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‘Serengeti shall not die’: Can the ambition be sustained?

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ABSTRACT

Serengeti, a World Heritage Site and a Biosphere Reserve, is increasingly being threatened by human factors, which undermine its natural resource base and, therefore, contradict the ambition contained in Grzimek’s popular book ‘Serengeti Shall Not Die’. We discuss five forces against the ambition: rapid human population growth, poverty, illegal hunting, habitat destruction, and wildlife diseases. We also review some of the current strategies adopted in view of pre-empting the negative outcomes resulting from these forces by pointing out their deficiencies. We conclude that, although human population growth and poverty are underlying factors threatening the Ecosystem, the current mitigative strategies barely address them adequately. We, therefore, recommend that, for Grzimek’s ambition to remain valid, the two factors should take priority. We also call for more research to establish the reasons making people exhibit unsustainable behaviours toward the resources. We further suggest learning from past mistakes in view of correcting the identified deficiencies. Support in the form of alternative sustainable livelihood strategies and discouraging all ecologically destructive policies are equally important. Drawing from experience of the Kenyan part of the Ecosystem we suggest banning of land privatization, commercial agriculture and other development policies conflicting with conservation interests around Serengeti National Park.

INTRODUCTION

Historical background of wildlife conservation in Tanzania

Tanzania has a long history of wildlife conservation dating back to the pre-colonial era. Although the notion of conservation among the pre-colonial traditional societies is highly disputed (Redford and Sanderson 2000; Songorwa *et al.* 2000), totemic links and spiritual affiliation to particular animals, plants or sites had benefited wildlife and habitats in

some parts of Tanzania. For example, Mgumia and Oba (2003) showed that sacred groves and ritual sites represent a potential contribution to the conservation of biodiversity in the miombo woodland among the Wanyamwezi people of central Tanzania. In Tanzania’s Western Serengeti Corridor, special respect accorded to sacred species such as elephant (*Loxodonta africana*) and bushbuck (*Tragelaphus scriptus*) has reduced their

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vulnerability to poaching compared to other edible species. As far as we can ascertain, there are currently no cases of elephant hunting for meat within 45 km west of the park. Likewise the annual offtake of bushbuck is the lowest (5%) compared to other species (Campbell and Hofer 1995).

The German colonial administration (1885–1919) enacted the first formal written wildlife law to regulate hunting in 1891 (URT 1998). This was followed by the creation of a number of protected areas (PAs). By 1911, about 30,000 km² or 5% of the colony had been included within 15 PAs (Baldus *et al.* 2002). The British Administration (1919–1961) established Selous Game Reserve (GR) as the country's first GR in 1922, followed by Ngorongoro Crater and Serengeti GRs in 1928 and 1929, respectively (URT 1998). In 1928, an aspiration for National Parks (NPs), a category prohibiting all human activities except research and game-viewing tourism, emerged. Strong advocacy for this idea came from the politically powerful conservation societies in England, spearheaded by the Society for the Preservation of the Flora and Fauna of the Empire (SPFFE) (Neumann 1992, 1996). Major Richard Hingston, who was sent to Tanganyika by the SPFFE in 1930 to investigate the needs and potential for developing a nature protection programme, recommended the creation of NPs as a matter of urgency.

The London Convention for Flora and Fauna of Africa, held in 1933, obligated all signatories (including Tanganyika) to investigate the possibilities of creating a system of national parks. Administrators in Tanganyika, however, remained adamantly against this idea on grounds that the strategy conflicted with African rights to such a degree that it could threaten the political stability in the colony (Neumann 1992, 1996). Pressures from powerful individuals in London, who consistently overstated the problem of what they termed 'indiscriminate slaughter' of wildlife by Africans, forced the colonial government to yield (Neumann 1996:90). The first game ordinance that gave the governor a mandate to declare any area a NP was enacted in 1940.

After independence in 1961, no radical changes were made to wildlife conservation policies to address the previously lost customary rights (Neumann 1996; Rugumayo 1999; Levine 2002). This was contrary to pledges made during the freedom movement campaigns (Levine 2002). The

economic justification of wildlife-based tourism, rather than ecological reasons, triggered more support for creating PAs. Julius K Nyerere, the first President of Tanzania, backed this economic motive, as he was quoted saying,

'I personally am not interested in animals. I do not want to spend my holidays watching crocodiles. Nevertheless, I am entirely in favour of their survival. I believe that after diamonds and sisal, wild animals will provide Tanganyika with its greatest source of income. Thousands of Americans and Europeans have the strange urge to see these animals' (quoted in Levine 2002)

Nyerere further affirmed the position and commitment of Tanzania to wildlife conservation through a statement he released at the International Symposium on the Conservation of Nature and Natural Resources held in September 1961 in Arusha, Tanzania. This statement has become known as the Arusha Manifesto, and has since become an important landmark statement for wildlife conservation in the country (URT 1998).

Currently, Tanzania with an area of 945,087 km², has about 30% of its land surface devoted to one form or another of wildlife protection (URT 1998). Tanzania's wildlife policy, enacted in 1998, demonstrates an ambition to include more areas with rich and unique biological values within the PA system, fostering ecological conservation and economic prosperity (URT 1998). Udzungwa NP (1900 km²) was established immediately following the signature of the UN Convention on Biological Diversity (CBD) in 1992. The size of Katavi NP was doubled in 1998 from 2253 to 4471 km² (Kideghesho 2001). Saadan and Kitulo have been proposed for inclusion into the NP system, while Ikorongo, Grumeti, Kijereshi and Usangu have been upgraded to GRs from their previous status as Game Controlled Areas.

Despite these historical conservation efforts, the wildlife habitats and species in Tanzania are increasingly threatened. Already with 46 extinct animal species, the country ranks third in Sub-Saharan Africa in terms of the number of animal species threatened (177), after South Africa (282) and Madagascar (254) (IUCN 2004). Of these 177 threatened animal species, 11, 69 and 72 fall in the categories of critically endangered, endangered and vulnerable, respectively (IUCN 2004). The country also ranks the third in terms of the number

of threatened plants in Africa, with some 239 threatened species, just behind Madagascar (276) and Cameroon (334) (IUCN 2004). Globally, Tanzania moved from 20th position in 1996 to 14th in 2002 on the list of countries with the highest number of threatened species (IUCN 2003). Some species (including those that are not globally threatened) are already locally extinct in some parts of Tanzania while some are prone to extinction (Newmark 1996; Kideghesho 2001).

