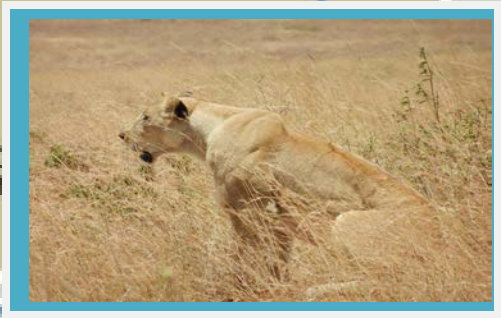


Serengeti-Maasai Mara Ecosystem Transboundary Protection and Monitoring Plan



ACRONYMS

AIS	Alien and Invasive Species
a.m.s.l	Above Mean Sea level
BSAP	Biodiversity Strategy Action Plan
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CFA	Community Forestry Association
CFM	Collaborative Forest Management
CITES	Convention on International Trade in Endangered Species of Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CRM	Collaborative Resource Management
DDPs	District Development Plans
EAC	East African Community
FZS	Frankfurt Zoological Society
IUCN	International Union for Conservation of Nature and Natural Resources
JT-BEPMP	Joint Trans-Boundary Ecosystem Protection and Monitoring Plan of the SMME
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
LATF	Lusaka Agreement Task Force
LVBC	Lake Victoria Basin Commission
MEMR	Ministry of Environment and Minerals Resources
MMMA	Maasai Mara Management Authority
MoU	Memorandum of Understanding
NBSAPs	National Biodiversity Strategy and Action Plans
NCC	Narok County Council
NEMA	National Environment Management Authority
NGO	Non-Government Organization
NMK	National Museums of Kenya
NRM	Natural Resources Management
PAs	Protected Areas
PES	Payment for Environment Services
PFM	Participatory Forestry Management
RAMSAR	The Convention on Wetlands of International importance especially as Waterfowl Habitat
REDD	Reducing Emission from Deforestation and Forest Degradation
SEA	Strategic Environmental Assessment
SMME	Serengeti-Maasai Mara Ecosystem
TBNRM	Trans-boundary Natural Resources Management
TMCC	Trans Mara County Council
TWBHH-MRB	Trans-boundary Water for Biodiversity and Human Health in the Mara River Basin Project
UNCCD	United National Convention to Combat Desertification
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAID	United States Agency for International Development
WCMC	World Conservation Monitoring Centre
WCS	World Conservation Society

WMA Wildlife Management Areas
WMD Wetlands Management Department
WRMA Water Resources Management Authority
WWF World Wildlife Fund for Nature

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EXECUTIVE SUMMARY

The Serengeti Maasai Mara Ecosystem is an important trans-boundary ecosystem between Tanzania and Kenya. In the context of this **Joint Transboundary Ecosystem Protection and Monitoring Plan (JT-BEPMP)** the **Serengeti-Masai Mara Ecosystem (SMME)** is defined as that area located on the south-western Kenya and north-central Tanzania international boundaries, comprising of ecological units within and outside the Protected Area (PA) systems of the Serengeti National Park (SNP) in Tanzania and the Masai Mara National Reserve (MMNR) in Kenya. The **Serengeti is a UNESCO Biosphere Reserve** while the **wildebeest annual migration and crossing of the Mara River was declared “The Eighth Wonder of the World”** in 2011. The SMME is an important water catchment area for Lake Victoria, Tanzania, Kenya, and Africa. Some of the other key values include the natural heritage, biodiversity, and tourism potential. Indeed, the two protected areas in the SMME are the prime tourist attractions in each country. Furthermore, in the context of transboundary issues, the JT-BEPMP, proposed in this report is meant principally to focus on transboundary issues and highlight those aspects of ecosystem protection and monitoring that are best tackled in “a trans-boundary” context while allowing for discussion of those issues that extend well beyond these limits, e.g. the Mau forest, and are closely linked to other issues managed at national level so as to maintain integrity and sustainability of the ecosystem.

Protection of the SMME is presently carried out by Kenya and Tanzania largely independently of each other. Whatever co-ordination there is on transboundary issues is informal and is taken at the initiative of the Wardens in charge of the PAs. On the other hand, the PAs within Tanzania and Kenya face largely similar threats as is clear from their management plans. Hence, protection of one side of the border will not guarantee safety of wildlife populations or ecosystem as a whole therein, justifying the need for collaboration to strengthen ecosystem and biodiversity conservation.

The Lake Victoria Basin Commission (LVBC) through the project “Transboundary Water for Biodiversity in the Mara River Basin (TWBHH-MRB)”, and other projects, has recently supported several studies on the trans-boundary natural resources management issues for the Mara River Basin. Solutions to these issues require institutional transboundary arrangements to be made. The present study required a protection and monitoring plan to be developed. The plan is required to harmonise the approaches to the ecosystem management of the SMME; optimize the use of resources available, and coordinate enforcement activities; identify common constraints to protection and monitoring; spell out the key transboundary issues; and jointly address activities that spill over on either side of the Tanzania – Kenya border.

The overall objective of the current consultancy, therefore, was **to prepare a comprehensive transboundary protection and monitoring plan for the SMME in MRB**. The specific objectives were: to review general management plans prepared by Serengeti National Park; and Maasai Mara Game Reserve; to identify the transboundary issues that the protection and monitoring plan should address in the SMME; to determine monitoring indicators, protocols to be used for measurements in the field and other details for the implementation of the plan; to explore the participation of the local communities in protection and monitoring areas adjacent the protected area components particularly in a transboundary

context; to explore the participation and involvement of other relevant stakeholders such as the police, customs and immigration officials; and to prepare joint protection and monitoring plan for the SMME ecosystem with an action plan for implementation. The work was carried out between July and September 2012, by a **team of consultants of Retouch Africa International (RAI), Nairobi, drawn from both Tanzania and Kenya**. The approach was tailored to cater for a wide range of stakeholders and to ensure community participation in future protection/monitoring activities. Information was gathered using an integrated approach comprising of review of published information and databases, questionnaires, face to face interviews, workshops and focus group discussions.

The proposed trans-boundary ecosystem protection and monitoring plan builds on commitments by Tanzania and Kenya towards the following legal instruments: The EAC/LVBC mandates, where partner states have made a commitment through the Treaty for Establishment of the East African Community, to develop policies and programs aimed at strengthening cooperation. Further, the EAC protocol on Environment and Natural Resources has articles with provisions for the management of trans-boundary resources. Other regional/international policies that support the trans-boundary protection and monitoring plan include the Convention on Biological Diversity (CBD), the UNESCO Convention on the Protection of World Cultural and Natural Heritage, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora.

A review of the existing protection and monitoring systems showed **total lack of formal joint patrol or monitoring plans**. Moreover, in some cases, the basic equipment/ facilities required for monitoring/protection are completely lacking. Trans-boundary protection and monitoring arrangements have, however, been initiated by TANAPA/SENAPA and MMNR/KWS/TMCC with occasional meetings for coordination of patrols and collaboration on cross-border poaching. This initiative covers only a small fraction of the SMME. Moreover, **indicators used for protection and monitoring have not been harmonized to cater for challenges across the international border**. Hence, the following **joint protection and monitoring mechanisms** are proposed:

1. Legislation backup, including establishment of a ***Joint Protected Area Coordination Forum*** to facilitate exchange of suspects and offenders, assignment of specific communication channels/ frequency, and standardization of facilities.
2. **Ranger Based Monitoring (RBM)**, adopted to regularly monitor the transboundary areas by law enforcement staff. This feeds directly into day-to-day management of the PAs and enables surveillance and specific interventions to be based on solid data. Moreover, using the rangers to collect monitoring data alongside the routine protection patrols does not add substantial costs to the exercise.
3. **Involvement and participation of all major stakeholders**, through annual **trans-boundary meetings**. These include representatives of Government Departments, NGOs/ Development Partners, Private sector, Communities in the bordering districts and counties, as well as Universities/research institutions. The local community will be represented by bodies/authorities such as **resource use groups and Local councils**.

4. Joint management of the SMME as one unit in the long term achieved by **developing one management plan for the Serengeti-Maasai Mara Ecosystem.**
5. The Joint Protected Area Coordination Forum should convene sessions four times a year, rotated between Tanzania and Kenya.
6. **Joint Border Surveillance and Patrols** to be conducted along the boundary to curtail illegal activities.
7. **Cross Visits should be facilitated for protected area authorities** to improve understanding of challenges and development of solutions.

The priority thematic areas for monitoring include the following: ungulate migration; habitat connectivity; Water quality and quantity; Fauna and flora; Human activities and their impacts; and land cover and land use. Detailed monitoring indicators and protocols should be agreed in a participatory manner by the implementing agencies, based on the definitions protocols provided in this plan and updated regularly.

An action plan for implementing the trans-boundary monitoring and protection plan of the SMME is proposed. Interventions are proposed in the following key areas:

- **Harmonisation of plans, policy, legal and institutional frameworks,**
- Joint Patrols,
- Surveillance on diseases and Invasive species (human and wildlife)
- Capacity Building,
- Cross-border movement of people and equipment,
- **Facilitate implementation of habitat integrity protection - grassland, savanna, riverine forests, migratory routes,**
- **Community involvement,**
- Infrastructure Development,
- Setting Monitoring and Evaluation standards,
- Developing **harmonisation tools/ protocols for data collection,**
- **Inter-Ministerial Committee for policy guidance,**
- Response to Crisis/ Emergency natural disasters, and
- **Communication.**

It is proposed that LVBC/ TWBHH-MRB kick start implementation of this plan as convener and coordinating institution. The roles of coordination can then be devolved to the relevant institutions with time.

JOINT TRANS-BOUNDARY ECOSYSTEM PROTECTION AND MONITORING OF THE SERENGETI-MAASAI MARA

1.0 GENERAL BACKGROUND

1.1 The Serengeti-Maasai Mara Ecosystem

1.1.1 Location and Area Definition

The Terms of Reference (ToR) of the consultancy specified “consultancy will be carried out in Mara River basin; and in particular within Serengeti and Maasai Mara Ecosystem”.

Notwithstanding the ToR statement, there is the question about the extent of the geographic area that should be covered by the proposed Joint Transboundary Ecosystem Protection and Monitoring Plan that is ecosystem-based. While the Mara River Basin (MRB) is a logical unit to consider from the standpoint of water resource management, its boundaries (which relate to the natural watershed) are not contiguous with those of the whole ecoregion to which both the Serengeti and Mara grasslands (Fig 1.1) belong. Also, the Serengeti extends well beyond the basin – only 10% of the Serengeti is in the Mara River basin.



Figure 1.1 The Mara River and Mara-Serengeti Ecosystem. Source: Wikimedia Common

After discussion it was concluded that in the context of this Joint Transboundary Ecosystem Protection and Monitoring Plan (JT-BEPMP), the Serengeti-Masai Mara Ecosystem (SMME) is defined as an area located on the south-western Kenya and north-eastern Tanzania international boundaries, comprising of ecological units within and outside the Protected Area (PA) systems of the Serengeti National Park (SNP) in Tanzania and the Masai Mara National Reserve (MMNR) in Kenya (Figs 1.2 and 1.3). Further, in the context of transboundary issues, the JT-BEPMP, proposed in this report, is therefore meant principally to focus on transboundary issues and highlight those aspects of ecosystem protection and monitoring that are best tackled in “a trans-boundary” context while allowing for discussion of those issues that extend well beyond these limits and are closely linked to other issues managed at national level so as to maintain integrity and sustainability of the ecosystem.

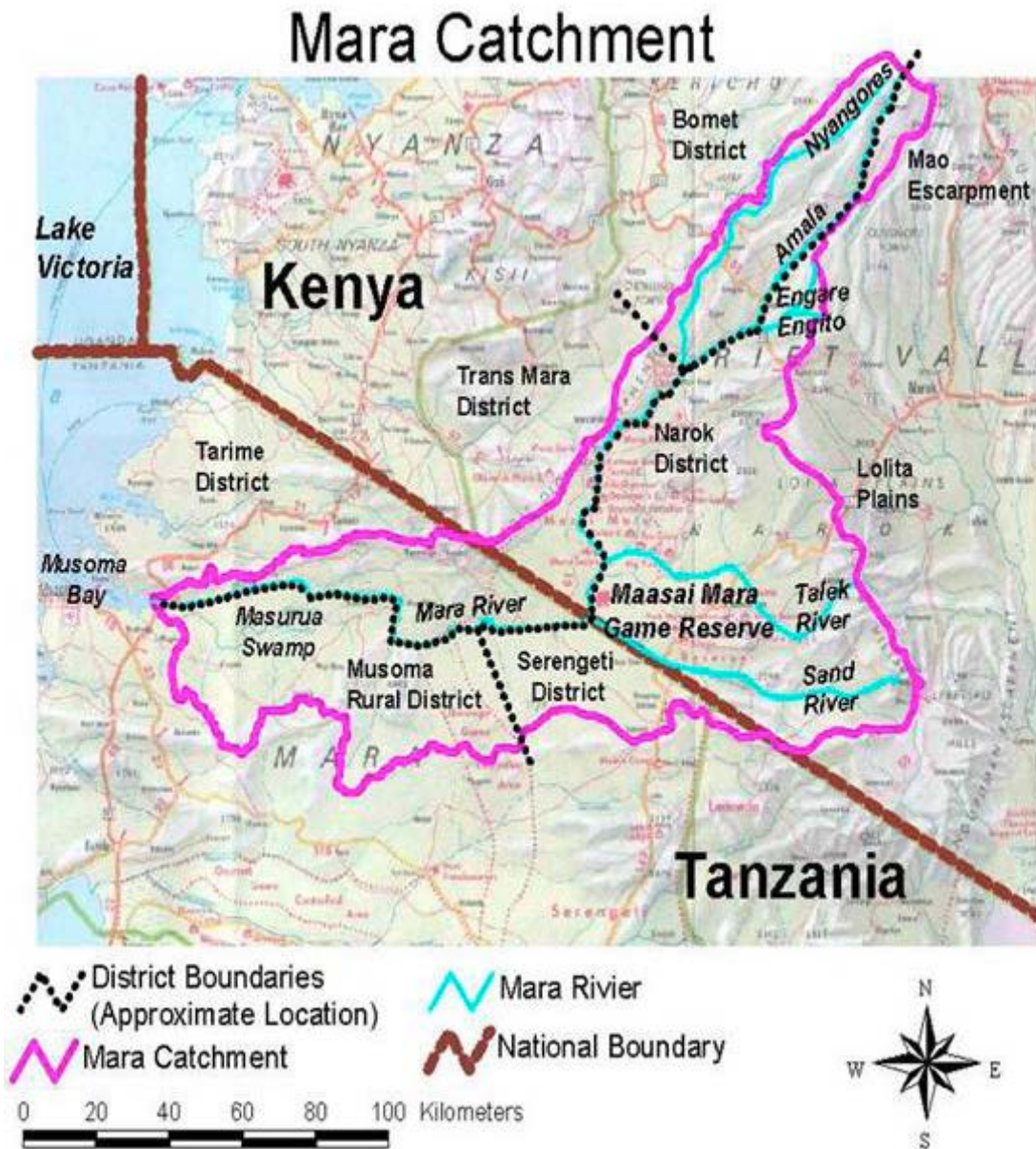


Figure 1.2: Location of the Mara River Basin. Source MRB-SEA



Figure 1.3 Serengeti National Park and Masai Mara National Reserve; and the wildebeest migration as tracked by GPS collared individuals Source TANAPA (SENAPA-GMP) 2005.

1.1.2 Protected Areas:

When it was originally established in 1948 as the “*Mara Wildlife Sanctuary*”, the **Mara** covered only 520 square kilometres of the current area, including the Mara Triangle. The area was extended to the east in 1961 to cover 1,821 km² and converted to a Game Reserve. The Narok County Council (NCC) took over management of the reserve at this time. Part of the reserve was given National Reserve status in 1974, and the remaining 159 km² were handed back to local communities. Further areas were removed in 1976 and 1984 to leave the reserve with the current total area of 1510 sq km.

The TransMara County Council (TMCC) was formed in the western part of the reserve (the Mara Triangle), in 1995, and control was divided between the new council and the existing



Narok County Council (NCC). In May 2001, the not-for-profit Mara Conservancy took over management of the Mara Triangle on behalf of the TMCC.

The MMNR is only a fraction of the Greater Mara Ecosystem, which includes the following Group Ranches: Koiyaki, Lemek, Ol Chorro Oirowua, Olkinyei, Siana, Maji Moto, Naikara, Ol Derkesi, Kerinkani, Oloirien, and Kimintet. The Maasai Mara Conservation area is administered by the Group Ranch Trusts of the Maasai community who also have their own rangers for patrolling the park area. The wildlife roam freely across both the Reserve and Conservation areas which are a continuous wildlife ecosystem.

Saturday Nation(Kenya), 28 July 2012, Page 21

“How Maasai Mara was formed”

In 1942, a Briton named Mr Tempol visited the Mara with the intention of seeing the Maasai people who were living at an area known as Mara Olpurkei, which is now known as Mara Triangle. About six years later, in 1948, Mr Tempol, then the Narok DC, created the Maasai Mara National Reserve as a wildlife sanctuary.

He again visited the area in 1957 to see Maasai. He told this community that the area was infested with tsetse fly (*etorobo*) and ordered the Maasais to leave the area since the *etorobo* was very harmful and could wipe out everything from the land.

When he visited the area for the third time in 1959, Mr Tempol created boundaries after meeting with the Maasai drawn from Enkiu and Olchoro Lolaineng to Kenya-Tanzania boundary.

He once again came back in 1961 and produced an aerial photograph of the area. In August of that year, he ordered all the Maasai to leave the area. They refused to leave saying that it was their ancestral land.

Today, the Maasai Mara National Reserve is one of the best wildlife parks in Africa and is famous for the abundance of lions and the spectacular wildebeest migration. Other than hosting over 95 species of animals and 570 recorded species of birds, the Mara ecosystem has one of the highest lion densities in the world and over two million wildebeest, zebra and Thompsons gazelle migrate annually.

Maasai Mara National Reserve stretches 1,510 square kilometers and rises 1,500 – 2170 meters above sea level. It is managed by Narok and Trans Mara councils.

The **Serengeti National Park** (SNP) was first established as the *Serengeti Game Reserve* in 1929, covering only 228,600 hectares to preserve lions which had previously been viewed as ‘vermin’. An enlarged site was declared a Protected Area in 1949 and, in 1951 the National Park was created with further modifications to its boundaries in 1959. Serengeti National Park is managed by the Tanzanian National Parks Authority (TANAPA).

The SNP is only the core protection zone of the Serengeti Ecosystem. A string of buffer zones surrounds this core area. These are the Ngorongoro Conservation Area, the Mara-Maswa- Grumeti- Kijereshi- and Ikorongo Game Reserves and four different Wildlife Management Areas, including Ikona and Loliondo game controlled area. The Park was nominated as a World Heritage Site in 1981 and in the same year, together with Ngorongoro conservation area, the Serengeti was declared as a Biosphere Reserve. It is realised that only by safeguarding the whole area can the Serengeti Park itself be efficiently protected. The total area of the **Serengeti-Mara Ecosystem** covers more than 25,000 sq. km.

The SNP and the MMNR share several commonalities: (i) The two form a trans-boundary wildlife sanctuary; (ii) they set the scene of the annual world spectacle of wildlife (wildebeest, zebra, Thompson's gazelle, predators, and others) migrations¹ and (iii) are dependent on part of the Mara River Basin (MRB) integrity. The trans-boundary MRB that covers 13,750 sq. km of land is the major source of water resources for the Serengeti Maasai Mara Ecosystem, (SMME)².

