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Managing the Wildlife Protected Areas in the Face of Global Economic Recession, HIV/AIDS Pandemic, Political Instability and Climate Change: Experience of Tanzania

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Additional information is available at the end of the chapter

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1. Introduction

World Conservation Union [1] defines a protected area as: “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.” Protected areas are intended to meet one or more of the following purposes: scientific research; education; wilderness protection; preservation of species and genetic diversity; maintenance of environmental services; protection of specific natural and cultural features; tourism and recreation; sustainable use of resources from natural ecosystems; and maintenance of cultural and traditional attributes[1]. Each of these management purposes is related to a category of protected areas i.e., groups of protected areas assigned to cater for specific purpose or objective.

Along with other benefits associated with protection and maintenance of biodiversity, justification for the establishment of protected areas in many developing countries indicates a bias on economic rather than ecological benefits. Many protected areas are established because of their economic potential. They generate significant multiplier effects across a national economy, and offer considerable economic value to the livelihoods of the poorest and most vulnerable sectors of society. They create investment opportunities and employment. Essentially, protected areas are recognized as important vehicle towards poverty reduction and sustainable development [2,3]. The most important avenue through which protected areas contribute significantly to local and national economy is through tourism industry. Protected areas are cherished as the key tourist destinations offering a variety of attractions to domestic and international visitors. They are also important hunting

grounds catering for international tourists and residents. Essentially, both consumptive and non-consumptive forms of tourism are recognized as important economic engine and a development strategy for many developing countries [4-6]. It is the largest in terms of contribution to the global GDP and second, after agriculture, in provision of employment [7].

The ability of protected areas to provide multiple benefits to humanity is, however, compromised by numerous factors causing overexploitation of species, habitat destruction, pollution and introduction of exotic species. Globally, there is a growing trend of biodiversity loss and an increase of species threatened with extinction. For example, of the 44,838 species included in the 2008 IUCN Red List database, about 17,000 (38%) were threatened with extinction. Comparison of the IUCN Red Lists for 1996 and 2008 indicates that the number of species threatened with extinction had grown [8,9]. In Southern Africa, poachers and organized criminal gangs, who supply the lucrative international ivory and rhino-horn markets, are reported to have caused significant negative ecological impacts on rhino and elephant. According to report, many parks in South Africa were experiencing a growing trend of rhino poaching. For example, between 2001 and 2006 about 70 rhinos were killed in Kruger National Park alone [10]. The most known and documented factors leading to these trends include human population growth, poverty, failure of conservation – as an alternative form of land use - to compete effectively with forms of land uses that are ecologically destructive, and inability of legal economic benefits from protected areas to offset the conservation related costs incurred by local communities through property damage, wildlife-related accidents and numerous opportunity costs.

Multiple benefits derived from the protected areas and growing threats facing them have prompted a dramatic increase of land under protection globally (Figure 1). Essentially, the protected areas are increasingly being acknowledged as the most effective tools for conservation of biodiversity – genes, species and ecosystems. The 2010 World Database on Protected Areas Annual Release [11] indicates that over 160,000 protected areas covering over 21 million square kilometres of land and sea have been established to date. Of these, terrestrial protected areas exceed 12% of the Earth's land area and marine protected areas occupy about 6% of the Earth's territorial seas. In recent years, the protected area coverage has been adopted as an indicator to measure the policy response to biodiversity loss in different countries. Efforts by governments and civil societies to conserve biodiversity are measured by the increased land and sea areas put under protection. The use of protected area coverage as an indicator is in line with the CBD's 2010 target of achieving a significant reduction of the rate of biodiversity loss [12].

The effectiveness of protected areas as the leading strategy in global efforts of stemming loss of biodiversity is, however, being challenged. It is argued that the effectiveness of the existing and the current pace of the establishment of the new protected areas can hardly reverse the current trends of biodiversity loss [14]. The deficiencies of the protected areas undermining their conservation goals include:

- The slow rate of expanding the protected areas to cope with the current threats of biodiversity;

- Inability of the protected areas to overcome all threats: The roles of protected areas can effectively mitigate the problems of species overexploitation and habitat loss, but has limited capacity to overcome other stressors, such as climate change, pollution, and invasive species;
- The increasing need for human development at the expense of wildlife habitats and species thus, creating conflicts with conservation goals;
- Insufficient size and connectivity of protected areas and, consequently, failure to sustain viable populations and allow exchange of genetic materials between individuals;
- Inadequate funding of the protected areas which undermines their effective management. Annual estimate for effective management of protected areas is \$24 billion — four times the current expenditure of \$6 billion [14].

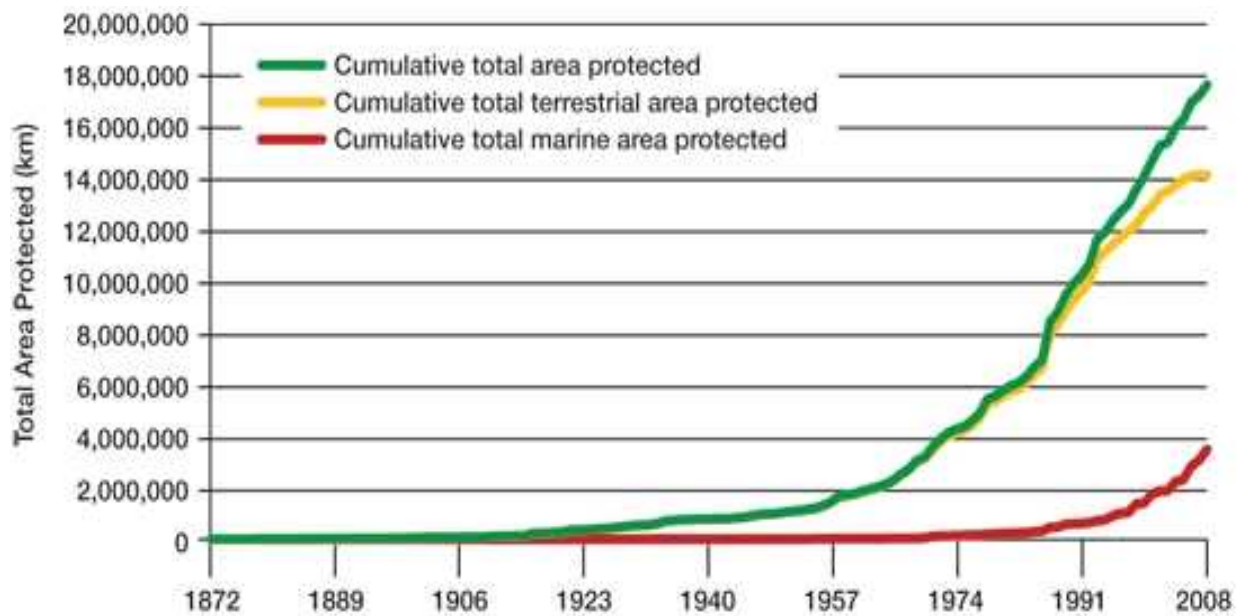


Figure 1. Growth in nationally designated protected areas from 1872 to 2008 (Graph excludes protected areas with unknown year of establishment). Source: [13].

The failure of protected areas in their conservation role is worsened by issues, which unfortunately are inadequately documented in literature as they have only emerged recently or they were existing but were not recognized as potential threats. Because of their freshness, their attention in conservation literature and policies has been minimal. This chapter seeks to examine these emerging issues in order to increase public awareness on impacts associated with these issues and stimulate feasible and sustainable interventions from different actors.

2. Framing the issue

Human population growth and poverty are regarded as the underlying causes for biodiversity loss in protected areas through overexploitation of natural resources, habitat destruction, introduction of exotic species and pollution. However, behind these causes, there are numerous factors determining their magnitudes and impacts on natural resources.

While the impacts of numerous factors on conservation and protected areas are well established in literature, the impacts for some have remained insufficiently documented, most likely because they have only recently emerged and/or recognized as threats to conservation. The factors whose impacts on conservation and protected areas are minimally acknowledged in literature include global economic recession, climate change, HIV/AIDS pandemic and civil wars. Global economic recession may generate poverty at, national and household levels and, consequently, affect the conservation sector and protected areas management by reducing funding and increasing human pressure on species and habitats. Similarly, HIV/AIDS pandemic may cause overexploitation of species and destruction of habitats when the victims remain with limited options to meet their livelihood strategies and medicinal needs. Impacts of climate change can be manifested through food insecurity and poverty, effects on species and habitats and worsening human-wildlife conflicts. Political instability cause poverty as people can hardly work to earn their living in a warfare environment. On the other hand, wars cause an influx of refugees and, therefore, contribute to human population growth. The high human population creates more demand for natural resources at the expense of species and habitats. In light of the scenarios mentioned here, it is apparent that these factors have notable ecological impacts on conservation sector and protected areas, in particular. It is, therefore, imperative that they are critically analyzed and brought to the attention of policy makers, conservation planners and public at large. Planning for protected areas should consider these factors as issues of urgency calling for special priority.