The mounting pressures attributable primarily to socio-economic factors such as demographic growth, poverty and market forces have led to poaching and habitat destruction and consequently impaired the ecological integrity of many Tanzanian ecosystems. This has ultimately led either to the loss of species or has driven them to the verge of extinction (Newmark 1996; Kideghesho 2001; Brooks *et al.* 2002). The focus of this paper is the Serengeti Ecosystem. It seeks to uncover the forces contradicting the popular ambition 'Serengeti Shall Not Die' (Grzimek and Grzimek 1960). It also reviews some strategies employed to overcome these forces and attempts to identify deficiencies, which have decreased their effectiveness.

The Serengeti Ecosystem

The Serengeti Ecosystem, with an area of about 25,000 km², is situated between latitudes 1° and 3°S and longitudes 34° and 36°E (Figure 1). The history of creation of PAs in this ecosystem dates back to 1928 when Ngorongoro GR was gazetted, followed by the declaration of Serengeti as a partial and then a complete GR a year later (Rugumayo 1999). The creation of these GRs infringed on the rights of over 10,000 resident Maasai pastoralists, initially by prohibiting cultivation and later by forceful eviction.

The Ordinance passed in May 1940 contained a clause that declared Serengeti the first NP in British colonial Africa. However, little was done about this due to World War II (Rugumayo 1999). A separate National Parks Ordinance passed in 1948 reaffirmed Serengeti as a NP and established an independent Board of Trustees (Neumann 1992). Calls for a full investigation of customary rights within the proposed boundaries of the NP were ignored. This resulted in resentment, leading to violence and sabotage. For example, the Maasai

resistance triggered political disorder and the destruction of wildlife habitats and species through setting fires with malicious intent and spearing of rhinos (*Diceros bicornis*) (Neumann 1992).

A committee of enquiry appointed in 1956 to look into the matter recommended splitting of the park into Serengeti NP (SNP) and Ngorongoro Conservation Area (NCA) so that, along with conservation, the interests of the Maasai pastoralists could also be accommodated in the latter (Perkin 1995). This recommendation was adopted and two different ordinances, NCA Authority Cap. 413 of 1959 and National Parks Ordinance, Cap. 412 of 1959, were enacted to manage the areas. The National Parks Ordinance prohibits all human activities other than conservation, game viewing and research.

Along with SNP (14,763 km²) and NCA (8,288 km²), falling under the jurisdictions of Tanzania National Parks (TANAPA) and the NCA Authority (NCAA) respectively, more PAs have been gazetted in the ecosystem after independence in 1961. The new PAs sought to provide a buffer zone for SNP and to protect the corridors for ungulates migrating between SNP and the adjacent Maasai Mara National Reserve (MMNR) in Kenya. MMNR (1,368 km²) is managed by Narok County Council. Maswa Game Reserve (2,200 km²) was established in 1962 while Ikorongo and Grumeti were declared Game Controlled Areas (GCAs) in 1974. The two GCAs along with Kijereshi (65.7 km²) were elevated to GRs following realization that the natural resources were still at risk and restriction in this category were inadequate to ensure effective protection of wildlife and the migratory corridors (John Muya, pers. comm. 2003). Between Ikorongo (ca. 563 km²) and Grumeti GRs (ca. 416 km²) lies Ikoma Open Area (IOA) (ca. 600 km²) (Figure 1). The Department of Wildlife of the Ministry of Natural Resources and Tourism administers all GRs and GCAs.

The SNP and MMNR permit neither human settlement nor the extraction of natural resources. The legal uses are research and game viewing. In the GRs, trophy hunting and game cropping are allowed, although settlements are also prohibited. The upgrading of the GCAs to GRs in 1994, therefore, involved relocation of the local people. Limited cattle grazing, firewood collection, hunting (game cropping, resident and trophy hunting) and bee keeping are allowed in the Ikoma Open Area.

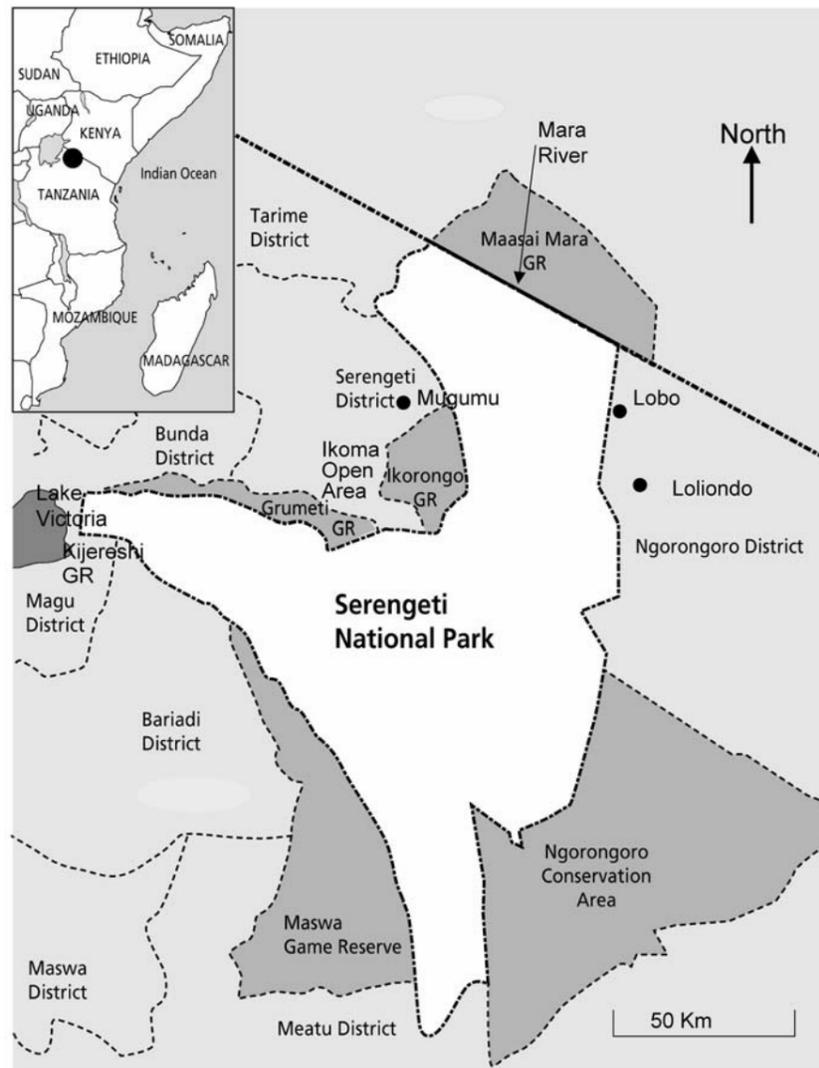


Figure 1 Location of Serengeti National Park and Surrounding Protected Areas

Forming the same ecosystem complex, Ngorongoro and Serengeti together were designated as one Biosphere Reserve in 1981. They were inscribed separately on the World Heritage List in 1979 and 1981 respectively (UNESCO 2003).