The SMME ecosystem is therefore an important trans-boundary ecosystem that is rich in biodiversity, especially large populations of herbivorous ungulates and carnivorous predators. It has the highest concentration of such species in the world. It also forms part of the trans-boundary Mara River basin which is an important watershed feeding the Lake Victoria Basin (Tanzania and Kenya) and the Nile River Basin. The SMME ecosystem is therefore of high importance at local, national, regional and global levels.

Background information about the socio-economic and bio-physical status of SMME for the protection and monitoring plan is based on reports from previous studies in the area. Efforts to document information for the SMME have been made through numerous biodiversity inventories and assessments (see references list).

1.1.3 Geology and Soils

Unfamiliar terms are often used in reports of geology and soils, but geology strongly affects the depth and quality of soil in any locality, and this in turn influences the soil's water retention capacity, drainage, vegetation and land use and susceptibility to erosion. It is therefore vital that this information should be identified, mapped and used in very practical ways to decide on future land use in the SMME.

The underlying strata in the Basin is composed of very old igneous and metamorphic rock of Cambrian and Pre-Cambrian age (>600 million years old) which form part of the 'Basement Complex'. The surface of this ancient landform was heavily eroded and then covered by younger rocks, including lava and other igneous extrusions released during the Tertiary period when volcanoes were active in the Great Rift Valley. The youngest rocks include sedimentary deposits of sand and gravel and other lacustrine sediments.

These basic rock types condition the nature, depth and fertility of soils in the SMME. On the escarpment and rangelands soils of volcanic origin are rich and dark. Lower down, shallow dark reddish brown soils are found which drain freely and are easily eroded if the surface vegetation is removed through cultivation. On the plateau and plains poorly drained grey-brown and dark brown soils support extensive grasslands or sorghum plantations. Finally in the river valleys and low lying wetlands clay soils have accumulated. These are enriched with organic sediment and are initially fertile when first cultivated.

1.1.4 Climate, Hydrology and Water Resources

¹ The SMME is most famous for its wildebeest (1.3m) and zebra migration (0.6m).

² The variation in pasture and water resources between the highlands and plains is one major reason behind the spectacular wildlife migrations in the ecosystem.

The SMME lies just south of the Equator; because of this it receives close to the maximum amount of the sun's energy possible. Temperatures (Fig 1.4) have a constant mean monthly maximum of 27 to 28°C year round. The mean minimum temperature ranges between 16°C in the hot months (October to March) and 13°C in the cooler months of May through August.

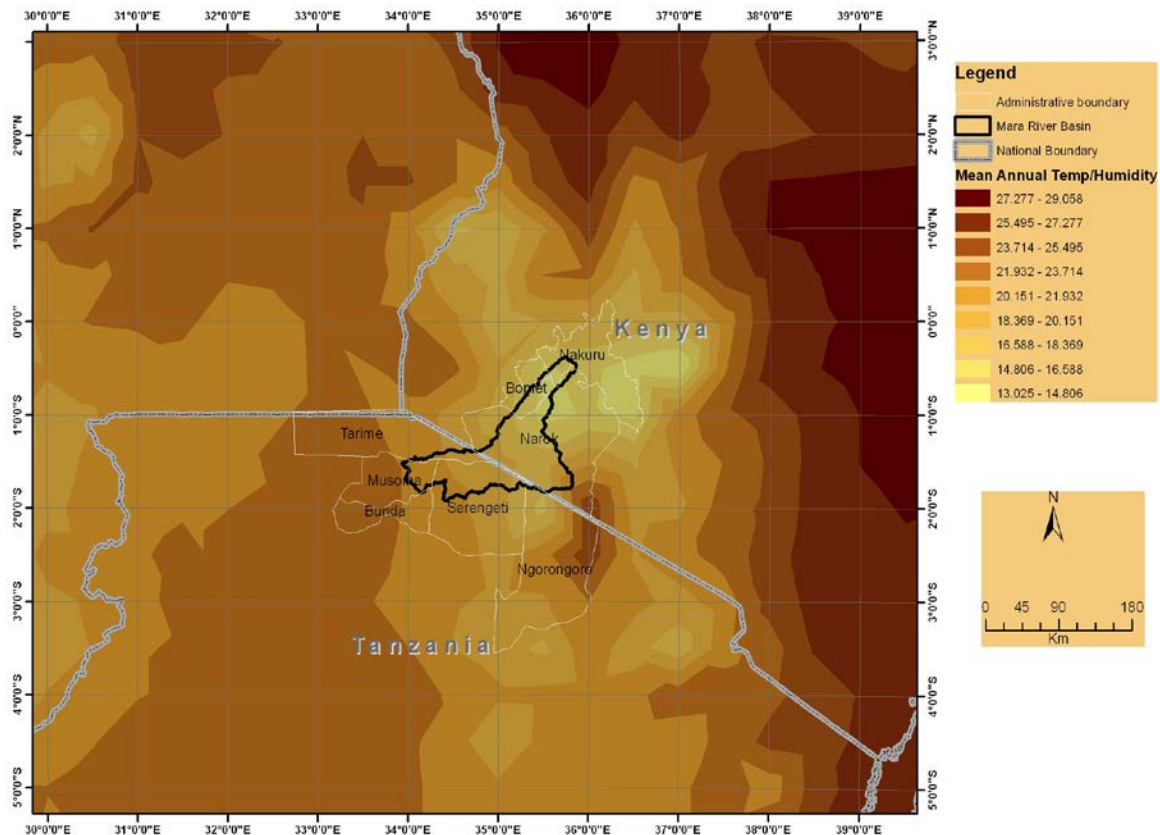


Figure 1.4 Annual Temperatures in the SMME Area. Source: WWF

Rainfall (Fig. 1.5) is governed by relief and the seasonal movement of world air masses which form the inter-tropical convergence zone (ITCZ). This belt of rain-laden winds moves north and south across the equator and brings two main periods of rain between March to June and November-December, although the timing varies with location. The pattern of rainfall is often erratic, with both extreme wet and dry years.

It is speculated that the annual variations are influenced by sun spot activity and international climatic events linked with reversal of the Pacific ocean currents, the El Nino / La Nina effect. It is also highly likely that global warming is beginning to affect both flood and drought frequency and intensity. Highest annual rainfall occurs on the Mau escarpment (averaging 1000-1750mm/yr), with around 900-1000 mm in the middle rangelands and only 500-800mm in the lowlands around Musoma-Mugumu. High temperatures lead to evaporation and transpiration of up to 71% of available water in the savannah region.

The forest cover in the upper catchment plays a crucial role in trapping and absorbing rainwater in the undergrowth and soils from where it percolates as ground water to provide

the sustaining year round base flow in the Mara River. Without this constant supply the Mara, the only perennial river, would also cease to flow in the dry season. This would have devastating consequences for human economic activity and biodiversity. Peak river discharges are created by heavy rains which saturate the ground and cause extensive surface flows. These climatic conditions create a distinct hydrograph with long periods of low flows followed by shorter flooding events as shown in Fig 1.6).

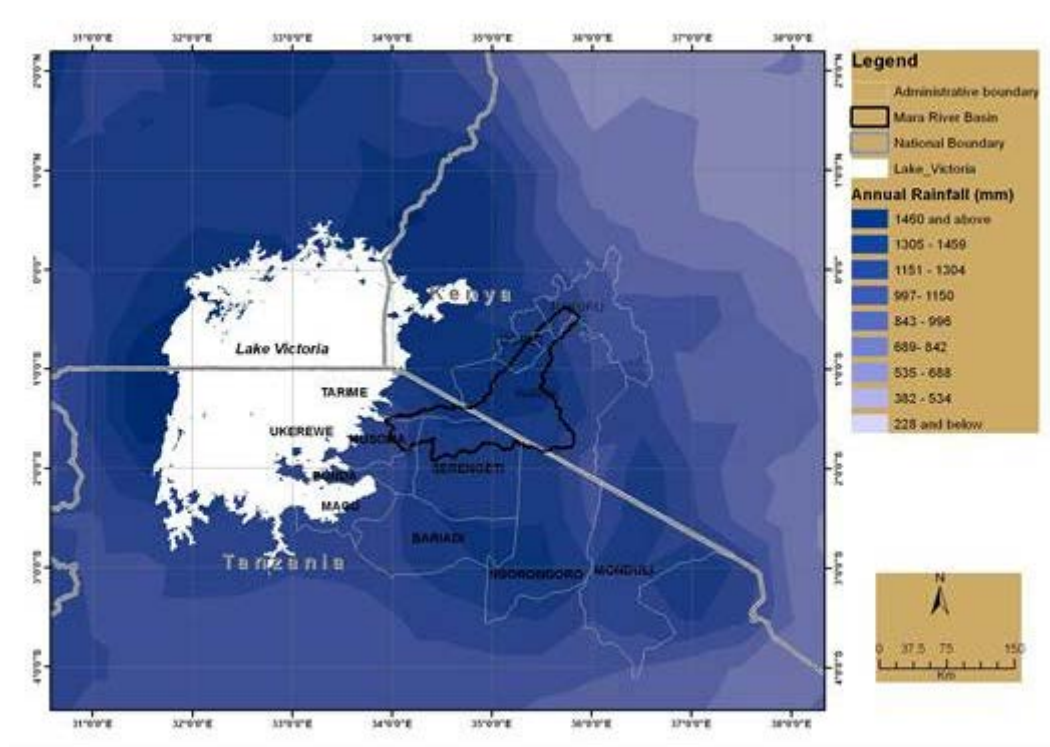


Figure 1.5 Annual Precipitation in areas surrounding the SMME. Source: WWF

A detailed study on the hydrology of the River Mara, done under the auspices of the LVBC with the support of WWF and USAID (Assessing Reserve Flows, 2010) examines the flow conditions in the River Mara from its outflow from the Mau Forests to the protected area of the Serengeti-Mara reserves. Critical indicators (physical, biological and social) are used to determine ecological and human responses to different flow conditions from extreme floods down to prolonged droughts.

The studies confirm two annual peaks in flow levels in March-June and November-December (as illustrated in Fig. 1.6). Volume and discharge rates increase with distance downstream. Flood flows in the upper Mara range from 8 to over 150 cubic metres a second (m³/s) with an average of 30m³/s while in the lower reaches (at the Kenya/Tanzania border) the range is from 90 to over 400 m³/s with an average of 300 m³/s. In dry years low flows can fall to 1 m³/s or less over the entire length of the main river, while tributaries like the Sand and Talek Rivers dry up completely.

The condition of indicator species of plants, insects and fish have been studied under these different conditions in order to define the flow regime that is needed to meet Resource Quality Objectives (RQOs). These flow conditions vary with each month in the year and are

measured in terms of the magnitude of discharge (m³/s), depth of water in metres and volume (million cubic metres).

The underlying concept of the reserve flow is that providing minimum standards are met in each month any surplus water is potentially available for abstraction for other uses. However the results of the study show that in drought years the reserve flows are not being met even in the upper and middle reaches of the river, from which the study concludes this *'may be the first clear evidence of a trend towards unacceptable alterations of the Mara River's flow regime'* (arising from poor catchment management, loss of forest and other vegetation cover, over grazing and excessive abstraction for livestock and irrigation).

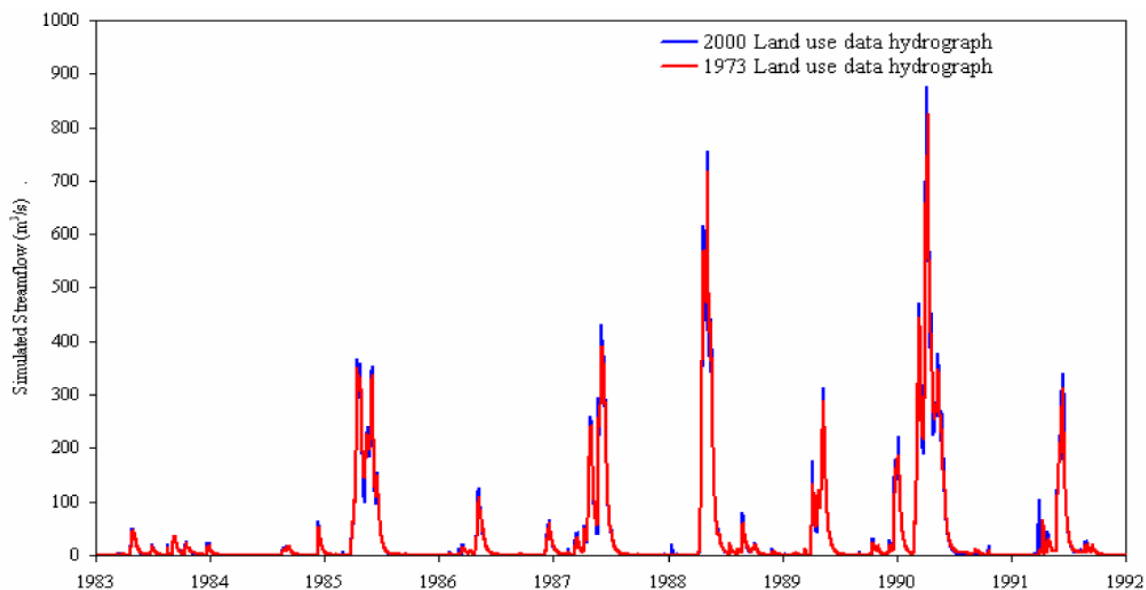


Figure 1. 6 River Mara Hydrographs 1983 – 1992. Source: MRB-SEA

Responsibility for the establishment of reserve flows for the Mara River rests with both Governments under their respective national laws and in accordance with international conventions. The study was undertaken by the Kenya and Tanzania Ministries of Water and Irrigation, with technical expertise from water resource managers, and experts from national and international universities.

1.1.5 Social Conditions

The basin is probably as well known for the distinctive culture and lifestyle of the Masai as it is for its wildlife, but there are other indigenous groups within the basin in both Kenya and Tanzania. Whereas in Kenya, under the New Constitution, the majority of Kenyans are keen to downplay the importance of ethnic origin which has been a cause of political tension in the past, it is nevertheless relevant to discussions on the future of the SMME to distinguish between long standing communities and the influx of new settlers that has swelled the population in recent years. In the last few decades, many Maasai have left their traditional mud-croton bomas and gravitated to more permanent settlements – a large number of which now crowd the ranchlands at the borders of the reserve.



In the 1960s the populations of the two countries stood at a total of less than 24 million (Kenya 10.9m; Tanzania 12.3m). Today, this figure is over 73 million (Kenya 38.6m; Tanzania 34.5m). The fastest growth in both countries has naturally been centred on areas with the best resources including the Rift Valley and central mountains of Kenya around the Mau Escarpment and the areas of Mwanza and Arusha in Tanzania. For reasons that are touched on above, population growth has been, and remains, a significant political issue in both countries. It is of special concern in those areas like the SMME where the traditional economic relationship between human beings and nature is dependent on the survival of enclosed forests and open rangelands and savannah grassland.

1.1.6 Biodiversity Features

Natural vegetation in the SMME passes through a sequence of zones from high enclosed canopy forest (moist montane forest) on the escarpment through dry upland forest (e.g. at Loita) to scattered woodland and then the extensive grasslands of the Savannah, with areas of scrub and thorn trees. Wetlands and swamps are found throughout the Basin but are heavily concentrated in the river's floodplain (Fig. 1.7). Within the Mau forest there are three separate forest formations: *Aningeria-strombosia-Drypetes*, *Albizia-Neoboutonia-Polyscias*, and mixed podo (*Podocarpus fulcatus*) of which one, *Aningesia-Strombosia-Drypetes* is restricted to forests west of the Kenyan rift valley and only occupies a substantial area in Mau. The Mara River Basin also contains important riverine forest along stretches of the main river and its tributaries. Management of all types of forest from closed canopy upland forests, which tend to receive the main focus of attention, through to Savannah and riverine zones is critical in terms of conserving biodiversity.

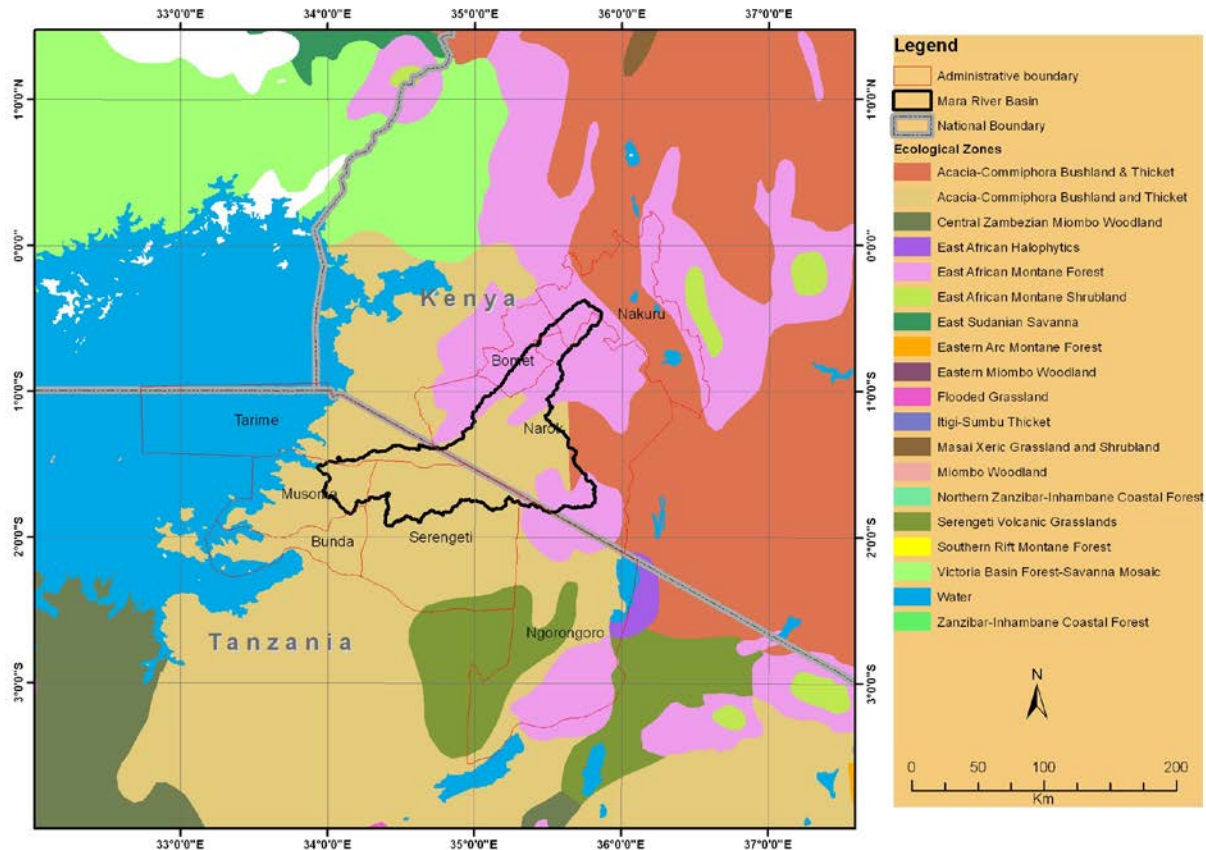


Figure 1.7 Biodiversity Zones. Source: WWF

The Mau forest is also a habitat to an impressive amount of large animals such as Buffaloes, Leopards, Hyenas, Elephants, Bongo, Yellow-backed Duiker, Golden cat, Giant forest hog, Colobus monkey and Impala. Some of the animals are of international conservation concern. The forests are also home to a rich variety of birds and is said to represent the richest montane avifauna in Eastern Africa. Endemic bird species in the area include Hartlaub's Turaco (*Tauraco hartlaubi*), Hunter's Cisticola (*Cisticola hunteri*) and Jackson's Francolin (*Francolinius jacksoni*).