3. Wildlife conservation in Tanzania and establishment of wildlife protected areas

Tanzania's conservation history dates back to early 1890s when the German Administration enacted the first Wildlife Law in order to regulate hunting. The British Administration, which took over in 1920 following defeat of the Germans in the World War I, continued to make wildlife conservation a matter of priority. The British regime enacted the first comprehensive wildlife conservation legislation, the Game Preservation Ordinance of 1921. Pursuant to the provisions of this Ordinance, Serengeti was declared a partial Game Reserve in 1921 and elevated to a full one in 1929. The Selous Game Reserve was gazetted as the first game reserve in 1922. In 1921, the Game Department was established to administer the game reserves, enforce the hunting regulations and control the problem animals [15].

In gazetting the protected areas, precautions were taken by colonial administrators in Tanzania not to infringe on African rights as this could lead to political instability of the colony. However, pressure for more restrictive and prohibitive conservation laws along with setting aside more lands exclusively for conservation came from Europe, spearheaded by the London-based Society for Preservation of Flora and Fauna of the Empire (SPFFE) and other powerful conservation lobby. In 1930, the Society sent Major Richard Hingston to investigate the needs and potential for developing a nature protection programme in Southern and Central Africa. One of the recommendations by Hingston was based on formalizing a more restrictive category of protected areas (i.e. national parks). Serengeti,

Kilimanjaro and Selous were proposed as ideal for the purpose of creating national parks in Tanganyika [16, 17]. The main criterion employed to rate an area's suitability as a national park was assurance that the area was unsuitable for Europeans' economic activities such as mining, livestock keeping and crop production.

Hingston's recommendations provided a basis for agenda of the 1933 London Convention on wildlife. All signatories (including Tanganyika) were required to investigate the potentials of creating a system of national parks. Colonial administrators in Tanganyika remained adamant for seven years, a situation that caused serious accusations from Europe that the colony was the worst offender in encouraging slaughter of game by the natives. These pressures paved the way to the first Game Ordinance that gave the governor a mandate to declare any area a national park. The Ordinance, enacted in 1940 repealed the 1921 Ordinance. Serengeti National Park was established in 1940 but remained a 'park in the paper' until 1951 as there was weak enforcement of regulations and laws governing the national parks.

Restrictive and prohibitive laws made the four decades of conservation under British rule be manifested by conflicts and resentment from the natives. For example, the Maasai tribe in eastern Serengeti resented the proposed park boundaries through violence and sabotage/vandalism. Their retaliatory response involved spearing of rhinos, setting fires with malicious intent and terrorising civil servants [17]. The Ikoma tribe of western Serengeti declared daringly that they would kill any wildlife ranger who would attempt to stop them from hunting and obtaining resources from Serengeti National Park.

As Tanzania was about to attain her political independence, there was a hope among the local communities and a fear among the European conservationists. The natives perceived independence as an end to stringent conservation laws that infringed upon their customary rights [16]. The conservationists were worried that political independence would decolonize nature by terminating the conservation efforts, mainly because Tanzanians had low capacity to carry out managerial activities in protected areas [16]. However, conservationists' fear was dissuaded when the post-colonial government endorsed continuation of colonial conservation policies uncritically. Economic rather than ecological reasons justified this policy choice. The wildlife-based tourism was perceived as a vital economic engine and insurance in case of failure of other economic sectors such as agriculture and minerals and, therefore, the government was not ready to forego this option. Julius Nyerere, the first Tanzanian President, 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" [18]

It is because of economic potential that land under legal protection has dramatically expanded in the past 50 years of Tanzanian independence. Today, while 55% of 236 countries have less than 10% of their land areas under legal protection [11], Tanzania has gazetted about 30% and 15% of its terrestrial land area as wildlife and forest protected areas,



<i>Protected area</i>	<i>Size (Km²)</i>	<i>Year established</i>	<i>Notes</i>
Nature Reserves (IUCN Category I)			
Amani	83.8	1997	Formed from 6 FRs: Kwamkoro, Kwamsambia, Mnyuzi Scarp, Amani Zigi, Amani East & West
Kilombero	1,345.1	2007	Formed by merging Matundu, Iyondo and West Kilombero Scarp FRs
Nilo	62.5	2007	Upgraded from a FR
Chome	142.83	Proposed	Was designated as FR in 1951
Magamba	87	Proposed	Notified as FR in 1942; was scheduled to be upgraded in April 2010.
Mkingu	233.9	Proposed	To include Nguru South and Mkindo FRs
Udzungwa Scarp	327.63	Proposed	Notified as FR in 1929
Uluguru	241.2	2009	Links 3 former FRs: Uluguru North and South and Bunduki)
National Parks (IUCN category II)			
Arusha	137	1960	Known as Ngurdoto Crater NP until 1967, expanded in 1973)
Gombe Stream	52	1968	
Jozani Chwaka Bay	50	2004	The only national park in Zanzibar Island
Katavi	4,471	1974	
Kilimanjaro	755	1973	World Heritage Site since 1987)
Kitulo	412.9	2005	
Lake Manyara	664	1960	Enlarged 2009: original size 330 km ²)
Mahale Mountains	1613	1985	
Mikumi	3230	1964	Extension in 1975
Mkomazi	3 270	2008	Game Reserve since 1951
Ruaha	22000	1964	Expanded in 2009: original size 10 300 km ²
Rubondo Island	240	1977	Game Reserve since 1965
Saadani	1,100	2005	Game Reserve since 1969
Serengeti	14 763	1951	Game Reserve since 1928; Biosphere Reserve and World Heritage Site since 1981

Tarangire	2 850	1970	
Ngorongoro CA	8260	1959	Game Reserve since 1928; Biosphere Reserve and World Heritage Site since 1981
Some Game Reserves			
Biharamulo	1,300	1959	
Burigi	2,200	1972	
Ibanda	294	1974	
Ikorongo Grumeti	3 300	1994	
Kijereshi	65.7	2001	
Kimisi	1,026.23	2002	
Liparamba	570.99	2000	
Kizigo	4 000	1982	
Lukwati	3,146	1997	
Lukwika/Lumesule	444	1995	
Maswa	2 200	1962	
Mkungunero	700	1996	
Mpanga- Kipengele	1,574.25	2002	
Msanjesi	210	1995	
Muhesi	2,000	1994	
Muhesi	2 000	1994	
Pande Forest	12	1994	
Rukwa	4,000	1995	
Rumanyika	245	1970	
Rungwa	9 000	1951	
Saadani	4,000	1995	Annexed to Ruaha National Park in 2009
Selous	50,000	1922	Word Heritage Site since 1982
Swagaswaga	871	1996	
Ugalla	5 000	1965	
Uwanda	5 000	1971	
Ramsar Sites			
Malagarasi-Moyovosi	32,500	2000	
Lake Natron Basin	2,250	2001	
Kilombero Valley Floodplain	7,967	2002	
Rufiji -Mafia-Kilwa Marine	5970	2004	

Source: [21].

Table 1. The major wildlife protected areas of Tanzania

respectively. According to 2005 World Database on Protected Areas, over 11% of protected areas in Tanzania was under IUCN category I and II, 26% under category III - V and 63% under category VI and others [19]. More protected areas have been gazetted or upgraded to higher categories since 2005 and, therefore, these figures do not reflect the recent changes.

At the independence there were only three national parks (Serengeti, Lake Manyara and Arusha); nine game reserves and Ngorongoro Conservation Area. Today the number has grown to 16 national parks comprising an area of over 42,000 km² (4.4% of the country's land surface: see Table 1 and Figure 1). Over 30 game reserves have been gazetted along with adoption of three new categories of protected areas. These categories are Ramsar Sites, Wildlife Management Areas (WMAs) and Nature Reserves. The four Ramsar sites cover about 5.5% of Tanzania's wetlands. The WMAs have emerged as a key option following the recognition by the Wildlife Policy of 1998 (revised in 2007) [15, 20] that the future of wildlife in Tanzania rests on the ability of wildlife to generate economic benefits to the rural communities who live alongside wildlife, and its ability to compete effectively with other forms of land uses which are ecologically destructive. WMAs are, therefore, established as one of the strategies for implementing community wildlife management in Tanzania. WMAs were first legally formalized through the WMA Regulations of 2002 (revised 2005) and are now formalized in the Wildlife Conservation Act of 2009. Currently 14 WMAs have been designated and 20 others are in the process. The designated WMAs and their locations in brackets include Burunge (Babati), Uyumbu (Tabora), Makao (Shinyanga), IKONA/Ikoma-Nata (Serengeti), MBOMIPA/Pawaga Idodi (Iringa), Mbarang'andu (Namtumbo – Ruvuma), Magingo (Liwale - Lindi), Enduiment (West Kilimanjaro), Ipole (Sikonge, Tabora), Nalika (Tunduru-Ruvuma), MUNGATA/Ngarambe Tapika (Rufiji), Wamimbiki (Morogoro & Bagamoyo), JUKUMU (Morogoro), Kimbanda (Namtumbo) and Chingoli (Tunduru).