A unique combination of diverse habitats enables Serengeti to support over 30 species of large herbivores and nearly 500 species of birds (Sinclair 1995). These species include both migrant and resident populations. Serengeti holds the largest and one of the last migratory systems of ungulates in the world (Sinclair 1995). Some 1.4 million wildebeest (*Connochaetes taurinus*), 0.2 million zebra (*Equus burchelli*) and 0.7 million Thompson's gazelle (*Gazella thompsoni*) migrate annually between

Serengeti and Kenya's Maasai Mara National Reserve (Norton-Griffiths 1995). The resident herbivores found in Serengeti include warthog (*Phacochoerus aethiopicus*), eland (*Tragelaphus oryx*), impala (*Aepyceros melampus*), giraffe (*Giraffa camelopardalis*), topi (*Damaliscus korrigum*), hartebeest (*Alcelaphus buselaphus*), water buck (*Kobus ellipsiprymnus*), and Grant's gazelle (*Gazella grantii*). Elephants (*Loxodonta africana*) and hippo (*Hippopotamus amphibius*) are both charismatic and key-stone species in the Ecosystem.

The Ecosystem supports one of the highest populations of carnivores in savannah, with lion (*Panthera leo*) numbering up to 3000 individuals (Packer 1990, 1996); leopard (*Panthera pardus*) ranging from 800

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to 1000 (Borner *et al.* 1987); spotted hyena (*Crocuta crocuta*) estimated at 9000 (Hofer and East 1995); and cheetah (*Acinonyx jubatus*) and Black-backed jackal (*Canis mesomelas*), numbering 250 and 6300 respectively (Caro and Durant 1995). Total numbers of three species of mongoose – banded (*Mungos mungo*), dwarf (*Helogale parvula*) and slender (*Herpestes sanguineus*) – exceed 160,000 (Waser *et al.* 1995). Of the 500 bird species, some have restricted ranges, including rufous-tailed weaver (*Hirundo ruficauda*) (monotypic genus), Usambiro Barbet (*Trachyphonus usambiro*), grey-crested helmet shrike (*Prionops poliophus*), grey-breasted francolin (*Francolinus rufopictus*), Fischer's lovebird (*Agapornis fischeri*), and Karamoja apalis (*Apalis karamojae*) (Stattersfield *et al.* 1998).

'SERENGETI SHALL NOT DIE': FORCES AGAINST THE AMBITION

In 1959, Bernhard Grzimek and his son Michael co-authored a book entitled 'Serengeti Shall Not Die' (Grzimek and Grzimek 1960). The title of the book has not only amassed popularity worldwide, but has also been adopted as a 'motto' among nature lovers. This has been inspired by a desire to see Serengeti survive to benefit current and future generations of humankind, both locally and globally. Although this ambition has somehow remained valid for nearly five decades, the socio-economic and ecological changes in the region prompt a growing debate over the future prospects of this ecosystem. Huge pressures are threatening its ecological integrity. Huge pressures are threatening its ecological integrity (see e.g. Campbell and Hofer 1995; Hilborn 1995; Mbanjo *et al.* 1995; Sinclair and Arcese 1995; Loibooki *et al.* 2002). In 1985, Bernhard Grzimek warned (MNRT 1985:2):

'But the rhinos are gone and the elephants have been sadly reduced. Even more disturbing has been the tremendous growth in the number of people around the National Park. Areas, which we knew as wilderness, are now heavily settled and cultivated. Each day the park becomes more of an island, and pressures on its boundaries continue to grow. We must urgently renew our vigilant custodianship, lest we lose this asset for all mankind.'

In this section we discuss five factors – demographic factors, poverty, illegal hunting, habitat

destruction, and wildlife diseases – to show how they contradict this ambition of sustaining Serengeti as the global asset. Our main focus is the western part of the Ecosystem. The part is defined as all buffer zones (all Open Areas and GRs) and Districts bordering the park in the west.

Demographic factors

Over the last five decades, the western part of Serengeti Ecosystem has experienced rapid demographic growth accompanied by the expansion of human settlements and increased livestock populations. Between 1948 and 1978, the human population in the Eastern Lake Victoria basin increased from 1.5 to 3.3 million, but this growth is said to have had minimal effect on the areas adjoining SNP (MNRT 1985). Increased human settlement on the fertile lands close to Lake Victoria stimulated movement to the periphery of the park. Between 1957 and 1967, the human population adjacent to SNP grew at a rate of 10% per annum. The natural rate of increase was 3.4% and immigration contributed the remaining 6.6% (MNRT 1985).

Population growth around SNP has continued to be an issue. For instance, between 1988 and 2002, Serengeti and Bunda Districts recorded increases of 56% and 30% in population and 71% and 51% in the number of households, respectively (URT 1988; URT 2002). The current population in the seven districts to the west of the park is over two million with annual growth rate exceeding the national average of 2.9% (Packer 1996; URT 2002). This growth is mainly due to migration from within and even from outside the Tanzania, especially Kenya (Kideghesho, unpublished data). Economic potential due to good agricultural land, wildlife (as a source of game meat), water bodies (rivers and Lake Victoria for fishing), and gold deposits have been the major population pull-factors to the area. Hackel (1999) lists three conservation problems associated with people settling in or using new areas, which are also applicable to Serengeti (see Table 1).