The Serengeti-Masai Mara Plains are internationally famous for having the highest density and most diverse combination of large herbivores on earth. Estimates in 2003 (Gereta et al) indicated about 1.3 million wildebeest, 200,000 zebras and 440,000 gazelles. Amongst the larger carnivores are 9000 hyenas, 3000 lions and 250 cheetahs. The majority of the herbivores participate in the annual circular migration which is stimulated by the onset of rains bringing new grass to the plains (Fig. 1.8) The susceptibility of these herds to failure of the rains is high and in 1993 a severe drought in Serengeti killed around 400,000 wildebeest.

Individual surveys of ungulate species (giraffe, hartebeest, impala, warthog, topi, waterbuck and zebra) have shown declines in numbers in the periods 1989-2003 (Ogotu et al., 2011). The losses have been greatest in areas where human settlement has increased. Competition between wildlife and domesticated livestock is becoming intense as 'more and more people in the rangelands are allowing their livestock to graze in the Masai Mara reserve' (Morgan, 2009).

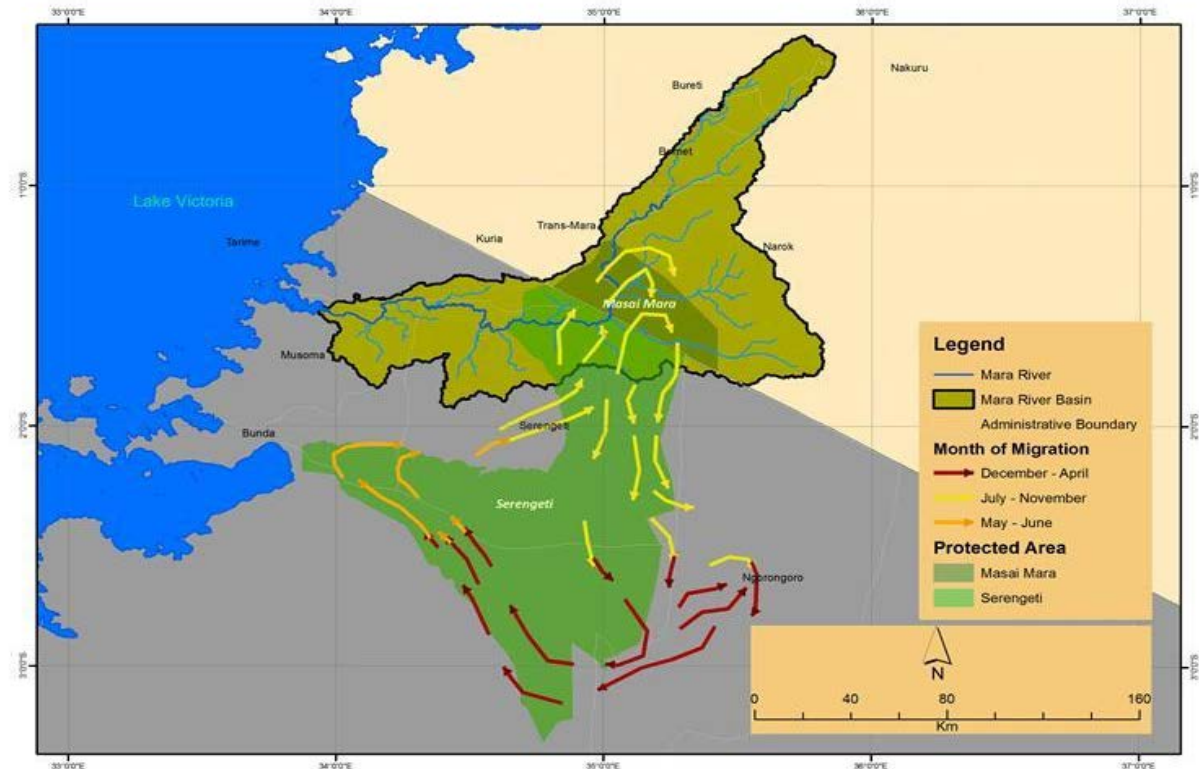


Figure 1. 8 Track of annual herbivore migration routes: Source: MRB SEA / WWF

The two major rivers flowing through the Serengeti National Park – the Grumeti and the Mara – are important components of the ecosystem that while providing water to support terrestrial and avian wildlife also form a well-known natural hazard in the path of the annual wildebeest migration. The rivers are also in themselves major aquatic ecosystems in which a wide range of Aquatic life occurs and in which large fauna – such as crocodile and hippo – as well as water-birds, are found.

1.1.7 Aesthetic, Tourist and other Values

In both Tanzania and Kenya the SMME is considered as having “*Exceptional Resource Value*” that should be conserved and protected for *its habitats, biodiversity, migrations of large mammals and birds, and its endemic and threatened species*. The most important of SMME’s values as identified by stakeholders include: the large mammal migration, which provides the principal justification for the SMMEs World Heritage and Biosphere Reserve status; high flora and fauna biodiversity within pristine wilderness areas; vast open savannah plains with large predator-prey populations that attract tourists and revenue to Tanzania and Kenya; and a large water catchment area, which is vital to the people living outside the PAs as well as to its biodiversity.

The Serengeti and Mara are the most visited PAs in both countries and are thus vital as sources of tourism income. In 2010 there were over 500,000 visitors to the main game parks in Kenya and tourism





is growing at a rate of 13% a year. Annual revenues to the parks alone exceed US\$ 9 million and represents large part of Kenya's tourism income. Tourism earns over 900 million KShs within the Masai Mara alone representing 9% of Kenya's overall tourism income which is close to \$1 billion.

Tourism in SNP in Tanzania has grown from less than 100,000 people in 1994 to over 220,000 by 2004. Revenues have also doubled to nearly a billion Tanzanian shillings (US\$7M). The extensive treeless short grassland plains that lie to the south-east of the SNP are what the Serengeti is best known for, and from which the Park derives its name from the Maasai word '*Siringet*', meaning endless plains. From about December until May each year, the plains are grazed by up to two million ungulates, which follow the moving rain-induced productivity around the plains. The plains are where the wildebeest in particular calve, providing mothers and their new-born calves with the nutrition and key micro-nutrients in sufficient quantity that they require.

Large areas of the SNP are very remote and form extensive wilderness areas, the second biggest in the Tanzania national park system after Ruaha National Park. Access to many of these areas is very difficult in the wet season due to impassable '*black cotton*' soils. The wilderness areas have been purposefully underutilised in terms of tourism in order to retain their conservation value. Key wilderness areas include Suba, the Itonjo hills, Nyamuma, Maate and Orangi.

Kopjes, or inselbergs, are a characteristic feature of the Serengeti, particularly the plains, and form discrete bio-geographical island habitats that provide shelter and capture water for distinctive communities of plant and animal species (e.g. caracal, hyrax, wild cat). In addition, they serve as vantage points for both prey and predators and potentially safer areas in which some carnivores (e.g. cheetah and leopard) may hide their young.

The MMNR and its environs now has more than 140 facilities with a total bed capacity of over 4000; and the resulting stress has begun to be manifested in the MMNR environment. SNP, which is much larger, has a bed capacity of about 1000. The tourism industry therefore is not only big business in terms of returns on investment from overseas visitors but it is also a major employer in both countries.

1.1.8 Cultural Values

The SMME is home to a diversity of cultures, as reflected in the existence of four major language groups within the ecosystem: Bantu (Sukuma farmers), Nilotic (Maasai and Kurya pastoralists), Cushitic (Iraqw agriculturalists) and Khoisan (Hadzabe hunter-gatherers). Although the Maasai are no longer allowed to graze their livestock in the SNP or in the MMNR, they have inhabited the area since the 17th Century. Evidence of this can be seen at



the Moru Kopjes with their well-preserved Maasai rock paintings. The Moru Kopjes are also the site of the famous Gong Rock, which makes a deep sound when struck and was used by Maasai to summon tribal members for ceremonies. To the west of the Park at Handajega there are also a number of reported traditional worship sites.

The Serengeti Plains have been critical to the unraveling of human origins, with notable discoveries such as the unearthing of the hominoid skull *Australopithecus* ("*Zinjanthropus*") *boisei* in the Olduvai Gorge and the early hominid footprints at Laetoli on the South-Eastern border of the Park. Within the Park itself, there are important Middle Stone Age sites at Seronera and Ichumbe Kopje near the Nyamara River. Current archaeological research in the Park is focusing on Middle Stone Age artefacts and faunal remains in the alluvial deposits of the Loiyangalani River. Archaeological samples recovered through test excavations have indicated a high potential for shedding light on key issues in human evolution. For example, the stone tools can reveal the technological and predatory competence of the humans who made them.

1.1.9 Crop and Livestock Farming

In the upper catchment of the Mara Basin in Kenya there are extensive tea plantations together with large holdings of irrigated wheat, maize and French bean farming and also investment plans for cotton growing (O’Keeffe, 2007). There has been progressive subdivision of land holdings, creating less economic units and reducing small holder farmers to subsistence level. Dairy farming has been expanding with consequent demands for more water. Agricultural development in the catchment responds to both internal and external stimuli.

On the lower plains livestock rearing is the principal activity with large herds of cattle, sheep and goats using free range grazing. This traditional pattern favoured by the Masai has come under increasing pressure with encroachment of small holder cultivation. For example, establishment of small settlements and farms around the Mara reserve is presenting a serious conservation problem where farming effectively cuts off existing wildlife habitat areas and blocking areas that have traditionally been part of the annual migration (Gathanju 2009).

In addition to livestock rearing the rangelands support an increasing area of irrigated wheat, maize and other horticultural crops. The lower flood plains in Tanzania also provide extensive livestock grazing, small holder farming and large scale irrigation. Principal crops include cotton, finger millet, sunflower, rice. Seasonally flooded areas are also important for grazing since they produce good grass and it is estimated that there may be 1.3 million cattle, 600,000 goats and 190,000 sheep within Musoma and Tarime Districts alone.

The community lands around protected areas are also being increasingly converted to provide land for settlements, cultivation and grazing. The exploitation of biodiversity resources in the community lands has traditionally been minimal due to the low human population and partly due to the seasonal pattern of use by semi-nomadic pastoral tribes. However, with the adoption of new modes of life by the surrounding communities, these areas are now facing undue pressure. The biodiversity in these areas lacks adequate legal protection, and its utilization is often unplanned and uncontrolled. In the last decade, Narok County has become a leading producer of wheat and barley in Kenya.

1.1.10 Private Farms and Group Ranches

In the upper catchment, the Private Farms and Group Ranch forest areas are primarily found in Ololulunga, Nkoban and Nkareta, and originally covered a total of 58,517 ha. These are small pockets of forests, which are disappearing at an alarming rate, and most of them may have already been lost to loggers and charcoal producers. Some farmers own up to 200 ha of indigenous forest stocked with cedar, *podocarpus* and many other valuable species.

The Masai Mara dispersal area is an integral component of the SMME, which encompasses approximately 4,200km² (Sitati, 2004). The natural value of the area has led to the proposition to designate the MMNR as a World Heritage Site. The Masai Mara Group Ranches also support a high and diverse population of wildlife species. It is an important wildlife dispersal area and supports both resident and migratory wildlife species from the reserve. Some group ranches adjacent to the MMNR have formed “conservation areas”, also known as “conservancies” in which sustainable human development in partnership with natural resource conservation is being promoted. Efforts are ongoing for other group ranches to follow suit.

1.1.11 SMME Threats, Challenges and Concerns

Both the SENAPA and MMNR management plans have identified “Conservation Targets” which are essentially identical (Tables 1.1 (a) and (b) below).

Table 1.1 SENAPA (a) and MMNR (b) Conservation Targets*

Table 1.1(a): SENAPA Conservation Targets			Table 1.1(b): MMNR Conservation Targets		
	Conservation Target	Ecosystem Level		Conservation Target	Ecosystem Level
1	The Migration	System	1	Southern Migration	Systems
2	Mara River		2	Northern Migration	
3	Riverine Forest	Community	3	Mara River	
4	<i>Acacia</i> woodland		4	Savanna/Hill Woodlands	Habitat
5	<i>Terminalia</i> woodland		5	<i>Croton/Euclea</i> thickets	
6	Kopje habitat		6	Black rhino (<i>Diceros bicornis michaeli</i>)	Species
7	Black rhino (<i>Diceros bicornis michaeli</i>)	7	Large carnivores		
8	Wild dogs	8	Roan antelope (<i>Hippotragus equines</i>)		
		9	Greater Kudu (<i>Teagelaphus strepsiceros</i>)		

* = The following should also be included in this list although they are not mentioned in the current Management Plans: Alien plants at community level in both countries, *Chromdaena odorata* on the Tanzanian side and *Pathenium hysterophanus* on the Kenyan side.

Similarly, both management plans have identified ecosystem conservation threats that are virtually the same (Tables 1.2 and 1.3 below).

There are significant management challenges facing the protected areas and their associated wildlife and the migration that contribute to the area’s uniqueness and global importance in both Tanzania and Kenya. These pressures are arising not just internally from escalating visitor use, but also externally from expanding human settlement and development in the wider ecosystem, which is impacting on wildlife dispersal areas as well as on the Mara River and other catchments that are the very lifeblood of the SMME.

The SMME Ecosystem is threatened mainly by encroachment, grazing, insecurity and settlements. Settlements (with agricultural cultivation) as a threat is particularly pronounced in the upper catchment of the Mara River (Mau Forest), but has also in the last decade become an important issue in the former grassland dispersal areas of Narok County. On the Kenyan side, in areas bordering MMNR, development of conservancies appears to have had the effect of pushing livestock grazing into the dispersal areas in larger and larger numbers. Settlement patterns have changed over time, leading to the integration of indigenous people and immigrant communities. Land use has, for example, changed from livestock farming to agriculture and vice versa, at times necessitating more use of natural resources from the protected areas. These threats also include poaching of wildlife for subsistence as well as commercial purposes, overutilization of resources within and outside protected areas, tourism development, water pollution and improper waste management systems, increased human wildlife conflicts as well as increased threats from invasive plant species. Climate change and variability is also an important threat to SMME.

Recently, it has been reported that there is some decline in the population of some wildlife species and the riverine forest on the northern part of SNP. These trends, if left unattended, will result into devastating impacts on the ecosystem health and integrity that will not only affect biodiversity conservation but also the tourists’ attractions within the ecosystem. The reduced tourism attraction will simultaneously lead to decreased revenue generation and elevated poverty level to communities. On the other hand biodiversity loss and habitat fragmentation exacerbated by climate change impacts will also result into increased poverty, droughts and desertification that in-turn shall have negative impacts on the livelihood of the people and National economies.

This transboundary protection and monitoring plan should therefore guide the monitoring of how impacts of interventions contribute to the integrity of the SMME. The plan includes measures to encourage resource users to participate in the monitoring of resources used.

Table 1.2 SENAPA Conservation Threats*

Target	Threat	Severity	Scope	Ranking
The Migration	Decline in Mara River flow rates	Very high	Very high	Very high
	Poaching	Very high	Very high	Very high
	Cutting off migration routes due to human development and cultivation	High	Medium	Medium
	Early dry season fires	Medium	High	Medium
	Fencing that creates hard boundaries	Medium	Medium	Medium



	Land use change/Settled agriculture in NCA (bore holes)	Low	Medium	Low
	Disease (e.g. rinderpest)	Not ranked		
Mara River	Water diversion and extraction	Very high	Very high	Very high
	Water pollution	Medium	Very high	Medium
	Bank erosion from flooding	Medium	Very high	Medium
Riverine forest	Fire	Very high	Very high	Very high
Acacia woodland	Hot unprescribed fires	High	High	High
	Cool controlled fires	Medium	Medium	Medium
Terminalia woodland	Hot unprescribed fires	High	High	High
	Cool controlled fires	Medium	Medium	Medium
Kopje habitat	Fire	Medium	Low	Low
Black rhino	Poaching	Very high	Very high	Very high
	Unviable population size	Very high	Medium	Medium
	Inbreeding	High	Medium	Medium
	Human disturbance	Medium	High	Medium
	Habitat loss through fire	Low	Medium	Low
	Disease (e.g. tick-borne)	Not ranked		
	Insufficient rhino secure areas	Not ranked		
Wild dogs	Disease	Very high	High	High
	Unviable population size	Very high	Medium	Medium
	Inbreeding	High	Medium	Medium
	Competition with other predators	High	Medium	Medium
	Human - Wild dog conflict	Medium	Medium	Medium

Source: SNP Management Plan – Page 28. * = Alien plants (medium ranking), and climate change and variability (high ranking) should also be included in this table although it is not mentioned in the current SNP Management Plan.

Table 1. 3 MMNR Conservation Threats (MMNR Mgt Plan)#

Target	Threat	Severity*	Scope*	Ranking
Southern Migration	Deforestation	Very high	Very high	Very high
	Water extraction	Very high	Very high	High
	Fire	High	Medium	High
	Poaching	Medium	High	Medium
	Disease	Medium	Medium	Medium
	Settled agriculture and fencing	Not ranked		High
Northern Migration	Deforestation	Very high	Very high	Very high
	Water extraction	Very High	High	High
	Fire	High	Medium	Very high
	Poaching	Medium	Medium	Medium
	Disease			Medium



	Human settlements	Medium	Medium	High
	Settled agriculture and fencing	Medium	Medium	High
	Exclusion from water sources			Very high
	Intensive pastoral practices		Medium	Very high
	Harassment/persecution			Very high
Mara River	Deforestation	Very high	Very high	Very high
	Water extraction	Medium	Very high	Medium
	Fire	Medium	Very high	Medium
	Pollution	Medium	Medium	Medium
	Tourism facilities	High	Very high	Very high
Savanna/Hill Woodlands	Fire	Very high	Very high	Medium
	Tourism facilities			Medium
	Tourism activities			Medium
	Elephant damage			Medium
Croton-Euclea thickets	Fire	High	High	Medium
	Tourism activities	Medium	Medium	Medium
Black rhino	Poaching	Very high	Very high	Very high
	Disease	Very high	Medium	Low
	Tourism facilities	High	Medium	Medium
	Tourism activities	Medium	High	Medium
	Loss of habitat (woodland)	Low	Medium	Very high
	Inbreeding	Not ranked		High
Large carnivores	Disease	Very high	High	High
	Human settlements	Very high	Medium	Medium
	Harassment/persecution	High	Medium	Medium
	Predation/competition	High	Medium	Medium
	Declining prey species	Medium	Medium	High
	Declining suitable range	Low	Low	High
Roan antelope and Greater Kudu	Poaching			Very high
	Disease			High
	Inbreeding			High
	Predation/competition			Very high

Source: MMNR Management Plan. * = *the MMNR does not cover severity and scope (the consulting team rated the severity and scope after field visits/examination)*. # = Alien plants (medium ranking) and climate change and variability (high ranking) should also be included in this table although it is not mentioned in the current SNP Management Plan.