4. Emerging issues in the management of wildlife protected areas in Tanzania

As pointed out earlier, protected areas are intended to meet a variety of management purposes in order to support human livelihood and development through provision of ecosystem goods and services in a sustainable way. However, numerous ecological, socio-economic and political factors tend to undermine this desire. Of these factors, are the traditional ones, which are sufficiently covered in literature and, those which have emerged just recently. The latter are underrepresented in literature and, therefore, their inclusion in policies and management plans for many protected areas are lacking. Four of these emerging factors include global economic recession, HIV/AIDS pandemic, climate change and political instability. This section examines these issues by pointing out their potential impacts on the management of wildlife protected areas. Relevant examples are drawn from different protected areas of Tanzania.

4.1. Global economic recessions

A global economic recession is a period of general economic decline; typically defined as a decline in GDP for two or more consecutive quarters. A recession is typically accompanied

by a drop in the stock market, an increase in unemployment, and a decline in the housing market. The World Bank's Global Development Finance report [22] placed Tanzania along with Ghana, Mali and Mozambique at relatively more risk to shocks associated with global economic recession compared to other African countries. This is due to considerable share of foreign owned banks and heavy reliance of economies on foreign direct investment in these countries [23]. Global economic recession may bear direct and indirect undesirable impacts in the management of wildlife protected areas by exacerbating poverty to people and, therefore, increasing pressure on natural resources. The recession also affects tourism sector which is the main source of revenues required to run the protected areas. Protected areas may also suffer through reduced support from donors, who fund different conservation programmes. Poor funding of the protected areas, consequently, undermine numerous activities and operations such as ecological monitoring, conservation education for local communities and law enforcement. These impacts are briefly discussed below.

4.1.1. Increased incidences of poverty and vulnerability

The financial recession in poor countries fuels incidences of poverty and vulnerability to individuals and at the national level. For example, reports indicate that Tanzania experienced significant loss economically due to 2007-2009 Global Financial Recession, despite the fact that it lasted for a very short time. The country's economy was projected to grow by 8% in 2009 but the crisis lowered this projection to 5% and 6% for 2009 and 2010. The



Figure 2. The need to feed the family prompts poaching of wildlife from protected areas

country estimated a loss of about US\$255 million from domestic income occasioned by the recession [24]. The financial crisis also affects decisions to review the minimum wage for both public and private sector workers. The decline of national economy is translated to several development factors including natural resources and tourism industry (24-26).

Experience indicates that household poverty detrimentally affect the protected areas and natural resource base. Reduced ability of households to improve on existing livelihood strategies, forces them to adopt the coping strategies that are unsustainable and ecologically destructive. For example, because of poverty peasants can barely afford to purchase and use agricultural inputs to increase crop production in a piece of land. Food insecurity and income poverty resulting from this scenario may lead to conversion of more wildlife habitats into croplands as well as killing of wild animals for protein as evidenced in Serengeti National Park and adjacent protected areas [27, 28]. Household poverty also limits people from access and use of electricity as a source of energy, thus making wood fuel (firewood and charcoal) the most dominant and reliable source of energy for cooking and heating, both in urban and rural areas [27]. In order to meet an increased demand for wood fuel, wildlife habitats and other critical wildlife areas are subjected to deforestation.

4.1.2. Reduced tourism revenues

Wildlife protected areas in Tanzania and elsewhere in Africa rely on external sources for their survival. These sources are international tourism and donors. Nature-based tourism accounts for about 95% of internal revenues for Tanzania National Parks (TANAPA) and Ngorongoro Conservation Area Authority (NCAA) - the government organizations managing the national parks and Ngorongoro Conservation Area, respectively [29]. This implies that the wildlife protected areas can hardly survive without tourism. The revenues generated through tourism industry are required for conservation work. International tourism, contrary to domestic tourism, commands higher priority because the latter is less developed and, therefore, its contribution to economy is insignificant.

Global economic recessions have many and far-reaching impacts on the performance of the tourism sector and, therefore, management of the protected areas. This is epitomized by the global economic crisis that started in late 2007 in the United States of America and in some European countries. The growth of about 7.0% in international tourist arrivals from 719,030 in 2007 to 770,376 in 2008 was relatively small in comparison to that of between 2006 and 2007, which was about 12.0% [25]. This relative decrease in growth rate for international tourists to Tanzania between the two seasons reduced the earlier projected earnings and interfered with employment. The conservation agencies – TANAPA and NCAA- were compelled to cut down their annual expenditures in 2008/2009 [30, 31] which among other expending areas included resource protection.

Tourism industry recorded a decline in revenue by about 18% in 2008 and it was predicted that by 2009 decline would be 30% [26]. The crisis further impacted on the tourism value chain including travel agents, transporters (taxis, buses, car rentals, and Safari/tour operators), hotels, restaurants and camping sites as 60% cancellation of bookings was

reported. The reduced number of tourists affected employment in hotels, restaurants and camping sites and their suppliers of food, beverages, laundry and utilities [26]. As a result of this crisis, some hotels and tour operators carried out their business below their capacities and others contemplated to close and lay off employees [25]. Laying off of the employees in different sectors may present another problem to protected areas as the redundant employees may resort to pursuing illegal activities such as poaching and unsustainable use of natural resources (e.g., fuel wood) in order to survive.

4.1.3. Reduced donor support

As is the case with many public sector budgets in Tanzania, external donor countries and development partners contribute notably to funding of the protected areas. Many conservation programmes and projects depend on funding from international agencies and other foreign donors. However, despite these efforts, there had been a global concern that funding of protected areas is inadequate [32]. It is, therefore, apparent that global economic recessions worsen the situation as many international donors can hardly honour their commitments to different projects/programmes including those related to conservation of biodiversity and, management of protected areas, in particular [25, 33, 34]. Essentially, it is unlikely for donors to pay adequate attention to recipient countries instead of fixing domestic problems in their own countries.

4.1.4. Undermining the community conservation strategy

There is a growing consensus globally that provision of tangible economic benefits to communities bordering the protected areas is the right strategy towards minimizing human-wildlife conflicts and motivating the communities to align their behaviours with conservation goals by refraining from unsustainable behaviours and actions that are destructive to natural resources. The guiding principle to this is that an incentive to conserve, and to tolerate wildlife-related costs, among the local communities is a function of economic gain [See e.g. 35-36]. Under economic recession, where most of the revenues are intended to come from tourism sector and donors, it is unlikely that this strategy can work flawlessly. Since economic benefits are regarded as important condition for behaviour change, it may not be surprising if the communities will resort to illegal activities and, therefore, increase pressures in protected areas. The likelihood of this scenario increases as the local economy also suffers from recession, causing increased incidences of food insecurity and income poverty among the households.

4.1.5. Inefficient state law enforcement

Global economic recession triggers meager budget for natural resources sector and management of the protected areas, in particular. Logically, the situation is worsened by reduced tourism revenues and donor support along with minimal priority accorded by government to conservation compared to other sectors. The underfunding of the protected areas leads to inadequate staffing, inadequate and poor equipment and, consequently,

failure to enforce the conservation laws effectively. The 1970s to 1980s global economic recession can epitomize this scenario. The recession rendered the entire natural resources sector (i.e., wildlife, land, forestry, and fisheries) getting only 1.2% of the total national development budget [38]. While the actual cost for effective control of poaching was estimated to range from US\$200 to 400/km² per annum [16; 39], the budget for big protected areas, such as the Selous Game Reserve, were as low as US\$3/km² [40]. The staff-area ratio in most protected areas were 1:125 (persons:km²), far below the recommended ideal ratio of 1:25 [41].

The underfunding of the sector caused huge loss of the populations of two of Africa's charismatic species – rhino and elephant. In 1976, for example, an aerial census estimated 110,000 elephants in the Selous Game Reserve in Southern Tanzania. Uncontrolled poaching reduced this population by 50% in 1986 and to approximately 22,000 in 1991. The rhino population in the reserve dropped from 2,500 in 1976 to 50 in 1986 and zero in 1991 [42]. Similarly, poaching in Serengeti National Park drove the black rhino to the verge of extinction while the elephant population dropped by 80% [43]. Countrywide, the elephant population dropped from 306,300 individuals in 1976 [42] to 203,900 individuals in 1981, to 100,000 in 1987 and to 57,334 in 1991 [44]. About 275 rhinos remained in 1992 compared to 3,795 individuals in 1981 [45].