Associated with human population growth is the increase of livestock numbers. This adds pressure on land, leading to overgrazing and land degradation. Statistics obtained from Serengeti District indicate that, between 1990 and 2002, the livestock units had increased by 52% from 175,680.5 to 266,624.5. This had lowered the carrying capacity,

Table 1 Problems of settling close to Protected Areas (Hackel 1999) and how they apply to the Serengeti Ecosystem

<i>Problem</i>	<i>Situation in Serengeti</i>
Disruption of ecological processes essential to maintain long-term biodiversity	Human impact causes depressed activities of migratory herbivores leading to detrimental effects on vegetation dynamics (McNaughton and Banyikwa 1995) Disruption of migratory corridors can render migration in the Serengeti a global Endangered Biological Phenomenon (EBP) (Meffe and Carroll 1997)
Increased hunting for home or market	Poaching data in Serengeti illustrate the relationship between human population growth and pressure on wild resources (see discussion on illegal hunting)
Increased pressure from local people to open protected lands for community use	The expansion of cultivation and settlements forced realignments of the boundaries of Maswa Game Reserve three times, causing 15% loss of the original area (MNRT 1985) The pastoralists in Bunda District (viz. Hunyari, Mariwanda, Kihumbu, Nyamotoke, Kyandege and Mugeta villages) and Serengeti (Nyichoka and Park Nyigoti villages) are currently appealing to the Government to legalise access to critical grazing and water points in Grumeti and Ikorongo Game Reserves (Personal observation). Manchira and Rubana Rivers in the two reserves, respectively, are critical water sources for communities who constantly complain of denied access. However, these communities have admitted that they illegally access these resources due to lack of alternatives

Table 2 The land available and land required* for livestock grazing in Serengeti and Bunda Districts in 2002

<i>District</i>	<i>Livestock units (2002)</i>	<i>Land available (km²)</i>	<i>Land requirement (km²)</i>	<i>% of land exceeded</i>
Serengeti	266 624.5 ^a	2456 ^b	3199.5 ^a	30.3
Bunda	267 090 ^c	2408 ^c	3205.08 ^c	33.1

Sources: ^aDALDO Serengeti District reports; ^bURT 2003, ^cDALDO Bunda District livestock reports. *The land requirement is calculated based on livestock units (LU), where 1 LU = 1 cow/bull = 2 goats or sheep = 5 donkeys, and requires 1.2 ha (Kauzeni 1995)

which was already considered to be exceeded a decade ago (Kauzeni and Kiwasila 1994). Table 2 shows the land available for livestock grazing in Serengeti and Bunda Districts and the land required based on livestock number/units.

Poverty

Poverty is defined in a variety of ways. The World Bank (WB 1992:26) defines it as 'the inability to attain a minimal standard of living.' Chambers (1987:8-9) views it as 'a state of deprivation associated with lack of incomes and assets, physical weakness, isolation, vulnerability and powerlessness.' Both definitions conform to the situation in many rural areas of Tanzania, where poverty is

considered a rural phenomenon. Between 22% and 39% of Tanzanians live below the food poverty line and basic needs poverty line, respectively (URT 2002). About 19.9% and 59.7% of the population live below US\$1 and US\$2 per day, respectively, while 41.6% live below the national poverty line (UNDP 2003). Serengeti is not exceptional – probably the situation is much worse.

Mara Region, in which much of Serengeti falls, ranks sixth in terms of poverty among the 21 administrative regions of Tanzania's mainland, with a regional annual per capita income of TAS 118,591 or US\$119 (URT 2002). Gross annual income per household from crop production in Bunda and Serengeti is estimated at US\$555 and 679 (Emerton and Mfunda 1999), respectively. Kauzeni (1995) and Johannesen (2002) reported a much lower income of between US\$150 to 200 per household. Taking an average of 6 persons per each household for both districts (URT 2002), average expenditure for each individual is evidently far below US\$1 per day.

Poor performance of agriculture and livestock in the area – attributed to land scarcity, drought, diseases and pests, poor soil fertility, lack of agricultural inputs and crop damage – is the main cause of poverty (Kauzeni 1995; Emerton and Mfunda 1999; Johannesen 2002). The villagers often blame wildlife conservation for exacerbating these factors (Kideghesho, unpublished data). The monetary

cost of crop damage by wildlife may be as high as US\$0.5 million a year for the whole of Western Serengeti: US\$155 for each of 3,000 households who regularly suffer from crop damage (Emerton and Mfunda 1999).

The above scenario constrains people's livelihoods, thus compelling the use of coping strategies that involve setting priorities and making economic choices that are ecologically destructive. Historically, illegal hunting and encroachment on wildlife habitats have been employed in Serengeti as both coping and adaptive livelihood strategies among poor households (Campbell *et al.* 2001; Johannesen 2002; Loibooki *et al.* 2002).

Illegal hunting

Demand for game meat has been the main driver for illegal hunting in Serengeti. However, between the 1970s and 1980s when commercial hunting for trophies became rampant in many African countries, Serengeti was one of the focal points. The commercial poachers from outside the area targeted the black rhinoceros and elephant. The former was driven to the verge of extinction while the population of the latter decreased by 80% (Dublin and Douglas-Hamilton 1987). Trophy hunting was also linked to a dramatic decline of the buffalo (*Syncerus caffer*) population from 63,144 in 1970 to 15,144 in 1998 (TWCM 1999).

'Operation Uhai' (Uhai is Swahili word for life) was a countrywide war launched by the Tanzania government against poachers in 1989. The war which comprised army, police and wildlife staff resulted in arrest of many poachers and confiscation of a large number of weapons (Baldus *et al.* 2003). This, along with a global ban on ivory under the Convention on International Trade in Endangered Species of Fauna and Flora (CITES) of 1988, kept the problem at minimum in the country and it was virtually eliminated in Serengeti.

However, illegal hunting for game meat has remained the major challenge to date. The economic situation forces people to pursue illegal hunting as a coping strategy to meet their livelihood requirements, i.e. protein and other household budgets, along with paying government levies and other contributions (Holmern *et al.* 2002; Johannesen 2002; Loibooki *et al.* 2002). Over 75% of the illegal hunters in Serengeti have

limited sources of income and virtually no livestock (Campbell *et al.* 2001; Loibooki *et al.* 2002). Holmern *et al.* (2002) found that about 60.5% of illegal hunters in Western Serengeti hunt for their own consumption while 8.5% hunt for cash and 31% for both purposes. Illegal hunting earns the hunters an annual income of US\$200, a value close to or equivalent to average on-farm income (Holmern *et al.* 2002).

Wire snaring is a common technique used by illegal hunters. The technique is very destructive and wasteful as it also kills untargeted species. However, it is the most preferred because it reduces the risk of arrest, as poachers spend the least time in the bush. Population growth and urbanisation have contributed to increased markets for game meat and consequently to escalating illegal hunting in Serengeti (J. Chuwa pers. comm. 2003). Tarime (particularly in villages bordering Kenya), Serengeti (Mugumu town), Bunda, Magu and Bariadi Districts and even some parts of Kenya are potential markets for bush meat from Serengeti.