Studies have been conducted to inform policy and practice in Wildlife Conservation of the SMME, prompted by the need for urgent action on several issues:

- Regional watershed protection:** The Mau Forest in Kenya and the Mara riverine vegetation in both Kenya and Tanzania comprise one large drainage basin for Lake Victoria. The protection of this watershed and associated biodiversity is important regionally and internationally. The watershed is vital to the ecological balance of both the SNP and MMNR that make up the SMME.

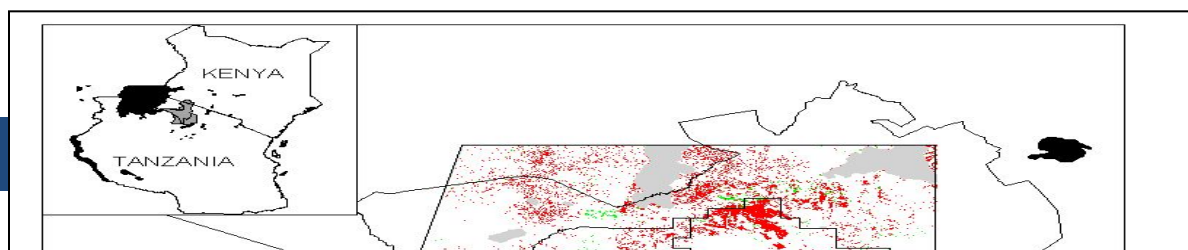




Figure 1.9 Areas experiencing human encroachment

- **Prevention of environmental degradation:** The SMME is vulnerable to many anthropogenic activities including fire, over-utilization of resources and increasing aridity in an area of unpredictable rainfall. Figure 1.9 displays a GIS derived map of the SMME and environs. It indicates in red, the areas that have been inundated with encroachment to the extent of attaining a serious loss in vegetation. In light of these revelations, a plan to manage the wildlife sanctuaries is necessary to develop solutions to a much larger problem affecting environmental management in the region.
- **Protection and management of biodiversity:** The SMME is very rich in biodiversity but evidence shows that the wheels of modernization and development are quickly eroding it. It is an urgent priority to develop strategies that would stem the tide of biodiversity loss in the ecosystem. (Source: EAC/DILAPS 2011 Pg 18. Homewood et al 2001)
- **Tourism potential:** The uniqueness of the basin in terms of forest and savannah biodiversity is unequalled by any other area in the world, and has been dubbed as “*the eighth wonder of the world*”, and the SNP recognized as a UNESCO World Heritage Site. It is the centre of wildlife- and nature- based tourism in the region and therefore the biodiversity of this basin is uniquely valuable as an international biodiversity asset.

- **Socio-economic development:** The diverse topography and climate of the SMME allows various land uses including agriculture, agro-forestry, fishery, pastoralism, hunting and gold mining, to mention but a few. There are socio-economic and ecological impacts on biodiversity and it is imperative that a coordinated approach is used as a vehicle to achieve economic development in the region without endangering biodiversity in the ecosystem.

1.1.12 Previous Collaborative Arrangements with Communities

Different institutional arrangements exist for ecosystem management in the SMME. In Kenya, under KWS, no consumptive use is allowed, and therefore no collaborative management is present. Under the Kenya Forest Act, collaborative and participatory forest management agreements have been initiated in the Mau section of the SMME. The KFS, which coordinates the management of the Mau Forest Reserve and Forest plantations, allows use of forest resources through permits. The Narok County Council, which coordinates management of Maasai Mara National Reserve (Trust Land), and the Trans Mara County Council, which is responsible for the “Mara Triangle” portion of the MMNR, also have various arrangements with communities, sometimes using members of riparian communities as scouts in their protection activities.

In Tanzania, TANAPA and SENAPA are responsible for the Serengeti National Park. Areas bordering the SNP are managed by a variety of agencies, including District authorities and Village Councils, all of which have arrangements with their communities.

The Serengeti National Park has involved adjacent communities in conservation and benefit sharing since late 1990s. The Community Outreach department was established with the aim to elicit the support and collaboration of the communities surrounding SENAPA in safeguarding the integrity of SENAPA’s resource values. Activities to achieve this included scaling-up the conservation education programme to all park-adjacent districts, and improving park-community communication and cooperation. The major focus of this department in future will be to re-invigorate the **Support to Community Initiated Projects (SCIP)** scheme. This will involve revising the SCIP planning process to ensure that all current and future SCIP projects address both community development needs (especially of marginalized groups) and ecosystem conservation priorities. Two key areas for future support are prioritized: the identification and establishment of conservation-friendly income generating activities and secondly, the mitigation of human-wildlife conflicts. Linked to this will be the provision of support for community-based natural resource management in the SENAPA buffer areas such as WMA, PFMP and CBFM.

In both countries, the communities are in support of these collaborative arrangements.

1.1.13 Current Management and Institutional Arrangements

Management of the protected areas in the SMME is coordinated by different institutions. This section merely introduces some of the key stakeholders whose views and actions are critical in determining the future of the SMM ecosystem.

The proposed SMME Joint Trans-boundary Protection and Monitoring Plan is only one of the processes and tools to be used by the LVBC, which have mandates to promote

cooperation on natural resource development and environmental issues in the region, and will need to be closely integrated with all existing and proposed initiatives.

A number of government ministries in the two countries have an immediate interest and concern in future planning for the development and conservation in the SMME as shown in Table 1.4 below. Also, a number of County Governments/District Councils, Village Councils, the private sector, communities and individual land owners in both countries have an important stake in the SMME.

In the context of Tanzania, the wildlife resources management is under the custody of the Ministry of Natural Resources and Tourism. Within the Ministry the management of wildlife resources has been commissioned to the Wildlife Division (responsible for the management of Game reserves and game controlled areas), Tanzania National Parks (responsible for the management of National Parks), Ngorongoro Conservation Area Authority (responsible for the management of NCAA), Local communities under the coordination of Wildlife Division (responsible for the management of Wildlife Management Areas). However the Wildlife Conservation Act has provisions for private sector’s involvement in wildlife management activities. Currently the Loliondo game controlled area and the Grumeti game reserve are, on the basis of an agreement, under the management of the Ortello Business Company and Grumeti Fund respectively.

In Kenya, the MMNR is managed by the Narok County Council and the Trans Mara County Council (since the creation of the latter following subdivision of the original Narok County). However, the Trans Mara County Council has subcontracted the day-to-day management of its section (known as The Mara Triangle for its triangular shape) to a private management organization known as The Mara Conservancy. This will need to be adjusted in 2013 as the original Narok County will reemerge under a single County Government. Kenya’s regulations also allow private sector’s involvement in wildlife management and as a result there are currently as many as eight privately managed “Conservancies” in the areas bordering the MMNR, a number of them growing out of what were previously Group Ranches.

Non-Governmental organizations and the private sector are also important current stakeholders in the management of SMME. In both SNP and MMNR there are privately run hotels, lodges and camping facilities that impact on the SMME ecosystem. There is active gold mining in the lower Mara River Basin in Tanzania, and NGOs sponsor many activities throughout the whole ecosystem. Lastly, individual land owners and communities are also important stakeholders in the SMME.

Table 1.4 Ministries in Tanzania and Kenya which have key responsibilities in parts of the Mara River Basin/SMME

Tanzania	Kenya
Ministry of Finance	Ministry of Finance
Ministry of Agriculture, Food Security and Cooperatives	Ministry of Agriculture
Ministry of Livestock and Fisheries Development	Ministry of Livestock Development
	Ministry of Fisheries
Vice President’s Office (Environment Sector) and National Environment Management	Ministry of Environment and Mineral Resources
	Office of the Prime Minister



Council (NEMC).	
Ministry of Natural Resources and Tourism	Ministry of Tourism Ministry of Forestry and Wildlife
Ministry of Water	Ministry of Water and Irrigation
Ministry of Lands, Housing and Human Settlements Development	Ministry of Lands Ministry of Housing
Ministry of Community Development, Gender and Children	Ministry of Gender, Sports and Social Services Ministry of Special Programmes
Ministry of Health and Social Welfare	Ministry of Public health and Sanitation Ministry of Medical Services
Ministry of Energy and Minerals	Ministry for Energy and Mineral Resources
Ministry of Transport	Ministry of Transport
PMO (Regional Administration and Local Governments)	Ministry of Local Government Ministry of Regional Development
Ministry of East African Cooperation	Ministry of Immigration and Registration of Persons
Ministry of Home Affairs	Office of the President: Ministry of State for Defense Ministry of State for Provincial Administration and Internal Security

The future role of a number of these ministries has been clearly identified (BSAP 2010) with regard to protection of biodiversity and encouraging sustainable development and use of the SMME's natural resources. These include the coordinating roles of the Ministry of Environment and Mineral Resources, Kenya and the Ministry of Natural Resources and Tourism and Ministry of EAC, Tanzania, who are the respective focal points for the East African Community. For Kenya, the ministries will change after the March 2013 elections as per the 2010 Constitution which prescribes the maximum number of ministries at 22. A number of the current ones will be merged.

1.1.14 Need for Trans-Boundary Protection and Monitoring Plan

The management of biodiversity within the SMME is currently carried out by the different sectors and institutions with legal mandates supported by their existing national administration and legal frameworks. This situation has resulted into unsuccessful combating of illegal off-take of resources within the ecosystem and uncoordinated conservation initiatives.

The transboundary nature of the network of protected areas within the ecosystem is another conservation challenge that affects the protected area management authorities, detracting from their efforts to achieve their management goals on resource protection and monitoring. The absence of a mechanism to reconcile various sectors and institutions in joint protection and monitoring activities that are backed by a joint Regional Institution and harmonized legal framework is itself a potential threat to the integrity of SMME. If this situation continues without a proper protection and monitoring mechanism in place, the political international administration and the isolation nature of the ecosystem as two separate units will result into devastating impacts that will not only affect biodiversity conservation but also the livelihoods of the people of both Tanzania and Kenya. This scenario therefore presents a



very urgent need for the establishment of joint protection and monitoring plan if sustainable conservation of biodiversity has to be achieved within the broader SMME.

Protected areas within the SMME face similar threats and challenges as discussed above (Sec 1.1.9). Even if one side of the border is well protected, unsustainable resource use on the other side will adversely affect conservation and resource use on both sides. There is thus a need for collaborative efforts to strengthen biodiversity conservation and PA management within a trans-boundary context.

Although there has been some level of collaboration in the SMME, most of the efforts are at agency level with each PA management authority following its own policies, and doing its own protection and monitoring on its side of the border. But the role of implementing of a trans-boundary protection and monitoring plan are greater, contributing significant benefits beyond each country, in terms of ecological, political, community, economic and organisational benefits. This therefore cannot be left at local and informal level as has been the case. Indeed, the informal approach has been borne out of a realization that transboundary arrangements are needed.

Ecological – the plan will enable simultaneous, cross-border restoration of key ecological functions promoting ecosystems management, improving protection of shared resources (e.g. water) and increasing the area needed to maintain minimum viable populations of fauna with large home ranges (particularly large mammals), thereby reducing the extinction risk due to stochastic events.

Political – the plan will improve regional cooperation in natural resource management between the two countries. It could provide a basis for further cooperation and collaboration in other areas where natural resources are shared across the international border.

Community participation – Both countries have encouraged collaborative resource management arrangements for some time: The Kenya Forest Act (2005) and the Water Act (2002) are very supportive of joint forest and water management, respectively, and community participation, implemented through Community Forest Associations (CFAs) and Water Resource Users associations (WRUAs). Information from the monitoring and protection plan should provide field based evidence to guide how riparian communities can be mainstreamed in the revised laws, in particular, communities' contribution in ensuring ecological integrity of the SMME as well as its contribution to the improvement of people's livelihoods.

Economic – the plan will increase efficiency in protection and monitoring, eliminate duplication of effort, and create economies of scale, enhancing economic opportunities through increased tourism potential and revenue, when planned and implemented in harmony and jointly. Aspects to be shared include skills, information/knowledge equipment and standardized methods.

Organisational – the plan will build capacity among the stakeholders and promote an enabling environment for better decision making on common problems/challenges. Opportunities for increased international support will be exploited better jointly. The plan



will enhance the availability of a larger pool of expertise for problem solving and creating viable future scenarios, and will guide co-operation, which is needed for effective law enforcement in dealing with illegal activities across the border. Nature-based tourism will be enhanced through joint marketing and tour operators' training and code of conduct to self-regulate the trade. Fees and visitor management strategies will be agreed to ensure harmony.

Infrastructural development – the plan will encourage coordination of infrastructural development that will enhance livelihoods in both countries.



2.0 LEGAL AND INSTITUTIONAL FRAMEWORKS FOR TRANS-BOUNDARY MANAGEMENT OF SERENGETI-MAASAI MARA ECOSYSTEM

2.1 Introduction

The conservation of Serengeti Maasai Mara ecosystem requires the application of various policies and laws as a result of the cross – cutting nature of environmental issues related to land, water, forestry and wildlife management. The actions associated with conservation of various components of the SMME have various positive and negative environmental impacts. These issues are addressed differently and fall within different administrative managements which are critical to maintenance of the integrity and health of the SMME. The sustainable management of the SMME must ensure compliance with various policies and/or legal regimes that govern the management of the environment. Since the execution of activities within SMME touches on various sectors, one has to comply with a number of policies and legislation (those relevant for land, water, forestry, wildlife, mining and others). This chapter provides a summary of the various national and international legal frameworks that govern the environmental and social issues pertaining to the future implementation of protection, monitoring planning and management objectives for the SMME.

The SMME trans-boundary protection and monitoring plan is supported by various legal frameworks. Implementation of this plan should build on the commitment by Tanzania and Kenya towards the different legal instruments. These are explained below. Also, the LVBC has recently completed a report on “review of policies, legislations and institutional arrangements of protected areas in the Serengeti Maasai Mara Ecosystem for improved management” that should guide implementation of this JT-BEPMP.

- *The Governments of Tanzania and Kenya are signatories to the six protocols and conventions presented below.*
- *Of particular note is that the signed international conventions have the necessary provisions for management of ecosystem including the SMME, had they to be internalized into the national and trans-boundary policy frameworks.*

2.2 The EAC/LVBC/ Mandates

East Africa Partner States have made a commitment through the *Treaty for Establishment of the East African Community (EAC)*, to develop policies and programs aimed at widening and deepening cooperation among member states. The objective of the treaty, among other things, is to attain sustainable growth and promote sustainable utilization of natural resources through:

- a) cooperating in the joint management and sustainable utilization of natural resources;
- b) coordinating policies and actions for the protection and conservation of natural resources and the environment against all forms of degradation and pollution arising from development activities;
- c) cooperating and adopting common policies for control of trans-boundary movement of toxic hazardous waste and any other undesirable materials;



- d) providing timely notification and relevant information to each other on natural resources and human activities that may or are likely to have significant trans-boundary environmental impacts and consulting with each other at an early stage; and
- e) developing and promoting capacity building programs for sustainable management of natural resources.

The Protocol on Sustainable Management and Development of Lake Victoria Basin (LVB), which is an annex to the Treaty, addresses environmental concerns in and around the lake. Important areas of focus that are relevant in the context of the protection and monitoring of the SMME are: equitable and reasonable utilization of water resources; protection and conservation of the basin and its ecosystem; sustainable development of natural resources; sustainable agriculture and land use practices; natural resources and environmental monitoring; and exchange of data and information.

The EAC's Protocol on Environment and Natural Resources (Chapter 3) has a number of articles with provisions for the management of trans-boundary resources. These include:

- a) Article 9: which commits Partner States to develop, harmonize, adopt and implement common policies, laws, strategies, plans and programs relating to the conservation and use of all forms of biological resources. Specifically, Section 2(a) states that partner states shall collaborate in the conservation of Trans-boundary biodiversity;
- b) Article 11: Section 3 states that the Partner States shall cooperate and where necessary, enter into agreements or other arrangements, in the management of trans-boundary wildlife ecosystems and protected areas; and promote management of shared wildlife resources and wildlife habitats across international borders including the conservation of species and populations, marketing of their products and development of trans-boundary conservation and management programs;
- c) Article 12 Section 1. The Partner States shall develop, harmonise and adopt common policies, laws and strategies for the conservation and sustainable utilization of wildlife resources in and outside protected areas in the Community and integrate such management into national development
- d) Article 12 Subsection 2(j) The Partner States shall develop common guidelines for the management of wildlife resources.
- e) Article 12 Subsection 3(h): the Partner States shall improve water catchment management;
- f) Article 12 Section 4. The Partner States shall adopt common national policies and programmes that allow local communities to effectively participate in wildlife management activities and to benefit from the wildlife resources;
- g) Article 12 Section 5. The Partner States shall cooperate, and where necessary, enter into agreements or other arrangements, in the management of transboundary wildlife ecosystems and protected areas, and
- h) Article 12 Section 8. The Partner States shall adopt common national policies and programmes that allow local communities to effectively participate in wildlife management activities and to benefit from the wildlife resources

The Lake Victoria Basin Commission (LVBC) was officially launched in Kisumu, Kenya in June 2007. Its function is to act as 'steward and custodian of the lake' and it is intended to serve as the 'caretaker' of the lake and its resources. Its vision is 'to promote, facilitate and coordinate activities of different actors towards sustainable development and poverty



eradication' in the Basin. A series of programmes have been initiated with the help of sponsors from the international community to support the lake's fisheries and eco-systems. These include:

- The Lake Victoria Environment Management Project financed by the World Bank and the Global Environment Facility,
- The Nile Equatorial Lakes Subsidiary Action Programme,
- The Mount Elgon Regional Ecosystem Conservation Project, and
- The Safety of Navigation on Lake Victoria project.

Specific initiatives of the LVBC are to establish a trans-boundary agreement to ensure water flows to sustain the biodiversity of the Serengeti-Mara ecosystem, to encourage implementation of harmonized river basin management practices and policies, and to facilitate cross boundary management of natural resources in the Mara River Basin

2.3 International Agreements and Conventions

2.3.1 The Convention on Biological Diversity

Specific objectives of the Convention on Biological Diversity (CBD) are to promote the conservation and sustainable use of bio-diversity and promote the fair sharing of benefits arising from the use of biological resources. Both Tanzania and Kenya have ratified the Convention and are therefore contracting parties. They are required to take the following actions, which are of relevance to this protection and monitoring plan:

- General measures for conservation and sustainable use of biodiversity;
- Identification and monitoring of biodiversity;
- In-situ and ex-situ conservation;
- Sustainable use of biodiversity;
- Incentive measures for biodiversity conservation;
- Research and training;
- Public education and awareness;
- Impact assessment of proposals that might adversely affect biodiversity;
- Exchange of information;
- Technical and scientific co-operation;
- Access to financial resources.

Implementation of this protection and monitoring plan can therefore draw from the progress made by Tanzania and Kenya towards implementing the CBD.

2.3.2 Convention Concerning the Protection of World Cultural and Natural Heritage

The principle objective of the World Heritage Convention is to protect objects of cultural and natural heritage which are of value to present and future generations. The Convention establishes a World Heritage List on which the World Heritage Committee may list those properties which form part of the world cultural and natural heritage. Tanzania and Kenya have signed the Convention. Since then, two sites, The Serengeti National Park was nominated as a World heritage site in 1981 and on the same year together with Ngorongoro conservation area, it was declared as a biosphere reserve. The phenomenal wildebeeste migration in the SMME was also recently (2011) declared the 8th Wonder of the World.