4.2. Climate change

Climate change is one of the emerging challenges of the 21st century. Tanzania, like other developing countries, is “highly vulnerable” to the impacts of climate change “because of the factors such as widespread poverty, recurrent droughts, inequitable land distribution, and over-dependence on rain-fed agriculture” [46]. Experts predict the possibility of extreme events posing the greatest climate change threat to Africa [47], including Tanzania, where the frequency, intensity and unpredictability of drought, floods and tropical storms are expected to increase. The wildlife protected areas are not and cannot be exempted from the impacts of climate change. The circumstances through which climate change can negatively affect the protected areas include:

4.2.1. Increasing of illegal activities

Low crop yield and death of livestock among the agricultural communities around the protected areas due to droughts, floods and diseases exacerbate poverty. When such situation happens the poor often resort to pursuing illegal and unsustainable activities inside and around the protected areas. For example, studies in Serengeti National Park have shown that illegal hunting is high among the poor households and increases at bad years when the crop yield is low [27, 28]. Similarly, illegal grazing of livestock inside the protected areas increases during the severe droughts. This is due to reality that unlike unprotected lands, protected areas often contain abundant and higher quality pasture during the drought seasons. The livestock owners, therefore, trespass and graze their livestock illegally inside the protected areas leading to serious conflicts between wildlife staff and local

communities. In many protected areas such as Kijereshi and Maswa Game Reserves, these conflicts have culminated into wounding and killing of wildlife staff [48]. Oftentimes pastoralists have coped with droughts by moving with their livestock to other parts of the country where they equally increase pressure in protected areas' exceptional resources and values. For instance, movement of Sukuma pastoralists towards southern Tanzania in 1990s and 2000s had serious ecological impacts in Ihefu and Great Ruaha River, which are key for survival of Ruaha National Park [49]. Experience shows that in many protected areas, illegal activities such as poaching increase when events such as floods destroy the infrastructure and making the parts of the protected areas inaccessible by law enforcement staff (personal experience).



Figure 3. The impacts of climate change like this compel livestock owners to graze their livestock inside the protected areas illegally.

4.2.2. Increase of the incidences of wild fires

Incidences of fire become more severe during the extreme droughts and, thus, killing wildlife species, destroying forage resources, reducing water supply and habitats. A study by Hemp [50] showed that loss of forest cover as a result of fire intensity and forest clearing in Kilimanjaro National Park has a more devastating impact than the melting glaciers. According to author glacier contributes one million cubic meters to water supply, while forest cover contributes 500 million cubic metres. Forest and bush fires have also contributed to the destruction of forest resources in the Uluguru Mountains Nature Reserve, which could have similar implications for the water security of downstream communities [47].



Figure 4. Increased poverty leaves the poor without option other than poaching. Four suspected poachers arrested in Ngorongoro Conservation Area with poisoned watermelons and pumpkins targeted to kill the elephants.

4.2.3. Impact on tourism industry

The floods and other climatic hazards affect the infrastructure such as roads and, therefore, render the protected areas, which are key tourist destinations, inaccessible. These consequently, reduce revenues which are important sources of funds for conservation work. A good example is the 1997/98 *El Niño* episode, which rendered most of the areas in the Tanzania's northern tourist circuit inaccessible. In order to cope with poor and inaccessible roads attributed to heavy rains in Serengeti and Arusha National Parks, various local tour operators resorted to taking their visitors around the park using tractors. The farming machines were used as path-finders or to perform the task of dragging, pulling or jostling tour vehicles that were stuck in the rain drenched, soggy grounds of the parks [51]. The heavy downpours also caused several airstrips in the parks, including the most important, Seronera to be closed down.

4.2.4. *Increased human-wildlife conflicts*

Human-wildlife conflicts often increase during the extreme droughts. This is the time when illegal grazing of livestock occurs inside the protected areas as pasture becomes scarce. Illegal livestock grazing is a serious management issue in Maswa, Ibanda, Burigi, Biharamulo, Moyovosi, Ugalla, Kimisi and Kitengule Game Reserves and Tarangire National Park and Kilombero Ramsar Site. Illegal grazing in protected areas is sometimes associated with widespread use of poison against predators in retaliation for livestock depredation. In Ibanda Game Reserve, for instance, this has led to local extinction of lions (Hassan Mnkeni, pers. comm). On the other hand, wild animals move out of from the protected areas and cause crop damage, livestock depredation and accidents to people. These scenarios occur in virtually all protected areas in Tanzania and they jeopardize the integrity of the protected areas.

5.2.5. *Increased risk of species extinction*

Extreme droughts and floods cause deaths to numerous wildlife species through destruction of important resources such as forage, water and shelter along with increasing incidences of diseases. For example, the aftermath of *El-Nino/La-nina* weather spells, in the Simanjiro District and Ngorongoro Conservation Area were reported to have brought forth the huge swarms of deadly insects known as "Stomoxys" which claimed the lives of both livestock and wildlife by inflicting bad wounds and painful sores to the animals. The first outbreak of *Stomoxys* flies occurred in 1962 following the extensive drought of 1961, followed by heavy rains of 1962. The epidemic resulted into the death of over 67 lions [52].

The wildlife species which are globally threatened due to factors such as low population numbers, restricted or patchy habitats, limited climatic ranges and/or restricted habitat requirements are more exposed to risk of extinction than others. Based on this reality, the Intergovernmental Panel on Climate Change (IPCC) warns that climate change will worsen the risk to these species if effective mitigation and adaptation measures will not be implemented.

Recent report by UN Food and Agricultural Organization (FAO) indicates that about 200 animal species in Tanzania classified by IUCN as vulnerable, endangered or critically endangered are subjected to more risk due to effects of climate change [53]. Of these species, are the large mammals including charismatic and flagship species such as elephant (vulnerable), black rhino (critically endangered), wild dog (endangered), cheetah (vulnerable), lion and abbot's duiker (vulnerable). These species constitute one of the key exceptional resource values in many Tanzanian protected areas. Therefore, their loss will obviously affect the tourism industry and lower the revenues which are important source of funds needed for conservation work.

4.3. HIV/AIDS pandemic

HIV/AIDS, one of the worst pandemics in history, touches virtually all sectors in Africa including natural resources sector. However, its appreciation in the conservation literature

is still minimal. Empirical data to quantify the impacts of the pandemic on the sector are lacking, though the situation is seemingly to be alarming. While, there is a need for scientific studies to quantify the impacts of HIV/AIDS pandemic in Tanzanian protected areas, the link between this pandemic and wildlife management can be explained as follows:

4.3.1. Weakened performance in the protected areas

Increased rates of illnesses and deaths among the protected areas rangers, senior officials, community game guards and other conservation personnel weaken the performance in the protected areas [54, 55]. This is likely to be the case as wildlife staff can hardly execute their duties including law enforcement when they are sick. Even the most committed employees become unproductive since successive bereavement undermines morale and enthusiasm. Poachers may take advantage to hunt illegally when wildlife staff members are sick, looking after their sick relatives or attending funerals. Economically, HIV/AIDS pandemic imposes huge financial costs to government, conservation agencies and communities. The following impacts of HIV/AIDS on conservation organizations in Africa, adopted from UNAIDS [55], are applicable to Tanzania situation and, protected areas in particular.:

- **Loss of investment in training:** Many conservation organizations have lost highly trained staff to the epidemic. This is particularly serious in Africa, where conservation capacity is already limited. Training replacement staff is very expensive – if funds are available at all.
- **Loss of staff time:** There is an increased absence from work when staff members care for their sick family members and attend funerals of relatives, friends and colleagues.



Figure 5. HIV/AIDS and associated opportunistic diseases undermine the performance of wildlife staff and causes overexploitation of natural . in the protected areas

- **Diversion of conservation funds for AIDS costs:** Many conservation organizations are covering the costs of medical expenses, sick leaves, terminal benefits, funeral costs, and training for replacement staff. These expenses reduce the budget available for conservation work, and often have to be covered by scarce core funds.
- **Decline in morale:** Successive bereavement saps morale and enthusiasm from even the most committed employees, slowing productivity.

4.3.2. *Increased illegal activities due to household poverty*

Agriculture is the leading employer in Africa and other developing countries. However, the sector is threatened by AIDS-related deaths among farm workers, most notably in southern and eastern Africa [56]. UN Food and Agricultural Organization (FAO) projected that 16 million agricultural workers would die of AIDS in 25 African countries with high rates of HIV prevalence between 2000 and 2020 [57]. Low agricultural production and food insecurity translates into increased poverty among the local communities. Households which have lost their breadwinners through HIV/AIDS pandemic remain with no option for meeting their subsistence and income needs. They, therefore, switch to coping strategies that are unsustainable and ecologically destructive such as killing of wildlife species and clearing of habitats.