Based on a 1991 aerial survey, Campbell and Hofer (1995) estimated that 210,000 herbivores (75,000 residents and 135,000 migratory) are hunted illegally each year within 45 km west of the protected areas. About 57% (118,922 off-take/year) are wildebeest. Mduma *et al.* (1998) suggest that a harvest of 80,000 wildebeest per year is unsustainable and may cause a total collapse of the population by the year 2018. Campbell and Hofer's estimated annual off-take is 50% higher, signifying an unpromising future for this species if the predictions of Mduma *et al.* are correct. In addition, the following seven resident species are estimated to experience heavy hunting pressure: waterbuck (94.3%), eland (30.9%), giraffe (29.6%), impala (28.7%), warthog (24.4%), topi (20.5%) and buffalo (19.5%) (Campbell and Hofer 1995).

As discussed above, human demography is an important factor dictating the magnitude of illegal hunting, along with other pressures on the ecosystem. On the basis of 1978 and 1988 national census data, Campbell and Hofer (1995) estimated the number of poachers within 45 km west of Serengeti National Park boundary and associated protected areas to be 23,294 and 31,655, respectively. More recent estimates of illegal hunters range between 52,000 and 60,000 (Campbell *et al.* 2001; Loibooki *et al.* 2002), an increase of 90% from 1988 to 1998.

Destruction of wildlife habitats

Wildlife habitats provide shelter, breeding places, dispersal and foraging grounds along with movement and access to critical resources in other localities. These roles make them the critical components for ecological integrity and the long-term survival of any Ecosystem. Unfortunately, extensive utilization of land and other resources driven by human population growth, limited alternative survival strategies for local people, land tenure and development policies, is increasingly causing destruction and outright loss of some critical habitats in Serengeti Ecosystem.

Failure to afford modern technologies and agricultural inputs has made expansion into new land – including sensitive areas for wildlife, such as migratory corridors and dispersal areas – the most feasible strategy for increasing agricultural output to cope with population growth. As in other parts of Tanzania, firewood and charcoal are extensively used in both urban and rural areas around Serengeti, due to a lack of alternative sources of energy. The high market demand for charcoal and firewood increases the vulnerability of critical wildlife habitats. Electricity could be an alternative source of energy, but most areas do not have access to this service including some District Headquarters such as Mugumu, Serengeti. However, even in areas with electricity, such as Bunda District, only few households can afford it, due to high installation costs; and even in the few households with the service, high tariffs make its use for cooking and boiling water economically unaffordable. For most Tanzanians (including some senior government officials), electricity is used for lighting and radio.

There is considerable encroachment for agriculture in SNP and Maswa GR, and mining and settlement are taking place in migratory corridors. Villagers in Park Nyigoti in Serengeti District reported that, during migration, it was becoming common to find several wildebeest killed after falling in the pits created by gold mining within the village. They also revealed that the animals have abandoned routes which are heavily settled by humans (Park Nyigoti villagers, pers. comm. 2003). Also contributing to land degradation and loss of ecological integrity are overgrazing by livestock, deforestation and bush fires. The latter originate mainly from human settlements along the western boundary of the SNP. Deforestation and

unplanned fire also affect woodland vegetation. Conversion of once-wooded vegetation to open grasslands is said to have had an impact on browsers in the North of SNP (Sinclair and Arcese 1995).

In 1995, Sinclair and Arcese (1995) estimated that 40% of the Serengeti Ecosystem's original area (ca. 30,143 km² in 1910) had been lost. They reported that the loss was accelerating rather than abating and that it was taking place largely within the legal boundaries of the park. They further observed that the greatest loss had occurred between the 1960s and 1990s, despite the great attention devoted to the area by researchers and conservationists. According to Sinclair, (as quoted by Morell 1997: 2059), 'Thirty to 40% of the park has changed its vegetation community in the last 25 years,' and that 'change should bring an accompanying change in the fauna.'

One example of the implication of habitat changes on fauna is the local extinction of roan antelope (*Hippotragus equines*) in many areas of the Ecosystem due to the loss of its *Combretum*-dominated habitats (Campbell and Borner 1995; Sinclair 1995). Sinclair (2005) reported an extraordinary loss of some 50% of bird species outside of Serengeti due to habitat loss, along with a loss in insect diversity due to human intervention in their systems. Loss of tree cover in riverine forests has led to the disappearance of the previously healthy populations of trogons and large-casqued hornbills (Morell 1997). Some bird species, such as shrikes and thrushes, have moved into the park, while black and white colobus monkeys (*Colobus angolensis*), previously seen along the Grumeti River, have moved further west. Rural communities have also reported the disappearance and reduction of animal species in areas where they were previously abundant, due to habitat loss.

Despite the above pressures on habitats in the Tanzanian part of the Ecosystem, its land tenure system, land use policies and market conditions have made it less prone to destruction compared to the Kenyan part. In Tanzania, the land belongs to the State, although most of it (except PAs) is held in a communal type of tenure – often called the deemed right of occupancy. In Kenya, the land outside the core PAs is privately owned. In both countries wildlife belongs to the State. In contrast to private land tenure, State control of land has the advantage that the State can implement policies

against land uses likely to cause detrimental impacts on wildlife.

The private land tenure system in Kenya has led to considerable negative impact on wildlife in the Kenyan part of the Serengeti Ecosystem. The system had allowed the landowners to respond to market opportunities for mechanized agriculture (Homewood *et al.* 2001). Between 1975 and 1995, the Kenyan part of Serengeti Ecosystem experienced higher decrease in vegetation cover than the Tanzanian side. In the former, over 50,000 ha of rangeland were converted to large-scale mechanized wheat farms (Serneels and Lambin 2001). This, along with fencing, had destroyed the wet season dispersal and/or calving grounds for the resident wildebeest population, leading to a decrease of 81% from 119,000 in 1977 to 22,000 in 1997 (Ottichilo *et al.* 2001a). The total non-migratory wildlife population declined by 58% in the same period. Populations of giraffe, topi, buffalo and warthog declined by 73 to 88% while populations of waterbuck, Thompson and Grant gazelles, kongoni, and eland decreased by about 60% (Ottichilo *et al.* 2001b). According to Serneels and Lambin (2001) the decline in the Kenyan wildebeest population had little effect on Serengeti wildebeest population over the last decades. However, they warn that more land conversion closer to Maasai Mara National Reserve would reduce the dry season range for the Kenyan and Serengeti population and consequently affect the entire ecosystem. In Tanzania, external investors have earmarked the Lobo and Loliondo areas, east of the SNP, as potential areas for large-scale agricultural schemes. If the government errs in its political decisions and allow the project on grounds of granting priority to food security, that will be another tragedy to Serengeti wildlife.