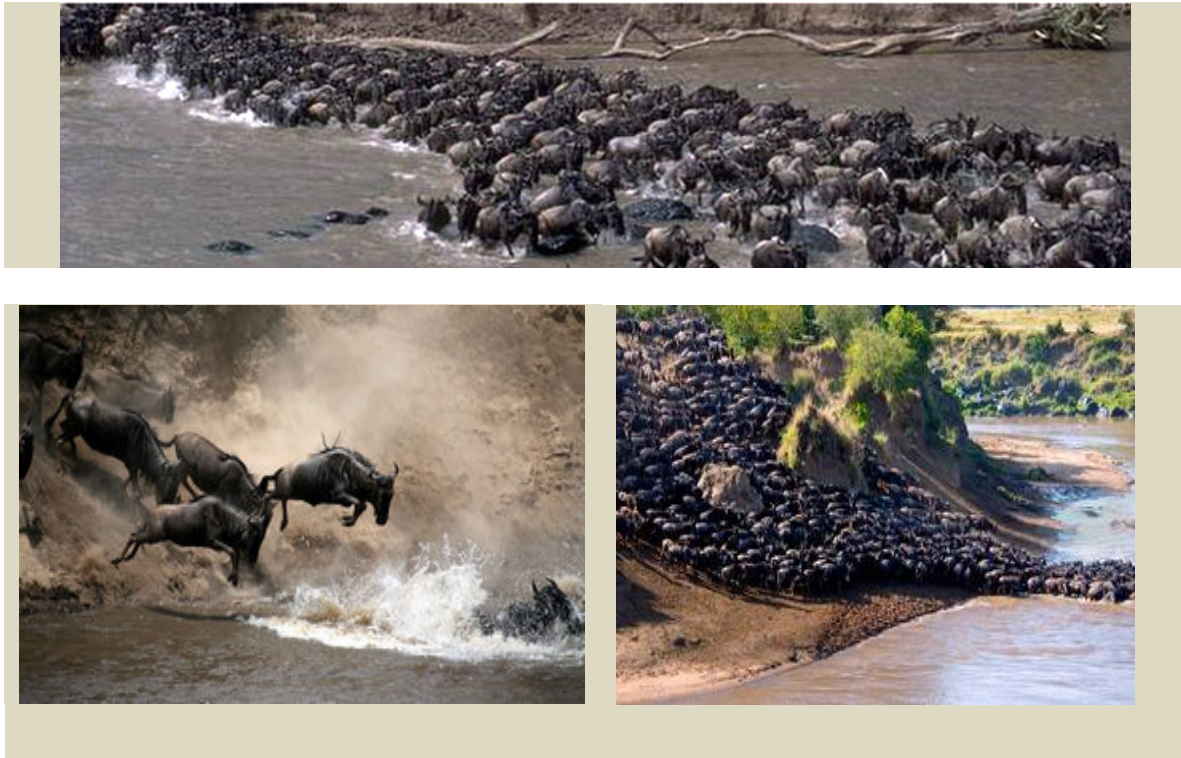


Figure 2.1: Wildebeest crossing Mara River

2.3.3 The Convention on International Trade in Endangered Species of Wild Fauna and Flora

This is one of the most important treaties in the field of conservation of biological diversity that aims at protecting identified endangered species from over-exploitation through a system of import/ export permits. CITES provides the primary international control structure for trade in wildlife products. It focuses on identification of endangered species and their withdrawal from the world market through a listing process. CITES appendices list the species that are threatened with extinction currently and those for which there is some indication that they face the threat of extinction in the future.

Tanzania and Kenya are contracting parties. Implementation of this protection and monitoring plan should draw lessons from individual experiences of implementation of CITES Tanzania and Kenya, which can be customised from a trans-boundary perspective.

2.3.4 Convention on the Conservation of Migratory Species

The Convention on Migratory Species (CMS) was adopted to conserve migratory species of wild animals. Such species may be terrestrial or marine in nature. The member states of this convention endeavour to conclude agreements for the protection and management of migratory species whose conservation status are unfavourable and of those whose conservation status would substantially benefit from international cooperation deriving from an agreement.



The Convention's Agreement on African Eurasian Migratory Water birds is specific on the need to protect the migratory water birds' feeding, breeding and wintering habitats, the main ones being the wetlands and open water bodies. The Wildebeest, Zebra, Thompson's gazelle and some predators in the SMME routinely migrate over a large part of the Serengeti and MMNR, crossing the national boundary between the two countries. This convention ensures that the border remains open to enable the migration to proceed unimpeded. And all species on either side of the border remain free to disperse.

2.4 Lusaka Agreement on Cooperative Enforcement Operations Directed at Illegal Trade in Wild Fauna and Flora

This is an agreement amongst members of the Eastern, Central and Southern African countries in cooperative enforcement directed at illegal trade in wildlife fauna and flora. This derives its basis from the African Convention, CITES and the Convention on Biological Diversity, and aims at reducing and ultimately eliminating illegal trade in wild fauna and flora and establishing a permanent task force to implement that objective. Tanzania and Kenya have taken steps to meet the obligations set out therein by signing the agreement and adopting regulations and other measures such as public awareness. Implementation of this plan can borrow experiences from the lessons of the Lusaka Agreement Task Force (LATF), which is hosted by KWS.



3.0 EXISTING PROTECTION AND MONITORING SYSTEM IN THE SMME

3.1 Existing Patrol Systems

The field work attempted to cover the following variables: a review of existing patrol plans that had a bearing on the transboundary cooperation, identification of constraints to cross-border law enforcement, identification of issues to be addressed by the plans to be generated during the consultancy, and development of indicators to be used for the plans.

During the review of existing patrol plans of individual PAs, it was found that the protected areas (except for the Grumeti) do not have concretized patrol plans. The plans also did not take into consideration trans-boundary arrangements. The wardens from Tanzania and Kenya carry out coordinated patrols, arranged on *ad hoc* basis, after agreeing on the timing.

On the Kenyan side, the MMNR and Mara Triangle carry out regular foot patrols, in addition to planned patrols for the protection of tourists. The force is structured according to functions and purpose, with specific assignments to carry out for each of the two platoons.

The MMNR and Mara Triangle reported that the frequency of patrols within the Protected Area is not pre-determined during a planning period. On an *ad hoc* basis, they carry out coordinated trans-boundary patrols together with SNP rangers after meeting and agreeing on the timing. Currently, the logistical support for coordinated trans-boundary patrols is provided by both park authorities, after the operations commanders of both Tanzania and Kenya have come up with a budget. The challenge is how trans-boundary patrols can be sustained in the long term, and carried out at regular times on the basis of advance planning. This justifies the need to have a trans-boundary protection and monitoring plan that can be used to mobilise resources from different sources.

On the Tanzanian part of the ecosystem there are two types of patrols, the planned and unplanned patrols. The two patrols can either be ground patrol on foot and vehicles, or aerial patrol using aircraft. However the latter patrol has to be supported by the ground patrol, because the Cessna plane is used only to detect the existence of poachers within the protected areas. These patrols are also supported by Intelligence Unit that is collecting information on illegal activities with the aim of pre-empting of poaching activities within the PAs and outside protected areas. For the case of Rhino protection, Rhino monitoring and tracking activities is carried out on a daily basis to safeguard the Rhinos from poachers. There are also some trans-boundary collaboration on the Rhino protection between SNP and MMNR, carried out on an *ad hoc* basis after consultations.

3.2 Basic Equipment/ Facilities used for Protection

The most basic equipment necessary for law enforcement include: appropriate uniforms, fuel and a vehicle (whenever they are used), water bottles, firearms and ammunition, and radio equipment. Of recent, Sniffer dogs (TMCC), and a GPS have been introduced as some of the basic equipment, to enable rangers collect geo-referenced data that is uploaded on to a computer at the office. Other equipment identified to be vital for overnight patrols include tents, raincoats and sleeping bags. These will be necessary for the proposed Joint Protection and Monitoring Plan.



On the Tanzanian side the following were listed as the equipment and facilities used for protection activities:

- Vehicles
- Firearms and Ammunitions
- Radio calls
- GPS
- Telephones
- Sniffer and tracker dogs
- Aircrafts
- GIS Lab
- Collars
- Water Bottles

Communication seemed well catered for through the supply of handheld radios with good backup base radios that act as repeaters. However, the communication equipment was for separate, local use in Tanzania and Kenya which is a constraint to the joint operations. It was reported that for trans-boundary communication purposes, there is no common authorized frequency to be used. As part of implementation of this trans-boundary protection and monitoring plan, there is need to spell out channels of communication for the management and conservation of SMME ecosystem.

3.3 Trans-Boundary Protection and Monitoring Arrangements

As of the time of this study, there are no formal arrangements on trans-boundary monitoring and protection of resources within the SMME. Whatever has been accomplished has been initiated by Wardens of SNP, MMNR and The Mara Triangle that have held meetings whenever necessary to coordinate patrols. Their communication has been informal, based on telephone contacts as and when necessary.

Significantly, there are some informal arrangements between SENAPA and MMNR on the conservation of Rhinos. Only one meeting was conducted between the two PAs on the joint rhino monitoring. Also the rangers at the border ranger post do collaborate on anti-poaching activities and at times the tracker dogs from MMNR assisted the SENAPA in carrying out patrols as needs arose. These arrangements were affected by difference in information management systems of the two sides. For instance one Rhino was given different names by the two protected areas, causing confusion. Also lack of common ear notching mechanism due to financial constraints is the other factor which has affected joint protection and monitoring of rhinos by the SENAPA and MMNR

Reports from the consultations indicated that the informal trans-boundary protection arrangements have been useful and can provide lessons and experiences for implementation of the trans-boundary protection and monitoring plan.



Coordinated Patrols have been held on as and when necessary, rather than as scheduled, and leave a lot that is not covered in the informal arrangement. Other areas that could have been catered for under the arrangement include active participation by KWS and the two County Councils in Kenya, the District Councils and others in Tanzania. Other agencies that are not involved include immigration, police and customs department. Their roles have to be specified later when roles of each agency is being assigned.

Key stakeholders in the context of protection are: Ministries of Defence (Army), Internal Affairs (Police and Immigration), Ministry of Finance (Customs), Judiciary/Attorney General (Legislation and Drafting of laws), Local Government (Local Administration and governments), Communication (Frequency and radio channel communication), Natural Resources, Forestry and Environment (water resources, forest conservation and National Environment Authority); Ministry of Tourism, and Development partners.

3.4 Indicators used for Protection

It is not possible to monitor every aspect of a program, therefore “indicators” are necessary to reduce the time spent in monitoring. Indicators identify what you need to measure to know if conditions have or have not changed. Indicators used for protection in the different countries include -- depending on the section/aspects of the SMME: number of patrols, patrol man-days /days per month, areas covered, maps produced using GIS, poaching levels, number of poachers arrested, number of poaching equipments confiscated e.g snares and traps, encounter rates of smuggling incidents, cattle rustling reports/encounters, existing/or new foot paths/foot prints, timber ferrying, tree stumps, recovered hand and power saws, recovered wildlife trophies.

These indicators have not been rationalised across the international border, but this is necessary for conserving SMME as a trans-boundary resource and enabling it to play its role in provision of ecosystem services.

4.0 GUIDELINES, STRATEGY, GOALS, APPROACHES AND PROCESS OF DEVELOPING THE PROTECTION AND MONITORING PLAN

4.1 Guidelines and Strategy

The major biodiversity resources of Tanzania and Kenya include ecosystems, such as natural forests, woodlands, savannah, arid and semi-arid areas, wetlands, and open water ecosystems, and the plant and animal life in these ecosystems and their genetic makeup. There are also modified agro-ecosystems and forest plantations. The different ecosystems and the organisms they contain have both direct and indirect values as a source of food, fuel, shelter, employment, foreign exchange earnings and tourism. Forests serve as a source of wood fuel, timber, poles, fibres, fodder, crafts, medicine, wild food, water catchment, and tourism. Woodlands provide building materials, fibres, pasture, fodder, medicine and wild foods. Natural vegetation including forests, woodlands and grasslands play an important role in mitigating soil erosion which maintains fertility and reduces sedimentation and siltation of water courses. Natural vegetation also acts as carbon sinks and helps to mitigate global warming. Wildlife is a source of bush meat, trophies, food, and medicine, and supports tourism. Wetlands are important in water storage and recharge, sediment trapping, nutrient cycling, water purification and treatment of wastes. Inland water systems (rivers, lakes and wetlands) are a source of fish, plants (some of which are of medicinal value), water for various uses, and recreation.

Both Kenya and Tanzania have designated National Parks, National Reserves, Wildlife Sanctuaries, National Monuments, Biosphere Reserves, World Heritage Sites, and Ramsar Sites for conservation and sustainable use of biodiversity in many areas including the SMME. However, these areas still face a number of challenges.

Some of the general threats to biodiversity in both Tanzania and Kenya include human encroachment, habitat destruction, poaching, over-abstraction of resources, deforestation, pollution and introduction of invasive species and genetic materials. The main challenges identified in the management of protected areas include weaknesses in policy and regulatory mechanisms, inadequate institutional arrangements to foster effective collaboration and networking, inadequate financial resources, and declining earnings from the tourism sector. In addition, there are gaps in biodiversity research, information and data. There is also inadequate community participation in wildlife management. The National Biodiversity Strategy and Action Plans (NBSAPs) of Kenya and Tanzania are founded on the Convention on Biological Diversity (CBD) and provide: A Vision, Guiding Principles, Strategic objectives, Methodologies and Actions which can guide conservation of biodiversity in the SMME.

4.2 Goals of the Protection and Monitoring Plan

The goal of this Joint Trans-Boundary Ecosystem Protection and Monitoring Plan is to conserve and protect the trans-boundary Serengeti-Masai Mara Ecosystem, its habitats, biodiversity, migrations of large mammals and birds, and its endemic and threatened species for posterity as envisaged in the NBSAPs.

Supplemental and complementary purposes of the JT-BEPMP are:

To safeguard the ecosystem's status as an area of national and international importance, as



- a) A Biosphere Reserve and a World Heritage Site;
- b) To ensure ecological structure, functions and services are better understood and conserved, through adaptive trans-boundary ecological management and improved research and monitoring;
- c) To optimise long-term economic benefits to the two nations through sustainable utilisation that maintains the ecosystem's wild aesthetic beauty;
- d) To promote and maintain an effective and mutually beneficial partnership with communities neighbouring the PAs; and
- e) To promote and maintain the scientific research and educational functions of the PAs.

These trans-boundary goals and purposes will be achieved through:

1. Protecting and monitoring of ecological and socio-economic aspects of the trans-boundary through this JPMP, and
2. Providing and consolidating information needed for the management of the trans-boundary ecosystem to assist management agencies and their collaborators assure the effective conservation of the values of SMME ecosystem.

Specific, measurable, actionable and sensitive ecological indicators have been identified from literature and consultations with stakeholders to enable monitoring of impacts of human activities and natural processes on the integrity of the SMME. The indicators will be used during monitoring of ecosystem health, climate change, levels of disturbance, vegetation changes, local community socio-economics, as well as resource use. The indicators will also guide during the monitoring of patterns of distribution, composition and abundance of selected taxa (e.g. endemic species). Specific objectives of the monitoring include to:

- Assess the effectiveness of joint activities;
- Evaluate the level of support from policy and decision-makers;
- Evaluate the extent to which the objectives of the trans-boundary protection have been achieved;
- Constantly assess the extent to which local communities have benefited from the plan ; and
- Ensure that reports are conveyed to decision-makers for consideration and action.

Changes will be detected by comparing freshly collected observations against baselines, where they exist. Some baseline data are, for example, available in patrol reports. Otherwise required baselines will be generated as opportunities arise, through research and implementation. Management effectiveness will ultimately be assessed.

Methods that can be used by a wide variety of people of different levels of skills and at different times are highlighted within the monitoring protocols. These are based on recommendations by the World Conservation Monitoring Centre (WCMC) (Tucker et al, 2005) and using tools previously developed by the National Museums of Kenya (NMK) in 2007. The standardised methods will allow different research and monitoring groups to compare their results directly; and pool them to make the data useful in a broader context. The various data when analysed will ultimately provide insights, trends and thresholds for intervention.

The following technical considerations have been made in designing this monitoring program:



- i. when to collect field measurements and samples, frequency of taking field measurements and samples and for how long;
- ii. where to collect field measurements and samples;
- iii. what methods to use for collecting the field measurements and samples and for handling and analyzing samples;
- iv. measurement of covariates along with other field measurements, e.g. surface water temperature and time of the day;
- v. ensuring quality control for monitoring data; and
- vi. personnel that will do the work

A short training course on analysis and interpretation of data will be required to equip personnel with skills and show how such data can benefit and inform management. Costs, training, oversight and sustainability should be incorporated in the operational plans.

4.3 Process and Methods used to develop the Protection and Monitoring Plan

4.3.1 Process used

Protection and monitoring of the SMME are currently being carried out routinely by the national institutions/ agencies mandated to manage the natural resources in both Tanzania and Kenya such as SENAPA/TANAPA/Local governments in Tanzania, and KWS/MMNR/KFS/County Councils/Conservancy authorities in Kenya. The collaboration and co-ordination is mutually arranged by the concerned authorities/stakeholders and activities are sometimes carried on in an *ad hoc* manner. As far as the consultants could discern, there has been no inter-governmental agreements/MOUs to facilitate the joint activities. Much of the collaboration and joint patrols have been focused on controlling/minimizing poaching.

As mentioned in Sec 1.1 above, the SMME has been under “protection and monitoring” for many decades by the institutions of the two governments established for that purpose and mandated to manage these resources. The JT-BEPMP, proposed in this report, is therefore meant principally to focus on transboundary issues and highlight those aspects of ecosystem protection and monitoring that are best tackled in “a trans-boundary” context and closely linked to other issues managed at national level so as to maintain integrity and sustainability of the ecosystem.

It is against this background and its legal and policy mandate of the EAC, in Council protocols (Articles articles 9-13; and 20, 21, 26 and 35) that a protection and monitoring plan is being drawn. In addition both the biodiversity strategy and action plan [Sec 3.3 (a), p19, Sec 4.6, p 27] and the strategic environmental assessment (Sec 2.2.5, p16. Sec 5.4, p 42, Sec 7.3.4, p 72) have supported the ecosystem approach in coming up with a Trans-boundary management/ protection/monitoring plan, capacity building and infrastructure development.

4.3.2 Methods used

The consultants carried out field work using participatory approaches and were able to interview and seek views from several categories of stakeholders and communities. Their views and opinions were synthesized together with information from published document to

achieve the objectives of coming up with a protection and monitoring plan. The methods used are described in the following 13 steps:

Table 4.1 Steps used in preparation of the JT-BEPMP

Step 1	Review of relevant primary and secondary literature (reports, policy documents, brochures)
Step 2	Discussions with the Lake Victoria Basin Commission staff on a regular basis for updates and consultation
Step 3	Development and testing of tools and guidelines for use during field work.
Step 4	Field visits to the institutions and agencies that manage parts of the SMME ecosystem; leaders of adjacent communities in Tanzania and Kenya.
Step 5	Discussions with staff from individual Protected Areas both at individual and group levels
Step 6	Discussions with institutions' technical staff in charge of protection, research and monitoring
Step 7	Discussions with non-governmental organisations active in conservation in the SMME Region
Step 8	Development and testing of conservation targets and indicators in discussions with stakeholders during field work in the SMME Region.
Step 9	Development of protocols for targets and indicators and further consultative review by some key stakeholders
Step 10	Analysing data, joint protection plan and monitoring development and report writing
Step 11	Discussions in stakeholders' meeting to finalize conservation targets, indicators and protocols (Regional Validation Workshop)
Step 12	Presentation of the findings and recommendations to the LVBC
Step 13	Incorporating of comments and submission of the final report

Techniques and approaches used during fieldwork to assess community perceptions and views of local leaders, institutional staff members, other stakeholders and potential beneficiaries were participatory and descriptive. They included literature search and reviews, field surveys, interviews, and field observations

4.4 SMME Transboundary Conservation Targets, Key Ecological Attributes and their Rationale

Tables 4.2 below summarises the key targets for the proposed Joint Transboundary Ecosystem Protection and Monitoring Plan. It is emphasized that the list is in no way exhaustive and complete, but rather it is intended as the starting point of transboundary cooperation. Other targets, key ecological attributes and indicators will continue to be monitored as spelt out in the two management plans (SNP and MMNR), with the proviso that the methods will be progressively unified with the assistance of the Transboundary Forum/LVBC and the MOU such that the data generated is understood in the context of the ecosystem as a whole and is directly of benefit to both Tanzania and Kenya.



