policy stipulates that, 25% of total annual hunting fees are to be sent to local communities who are living

within or adjacent to the hunting blocks (URT, 2007). The TANAPA policy also sets aside 17.5% of the annual Parks' revenue to assist in implementing socio-economic projects in villages adjacent to Parks (Kaswamila 2003). This study shows that in reality the anticipated benefits rarely trickle back to the local community.

Benefit sharing schemes in the country show mixed results. For example, between 1992 and 2003, Serengeti National Park (SNP) generated US $ 31 million from tourism but only 1.6% was allocated to adjacent villages for socio-economic development projects (Kideghesho & Mokiti, 2003). Instead, a substantial amount was allocated to law enforcement (ibid.). Emerton & Mfunda (1999), in their studies in Western Serengeti, found that an individual household got an average of US $ 2.5 per year from benefit sharing received indirectly through implementation of development projects.

A study by Kaswamila (2003) in 10 villages adjacent to Kilimanjaro National Park, on the impact of Support for Community Initiated Project (SCIP), revealed that between 1994 and 2001, about US $ 213, 000 was spent on socio-economic development projects in four districts (Moshi Rural, Rombo, Hai & Monduli). However, several weaknesses were observed: 70% of the projects were not priority projects to local communities; there were imbalances in fund allocation; and there was nepotism in disbursement of funds and lack of criteria in allocating funds to villages (ibid.).

Where decision-making has been devolved to local people, however, for example through eco-tourism e.g. hunting concessions, it has been shown to deliver tangible benefits relative to "top-down" projects. Community-partnership studies carried out in Northeastern Tanzania on benefit sharing have shown encouraging efforts in respect of poverty alleviation. Oliver's Camp (Simanjiro District), a private sector-community partnership recorded direct financial benefits to the community in terms of employment wages, village income from wildlife fee collection and spin-off enterprises like beadwork and other crafts (Nelson, 2004). However, only one-third of the total workers came from the local villages. In Ololosokwan (Loliondo Division), revenues from land rented (98 km^2) to a South African eco-tourism company and revenues from campsite near Klein's gate have resulted in the village council's annual budget increase from only US $ 2,500 between 1995 and 1997 to an average of US $ 57,000 between 2000 and 2002 (ibid.).

In Sinya (Monduli District), located within the Greater Amboseli ecosystem (Tanzania part), agreement between the village and a local eco-tourism company has led to increase of tourism income generated from bed-night fees. The income increased rapidly during the five years (1999 to 2003) from US $ 5,000 to $ 19,000 (ibid.). The income has been used for conventional social service infrastructure priorities, notably construction of a primary school dormitory and maintenance of water supply machinery (ibid.). Nonetheless, while some revenue has clearly been invested in socially valuable community projects, much of the revenue has not been used well (ibid.).

The preceding discussion has shown that where local people obtain tangible benefits, these act as an incentive to conservation initiatives and vice versa. Also, community-partnership projects, in particular eco-tourism and game fee hunting, are better placed to trickle down benefits to local people. What is important is to devolve power to lower levels (local people). However, the people need is to be equipped with enterprise management skills and clear and transparent contractual agreements.

Human encroachments

In a conservation setting, environmental modifications lead to loss of species and ecological integrity as a result of loss of shelter, breeding places, dispersal and foraging grounds, movement and access to critical resources in other localities (Kideghesho & Mokiti, 2003). In heavily disturbed settings, fragments of original habitat become disconnected from one another and become isolated islands and large predators and wide ranging taxa are first affected by habitat loss (August *et al.* 2002).

This study has shown that encroachment into wildlife habitats for different uses such as agriculture, grazing, settlements, tree cutting for charcoal, fuel wood and timber, poaching etc. is on the increase in the study area. Demographic pressure and lack of alternative resources have also contributed to the problem. The scope of different types of encroachments in areas adjacent to

protected areas in Northeastern Tanzania and in other parts of the country is widely documented. For example, Kideghesho *et al.* (2000) estimate Mwada and Vilima Vitatu villages use 650 m^3/month of wood for charcoal making.