Recently, further development programmes with potential negative impacts to Serengeti Ecosystem have been proposed on the Kenyan side. The conservationists are concerned that, if implemented, the programmes may affect the water quantity in Mara River – a dry season refuge for over a million wildebeest and zebra of the Serengeti. The proposed programmes are Mau forest de-gazettement, irrigation of mechanized farming and the development of the Amala Weir Hydropower project (Gereta *et al.* 2002). Using the ecohydrology model, Gereta *et al.* (2002) predicted that the projects might cause severe drought and thus reduce

wildebeest population by 80%. With 50% die-off, it may take 20 years for the population to recover, while with 80% there may be no population recovery (Gereta *et al.* 2002).

Failure of wildlife conservation to compete effectively with alternative land uses in the area provides incentive for conversion to agriculture. For example, decision by the landowners around MMNR to convert their rangelands into agriculture is ecologically costly but economically profitable: the value of developing the land to full agricultural potential was 15 times greater than its use for wildlife-based tourism along with limited agriculture and livestock. Profit earned by landowners for devoting their land to wildlife conservation was US\$2.78 per hectare compared to US\$43.21 for alternative use (Norton-Griffiths 1995).

Wildlife diseases

Although diseases in wildlife areas have received minimal attention in the past, there is now a tendency to view this factor as one of the major constraints to the effective management of biodiversity in Tanzania. Drastic drops of wildlife populations due to diseases in Tanzanian protected areas at different times have contributed to making diseases an important agenda item for the effective conservation and management of wildlife.

Recent and serious epidemics in Serengeti have been canine distemper virus (CDV) and rabies. CDV killed about 1,000 out of 3,000 lions in 1993–94 (Harder *et al.* 1995; Morell 1995; Roelke-Parker *et al.* 1996). The CDV epidemic spread north to Kenya's Maasai Mara National Reserve, where it also affected a large number of hyenas, foxes, and leopards (Roelke-Parker *et al.* 1996). Rabies contributed to the drastic decline of wild dogs (*Lycan pictus*) and their ultimate decimation in the Serengeti and the Maasai Mara (Woodroffe and Ginsberg 1997) in the 1990s. Domestic dogs (*Canis familiaris*) on the perimeter of the Serengeti National Park (estimated at 30,000) have been identified as the source of both epidemics. Lack of vaccination against the two diseases had made these animals potential agents of transmission (Morell 1995; Roelke-Parker *et al.* 1996). However, the association between domestic dogs, rabies and disappearance of wild dogs is contested (Dye 1996; East and Hofer 1996). Another disease is rinderpest: an outbreak killed several hundred

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buffaloes in the Serengeti-Ngorongoro area in 1982 (EMERCSA 2002).

SUSTAINING THE AMBITION: SOME STRATEGIES AND THEIR DRAWBACKS

Some strategies are being adopted in order to ensure that Serengeti survives. However, these have not been sufficiently effective in meeting the intended objectives. In this section, an attempt is made to show why these strategies are flawed.

Provision of adequate conservation status to wildlife areas

One strategy has been to create new PAs or upgrade areas from lower to higher categories. In Serengeti, the GCAs have recently been elevated to GR. In the legal context, GCAs are the least restrictive category of PAs in Tanzania (URT 1974b). They, therefore, present lower opportunity costs to people in terms of land and other resources. This has rendered many GCAs prone to degradation in the face of increasing human population and unsustainable land uses.

As pointed out earlier, Ikorongo, Grumeti and Kijereshi were declared GCAs in 1974 (URT 1974a) in order to provide a buffer zone for Serengeti National Park and protect corridors for migratory herbivores in the western part. However, this status could not meet the objectives for which these GCAs were established. Therefore, a consultative meeting in 1984 between the Wildlife Department and Bunda and Serengeti District Councils proposed upgrading them to GRs. The Mara Region Development Council endorsed and submitted this proposal to central government in 1985. However, the intervention was needlessly delayed until 1994 (URT 1994). And yet after gazettelement, effective enforcement was delayed until 2000.

The process of establishment of the GRs was fundamentally flawed because the ten-year time lag allowed more developments and expansion onto previously unoccupied lands. The local communities, therefore, resented the process as this meant loss of economic opportunities. Later, as the process became a matter of urgency, implementation was effected as a 'fire fighting' or 'crash programme' culminating with forceful eviction, human rights violations, and a general failure to

observe the principles of good governance. Apathy and resentment towards wildlife conservation increased among the rural communities, a scenario unhealthy for conservation.

Generally, the above events have lowered the credibility of the government and its conservation agencies as communities have lost trust. There is poor acceptability and scepticism towards conservation initiatives aiming at promoting conservation and development, despite the promise they hold for communities.

Anti-poaching activities

It is claimed that improved anti-poaching operations have resulted in a substantial increase in the number of poachers arrested annually (Joseph Chuwa, pers. comm. 2003). Between 1995 and 2002, SNP staff (excluding Game Reserves, Village Game Scouts and Anti-poaching Unit) arrested 7359 poachers, an average of 1051 per annum (J. Chuwa, Pers. comm. 2003). Considering the high number of poachers estimated to be living in the area (ca. 52,000 to 60,000) (Loibooki *et al.* 2002), this achievement is insignificant. Between July 2002 and June 2003, 433 court cases were filed against poachers in the four Districts of Western Serengeti – about 0.72% of the estimated poachers. This may suggest that, despite heavy investment in anti-poaching operations, the strategy is not effective in overcoming the problem of poaching, which is one of the serious threats to the ecosystem.

Community participation in conservation and management of wildlife

Community conservation (or participation in conservation) is increasingly gaining prominence as a major paradigm of conservation work in Africa. It seeks to address the deficiencies of the 'fences and fines' approach. The latter is believed to have failed to conserve wildlife mainly due to shrinkage of government budgets (Gibson and Marks 1995; Songorwa 1999; Newmark and Hough 2000; Baldus *et al.* 2003). Community participation entails the involvement of communities in designing, planning, decision-making, benefit sharing, implementation and evaluation and monitoring.

In the Serengeti Region, the approach has enjoyed considerable publicity through two community conservation programmes: Community

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Conservation Service (CCS) and Serengeti Regional Conservation Project (SCRP) run by Tanzania National Parks (TANAPA) and Wildlife Division (WD), respectively. The two initiatives are, however, flawed in that their main focus had been on benefit provision. Only minimal emphasis is given to other components of participation, thus rendering the communities the 'passive beneficiaries.'