4.5 Indicators Used for the Proposed Protection and Monitoring Plan

The indicators used (Table 4.3 below) are an attempt to highlight, for the moment, only those parameters that pertain to transboundary issues as derived from the two Management Plans for Serengeti National Park and Maasai Mara National Reserve-including the Mara Triangle (Tables 1.2 and 1.3 above), plus other transboundary issues identified in the field during this study but not covered by the management plans. It is anticipated that eventually there will be a single Management Plan for the whole of the SMME as one ecosystem. The indicators will need to be rationalised across the international border as this is necessary for conserving SMME as a trans-boundary resource and enabling it to play its role in provision of ecosystem service.

Table 4. 2 Trans-boundary Ecosystem Conservation Targets, Key Ecological Attributes and Rationale

Conservation Target	Subsidiary targets	Key Ecological Attributes	Rat
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Migration	<ul style="list-style-type: none"> - Cross-Border migration species (Wildebeeste, Zebra, Thompsons gazelle, Eland) - Cross-border migration carnivores (Lion, Cheetah, Spotted Hyena, Wild dog) 	<ul style="list-style-type: none"> - Population size of key migratory species - Population size of cross-border migration carnivores and their age/sex structure and ratio - Traditional migratory routes, access to critical areas - Habitat connectivity, Habitat (grassland) size - Pasture quality and quantity - Mara river (water) quality and quantity 	<ul style="list-style-type: none"> . The defining characteristic of the Serengeti-Mara ecosystem, and plays a key role in determining key ecological processes and animal and plant diversity and abundance. . Even relatively small alterations to the migration could have far-reaching impacts on the SMME's ecology and biodiversity
Mara River	<ul style="list-style-type: none"> - The Mau Forest - Riverine forest - Riverine forest mammals and birds, and herpetofauna. 	<ul style="list-style-type: none"> - Water flow – quantity and quality - Size, extent and stability of Mau Forest, Siana and Loita Hills forests - Size, extent and stability of riverine forests - Recruitment rate of key forest species - Indicator species of riverine forests (e.g. Colobus monkey, riverine birds) 	<ul style="list-style-type: none"> - The Primary, and occasionally the only, source of water in the SMME. The survival of the migration in its current form depends on seasonal access to the river, especially during periodic droughts. - River flows and sediment loads have been severely affected by upstream activities in recent years, especially in the Mau Forest.
Black rhino <i>(Diceros bicomis michaeli)</i>		<ul style="list-style-type: none"> - Age/sex structure and ratio and population size - Habitat size and quality - Recruitment - Genetic diversity 	Classified as critically endangered by IUCN. Global population declined drastically over last 30 years. SMME contains "indigenous" populations, but it remains both small and vulnerable.
Wild dog		<ul style="list-style-type: none"> - Population size, age/sex structure and ratio - Prey species available - Habitat availability and connectivity 	Wild dogs are classified as endangered by IUCN. Faces threats including human-wildlife conflicts and reduction of dispersal areas.
Wildlife, Human and Livestock diseases	<ul style="list-style-type: none"> - Rinderpest, Rift Valley Fever, Foot and mouth disease, Trypanosomiasis, Rabies, Canine distemper 		General and serious threat to animal and human health
Tourism	<ul style="list-style-type: none"> -Carrying capacity, -visitors experiences - No of facilities 	<ul style="list-style-type: none"> - Introduction of exotics, - pollution to Mara river - Habitat loss and modifications, -changing lifestyles of riparian communities 	A heavy land user with high transboundary prospects and strong ecosystem impacts
Invasive species		<ul style="list-style-type: none"> -habitat loss, invasives colonization,-Species diversity, - pasture quality and quantity, -Wildlife health 	



The trans-boundary threats were weighted in a matrix (Table 4.3), considering their Scope (Geographic extent) and Severity (Level of damage) to assist in arriving at the targets to be monitored-*indicators* (table 4.4).

Table 4. 3 SMME Transboundary Threat Analysis Matrix

Threat \ Target	Ungulate Migration	Mara River	Riverine forest	Black rhino	Large carnivores	Wild dog	Woodlands
Deforestation		High	High				
Human settlement, cultivation	High						Low
Habitat degradation (ecology, especially grassland)	High			High	Medium	Medium	
Water pollution		Medium					
Water diversion and extraction	Medium	High	High				
Inbreeding				Medium		Medium	
Disease				Medium			
Poaching				High	Low		
Fire	Low						High
Poaching	High						High

KEY

Overall Threat Level	Very High	High	Medium	Low
Severity (level of damage)	Destroy or eliminate the Conservation Target	Seriously degrade the Conservation Target	Moderately degrade the Conservation Target	Slightly impair the Conservation Target
Scope (geographic extent)	Very widespread or pervasive	Widespread	Localised	Very localised



Table 4.4: SMME Joint Transboundary Ecosystem Targets Indicators to be Monitored

Conservation Target	Indicator to be monitored	Protocol (Definition)	By Whom	Who enters data	Who checks and corrects
Migration	- Viability of Migratory corridors - Population size of key migratory species - Habitat connectivity	- Habitat connectivity sustains corridors and thus migration. Monitor: Annual (or biannual) counts of wildebeeste, zebras, Thomson's gazelles, fires, and other corridor disruptions	TANAPA/SENAPA/TAWIRI/WMA. Ikorongo-Grumeti Game Reserve. KWS/DRSRS/MMNR/Conservancies	TANAPA/SENAPA/TAWIRI/WMA. Ikorongo-Grumeti Game Reserve. KWS/DRSRS/MMNR/Conservancies	TANAPA/SENAPA/TAWIRI/WMA. Ikorongo-Grumeti Game Reserve. KWS/DRSRS/MMNR/Conservancies
	- Population size/structure of cross-border migration of carnivores	- Population structure/sex ratio indicates stability - Monitor: Number/sex ratio of lions/lionesses, hyenas, cheetahs	TANAPA/SENAPA/TAWIRI. KWS/DRSRS/MMNR	TANAPA/SENAPA/TAWIRI. KWS/DRSRS/MMNR	TANAPA/SENAPA/TAWIRI. KWS/DRSRS/MMNR
	- Pasture quality and quantity	- Migration is partly influenced by pasture availability - Monitor: Cover/canopy changes via aerial surveys e.g. biannually	TANAPA/SENAPA/TAWIRI. KWS/DRSRS/MMNR	TANAPA/SENAPA/TAWIRI. KWS/DRSRS/MMNR	TANAPA/SENAPA/TAWIRI. KWS/DRSRS/MMNR
Mara River	- Environmental flows (Quantity and quality) - Riverine forests	Environmental flows are minimum flows that maintain ecosystem services of the river, critical for the existence of riverine vegetation species. Monitor: River discharge, Pollution levels, Riverine Forest damage	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEMFRI/KFRI/Kenya Water Towers. TAFORI/TAWIRI/SENAPA/WUAS/Basin Water Office	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEMFRI/KFRI/Kenya Water Towers. TAFORI/TAWIRI/SENAPA/WUAS/Basin Water Office	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEMFRI/KFRI/Kenya Water Towers. TAFORI/TAWIRI/SENAPA/WUAS/Basin Water Office
	- Size, extent and stability of Mau Forest	Stability of Mau forest vital for Mara River. Monitor: deforestation	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEMFRI/KFRI/Kenya Water Towers	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEMFRI/KFRI/Kenya Water Towers	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEMFRI/KFRI/Kenya Water Towers
	- Size, extent and stability of Siana	The two forests vital for stability of Sand River. Monitor: deforestation	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEMFRI/	WRMA/KFS/DRSRS/MMNR/MaraMRUS/	WRMA/KFS/DRSRS/MMNR/MaraMRUS/KEM



	and Loita Hills forests		KFRI/Kenya Water Towers	KEMFRI/KFRI/Kenya Water Towers	FRI/KFRI/Kenya Water Towers
Endangered species (Black rhino and \Wild dogs)	<ul style="list-style-type: none"> - Population structure/size - Habitat quality - Poaching threat 	Assessment of the population size and structure for endangered species is critical in providing information on trends, which also infer the quantity and quality of the habitat used. Monitoring will include: Annual/biannual counts, No of poachers caught; no of rhino horns retrieved	KFS/DRSRS/KWS/MMNR/MaraWRUA/KEMFRI/KFRI. TAWIRI/SENAPA/Ikorongo-Grumeti National Reserve	KFS/DRSRS/KWS/MMNR/MaraWRUA/KEMFRI/KFRI. TAWIRI/SENAPA/Ikorongo-Grumeti National Reserve	KFS/DRSRS/KWS/MMNR/MaraWRUA/KEMFRI/KFRI. TAWIRI/SENAPA/Ikorongo-Grumeti National Reserve
Diseases	<ul style="list-style-type: none"> -Vector control/management -Assessment prevalence of the diseases 	<ul style="list-style-type: none"> - Regular and routine screening for Trypanosomiasis (Tryps) shall provide information on the existence of pathogens for tryps and thus institution of effective control measure. - Deployment of tsetse targets has proved effective in reducing tsetse fly population and hence tryps outbreak. 	KFS/DRSRS/KWS/MMNR/KFRI/KEMFRI/Veterinary Dept. TAFORI/TAWIRI/SENAPA/VIC	KFS/DRSRS/KWS/MMNR/KFRI/KEMFRI/Veterinary Dept. TAFORI/TAWIRI/SENAPA/VIC	KFS/DRSRS/KWS/MMNR/KFRI/KEMFRI/Veterinary Dept. TAFORI/TAWIRI/SENAPA/VIC
Poaching	<ul style="list-style-type: none"> - Poaching intensity and extent - Mode of poaching 	<ul style="list-style-type: none"> - Both subsistence and commercial poaching is affecting the SMME integrity. Knowing the levels for poaching, poaching networks and types of poachers is important in devising effective anti-poaching measures. Monitor: poaching intensity (frequency, carcasses caught, snares retrieved) 	TANAPA/SENAPA/TAWIRI/WMA/Ikorongo-Grumeti Game Reserve. KWS/DRSRS/MMNR/Conservancies	TANAPA/SENAPA/TAWIRI/WMA/Ikorongo-Grumeti Game Reserve. KWS/DRSRS/MMNR/Conservancies	TANAPA/SENAPA/TAWIRI/WMA/Ikorongo-Grumeti Game Reserve. KWS/DRSRS/MMNR/Conservancies
Alien and invasive species management	<ul style="list-style-type: none"> - Diversity of AIS - Extent of invasion - Species composition 	<ul style="list-style-type: none"> - IAS has been recently reported to result into habitat loss and degradation. Management of IAS is critical in maintaining ecosystem health and integrity. Area (ha) invaded will be monitored/measured - species identification - impact assessment 	TANAPA/SENAPA/TAWIRI/WMA/Ikorongo-Grumeti Game Reserve/Min of Agriculture. KWS/KARI/KEPHIS/KFS/DRSRS/MMNR/Conservancies/Min of Agriculture	TANAPA/SENAPA/TAWIRI/WMA/Ikorongo-Grumeti Game Reserve/Min of Agriculture. KWS/KARI/KEPHIS/KFS/DRSRS/MMNR/Conservancies/Min of Agriculture	TANAPA/SENAPA/TAWIRI/WMA/Ikorongo-Grumeti Game Reserve/Min of Agriculture. KWS/KARI/KEPHIS/KFS/DRSRS/MMNR/Conservancies/Min of Agriculture
Tourism	<ul style="list-style-type: none"> - No of tourists visiting various facilities/sites 	<ul style="list-style-type: none"> - Tourists congregate in specific areas. Monitoring their optimal capacity is beneficial to ecosystem integrity 	SENAPA/TENAPA/WMA/Ikorongo-Grumeti National Reserve/TTB. Min of Tourism/KTB/NCC	SENAPA/TENAPA/WMA/Ikorongo-Grumeti National Reserve/TTB. Min of Tourism/KTB/	SENAPA/TENAPA/WMA/Ikorongo-Grumeti National Reserve/TTB. Min of Tourism/KTB/NCC



			/TMCC/KWS	NCC /TMCC/KWS	/TMCC/KWS
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KTB = Kenya Tourism Board; TTB = Tanzania Tourism Board; NCC = Narok County Council; TMCC = Trans Mara County Council



4.5 The Proposed SMME Joint Transboundary Ecosystem Protection and Monitoring Plan

The Protection and Monitoring Plan is detailed in Table 4.5 below. It lists key intervention areas that should be addressed in order to sustain the ecological integrity of the Serengeti-Masai Mara Ecosystem. For each of the intervention areas, activities are proposed. For the sustainability of the initiated interventions, it is proposed that efforts should be made to integrate activities of the trans-boundary action plan in the individual protected area agencies and other stakeholders planning frameworks e.g. Management Plans for SNP and MMNR, district development plans and annual work plans. Interventions for protection and monitoring are proposed in the following key areas:

- Harmonisation of plans, policy, legal and institutional frameworks,
- Joint Patrols,
- Capacity Building,
- Cross-border movement of people and equipment,
- Coordination of Protection Activities, habitat integrity -grassland, savanna, riverine forests, migratory routes
- Communication
- Community involvement,
- Infrastructure Development,
- Setting Monitoring and Evaluation standards,
- Developing harmonisation tools/ protocols for data collection,
- Response to Crisis/ Emergency natural disasters,
- Capacity building in monitoring data handling, and
- Surveillance on diseases and Invasive species (human and wildlife),



Table 4.5: The Proposed Joint Trans-Boundary Ecosystem Protection and Monitoring Plan (JT-BEPMP) for the SMME

<i>Intervention Area</i>	<i>Key Actions/ Activities</i>	<i>Responsible Institution(s)</i>
PROTECTION		
<i>Use existing legal mechanisms</i>	Set up the “ Joint Protected Area Coordination Forum ” using the LVBC and within the LVBC	LVBC, Attorney Generals, TANAPA, SENAPA, MMNR/KWS, KFS, Police
<i>Harmonise policy and legal frameworks</i>	Prepare guidelines for arrest and prosecution of suspects/offenders and procedure for exchange of suspects	Attorney Generals, TANAPA, SENAPA, MMNR/KWS, KFS, Police
	Conduct joint trans-boundary annual policy dialogues for the protection and monitoring of SMME	TANAPA, SENAPA, MMNR/KWS, LVBC, KFS
	Build capacity of PA Managers on the policies and legislation in the two countries to support conservation and management of SMMME as one ecosystem	TANAPA, SENAPA, MMNR/KWS, LVBC, KFS
	Prepare a joint SMME Management Plan emphasizing a single ecosystem	TANAPA, SENAPA, MMNR/KWS, LVBC, KFS, NCC/TMCC/District councils, LVBC
	Harmonise legal frameworks on water allocation and distribution	Water ministries, WRMA
<i>Joint Patrols</i>	Initiate discussions to prepare and sign a formal MoU for joint patrols	GoT, GoK, LVBC, TANAPA, SENAPA
	Prepare and sign MoU to formalise cross-border pursuit of poachers	GoT, GoK, LVBC/EAC
	Joint or coordinated activities on sites where ecosystem restoration is urgently needed	UWA, KFS, NFA, County/District Councils, LVBC/ EAC
	Capacity Building of personnel in trans-boundary ecosystem law	TANAPA, SENAPA, MMNR/KWS,



<i>Intervention Area</i>	<i>Key Actions/ Activities</i>	<i>Responsible Institution(s)</i>
	enforcement	
	Facilitate mainstreaming of joint and coordinated patrols in individual PA Agencies and other institutional plans	TANAPA, SENAPA, MMNR/KWS, LVBC,
	Facilitate mainstreaming of joint and coordinated patrols in individual PA agencies and other institutional plans	MNRT, TANAPA, SENAPA, MF&W/KWS, LVBC
	Map out threats and identify hotspots for direct focus, based on well known indicators such as poaching, smuggling, cattle rustling, foot paths	TANAPA, SENAPA, MMNR/KWS, LVBC, County/District Councils
	Define protection operational standards e.g. types of patrols and coverage and to optimise personnel resources in the ecosystem	TANAPA, SENAPA, MMNR/KWS, LVBC, NCC/TMCC/District Councils
	Establish mechanisms for movement and tracking of produce from the Ecosystem	TANAPA, SENAPA, MMNR/KWS, LVBC, NCC/TMCC/District Councils, Customs
<i>Capacity Building</i>	Assess capacity needs and build personnel in the ecosystem Construct office space for staff and patrol bases in strategic locations	TANAPA, SENAPA, MMNR/KWS, LVBC, NCC/TMCC/District Councils,
	Provide equipment for data collection and storage e.g. GPS, GSM enabled GPS, Data Loggers, Computers and solar energy systems	TANAPA, SENAPA, MMNR/KWS, LVBC, NCC/TMCC/District Councils,
	Build capacity of personnel in trans-boundary ecosystem data collection and analysis methods, including archiving	TANAPA, SENAPA, MMNR/KWS, LVBC, NCC/TMCC/District Councils,
	Prepare a syllabus for training rangers to equip them with necessary skills specific for trans-boundary activities and techniques.	TANAPA, SENAPA, MMNR/KWS, KFS, Wildlife Training Institutes
<i>Cross-border movement of people</i>	Prepare guidelines immigration for coordinated movement of people and equipment for management and conservation of SMME ecosystem	Immigrations, Customs Departments, TANAPA, SENAPA, MMNR/KWS, EAC/LVBC



Intervention Area	Key Actions/ Activities	Responsible Institution(s)
<i>and equipment</i>	and for tourists	
	Define specific entry and exit cross-border points in the protected areas	Immigrations, Customs Departments, EAC/LVBC, TANAPA, SENAPA, MMNR/KWS,
<i>Coordination of Protection Activities, habitat integrity</i>	Establish a cross-sectoral committee involving institutions responsible for Foreign Affairs, Security, Customs and Immigration	URT, TANAPA, SENAPA, MMNR/KWS, LVBC,
	Decentralise data analysis and management to PA level and strengthen the trans-boundary access and sharing of information	TANAPA, SENAPA, MMNR/KWS, NCC/TMCC / District councils
Communication	Prepare a communication protocol to harmonise radio frequency channels	TANAPA, SENAPA, MMNR/KWS, KFS, LVBC, country Communications commissions
	Install Area-Wide clear network to allow for easy access to information (Software improvement to network all PA s in Tanzania and Kenya)	TANAPA, SENAPA, MMNR/KWS, LVBC, KFS, Consultant
<i>Community involvement</i>	Map out accessible areas with resources of trans-boundary nature	TANAPA, SENAPA, MMNR/KWS, LVBC, KFS, NCC/TMCC/District councils
	Facilitate provision of alternative Sources of livelihoods to neighbouring communities including generating guidelines for cultural activities	TANAPA, SENAPA, MMNR/KWS, LVBC, KFS, NCC/TMCC/District councils
<i>Infrastructure Development</i>	Prepare an infrastructure plan appropriate for tourism and other purposes, including cross-border Ranger Posts, Trails, accommodation and training of people	TANAPA, SENAPA, MMNR/KWS, NCC/TMCC / District Councils
	Set standards for the infrastructure to be set up	LTANAPA, SENAPA, MMNR/KWS, LVBC,