Cultivation is also impacting the wildlife corridors in Northeastern Tanzania. The proportion of cultivated lands in the Kwakuchinja corridor linking Tarangire and Lake Manyara National Park has doubled from 8% to approximately 16% of the land area since 1987 (Kideghesho 2001; Rodgers *et al.* 2003). The Kitendeni corridor providing the last remnant link between Mount Kilimanjaro and Amboseli National Park in Kenya is similarly threatened by conversion to agriculture (Kideghesho 2001). This corridor has shrunk from 21 km^2 in 1952 to 5 km^2 in 2001, resulting in a reduction of wildlife habitat and increasing human-wildlife conflicts (Noe 2003). Cultivation in the Simanjiro plains to the east of Tarangire National Park has increased from 1% to 4% of the total land area, due to both large-scale land alienations and smallholder conversions (TMCP 2002) leading to increased blockage of wildlife migratory routes.

Todate, Serengeti ecosystem has lost over 40% of its original area (Sinclair and Arcese 1995). This loss is believed to be accelerating rather than abating and it has taken place largely within the legal boundaries of the Park (ibid.). Encroachment for both subsistence and commercial poaching is at an alarming rate. The results of this investigation show that in Sangaiwe, game worth TZS 17,388,270 (US $ 17,000) was poached for both subsistence and commercial purposes between 2001 and 2005 (BDC, 2004). In Esilalei, game trophies worth TZS 2,710,258 (US $ 2,700) were poached between 2003 and 2004 (Kaswamila 2006).

A study around Lake Manyara National Park (LMNP) reveals that out of the 43 elephants reported to have been killed by poachers between 1997 and 2002, only one was killed inside the Park (LMNP, 2002). Subsistence poaching (in particular of bush pigs (*Potamochoerus porcus*), dik dik (*Rynchotragus kirkii)*, warthog (*Phacochoerus aethiopicus*), bushbuck (*Tragelaphus scriptus*) and impala (*Aepyceros melampus*), illegal fishing, fuel wood collection, and logging still occur in areas bordering the Park (ibid.). Poaching in Tarangire National Park shows that between 1995 and 2000 about 269 poaching cases were reported (TNP 2002).

Human population growth along with limited alternative survival strategies have led to extensive utilization of land and other resources at the expense of wildlife. Poverty makes cropland expansion the primary method of increasing agricultural production to match the increased high human population. Unless local people get tangible benefits and are provided with alternative sources for e.g. fuel wood, timber, income sources; conservation of corridors will continue to be a long-standing debate. On the other hand, tangible benefits will have implications for socio-economic developments e.g. electrification of residential areas, agriculture expansion through mechanisation which will also have negative impacts on the corridors. Benefit sharing will likely lead to increased development, which will also have negative impacts on the corridors, unless very carefully planned.

The challenge to scientists is to start predicting the future of wildlife corridors in developing countries. Important assumptions among others are to regard societies in rangelands as dynamic and to recognise that they are in transition to change their lifestyles for the better. Local people in rangelands are unlikely to be able to continue depending on natural resources (agriculture/grazing) and/or fuel wood as source of energy. Long-term strategies are needed now rather than later. Given the high population growth rates in developing countries and people's quest for socio-economic development, the future of wildlife corridors in the developing world is bleak.

With long-term conservation vision, we can prescribe sustainable conservation measures and strategies. Warning signals are exemplified by the significant transformation of the Tanzania's Maasai socio-economic and cultural make-up since the 1980s (Nelson 2004). Maasai are now cultivating using tractors, they own mobile phones, and are increasingly building modern houses in rangelands. These socio-economic developments are challenges to conservationists, Tanzania Government, International conservation agencies (IUCN, AWF, WWF etc.) and local Community-Based Organisations (CBOs).

CONCLUSIONS AND RECOMMENDATIONS

The results of this investigation have clearly indicated that where local people have not been involved in decision-making on major issues affecting their livelihood, conflict has increased. In addition, policies are required which encourage development of local administrative institutions and which take into account the socio-cultural characteristics of the village concerned. The current systems of village administration are bureaucratic and political. To mitigate conflicts in areas adjacent to protected areas the following are recommended:

- To have in place policies geared towards empowering local communities at grass roots level e.g. the formation of CBOs or Authorised Associations national umbrella organisation to represent the interests of grass-roots organisations at higher government levels such as ministry or parliamentary level;

- Strengthening environmental management departments at district and village level to facilitate monitoring of undesired developments in wildlife corridors and prosecute offenders;

- Emphasise on conservation education including provision of environmental education in schools (primary and secondary), conservation related film shows, study tours, distribution of *Kiswahili* version conservation leaflets/policies;

- Establishment of more supportive legislative and policy content to be established alongside effective planning e.g. enabling policies and legislation on benefit sharing, provision of alternatives for resource restrictions etc; and

- Provision of dis-incentives for non-compatible land-uses

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