The perception among the communities is that genuine participation is lacking, and that the wildlife managers often reserve the right to the final say on what should or should not be done. The exercise of developing the General Management Plan (GMP) for Ikorongo and Grumeti GRs in 2000 may be cited as an example. The communities were invited along with other stakeholders to the planning workshops, giving an impression that the process was participatory. The communities, however, complained later that their interests did not appear in the draft GMP document as agreed during the planning sessions. Some of the provisions identified and agreed upon during the planning exercise were access to water points for livestock during the dry season, salt licks and visits to sacred groves. However, these activities have remained illegal and liable to penalties, prompting the local people to question the logic of being invited to the planning workshops if their ideas and interests are ignored (Villagers bordering Grumeti GR, pers. comm. 2004).

Benefit-based strategy

The benefit-based strategy is a key component of many community conservation programmes. Such a strategy aims at motivating rural residents to align their behaviours with conservation goals. It is considered as a positive rather than negative incentive. The latter – relying primarily on regulation and control – is considered to be necessary, but 'insufficient and inherently unstable' (Murphree in Hutton 2004:586). Through the strategy the target beneficiaries are expected to 'surrender access to, or curtail illegal offtake of, native species and their habitats' (Barrett and Arcese 1995: 1074) for the interest of conservation. The assumption behind this is that lack of benefits prompts illegal use and/or active destruction of the resource (Emerton 2001). Examples of the benefits that are often provided include low cost game meat

(through cropping schemes) and social services (e.g. health and education facilities). Despite being popular, compared to other components of participation, benefit-based strategy is flawed, and thus its efficacy in meeting conservation objectives is limited. Some of the flaws constraining the strategy are discussed below.

Priority compared to other strategies

The benefit-based strategy receives low priority compared to the promotion of the unpopular 'fences and fines' approach, in which the wildlife managers still invest heavily. For example, SNP records (as of 2004) indicate that the Law Enforcement Department (LED) had 172 staff, 18 centres/ranger posts, and 21 vehicles, in contrast to 18, 6 and 4, respectively, for the Community Conservation Service (CCS). The budgets allocated to the two departments from 1999 to 2004 were US\$862,000 and 361,000, respectively. Donor agencies also direct most of their support in the form of vehicles, uniforms and ammunitions to LED. Villagers in Robanda, Serengeti District, criticised Frankfurt Zoological Society [FZS: a donor organisation] for neglecting the development aspect of the people while investing heavily in supporting anti-poaching activities.

The nature and types of the benefits granted

Most of the conservation-induced costs (such as property damage and opportunity costs) are borne and felt by individuals and households rather than the entire community. However, conservation-related benefits often accrue communally (in the form of social amenities such as the construction of roads, classrooms and dispensaries) rather than to individuals and households. This means that the victims of the wildlife costs are insufficiently compensated. Additionally, these benefits are not easily realised by the victims, since they rarely solve the actual problems caused by wildlife, such as food insecurity and conservation-induced opportunity costs. A classroom or a tarmac road has lower value than a bag of maize to a person who is starving (due to crop raiding by elephant); as a villager in Nyichoka, Serengeti District, observed, 'even if the classrooms are decent like *ikulu* (State house), children cannot concentrate with empty stomachs.'

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Another problem with communal benefits is that they can hardly be distributed evenly. The share for households/individuals incurring serious losses due to conservation is the same as that gained by the least affected and those reaping the benefits illegally (e.g. through poaching). For example, it is impractical to bar a poacher from walking on a road constructed by a conservation agency or denying his son the right to sit in a classroom donated through a conservation initiative. There is also a tendency for local elite to monopolise the benefits.

Total benefits are too small to balance the costs

The conservation-related benefits that trickle down to rural communities are too small to balance the costs of conservation. Emerton and Mfunda's (1999) cost-benefit analysis at individual household level shows that each of the 9,500 households in Western Serengeti indirectly receives an average of US\$2.5 per year as benefit-sharing through the implementation of development projects. The wildlife-related costs range from US\$155 per household for farmers adjacent to the Serengeti National Park and Grumeti and Ikorongo GR to more than US\$770 a year for illegal cultivators inside the Reserve. The Secretary of the Pastoralists in Hunyari ward, Bunda District, elaborated this by saying:

'This is a joke! Few shillings used to construct two classrooms and two kilograms of bush meat we buy from SRCP (Serengeti Regional Conservation Project) per year can not match up to loss of pasture and water sustaining our cattle amounting to 70,000. Nor could they (classrooms and meat) be able to restore our dignity, which is openly being abused by game rangers when they get us inside the reserve. What is the use of school if it means loss of the cattle which provides food, clothes and school requirements for children who are intended to attend to this school.'

Moreover the 'ecologically damaging' activities are more economically profitable compared to benefits people receive in order to abstain from these (destructive) activities. For example, illegal hunting in Western Serengeti generates an economic value 45 times greater than that derived from the SRCP community cropping scheme (Holmern *et al.*

2002). In Maasai Mara, returns for landowners from agriculture and ranching were 15 times greater than from conservation (Norton-Griffiths 1995). Therefore wildlife conservation is more of a liability rather than an asset, making it disadvantageous for people to forego their current activities in favour of conservation goals.

Sustainability of the benefits

As already mentioned, conservation-related benefits are granted in order to win local support for conservation. Likewise, these benefits are often believed (in theory) to aim at reducing poverty since this is the main driving force triggering poaching and other unsustainable activities. For communities to access these benefits, however, stakeholders from developed countries (i.e. donors and tourists) are critically important. Virtually all conservation projects or programmes in Africa depend on donor funding and revenues generated through tourism.

Experience shows that most of the conservation projects have been vulnerable to collapse since the host governments or departments are unwilling, or can rarely afford, to fund these projects after the donor pullout. The Norwegian Agency for Development Cooperation (NORAD) funds SRCP and, as the project will end in 2006, there has been a substantial reduction of budget allocation every year in what is termed as 'smooth landing'. Experience of similar projects in Tanzania such as Matumizi Bora ya Malihai Idodi and Pawaga (MBOMIPA) and the Selous Conservation Project (SCP) has indicated the government's reluctance to take over the responsibilities after donors have pulled out on the grounds of inadequate financial capacity (Songorwa 2004). This scenario may suggest that no miracles will emerge for SRCP. The unwillingness and/or inability of the Tanzanian government to fund these projects signals that even the minimal benefits that accrue to communities are to be terminated. On the other hand, tourism is susceptible to factors such as political instability, economic hardship, or terrorism. This again reduces the reliability of the industry as a viable source of benefits to communities. Since the benefits are intended to change people's behaviours, their curtailment may inevitably turn people to illegal and unsustainable activities.