<i>Intervention Area</i>	<i>Key Actions/ Activities</i>	<i>Responsible Institution(s)</i>
MONITORING		
<i>Monitoring and Evaluation standards</i>	Standardise indicators in protection, and update them whenever necessary	TANAPA, SENAPA, MMNR/KWS
	Gather and or compile baselines for trans-boundary protection and monitoring	LVBC/Consultant
<i>Develop harmonisation tools/ protocols for data collection</i>	Standardise protection and monitoring tools for the ecosystem, borrowing experiences from use of GIS, GPS and MIST	TANAPA, SENAPA, MMNR/KWS,
	Organise joint M & E visits to selected parts of the ecosystem	TANAPA, SENAPA, MMNR/KWS,
<i>Response to Crisis/ Emergency natural disasters</i>	Carry out a risk assessment and map out risk and fire prone areas; with mitigation measures	TANAPA, SENAPA, MMNR/KWS,
	Establish emergency procedures for management of the risks and hazards, with clear guidelines	TANAPA, SENAPA, MMNR/KWS,
	Identify and establish gauging stations and monitoring equipment on key rivers	WRM, Water Departments, PA authorities
<i>Capacity Building in monitoring data handling</i>	Carry out training on data collection and Monitoring & Evaluation	TANAPA, SENAPA, MMNR/KWS, NCC/ TMCC/ District Councils



<i>Intervention Area</i>	<i>Key Actions/ Activities</i>	<i>Responsible Institution(s)</i>
	Training in GIS and Remote Sensing Applications and database Mgt	TANAPA, SENAPA, MMNR/KWS, KFS,
	Build capacity of personnel in trans-boundary ecosystem data collection methods and archiving	TANAPA, SENAPA, MMNR/KWS, KFS, NCC/ TMCC/District Councils
	Build capacity in water data collection and analysis	Ministry of Water/WRMA
<i>Community involvement</i>	Review resource access agreements and other data needs for areas of community participation	TANAPA, SENAPA, MMNR/KWS, KFS, NCC/ TMCC/District Councils
	Prepare and update formats for data collection by communities as a feedback mechanism	TANAPA, SENAPA, MMNR/ KWS, KFS, NCC/ TMCC/District Councils
	Prepare a lessons learnt report from Tanzania and Kenya on experiences with various approaches of ecosystem restoration	TANAPA, SENAPA, MMNR/KWS, KFS, NCC/ TMCC/District Councils
	Facilitate a local government level trans-boundary protection and monitoring committee for SMME	TANAPA, SENAPA, MMNR/KWS, KFS, NCC/ TMCC/District Councils
<i>Surveillance of diseases and Invasive species</i>	Facilitate cooperation between veterinary departments and departments of health	TANAPA, SENAPA, MMNR/KWS, KFS, NCC/ TMCC/District Councils
	Set up invasive species monitoring group in each agency	TANAPA, SENAPA, MMNR/KWS, KFS, NCC/ TMCC/District Councils



5. PROPOSED JOINT PROTECTION AND MONITORING MECHANISMS

5.1 Legislation Backup for the Proposed Arrangement

In as much as there are existing regulations in place, the managers in charge of the areas on the ground felt that these were not enough as they do not clearly spell out the modalities of application to trans-boundary issues on the ground. The areas where there is need to harmonise are:

- Rules of engagement,
- Exchange of prisoners,
- Transfer of equipment to operate within another country,
- Assignment of specific communication channels/frequency,
- Standardisation of facilities.

5.2 Ranger Based Monitoring (RBM)

The objective of RBM is to regularly monitor a protected area by law enforcement staff in order to understand the illegal human use of the habitat (poaching etc), ecological processes in the PAs and distribution and habitat use of specific key species. The monitoring feeds directly into day-to-day management of the protected area and enables surveillance and specific interventions to be based on solid data. This can include where to send patrols, based on suspected activities of poachers, availability of seasonal resources and presence of snares. It can also include the movements of key species, such as elephants and their use of habitat. The RBM produces effective field maps for park staff and patrolling law enforcement staff using GPS coordinates. Data can be analysed for each protected area, as well as at the headquarters of the protected area authority. A centralized, regional database should be developed so that the data is available for the entire ecosystem, thus allowing the SMME to be managed as one ecological unit. This requires the standardization of the RBM datasheet across the protected areas within the Serengeti-Maasai Mara ecosystem.

Using the rangers to collect monitoring data along the routine protection patrols does not add substantial costs to the exercise. Monitoring will help to make the patrols more effective in terms of coverage and targeting. Moreover, the ranger patrols are cost effective because rangers work in small teams, they travel faster (covering more ground), and minimizing potential impacts of their activities by following already established guidelines for use of human or wildlife trails.

5.3 Socioeconomic Factors

Data collection on socioeconomic factors outside the forest, such as the number of people living near the PAs, their distance from the PAs, their livelihood activities, and their needs and dependence on resources from the Protected Areas should be given particular attention. These data should be analyzed along other data sets such as illegal activities in the PAs to gain a better understanding of the threats to the ecosystem and its flora and fauna. Already, there is very good baseline data on local community socioeconomic and resource use for both countries (IUCN 2004, IUCN 2005). Data needs to be collected periodically every five years using Participatory Rapid Appraisal and stratified random Sample Household Survey methods



5.4 Involvement and Participation of Stakeholders in Protection and Monitoring

The following stakeholders (the relevant departments in the ministries) were identified as necessary for implementing this trans-boundary protection and monitoring plan and therefore should be brought on board during the implementation of this plan by being consulted, receiving reports and attending annual trans-boundary meetings:

5.4.1 Government Departments, both Countries

- TANAPA, NCAA, SENAPA, KWS and Conservancies bordering the MMNR
- *Ministry responsible for Tourism* (to advise on the development of tourism opportunities);
- *Focal points for United Nations conventions* (Convention on Biodiversity, Convention on Combating Desertification, Convention on Climate Change);
- *Veterinary Services* (animal health);
- *Ministry responsible for Wildlife* (to advise on the management of wildlife, and the cross border movement of wildlife);
- *Ministry responsible for Forestry* (to advise/inform on the state of the Mau forest and the management of riverine forest and cross border vegetation);
- *Ministry responsible for Water resources management* (to advise on the management of shared Mara river basin and wetlands);
- *National Environment Management Authority* (to co-ordinate and advise on conventions and environmental aspects);
- *Attorney General* (for drafting and advising on regulations, policies and laws);
- *Customs* (to advise on cross-border movement of equipment, goods and capital);
- *Defence Force* (border control and security);
- *Police* (arrests and prosecution of offenders);
- *Foreign Affairs* (for advising on and facilitating international relations and protocols);
- *Immigration* (to advise on the movement of technical people, local community, tourists) between borders and wildlife trade, deportation of offenders);
- *Local Government* - State Lands/County Councils of Narok and Trans Mara in Kenya, District Councils of Serengeti, Ngorongoro, Bunda, Busega, Maswa, and Tarime in Tanzania (community mobilisation, land rights);
- *Ministry of Finance* (funding mechanisms)

5.4.2 Other Key Stakeholders

The other key stakeholders that will be fundamental in the implementation of this protection and monitoring plan include:

- Frankfurt Zoological Society
- WWF
- Grumeti Fund
- Ortello Business Company
- NGOs, CBOs, Development Partners: to advise on sources of funds, technical support and community mobilisation.
- Private sector: to advise on opportunities and forms of investment such as in the tourism sector.



- Representatives of the communities in the bordering districts and counties: to advise on community requirements and concerns, including community mobilisation.
- The Universities' and other tertiary institutions natural resource departments: to involve in for training, research and development.

5.5 Involvement and Participation of Local People in Protection and Monitoring

This should be through the involvement of representative bodies and local authorities such as resource use groups and lower local council officials; as well as building capacity of the local communities aimed at managing their own resources – e.g. modern bee keeping, adding value to traditional products like baskets, cultural tourism – show casing traditional ceremonies and dishes, traditional clothing, preparation of traditional medicine, food and drinks, etc.

Better local community involvement in implementing this plan is essential. This is important because many communities living on the borders between countries suffered from artificial divisions imposed by political boundaries that separate families and peoples (Sandwith *et al*, 2001). Whereas it may be difficult to prescribe a format of public involvement given the variations in cultural, socio-economic and political conditions, the following aspects suggested by Sandwith *et al* (2001), Hall-Martin and Modise (2002), and Metcalfe (1999) can be valuable:

- i. Engaging early in discussions with local communities inhabiting all jurisdictional zones. This consultation should clearly discuss the concept of trans-boundary protection and monitoring and establish the concerns and indigenous knowledge of the local stakeholders.
- ii. Working with the people and communities concerned to identify the shared values and interests that can support nature conservation and sustainable resources use, and which also form the basis for cooperation among communities and trans-boundary institutions. Ensure that similar approaches are adopted when engaging communities in each country.
- iii. Identifying cultural values and resources that communities of the various jurisdictions concerned deem important, that can reinforce the conservation of biodiversity.
- iv. Identifying any potential or actual disputes among communities in the different jurisdictions as well as between them and the conservation objectives. This may be related to disputes related to access to natural and cultural resources.
- v. Establishing conflict management processes whenever necessary e.g. for inter-tribal land conflicts, inter-tribal cattle rustling/thefts, wildlife-people conflict etc.
- vi. Addressing needs related to land and to cultural and natural resource rights.
- vii. Striving to achieve support from local decision-makers (Members of Parliament, Councilors and community leaders).
- viii. The rights of the minorities should be recognized and accommodated in planning and management.
- ix. Ensuring transparency and honesty when dealing with communities on either side
- x. Identifying opportunities for sustainable economic development that could generate benefits for the local people. Hall-Martin and Modise (2002) suggest that this may include participation in the utilization of resources, contracting of certain essential



- services e.g. transport, infrastructure development, accommodation and procurement of local produce (e.g. crafts and fresh produce).
- xi. Involving local and regional NGOs and community based organisations, as these may have established partnerships with local communities, and built a relationship trust.
 - xii. Community members should be encouraged/trained to use their local connections to be part of the intelligence gathering efforts e.g. in poaching.
 - xiii. Communities should be represented at national and regional meetings to voice their own concerns and to strengthen their appreciation and status (Metcalf, 1999).
 - xiv. Encouraging indigenous knowledge systems and participation of traditional healers, spirit mediums and persons with special knowledge of culture, environment, and history.
 - xv. Supporting the communities on how to work with the private sector.
 - xvi. Identifying and building on existing community based natural resources management structures (e.g. those created as part of the Collaborative Resource Management - CRM programmes) lessons learned from CRM be highlighted through trans-boundary protection to provide examples of best practices and pitfalls to avoid; and
 - xvii. Facilitating the restoration of cultural linkages of communities along international boundaries that were separated by the arbitrary drawing of colonial borders, and promoting cross-border economic activities.

5.6 Joint Protected Area Coordination Forum

We propose that a *Joint Protected Area Coordination Forum* be established. Regular meetings of protected area staff across the borders are crucial for implementing this protection and monitoring plan. A Forum/Platform for joint protection and monitoring should therefore be initiated as a first step. An initial MoU between key PAs agencies from the two countries, including field and headquarters staff i.e. TANAPA/SENAPA and MMNR/ Mara Triangle as major immediate stakeholders, under the auspices of LVBC, may be a practical point to start (see Box 6.1 and 6.2). This forum should be held four times a year, rotated between Tanzania and Kenya to maintain neutrality. Reports based on monitoring indicators in this plan should be presented and any other business discussed and plans for action made.

- i. Regular, formalised meetings of the wardens will help to break down suspicion between groups and build trust between individuals from the two countries. These meetings will also improve communication between the PA authorities. Consultations for development of this plan indicated that most stakeholders are ready to support each other when problems occur.
- ii. Working together will facilitate the sharing of information about threats that have a trans-boundary nature.
- iii. Joint planning is expected to build capacity to tackle transboundary threats such as poachers, who are often armed, smugglers or bandits.
- iv. Joint planning will lead to a better appreciation of transboundary needs and the necessity to manage the ecosystem as a whole.
- v. Joint meetings that involve an aspect of joint training will help build the skills of PA staff and to equalize the level of knowledge between countries, bringing up those that have had less chance of further education, without slowing the more advanced participants.



- vi. It is proposed that a Joint Bilateral Technical Committee to coordinate policies be formed as part of the Forum.
- vii. It is also proposed that efforts should be made to establish common communication protocols and mechanisms beyond boundaries, including radio links between the park headquarters in the protected areas.
- viii. In the SMME it will be necessary to formalize a joint office at the border for co-ordination of transboundary issues/activities.

5.7 Joint Border Surveillance and Patrols

Coordinated surveillance and patrolling of border areas can be very effective. Even if, as in most patrols, protected area management staff do not cross country borders, coordinating patrols along the boundary can help to capture people involved in illegal activities. Currently anyone caught in illegal activities outside their country is deported. There are no mechanisms for legal or normative penalty against deportees and they could be back in the protected area committing similar offences the next day. This can also be avoided by making the penalty the same in both countries so that with trans-boundary protection, those handed over to the park counterparts at the border can be prosecuted in their respective own countries and expect any advantage. Radio frequencies could be shared to facilitate communication during joint patrols. Joint patrols allow sharing of information and logistics and require working as one team.



6.0 THEMATIC AREAS FOR DATA MONITORING AND HANDLING

6.1 Sampling Considerations

6.1.1 Sampling units and coverage

It is proposed that the basic sampling unit of a ranger patrol trail be used for monitoring of illegal activities and key species. Sampling should cover as much of the protected area on the Tanzania and Kenya sides as possible so that inferences drawn from the results are applicable to the whole of the SMME.

Ideally, all areas should be covered therefore new trails may be needed where the patrol trails may not be covering the ecosystem. It is proposed that every square kilometer of the PAs within the SMME be visited at least once every two years with an average of at least one visit per year per km² and every 10 km² should be visited every 6 months as a minimum. These figures are only indicative and can be modified as necessary. It should be noted however, that it is not desirable for significant areas to go unvisited for long periods. The conventional law enforcement system of foot patrols that start from ranger camps as well as from park headquarters will be used.

Considering that RBM is to be used, efforts must be made to ensure that monitoring is representative i.e. rangers go where they suspect illegal activities to be going on as well as periodically monitoring other parts of the ecosystem. Use of a GIS database will ensure that localities to be monitored can be selected in advance with a target of having complete coverage. This involves analysing the data spatially, so that patrol coverage can help direct efforts to areas not covered previously.

It is proposed that during the implementation of this plan, previous demarcations and designations of the sectors for different PAs be used. If the PA is divided into sectors, extrapolating relative densities of wildlife and illegal activity (catch per unit effort) to the entire area corrects indices for differences in area size for the different blocks under the jurisdiction of each ranger camp.

6.1.2 Data collection methods

The rangers will use a standardized patrol form-Ground Patrol Data Sheet- (currently used during RBM) for ecological monitoring (Annex 3). The following information will be recorded:

- Number of park rangers on patrol,
- Duration of the patrol (including rest time),
- GPS location coordinates of routes taken (records every 250m or 15min),
- Types, quantities and GPS location coordinates of variables of interest,
- Mammals, reptiles, birds, invertebrates,
- Wildlife resources, illegal activities, etc.



6.2. Thematic Areas for Monitoring

The thematic areas for monitoring may be prioritized as follows:

- 1) Flora and Fauna (terrestrial and aquatic);
- 2) Human activities and developments;
- 3) Water quality and quantity;
- 4) Vegetation changes;
- 5) Pasture quality and quantity
- 6) Size, extent and stability of riverine forests, and
- 7) Climate change.

The following specific issues will be monitored:

6.2.1 Fauna and flora

Terrestrial and aquatic fauna will be monitored. The monitoring teams will update baseline data on relative abundance, distribution, species richness and diversity. In addition, the teams will identify key indicator taxa for ecosystem health. The following aspects will be monitored:

- Population trends of key indicator taxa for ecosystem health.
- Endemic, rare, endangered and threatened species.
- Locations of invasive species.
- Impact of climatic variability on Flora and Fauna (terrestrial and aquatic).

The monitoring teams will record taxa of fauna (direct observations) or their signs (nests, dung, hair, footprints, etc) encountered.

6.2.2 Human activities and impacts

The following will be monitored:

- Illegal human activities and their impacts on the ecosystem e.g. poaching (poachers, poacher camps, camp fires, recoveries of wildlife products- animal carcasses, skins, bush-meat and trophies, snares and spears), smuggling, cattle rustling (routes used in rustling), and foot paths;
- In Mau Forest and Riverine forests: logging (counts of logging sights, counts of stumps, recovered timber, hand or power saws), encroachment (open land and number of gardens), forest fires (area burnt and number of fires), restoration/enrichment planting efforts (extent, integrity, effectiveness),
- Impact/sustainability of resource use agreements and human activities inside the park on vegetation.
- Cultural activities in the park and their impacts e.g. visitation to caves and sacred places for different purposes;
- Human population changes (from national census data) for the purpose of predicting the variation of pressure on park resources.
- Impact of revenue sharing scheme on the communities and on the conservation of the park.
- Impact of resource use on community livelihood
- Tourism developments, management and related impacts
- Human-Wildlife Conflict

- Visitor satisfaction
- Benefits from livelihood activities, including guidelines and management plans of woodlots

6.2.3 Water quality and quantity

Water resources, their allocation and distribution in the SMME Ecosystem will be monitored focusing on rivers Mara and all its tributaries, Grumeti, and all the rivers and streams in the SNP and adjoining wildlife areas. This may be done in conjunction with the responsible bodies for water development e.g. Ministry of water or its equivalent in each country. The following will be monitored:

- The water catchment functions of the park
- Pollution of water resources from activities **inside and outside** the park
- Impacts of gravity flow schemes on the water catchment functions of the Park.
- Changes in river flow
- Interventions on the streams/rivers, e.g. water abstraction
- Allocation and distribution of waters
- Water quality and quantity

6.2.4 Land cover and land use

Changes in land cover and land-use over time need to be monitored. Through satellite imagery/aerial photos, the changes in forest cover and effects of the human population can be measured and understood in conjunction with socio-economic and ecological data, especially in the dispersal areas outside the PAs. There is already good baseline data collected on land cover (Mundia *et al* 2009, Homewood *et al* 2001, Odenyo 1978), though it may need to be harmonized and standardized.

Vegetation change is sometimes a normal process implying that the aim of management should not be to view vegetation change as necessarily undesirable because both forest and savannah ecosystems are always in a state of flux and changing (Eggeling 1947, Sheil 1997, Sheil 1998, Sheil 1999, Sheil 2001, Sheil 2003). The challenge therefore is to identify undesirable change and what management measures should be done about it.

The concern is that, in-as-much as the threat level to such habitats and species is probably still relatively low, they could be vulnerable to global warming and tourist activity. Fire might also be one of the threats and related data be collected as part of routine patrol by rangers in Tanzania and Kenya. In terms of ecology it is likely that both occasional severe droughts as well as fires may be relatively natural parts of the ecology, even if fire risk is likely greatly increased with human presence (Wesche 2003, Wesche *et al.*, 2000).