4.3.3. *Overexploitation of natural resources for medicinal use*

Available research-based literature indicates that HIV/AIDS had had some serious environmental implications through overexploitation of species and habitat destruction [55]. In Tanzania, prevalence of HIV/AIDS pandemic has roused beliefs that have contributed to these problems. A number of traditional healers are capitalizing on pandemic by claiming that they can treat the pandemic and related opportunistic and chronic diseases that western trained doctors cannot. For instance, in the past, poaching of giraffe was not an issue that could draw considerable conservation or management attention among the protected area managers. However, of recent it is becoming a major issue following a belief among the people that brain and bone-marrow from this species can cure HIV/AIDS. In the period between 2004 and 2008, mass poaching of giraffes was reported in Monduli District and the West Kilimanjaro Wildlife Corridor - striding between Arusha and Kilimanjaro National Parks [58, 59]. In 2011, a retired pastor in Samunge Village of Loliondo Division, Ambilikile Mwasapile, claimed that he was ordered by God through a dream to dispense the herb, *Carisa edulis*, to heal the sick suffering from all chronic diseases including AIDS, diabetes, and asthma. The publicized news about miracle cure caused an influx of thousands of people from all over East Africa. A cup (or *Kikombe*) of the herbal concoction was regarded as a sufficient dose for all diseases. Serengeti and Ngorongoro Conservation Area and Loliondo Game Controlled Area, which are close to the village suffered through habitat destruction (deforestation for firewood and physical impacts of vehicles) and pollution (human wastes and garbage) as roads to Samunge village pass through these protected areas (Figure 6).

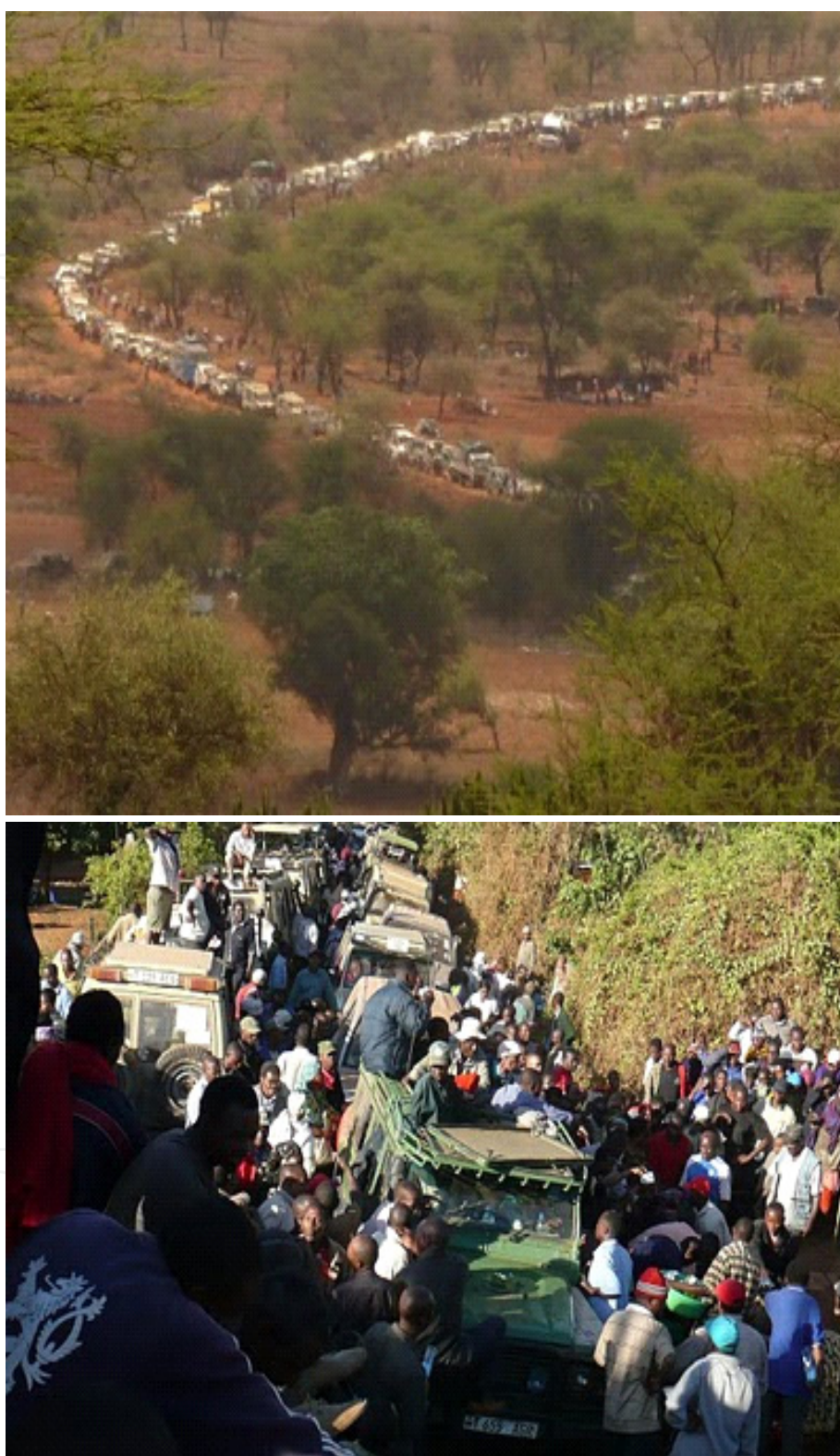


Figure 6. Vehicles going to Samunge village and people queuing for herbal concoction from a retired Lutheran Pastor, Ambilikile Mwasapile, who claimed to have received revelation of medicine from God through a dream that can cure all chronic diseases including AIDS. The queues of vehicles with patients who were waiting to drink the concoction reached up to 46-kilometre long. On average, over 4000 patients were served per day.

4.4. Political instability/civil wars

Political instability - defined as the unsteadiness in governments, regime changes and the insecurity that the society receives out of these changes in a nation or in a region - is endemic to many African countries. The causes of political conflicts and instability in Africa have political, economic and social-cultural dimensions [60, 61]. Political causes of conflicts and instability include the struggle for power; lack of visionary leadership; external influence; lack of good governance and transparency; and abuse of human rights. Economic causes include a deterioration and deep malaise of the economy, widespread poverty and a large pool of unemployed, landless and aimless youth; inequitable distribution of resources and national wealth and the negative effect of the external debt burden and the international financial system. Social and cultural causes include social inequality; system of exclusion and ethnic hatred; role of the political class in the manipulation of ethnic and regional sentiments; cultural detachment and the search for identity with extra-African culture; and defective educational system [60, 61]. While some causes of instability are purely internal and portray specific sub-regional dynamics, others have a significant international dimension [61]. International interests have often been a cause of conflicts for political and economic reasons. As a result many countries endowed with abundant natural resources are subjected to higher risk of civil wars making these countries' resources a curse instead of being a blessing.

4.4.1. Reduced revenues from tourism sector

Political instability is bad news for a country's tourism industry, even if no tourist ever becomes physically harmed or killed. This is due to natural sensitivity of tourists to events of political instability and violence in their holiday destinations. Political instability and violence jeopardize a relaxed and unconcerned holiday [62]. Political violence forces the tourists to choose an alternative destination with similar characteristics but in a more stable condition. Official authorities in the countries where tourists originate often issue an advice to their citizens against traveling to destinations characterized by the widespread and prolonged violence. Since tourism is the major source of funding of the conservation activities in the protected areas it is apparent that these activities will be affected once the country or its neighbours get into political turmoil. Examples from Tanzania and other countries in East Africa corroborate this reality. For example, bombing of American embassies in Dar es Salaam and Nairobi in 1998 affected tour business and caused a drastic drop of inquiries about holidaying in Tanzania with some potential customers who had already booked for safaris cancelling their bookings [25]. In Kenya, tourism industry suffered 90% drop in arrivals following the 2007 Post Election Violence [63]. Following its land reform programme, western countries labeled Zimbabwe as a dangerous place for tourist to visit. This negative image imposed on Zimbabwe reduced the tourism revenues notably from US\$700 million in 1999 to US\$71 million in 2003. As a result, over 80% of the country's large game in private conservancies was illegally hunted [64].

4.4.2. Increased poverty and divergence of government priority to strengthen military activities

It is irrefutable that neither individuals nor government agencies and other potential stakeholders can competently concentrate in planning and executing conservation programmes in an environment of war and political turmoil. Furthermore, economic activities can hardly proceed harmoniously in this environment. It is, therefore, likely that most of the people around the protected areas are subjected to hunger and poverty, a scenario which may force them to engage in poaching of wildlife resources from the protected areas. This problem may be simplified by the fact that during the war, law enforcement cannot be conducted efficiently. Experience has also shown that, governments' priority shifts to political crises, leaving other sectors including conservation unsupported. In some countries such as Rwanda, Uganda, DRC, Mozambique and Southern Sudan, protected areas and wildlife species have been used to support the soldiers through provision of shelter and bush meat. In such situation it becomes very difficult to manage the protected areas.