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Establishment of Wildlife Management Areas

The Wildlife Policy of Tanzania prescribes the establishment of Wildlife Management Areas (WMAs) as a pragmatic way of empowering people to manage and benefit from wildlife on their lands. In Western Serengeti, Ikona WMA is being established to this end. Five villages bordering Ikorongo and Grumeti GRs (Robanda, Park Nyigoti, Nyichoka, Natta-mbiso and Nyakitono) are the intended beneficiaries. However, the optimum acceptability of the intervention is likely to be constrained by past history, policy, and institutional failures.

Perceptions that politicians and government bureaucrats have hijacked the idea of WMAs have lowered the credibility of the intervention. The District authorities are accused for giving orders contradicting the guidelines of WMAs, deciding on the type of investors and 'protecting' them even in cases where they have failed to observe the contracts. Scepticism is furthered by the fact that there are fewer local representatives on the board than District officials and that no law has been enacted to back this intervention. The participation of some organizations, which have had historical conflicts over wildlife conservation with local people, has amplified the cynicism that the creation of WMA is an impending land grab by the government and foreigners (Nyichoka Villagers, pers. com. 2003). At the conservation stakeholder meeting held in Robanda village on 16 September 2003, villagers were less convinced that Frankfurt Zoological Society (FZS), whose priority for decades has been 'wildlife against people', could stand for the interests of the local people. One villager had this to say in the meeting:

'WMA cannot be a good thing to us (communities), if it is spearheaded by Frankfurt. The history of Frankfurt since Grzimek's time has been to save wildlife at the expense of our life. And there is no sign that this practice has changed as to date it is still donating new vehicles and guns to TANAPA as if there is a war to fight.'

Communities are also worried about the likely increased restrictions to access over resources, such as grazing land and water, within the current proposed boundaries of WMAs. Narrating the history of relocation in Serengeti, an octogenarian in Nyichoka says:

'History has taught us a lot. We were forced out of Serengeti (National Park). First the boundary was moved from Naabi Hill to Banagi River in 1950s. Then, in 1960s Mochatongarori became the new boundary and later we were pushed to Romoti River in 1970s. In 1974 Ikorongo and Grumeti were set aside as Game Controlled Areas and we were promised to remain in and continue to enjoy resources critical to our households, although in few weeks we were relocated because of the so-called villagisation policy. Our attempt to go back and make living from our lands in Ikorongo and Grumeti after failure of villagisation policy was defeated by the government in 1994 by mere baptizing the areas as Game Reserves. We were therefore forced out of the reserve and we therefore lost Manchira River, which was critical source of water and salt for domestic use and livestock. Further to this we lost our grazing land, settlements, sacred sites and mining areas, which served as a source of employment to our youth. Today they want to baptize our land with the name WMAs. As usual we see a lot of promises here! But next year the name will change and we (communities) will be forced out. Can't these people be advised that we are fed up? What is the difference between this policy and several other government policies, which we have heard of before? Is it not true that despite a lot of good promises these policies ended in vain? Where is ujamaa vijijini (villagisation policy)? where is Azimio la Arusha (Arusha Declaration)?'

CONCLUSION AND RECOMMENDATIONS

Serengeti has ecological importance as the last intact plains ecosystem supporting the Earth's largest populations of terrestrial mammals. The designation of protected areas and the designation of the area as a Biosphere Reserve and World Heritage Site should have been important measures for guaranteeing the ecological integrity and viability of Serengeti. However, as trends discussed in this paper show, Serengeti – a global asset – remains endangered. Further, interventions other than creation of the protected areas – such as community participation, benefit-based strategy, anti-poaching, and the creation of WMAs – are also

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flawed as observed in this paper due to problems of implementation. The following specific recommendations are essential for Grzimeks' ambition to be sustained:

Making human population growth a matter of priority: Although population growth is one of the underlying causes of threats facing Serengeti Ecosystem, none of the current strategies addresses it adequately. Overlooking this factor is synonymous to treating the symptoms rather than the causes. Unless a proactive intervention is sought, it is apparent that human population will keep on growing and, therefore, demand for more land and resources will increase. As population increases, the effectiveness of the current strategies will be diluted and conflicts will intensify. The possible strategies may include developing the active policies to reduce immigrants from other areas by limiting the population-pull factors.

Provide alternative sustainable livelihood strategies: The agenda of human survival is critical if forces threatening the ecosystem are to be halted. It is illogical for anyone to accept a scenario where preservation of biodiversity implies starvation. To reduce the pressures on natural resources and habitats, strategies may include: (1) devising a special policy which will obligate other regions of the country to provide employment opportunities to young people from Serengeti area; (2) supporting the agricultural sector by subsidizing inputs, providing credits and access to markets, and controlling problem animals; and (3) securing and subsidizing the alternative sources of energy (e.g. biogas and electricity) to reduce dependency on fuelwood.

Knowledge on the nature of illegal activities: The current strategies suggest that there is either lack or inadequacy of this knowledge. Knowing why local people exhibit a particular unsustainable behaviour may be useful in devising more pragmatic solutions to current challenges facing the ecosystem. More research programmes in this area are, therefore, imperative.

Learning from mistakes and correct identified deficiencies: Current conservation-related flaws in Serengeti can be a good entry point to safeguarding the ecosystem: (1) ensure the genuine participation of local people and value their concerns and

contribution in conservation activities; (2) review the mechanisms for benefit sharing to ensure that they are evenly distributed, adequate to offset the conservation-induced costs and they can outweigh those generated by alternative land uses; (3) the government, its agencies and donors have to prove to people that, unlike in the past, they are credible and trustworthy and, therefore, the initiatives or programmes they propose will work; and (4) wildlife staff, donor organizations and other stakeholders also need to change their attitude regarding local people and the way conservation should be pursued – sensitization may help.

Discourage land privatization and commercial agriculture: The detrimental impact of private land tenure on wildlife around the Kenyan part of Serengeti Ecosystem should serve as a precaution against adopting similar policies around Serengeti. The current state/communal land tenure and policies restricting commercial and mechanization agriculture should be maintained. Further, practical ways seeking to harmonize the development policies around the Ecosystem should be developed by both countries sharing the Ecosystem.

Participatory land use planning: The appropriate zones should be determined for particular uses. The uses that are incompatible with conservation should be discouraged in critical wildlife areas such as migratory corridors, calving and dispersal grounds

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