4.4.3. Human population growth

Civil wars are a major population push factor from areas where wars are waged to areas where peace and tranquility prevail. Tanzania, unlike its neighbours had never experienced the civil wars but the impacts of these wars had been felt in its protected areas and, conservation sector in general. Civil wars and political instability contribute to population growth through influx of refugees. For example, political instability in Rwanda, Burundi and the Democratic Republic of Congo in 1990s caused an influx of more than a million refugees at one time. This had far-reaching effects by causing overexploitation of natural resources and environmental degradation in and around the protected areas located in the western part of the country (including Burigi, Biharamulo, Ibanda and Rumanyika Game Reserves) as expounded below:

4.4.4. Illegal hunting

The prolonged presence of refugees in western Tanzania and possession of sophisticated firearms caused rampant poaching of wildlife species for meat [65 - 69]. Essentially, demand for wild meat has been driven partly by insufficient refugee food rations that failed to supply meat protein [69]. An average number of wild animals which were killed from the game reserves every day to supply animal protein were estimated at 100 [65]. Statistics indicate that majority of the arrested poachers were refugees. In Kagera Region, 87% of arrested poachers in the mid-1990s were refugees [69]. In Ibanda and Rumanyika Game Reserves, refugees arrested as poachers exceeded 60% [65]. Proximity to Great BENACO Refugee Camp made Burigi Game Reserve suffer most. Over 3,000 poachers were arrested in a year period in this Reserve. These illegal activities associated with refugees resulted to a dramatic decline of wildlife species. For, example, animal census conducted by Tanzania Wildlife Conservation Monitoring (TWCM) in Burigi-Biharamulo Game Reserves in 1990 and 1998 indicated that the reserves had lost about 90% of the populations of 13 ungulates (Table 2).

s/n	Animal species	1990 Estimates	1998 Estimates	% loss
1	Bushbuck (<i>Tragelaphus scriptus</i>)	229	18	92
2	Eland (<i>Tragelaphus oryx</i>)	878	237	73
4	Impala <i>Aepyceros melampus</i>)	5,130	2,795	56
5	Lichtenstein's Hartebeest (<i>Alcelaphus lichtensteini</i>)	324	0	100
6	Reedbuck (<i>Redunca redunca</i>)	147	98	33
7	Roan Antelope (<i>Hippotragus equines</i>)	466	15	97
8	Sable Antelope (<i>Hippotragus niger</i>)	279	32	89
9	Sitatunga (<i>Tragelaphus spekei</i>)	490	0	100
10	Topi (<i>Damaliscus korrigum</i>)	6,399	160	97
11	Waterbuck (<i>Kobus ellipsiprymnus</i>)	822	94	89
12	Warthog (<i>Phacochoerus aethiopicus</i>)	2,628	71	97
13	Zebra (<i>Equus burchelli</i>)	6,552	606	91

Source: TWCM [70, 71].

Table 2. Comparison of 1990 and 1998 wet season estimates for common wildlife species in Burigi-Biharamulo Game Reserves



Figure 7. Illegal hunting for bush meat is important coping strategy against poverty

The impacts of refugees were also noted in Gombe National Park. Numbers of several wildlife species including buffalo, zebra, bushbuck, and duiker (*Cephalophus* spp.) were reported to have declined notably [69]. Also noted in southern portion of this park was a considerable decrease of the population of chimpanzee (*Pan Troglodyte*) attributed to proximity of the area with large Congolese immigrants, who traditionally eat primate meat [69].

4.4.5. Habitat destruction

Along with illegal hunting, refugees had a profound impact on wildlife habitats. Deforestation caused scarcity of fuel resources, land degradation, destruction of water sources and, consequently, encroachment into protected areas. At the peak of the Rwanda refugee crisis, daily consumption of firewood for camps in the Kagera region alone was about 1,200 tons [66]. Generally, an average of 300 metric tons of fuel wood were consumed per day in 1997 [65]. The impacts of deforestation extended up to 20km away from the camps. Destruction or deforestation in BENACO area was estimated at 960 km² of land. Aerial photos of the affected region taken in 1996 showed that some 225km² and roughly 470km² of land were completely and partially deforested, respectively [65].



Figure 8. Refugees fleeing civil wars from their countries contribute to population increase and demand for resources at the destinations where they settle.

5. Conclusion and the way forward

The reviews presented in this chapter provide unquestionable reality that global economic recession, climate change, HIV/AIDS pandemic and political instability are potential factors, among many others, that undermine the efforts geared towards the management of the protected areas. There is direct and indirect links between these issues and loss of wildlife habitats and species in many protected areas. It is, therefore, imperative that these issues are accorded adequate priority by mainstreaming them into policies and management plans of the protected areas and conservation agencies. The effective strategies for addressing these issues should be developed and form a part of management plans for protected areas. The following are some specific recommendations for each of the issues.

5.1. Economic recession

The financing of protected areas in Tanzania heavily relies on international tourists and donors. However, as shown earlier, these sources are vulnerable to a number of factors including global economic recessions. Unfortunately, Tanzania lacks preparedness mechanisms to offset the effects of economic recessions in protected areas. This deficiency should be addressed. The possible approach is to establish the sustainable financing mechanisms that will guarantee the continued existence and integrity of the country's protected areas. The following actions adopted from Runyoro and Kideghesho [25] are recommended:

- Development of the "Conservation Trust Fund". Trust funds have been established in many developing countries over the past decade as a way of providing long-term funding for protected areas. Trust funds are typically legally independent institutions managed by independent boards of directors and have a permanent endowment that is supported through grants.
- Tanzania should be promoted together with other East African Community countries as one tourism destination and an elaborate and sustainable tourism for domestic, regional and African Continent citizens should be promoted and encouraged to visit Tanzania's attractions more frequently as much as the government commits itself to improving infrastructure and services along with maintaining peace and tranquility.
- The development of a revenue retention scheme similar to that of Selous Game Reserve that would increase the local capacity of the conservation agencies to manage the protected areas under their jurisdiction.
- The Government of Tanzania should consider relieving taxing government organizations entrusted to manage the protected areas in order to improve the tourism industry as the act of taxation has become a burden and an impediment to ensuring high class conservation of these resources.

5.2. Climate change

The problem of climate change and its potential impacts on protected areas can be addressed by adoption of a variety of mitigation and adaptation strategies. The possible strategies include:

- The protected area and conservation managers should be familiar and understand the importance and relevance of climate change and adaptation. This may necessitate capacity building through offering training that will equip the managers with relevant skills and knowledge. This will enable them to critically analyze the current exposure to climate shocks and stresses, and provide a model-based analysis of future impacts of the problem. Capacity can be developed through: briefings; training materials; short courses for staff and partners; and regular knowledge and information exchange between staff and partners working in different sectors and in 'lessons learnt'.
- Protected area and conservation managers in collaboration with other stakeholders should work out the strategies for reducing vulnerability to climate change as one of the priority agenda. To this end, the protected area managers, conservation agencies and other stakeholders must focus on building adaptive capacity, particularly to the most vulnerable people; and, in some cases, on reducing exposure or sensitivity to climate

impacts. The precaution should be taken to ensure that development initiatives do not inadvertently increase vulnerability. Effective reduction of vulnerability will reduce much of the pressures in protected areas from the people who would look at protected areas as the only possibility for their survival.

5.3. HIV/AIDS pandemic

The damaging impacts of HIV/AIDS pandemic on conservation sector and protected areas prompts the need to rank this challenge among the top priorities in the management plans of the respective protected areas. The following actions should be observed:

- The protected area managers and conservation agencies should mainstream HIV/AIDS into their policies and management plans. UNAIDS and World Bank [72] define mainstreaming HIV/AIDS as the process that enables the actors to address the causes and effects of HIV/AIDS in an effective and sustained manner, both through their usual work and within their workplace. It means “wearing AIDS glasses” while working in all sectors and at all levels. Essentially, mainstreaming HIV/AIDS means all sectors determining: the ways through which they may contribute to the spread of HIV/AIDS pandemic; the ways in which the epidemic is likely to affect their sector's goals, objectives and programmes and where their sector has a comparative advantage to respond to and limit the spread of HIV and to mitigate the impact of the epidemic [73].
- Ensure that all factors driving the HIV/AIDS epidemic such as poverty and gender inequalities are sufficiently addressed by the management authorities of the protected areas, conservation agencies and the government. This may involve developing policies that address gender equality and human rights along with adopting sustainable poverty reduction strategies that will strengthen people's livelihoods and therefore preempt the need to obtain resources from protected areas illegally and unsustainably.
- Mobilizing the public and private stakeholders to actively take part in the implementation of strategies aiming at fighting the epidemic in and around the protected areas. The strategies, among others, should include promotion of high level advocacy and education on HIV/AIDS pandemic, protection of human and communal rights of people infected and affected with HIV/AIDS, enhancing health care and counseling of HIV/AIDS patients, ensuring the welfare of the bereaved orphans and survivors of HIV/AIDS victims and handling of social, economic, cultural and legal issues related to this epidemic.

5.4. Political instability

Detrimental impacts caused by civil wars in protected areas through degradation and loss of biodiversity, calls for adoption of a number of strategies –those required to prevent occurrence of conflicts and political instability as well as those required to mitigate the problems and impacts caused by these situations(in case they occur). The following are possible strategies:

- Strategies for conflict prevention and peace building should be sought. One way towards this end is to ensure that the principles of good governance and accountability are observed by all countries and all sectors. International community, when necessary,

should intervene to fight social vices which can lead to civil wars such as inequalities, injustice, corruption, nepotism etc. Furthermore, in order to ensure that peace and tranquility are sustained for longer time there is a need for establishment of a global network on conflict prevention and peace education in collaboration with relevant ministries and organizations in several countries. Civil societies and religious organizations, among others, should take a lead to this end.

- The conservation community should view the problem of refugees, not only as political, but also as ecological challenge. Therefore, there is a need for conservation authorities to collaborate with other stakeholders to ensure that the ecological problems brought by refugees in protected and adjacent areas are addressed.
- Conservation managers should assume a new role as advocates of peace at local, regional and global levels. It is true that historically the impacts of political instability in Tanzania have been felt in the protected areas located in the periphery regions as the problem has often been emanating from the neighbouring countries. This is due to the fact that, for years, Tanzania has enjoyed peace and tranquility and, therefore, internal political environment had rarely seemed to affect the management of protected areas. However, this scenario should not be considered as a prerogative to Tanzania. The fact that the political climate and socio-economic and ecological factors are changing may change the situation to worse if pragmatic measures will not be taken to cope and adapt to these changes.
- The international community should ensure that all factors driving the refugees to behave unsustainably by poaching and destroying habitats are adequately addressed. These entail provision of adequate food and alternative fuel for cooking and heating.
- When the problem of refugees arises, the government and other stakeholders should work out the logistics to distribute the refugees to different parts of the country in order to minimize pressure on resources and habitats caused by concentration of refugees in one place.

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6. References

- [1] IUCN. Guidelines for Protected Area Management Categories. Gland and Cambridge: IUCN; 1994.
- [2] Lopoukhine N. Protected areas — For Life's Sake. In: Secretariat of the Convention on Biological Diversity (Ed). Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. Montreal: Technical Series; 2008 p. 1-3.
- [3] Scherl L.M. and Emerton L. Protected areas and Poverty Reduction. In: Secretariat of the Convention on Biological Diversity (Ed). Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. Montreal: Technical Series; p 4-18.

- [4] WWF International. Guidelines for Community-based Ecotourism Development. Gland: WWF International;2001.
- [5] Mitchell J, Ashley C. Can Tourism Reduce Poverty in Africa? ODI Briefing Paper. Overseas Development Institute 2006; www.odi.org.uk/publications/briefing/bp_March06_Tourism1-web.pdf. (accessed 10 May 2012).
- [6] Okayasu S. The Status of Ecotourism in the Eastern Arc Mountains of Tanzania. MSc. Thesis, Imperial College London; 2008.
- [7] UNWTO (2007) Tourism Highlights, Edition 2007. UNWTO Tourism Highlights. United Nations World Tourism Organization.
- [8] IUCN (World Conservation Union). 1996 Redlist of Threatened Species. IUCN;1996. www.iucnredlist.org. (accessed 20 March 2012)
- [9] IUCN (World Conservation Union). 2008 Redlist of Threatened Species. IUCN;2008. www.iucnredlist.org. (accessed 20 March 2012)
- [10] Cadman, M. Poachers target elephants, rhinos. 2007;Independent Online. [Online]. Available: <http://www.iol.co.za/in> (accessed 20 October 2011)
- [11] UNEP. World Database on Protected Areas Annual Release. Cambridge:UNEP-WCMC; 2010. <http://www.wdpa.org/AnnualRelease.aspx#expandText4> (accessed 10 June 2012).
- [12] CBD. 2010 Biodiversity Target. CBD; 2010. <http://www.cbd.int/2010-target/>. (accessed 10 June 2012).
- [13] UNEP-WCMC. World Database on Protected Areas. Cambridge:. UNEP-WCMC;2009. <http://www.wdpa.org/>. (accessed June 10, 2012).
- [14] Mora C, Sale P. Ongoing Global Biodiversity Loss and the Need to Move Beyond Protected Areas: A Review of the Technical and Practical Shortcoming of Protected Areas on Land and Sea. Marine Ecology Progress Series. 2011;(434):251-266.
- [15] URT. Wildlife Policy of Tanzania. Dar es Salaam:Government Printer;1998.
- [16] Bonner R. At the Hand of Man: Peril and Hope for Africa's Wildlife. New York:Alfred A. Knopf;1993.
- [17] Neumann RP. Political Ecology of Wildlife Conservation in the Mt Meru Area of Northern Tanzania. Land Degradation and Rehabilitation 1992;3:99 – 113
- [18] Nash RF. Wilderness and the American Mind. NH:Yale University Press;1982.
- [19] UNEP-WCMC. World Database on Protected Areas. Cambridge:. UNEP-WCMC;2005. <http://www.wdpa.org/>. (accessed June 10, 2012).
- [20] URT. Wildlife Policy of Tanzania. Dar es Salaam:Government Printer;2007.
- [21] Kideghesho JR, RunyoroVA, Nyahongo JW, Kaswamila A. 50 years of Arusha Manifesto and the future of wildlife conservation in Tanzania. 2011: Conference Proceedings December 6-8, 2011, Arusha International Conference Centre, Arusha, Tanzania. Arusha:Tanzania Wildlife Research Institute (TAWIRI);2011.
- [22] World Bank. Global Development Finance 2008. Washington DC: World Bank;2008.
- [23] Massa I, te Velde WD. The Global Financial Crisis: Will Successful African Countries be Affected?’, ODI Background Note, 8 December. London: Overseas Development Institute;2008.
- [24] Lunogelo HB, Mbilinyi A, Hangi M. The Global Financial Crisis and Tanzania: Effects and Policy Responses. Final Report submitted to the Economic and Social Research Foundation (ESRF). Dar es Salaam: ESRF 2009.

- [25] Runyoro VA, Kideghesho JR. Coping With the Effects of Global Economic Recession on Tourism Industry in Tanzania: Are We Prepared? *Journal of Tourism Challenges and Trends* 2010; 3(1)95-110.
- [26] Ngowi HP. The Current Global Economic Crisis and Its Impacts in Tanzania. *African Journal of Business Management* 2010;4(8):1468-1474
- [27] Kideghesho, JR, Røskoft, E, Kaltenborn, BP, Tarimo, TCM. Serengeti shall not die: Can the ambition be sustained? *The International Journal of Biodiversity Science and Management* 2005;1(3)150-166
- [28] Loibooki M, Hofer H, Campbell KLI, East ML. Bushmeat Hunting by Communities Adjacent to the Serengeti National Park, Tanzania: The Importance of Livestock Ownership and Alternative Sources of Protein and Income. *Environmental Conservation* 2002; 29:391–398.
- [29] Thirgood S., Mlingwa C, Gereta E, Runyoro VA, Malpas R, Laurenson K, Borner M. Who Pays for Conservation? Current and Future Financing Scenarios for the Serengeti Ecosystem. In: Sinclair ARE, Packer C, Mduma SAR, Fryxell JM (Eds.). *Serengeti III. Human Impacts on Ecosystem Dynamics*. Chicago:University of Chicago Press; 2008. p. 443-469.
- [30] TANAPA. TANAPA TODAY: A quarterly Publication of Tanzania National Parks. Arusha: TANAPA;2009.
- [31] NCAA. (2009). Mid-Term Expenditure Framework (MTEF) Budget 2009/2010. Arusha; Ngorongoro Conservation Area 2009.
- [32] Emerton L., Bishop J, Thomas L. Sustainable Financing of Protected Areas: A Global Review of Challenges and Options. Gland and Cambridge: IUCN; 2006.
- [33] Hance, J. Economic Crisis Threatens Conservation Programs and Endangered Species. An Interview with Paula Kahumbu of WildlifeDirect on August 17, 2009. http://news.mongabay.com/2009/0817-hance_kahumbu.html. (accessed on 12 June 2012).
- [34] Butler, R. Economic Crisis Hits Conservation but May Offer Opportunities: An Interview with Mark Tercek, the President and CEO of the Nature Conservancy, One of the World's Largest Conservation Group on March 03, 2009. http://news.mongabay.com/2009/0303-tercek_interview.html. (accessed on 12 June 2012).
- [35] Little PD. The Link Between Local Participation and Improved Conservation: A Review of Issues and Experiences. In: Western D., Wright, M. and Strum, S. (Eds). *Natural Connections: Perspectives in Community Based Conservation*. Washington DC: Island Press;1994. p. 347-372.
- [36] Wells M, Brandon K. People and Parks: Linking Protected Area Management with Local Communities. Washington DC: World Bank; 1992.
- [37] Western D. The Background to Community-based Conservation. In: Western D., Wright, M. and Strum, S. (Eds). *Natural Connections: Perspectives in Community Based Conservation*. Washington DC: Island Press;1994. p. 1-12.
- [38] Yeager R. Land Use and Wildlife in Modern Tanzania. In: R. Yeager, Miller NN (Eds.). *Wildlife, Wild Death: Land Use and Survival in Eastern Africa*. New York: State University of New York Press; 1986. p. 21-65.

- [39] Leader-Williams N, Albon SD, Berry PSM.. Illegal Exploitation of Black Rhinoceros and Elephant Populations: Patterns of Decline, Law Enforcement and Patrol Efforts in Luangwa Valley, Zambia. *Journal of Applied Ecology* 1990;27:1055–1087.
- [40] Baldus R, Kibonde B, Siege L. Seeking conservation partnership in the Selous Game Reserve, Tanzania. *Parks* 2003;13:50–61.
- [41] URT. A Review of the Wildlife Sector in Tanzania. Volume I: Assessment of the Current Situation. Dar es Salaam: Wildlife Sector Review Task Force; 2005
- [42] Nelson F, Nshala R, Rogers WA. The Evolution and Reform of Tanzanian Wildlife Management. *Conservation and Society* 2007;5:232-261
- [43] Dublin HT, Douglas-Hamilton I. Status and Trends of Elephants in the Serengeti-Mara Ecosystem. *African Journal of Ecology* 1987;25:19-33.
- [44] Cumming DHM, Du Toit, RF and Stuart SN. African Elephants and Rhinos: Status Survey and Conservation Action Plan Volume 10 of IUCN/SSC Action Plans for the Conservation of Biological Diversity. Gland: IUCN;1990.
- [45] Sas-Rolfes M. Environment briefing paper: Does CITES Work? Four Case Studies. London: Institute of Economic Affairs; 1997.
- [46] IPCC (Intergovernmental Panel on Climate Change) . Climate Change 2001: Synthesis Report Summary for Policy Makers. Third Assessment. <http://www.ipcc.ch/pdf/climate-changes-2001/synthesis-spm/synthesis-spm-en.pdf>. Wembley: IPCC;2001. (accessed 22 June 2012)
- [47] Ehrhart C, Twena M. Climate Change and Poverty in Tanzania: Realities and Response Options for CARE. Background Report to CARE International Poverty-Climate Change Initiative. Dar es Salaam: CARE;2006.
- [48] Kideghesho JR. Wildlife Conservation and Local Land Use Conflicts in Western Serengeti Corridor, Tanzania. PhD Thesis, Norwegian University of Science and Technology;2006.
- [49] Kashaigili JJ, Rajabu K, Masolwa P. Freshwater Management and Climate Change Adaptation: Experiences from the Great Ruaha River Catchment in Tanzania. *Climate and Development* 2009;1(3): 220-228.
- [50] Hemp A. Climate Change-Driven Forest Fires Marginalise the Impact of Ice Cap Wasting on Kilimanjaro. *Global Change Biology* 2005;11:1013-1023.
- [51] Nkwame VM. Tractors Used to 'Game-Drive' Tourists in Serengeti: Tour Operators Want TANAPA to Take Responsibility on Poor Park Roads. www.arushatimes.co.tz/2007/3/Tourism_1.htm (accessed 30 June 2012).
- [52] Arusha Times. Deadly Insects Plagued Crater. <http://www.ntz.info/gen/n00103.html>. (accessed 30 June 2012).
- [53] Mijingo, H. Effect of Climate Change on Tanzanian Wild Species. 2011; <http://www.dailynews.co.tz/feature/?n=26459&cat=feature> (accessed 18 May 2012).
- [54] Ngoti PM, Baldus RD. HIV/AIDS and the Wildlife Sector In Tanzania. Tanzania Wildlife Discussion Paper No.38. Dar Es Salaam: Wildlife Division;2004.
- [55] UNAIDS. The Impact of AIDS on People and Societies. 2006 Report on the Global Aids Epidemic. UNAIDS;2006.
- [56] De Souza R, Williams JS, Meyerson FAB. Critical Links: Population, Health, and the Environment. *Population Bulletin* 2003;58(3) 17-28

- [57] FAO. "AIDS—A Threat to Rural Africa." FAO (Food and Agriculture Organization) Fact Sheet" www.fao.org/Focus/E/aids6-e.htm, (accessed June 12, 2012).
- [58] The Arusha Times. National Pride in Jeopardy. *The Arusha Times*. 4-10, September, 2004. www.arushatimes.co.tz/2010/1/front_page_1.htm, (accessed 21 April 2012).
- [59] The Arusha Times. Tanzania: Tale of Momella's Giraffes without Tails. www.arushatimes.co.tz/2010/1/front_page_1.htm, (Accessed 21 April 2012).
- [60] Bujra A. African Conflicts: Their Causes and Their Political and Social Environment. *DPMF Occasional Paper*, No. 4. Development Policy Management Forum (DPMF). Addis Ababa: United Nations Economic Commission for Africa (UNECA); 2002.
- [61] Adebayo A., editor. *Comprehending and Mastering African Conflicts*. London: Zed Books; 1999.
- [62] Neumayer E. The Impact of Political Violence on Tourism: Dynamic Cross-National Estimation. *Journal of Conflict Resolution* 2004; 48(2):259-281
- [63] Travel News. Kenya's Tourism Industry Suffers 90 per cent Drop in Arrivals. [//www.monstersandcritics.com/lifestyle/travel/news/article_1390983.php/Kenyas_tourism_industry](http://www.monstersandcritics.com/lifestyle/travel/news/article_1390983.php/Kenyas_tourism_industry) (accessed 28 May 2012).
- [64] ZimConservation. Report no. 1. 2004
http://zimconservation.com/?page_id=133 (accessed 8 June 2008).
- [65] URT. Keynote Address by Honourable Mizengo Peter Pinda (MP), Prime Minister of the United Republic of Tanzania at the Second United Nations High Commissioner for Refugees' Dialogue on Protection Challenges on the Theme of Protracted Refugee Situations in Geneva, December 10, 2008. Dar es Salaam: URT, 2008
- [66] UNHCR. Environment in UNHCR. Refugee affected areas. UNHCR Engineering and Environmental Services Section. Switzerland. <http://www.unhcr.org/protect/PROTECTION/3b039f3c4.html>. (accessed on 3 June 2012).
- [67] Jambiya G. Milledge SAH and Mtango, N. '*Night Time Spinach*': Conservation and Livelihood Implications of Wild Meat Use in Refugee Situations In North-Western Tanzania. Dar es Salaam: TRAFFIC East/Southern Africa; 2007.
- [68] Berry L. The Impact of Environmental Degradation on Refugee-Host Relations: A Case Study from Tanzania. Switzerland: Policy Development and Evaluation Service, United Nations High Commissioner for Refugees; 2008.
- [69] Jambiya G., Milledge SAH., Mtango, N, Hurst A. Wild Meat and Food Security in Refugee Hosting Areas. Dar es Salaam: TRAFFIC East/Southern Africa; 2008.
- [70] TWCM (Tanzania Wildlifer Conservation and Monitoring). Wildlife Census Burigi Biharamulo – 1990. Arusha: TAWIRI; 1991.
- [71] TWCM (Tanzania Wildlifer Conservation and Monitoring). Wildlife Census Burigi Biharamulo – 1998. Arusha: TAWIRI; 1998.
- [72] UNAIDS, World Bank. AIDS, Poverty Reduction and Debt Relief: a Toolkit for Mainstreaming HIV/AIDS Programmes into Development Instruments. Geneva: UNAIDS / WORLD BANK; 2001.
- [73] Elsey H, Kutengule P. Mainstreaming HIV/AIDS in Development Sectors: A Resource Pack for Practitioners and Policy Makers. DFID's HIV/AIDS Knowledge Programme, Liverpool School of Tropical Medicine and Health Economics and HIV/AIDS Research Division. Natal: University of Natal; 2003.