6.3 Spatial Information

6.3.1 Use of maps, images and GIS in monitoring



The SMME ecosystem, including the Mau forest, is a spatially heterogeneous area in biophysical conditions like vegetation and topography and such conditions make planning activities more difficult. Choosing the most appropriate set of management interventions in such an area depends on accurate, detailed area and site description and characterization. Characterization, in turn, is based on geographic information. The most basic tool is a geo-referenced map at a suitable scale on which field survey data can be plotted. Geographic Information Systems (GISs), Global Positioning Systems (GPSs) and high-resolution, large-scale satellite imagery (e.g. IKONOS imagery) or aerial photographs are efficient and effective means for obtaining and managing basic geographic planning information.

Geo-referenced databases make it substantially easier to monitor impacts of activities in the PAs; whether the focus is on measuring results or ensuring that mitigation measures are doing their job. GIS integrates spatial and other kinds of information within a single system, offering a consistent framework for analyzing geographic data. GIS may help SMME management devise practical plans for monitoring, managing and mitigating conservation problems by using it to answer many spatial related questions, such as: *What is at ...? Where is it? What has changed since ...? What spatial patterns exist? What if ...?*, which require a comprehensive GIS database. Major sources of data for GIS include topographic maps, satellite images, aerial photographs and GPS coordinates. Therefore, a survey of existing maps, images, photos and GPS data will be necessary.

6.3.2 Analog survey maps and other data

Maps covering the SNP and MMNR and the surroundings areas are available from the Lands and Mapping Department, Dar-es-Salaam and Nairobi. Topographic maps are available at scales of 1:250,000 and 1:50,000 map sheets. These sheets are from the topographic map series of 1960-76, which all contain infrastructure, settlements, rivers, contours, administration, gazetted areas, and land use. Contours and spot heights on these survey maps may be in feet (intervals of 500 feet, or about 165 meters). It is noted that names, or their spelling, may have changed since the maps were made. The maps will be useful for guiding stratification of areas to be monitored according to different characteristics. The maps will also be useful during the actual monitoring exercise and data entry to validate the areas to be monitored. The Lands Departments also have aerial photographs of various scales taken at different times, going back to the 1950s.

Good quality satellite images that provide a historical baseline on cover are also available. Many studies have been carried out in the SMME using satellite imagery dating back to the early 1970s, and there is available also a Landsat archive of the SMME at the Regional Centre for Mapping of Resources for Development in Kasarani, Nairobi. The FZS also has a satellite imagery archive of SNP.

6.4 Data Handling and Interpretation

The raw data collected through the various monitoring protocols need to be carefully checked, then entered in databases, checked, corrected and double checked, before analysis and evaluation concerning management questions. The challenges posed by data

management in any organization should not be underestimated; too often in designing a monitoring approach, the management aspects of data are overlooked.

TANAPA/SENAPA and MMNR/KWS must clearly define data-management systems and allocate responsibilities for each step in managing data from each monitoring protocol. Oversight by a staff member such as the Warden responsible for Research and Monitoring and an assistant, well trained and experienced in database management and possibly GIS, is needed to ensure quality control of the data sets. Without due attention to quality control and basic “housekeeping tasks”, the value of collecting large long-term data sets would be wasted. With good controls and effective management it should be relatively simple to utilize data in a wide variety of informative ways.

Once monitoring data have been collected during implementation, they should be analysed. Methods of data storage and analysis need to be standardized to make comparison possible among trans-boundary partners. Adequate staff time and financial resources should be mobilised and allocated for this, on both sides of the border.

Data validation, cleaning, entry and analysis should be done by wardens responsible for law enforcement and research and monitoring. If these processes are to be done by a ranger(s), they should be under strict supervision of the wardens.

6.5 Skills Training Assessment

To ensure that the monitoring data collected is comparable, well stored and analysed, current training needs for staff involved in the implementation of the protection and monitoring activities need to be assessed. Skills training for both junior (e.g. rangers) and senior staff (e.g. wardens) in areas like using maps, GPS, compass, and other equipment, care and maintenance of the equipment, knowledge of how to record data on standard data sheets, basic computer knowledge, basic data entry, sample collection methods, knowledge of species identification, data analysis, communication and report writing skills should be assessed. For wardens, a questionnaire should be designed on their level of knowledge on using the computer and computer packages like MS Word, Excel, Access, and PowerPoint. Also knowledge of basic statistical analyses like calculating measures of central tendency (mean, mode and median), levels of measurement, measures of variability (range, standard deviation, coefficient of variation), summarizing and presenting data, statistical significance, tests of difference and association should be tested.

Also, skills training for all thematic areas as listed in 6.2 above must be catered for, on the basis of “need to know”.

6.6 General Recommendations for Implementation of the proposed methods

The following recommendations, which form a basis for the action plan, are proposed for sustainable protection and monitoring of the SMME ecosystem:

- In order to ensure reliable data are collected, regular training and checking of patrol staff and park wardens, at least on a quarterly basis is recommended. Ensuring



consistency in the period and frequency of data collection is crucial and for this plan, it is proposed that this should be on weekly or monthly basis, depending on availability of resources.

- Comprehensive identification guides and booklets/charts with pictures of the fauna and their signs do not exist at present and need to be developed and used. In case rangers are doubtful about the accuracy of their sightings, they need to be encouraged to suggest adjustments on practical ways of data recordings during the implementation of the plan. Wardens should regularly participate in patrols, to directly assess the rangers' skills and difficulties in recording data accurately, as well as carrying out their other tasks.
- Monitoring tools should be harmonised across PAs in Tanzania and Kenya for ease of analysis of data. This will be based on the monitoring tools that are specified in this plan
- It is necessary to carry out training for Wardens, Rangers and other staff to carry out ranger based data collection. Aspects for training may include population survey methods for fauna.
- Equipment (e.g. GPS units, Computers, Data Loggers, Camera traps, Solar panels and Gauges for water monitoring) should be procured for collection and storage of data
- Threats to be monitored should be clearly spelt out and mapped so that threats/hotspots are identified for focus
- Develop systematic and harmonized systems for data archiving
- TANAPA/SENAPA/MMNR/KWS should encourage continuous research in all aspects of the SMME ecosystem.



7.0 ACTION PLAN FOR JOINT TRANS-BOUNDARY ECOSYSTEM PROTECTION AND MONITORING OF THE SERENGETI-MAASAI MARA

7.1 Introduction

To operationalise the protection and monitoring plan for Serengeti-Maasai Mara Ecosystem, an Action Plan has been developed. The action plan outlines key intervention areas that should be addressed, in order to sustain the ecological integrity of the SMME. It is also an abridged form of the JT-BEPMP detailed in Table 4.3, i.e., the JT-BEPMP and the Action Plan should be seen as a continuum. For each of the intervention areas, responsible institutions are listed in Table 4.3 above. These institutions will work under the umbrella of the proposed Joint Protected Area Coordination Forum proposed in Section 5.6 above.

Estimates of the costs are time-dependent and should be added at a later date. For the sustainability of the initiated interventions, it is proposed that efforts should be made to integrate activities of the trans-boundary action plan into the revised individual protected area agencies and other stakeholders planning frameworks e.g. Serengeti National Park and Maasai Mara National Reserve Management Plans, District Development Plans and annual work plans. Eventually, it is proposed that a single Management Plan for the SMME be developed with the institutional arrangements, as outlined in Section 5.6, for implementing it. Table 7.1 provides a summary of the Action Plan for the trans-boundary monitoring and protection plan for the SMME ecosystem.

7.2 Goals of the Protection and Monitoring Plan

As discussed in section 4.2 above, the goal of this Joint Trans-Boundary Ecosystem Protection and Monitoring Plan is *to conserve and protect the trans-boundary Serengeti-Masai Mara Ecosystem, its habitats, biodiversity, migrations of large mammals and birds, and its endemic and threatened species for posterity as envisaged in the National Biodiversity Strategic Action Plans of Tanzania and Kenya*. The goal of this Action Plan is to launch the Joint Trans-Boundary Ecosystem Protection and Monitoring Plan.

Supplemental and complementary purposes of the JT-BEPMP are:

- a) To safeguard the ecosystem's status as an area of national and international importance, as a Biosphere Reserve and a World Heritage Site;
- b) To ensure ecological structure, functions and services are better understood and conserved, through adaptive trans-boundary ecological management and improved research and monitoring;
- c) To optimise long-term economic benefits to the two nations through sustainable utilisation that maintains the ecosystem's wild aesthetic beauty;
- d) To promote and maintain an effective and mutually beneficial partnership with communities neighbouring the PAs; and
- e) To promote and maintain the scientific research and educational functions of the PAs.

These trans-boundary goals and purposes will be achieved through:

3. Protecting and monitoring of ecological and socio-economic aspects of the trans-boundary through this JT-BEPMP, and

4. Providing and consolidating information needed for the management of the trans-boundary ecosystem to assist management agencies and their collaborators assure the effective conservation of the values of the SMME.

Specific, measurable, actionable and sensitive ecological indicators have been identified from literature and consultations with stakeholders to enable monitoring of impacts of human activities and natural processes on the integrity of the SMME. The indicators will be used during monitoring of ecosystem health, climate change, levels of disturbance, vegetation changes, local community socio-economics, as well as resource use. The indicators will also guide during the monitoring of patterns of distribution, composition and abundance of selected taxa (e.g. endemic species and invasive species). Specific objectives of the monitoring include to:

- Assess the effectiveness of joint activities;
- Evaluate the level of support from policy and decision-makers;
- Evaluate the extent to which the objectives of the trans-boundary protection have been achieved;
- Constantly assess the extent to which local communities have benefited from the plan ; and
- Ensure that reports are conveyed to decision-makers for consideration and action.

Changes will be detected by comparing freshly collected observations against baselines, where they exist. Some baseline data are, for example, available in patrol reports. Otherwise required baselines will be generated as opportunities arise, through research and implementation. Management effectiveness will ultimately be assessed.

Methods that can be used by a wide variety of people of different levels of skills and at different times are highlighted within the monitoring protocols. These are based on recommended by the World Conservation Monitoring Centre (WCMC) (Tucker et al, 2005) and using tools previously developed by the National Museums of Kenya (NMK) in 2007. The standardised methods will allow different research and monitoring groups to compare their results directly; and pool them to make the data useful in a broader context. The various data when analysed will ultimately provide insights, trends and thresholds for intervention.

7.3 Implementation Arrangements for the Trans-Boundary Monitoring and Protection

Action Plan

As explained above, as a beginning point, a Joint Protected Area Coordination Forum is proposed to be set up through a Memorandum of Understanding (MoU) between the authorities responsible for the two PAs with the assistance of LVBC as the convener for mobilization of resources. This Forum should initiate the implementation of the Action Plan after an agreement is spelt out in an MoU. During that period, LVBC will work with the PA Agencies and other stakeholders to integrate the interventions in the planning frameworks and budget of the different institutions, while the Forum is being progressively formalised, legalized, and upgraded as explained in Sec 5.6.



7.1 Action Plan for SMME Joint Ecosystem Transboundary Protection and Monitoring Plan

Activity	Year of Engagement/Implementation									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
	Short term (2012 – 2014)									
Prepare and sign MoU to formalise implementation of JT-BEPMP among all key stakeholders										
Undertake joint patrols to combat poaching										
Expand areas of engagement between Wardens										
Undertake joint wildlife census for the SMME										
Perform ear notching and collaring for identification and monitoring of endangered species										
Undertake monitoring of water quality and quantity for Mara River				This is a continuous activity to be implemented throughout the period						
Improve effective cooperation among different actors in both countries										
Carry our capacity strengthening based on priority needs										
	Medium Term (2014 – 2017)									
Train rangers and other professionals on modern anti-poaching techniques										
Provide protected areas with modern anti-poaching equipments										
Assess the invasion of IAS and their impacts on ecosystem health and integrity										
Develop capacity for remote sensing and GIS for core protected areas										
Develop and implement common/identical										



penalties and punishments							
Develop Joint Management Plan for SMME covering mutually agreeable Plan Areas							
	Longer Term (2018 – 2021)						
Restore the Mau forest to its original status							
Address Policy Differences and develop trans-boundary policies and laws (harmonization of laws and policies)							
Purchase helicopters for patrols							
Liaise with UNESCO WHC and Biosphere reserve on support for world site and biosphere reserve management							
Set-up Joint Management Authority for SMME							
Manage SMME Jointly							



8.0 REFERENCES

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9.0 ANNEXES

Annex 1. Terms of Reference (ToR) for the consultancy services to develop a Protection Plan for SMME in the Mara River Basin

SCOPE OF THE CONSULTANCY

The consultancy will be carried out in Mara River basin; and in particular within **Serengeti and Maasai Mara Ecosystem**. The consultancy will review Serengeti National Park; and Maasai Mara General management plans; their implementation, particularly on law enforcement patrol and monitoring plan of individual protected areas within SMME; identify the transboundary issues that the joint protection and monitoring plan can address within SMME; harmonise monitoring indicators, protocols to be used for measurements in the field and other details for the implement prepared to monitor implementation of the annual management plans; Explore the participation of the local communities in protection and monitoring of areas adjacent the protected area; Explore the participation and involvement of other relevant stakeholders such as the police, customs and immigration officials; and Prepare proposal on joint law enforcement and monitoring plan for the SMME ecosystem with an action plan for implementation.

OBJECTIVES OF THE CONSULTANCY

Overall Objective

The overall objective is to prepare a comprehensive transboundary protection and monitoring plan for the SMME in MRB.

Specific Objectives

The specific objectives include:

- a) To review general management plans prepared by Serengeti national park; and Maasai Mara game Reserve;
- b) To identify the transboundary issues that the protection and monitoring plan should address in the SMME;
- c) To determine monitoring indicators, protocols to be used for measurements in the field and other details for the implementation of the plan;
- d) To explore the participation of the local communities in protection and monitoring areas adjacent the protected area components particularly in a transboundary context;
- e) To explore the participation and involvement of other relevant stakeholders such as the police, customs and immigration officials; and
- f) To prepare joint protection and monitoring plan for the SMME ecosystem with an action plan for implementation.

SPECIFIC TASKS

The tasks of the consultancy will include, but not limited to the following:

- a) Review existing law enforcement patrol and monitoring plan of individual protected area components in the SMME;



- i. Review general management plans prepared by SNP and MMNR;
 - ii. Review the implementation of the General and annual management plan, particularly on the protection and monitoring;
 - iii. Identify protection priority areas in both protected areas;
 - iv. Identify which institutional framework will be used at either national or regional level to protect and monitor the wildlife in the SMME;
- b) Identify the transboundary issues that the protection and monitoring plan should address in the SMME; here include but not limited to:
- i. Ecosystem ecological monitoring to ensure sustainable ecology in SMME
 - ii. Tourism activities monitoring
 - iii. Ant-poaching monitoring
 - iv. Species / biodiversity monitoring
- c) Determine monitoring indicators, protocols to be used for measurements in the field and other details for the implementation of the plan; here include indicators protocols to monitor:
- i. ecosystem ecological
 - ii. Tourism activities
 - iii. Ant-poaching
 - iv. Species / biodiversity
- d) Explore the participation of the local communities in protection and monitoring areas adjacent the protected area components particularly in a transboundary context;
- i. Review community involvement procedures particularly on the ecosystem ecological, Tourism activities, Ant-poaching and Species / biodiversity monitoring
 - ii. Review existing legal frameworks on the involvement of communities and other stakeholders in the protection and monitoring; and identify which will enable joint protection and monitoring
 - iii. Community Benefits accrued on the protection and monitoring activities
- e) Explore the participation and involvement of other relevant stakeholders such as the police, customs and immigration officials;
- i. Review police, customs and immigration officials involvement procedures particularly on the ecosystem ecological , Tourism activities, Antpoaching and Species/biodiversity monitoring; and
 - ii. Review existing legal frameworks on the involvement of police, customs and immigration officials in the protection and monitoring; and identify which will enable joint protection and monitoring.
- f) Prepare joint protection and monitoring plan for the SMME ecosystem with an action plan for implementation.

EXPECTED OUTPUTS OF THE CONSULTANCY

The main output (s) will include:

- i. An inception report detailing the stepwise methodological approach to be adopted to ensure that the outcomes of the consultancy results are valid and reliable seven (7) days after signing of the contract;
- ii. Draft report; and
- iii. A protection and monitoring plan for the SMME ecosystem with an Action plan for implementation.

QUALIFICATIOS AND EXPERIENCE REQUIRED OF CONSULTANTS



The study will require consultancy firm with a team of specialists having the following skills and experience:

- i. The Team Leader shall have a post graduate qualification with professional experience in law enforcement in protected areas, monitoring and evaluation, and transboundary natural resource management of at least ten years.
- ii. Other team members must have post graduate degrees in forest management, institutional development, and wildlife management; and
- iii. The team members must demonstrate working experience of at least five years with multi-stakeholders, institutions; and interactions with the local institutions, protected area managers, local leaders, politicians and policymakers.

DURATION OF THE CONSULTANCY AND SCHEDULE OF DELIVERABLES

The study is expected to take 30 consultancy days spread over two and a half calendar months. The Draft report for discussion is expected within 30 workdays following which it will be presented to LVBC Secretariat for review. LVBC will subject the draft report to a stakeholders meeting for discussion. Thereafter, the consultants are expected to integrate comments, and produce the final report. The work is anticipated to start in June 2012 and is expected to be completed by mid August 2012.

REPORTING

Consultant (s) will be required to produce the following:

- i. Inception report to be delivered seven days after the date of signing the contract.
- ii. Draft Report to be delivered three weeks after presentation of the inception report
- iii. Final report to be delivered two weeks after submission of the draft report

The supervision of the consultancy will be carried out by the Project Coordinator TWBH-MRB on behalf of the LVBC. All reports will be submitted in six hard copies and a soft copy in a CD.

Annex 2. Individuals and organisations consulted during fieldwork

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Dr. Hamisi	Project Coordinator, WWF, Mara River Basin, Narok	
James Mburu	KFS Coordinator, Narok County	
James Arugwa	Ag KFS Zonal Officer, Narok	



Annex 3: Some of the biodiversity related policies, laws and plans of Kenya and Tanzania

Kenya

- (i) Sessional Paper No. 10 of 1965: African Socialism and its Application to Planning in Kenya (GoK 1965) recognized that the future development of Kenya depended on the implementation of strategies designed to conserve natural resources while creating a physical environment in which progress could be made.
- (ii) Sessional Paper No. 1 of 1986: Economic Recovery for Renewed Development.
- (iii) National Development Plan 1994-1997: This was the first plan prepared after Rio and dedicated to integration of environmental concerns in all development activities towards the sustainable development objective.
- (iv) Sessional Paper No. 1 of 1994: Recovery and Sustainable Development to the Year 2010 (GoK 1994) in which the government addressed the emerging issues on environment and development. Since most policies were sectoral, the government identified the need to develop a specific policy addressing environmental issues.
- (v) National Environment Action Plan (NEAP) (GoK 1994).
- (vi) Sessional Paper No. 6 of 1999: Policy Paper on Environment and Development. (GoK 1999). This policy paper attempts to provide guidelines for achieving sustainable national development. It also underpins the vital role the environment plays in sustainable development. It was also catalytic to the development of the Environmental Management and Coordination Act.
- (vii) National Biodiversity Strategy and Action Plan (NBSAP) (GoK 2000): The document identifies the necessary steps to conserve biodiversity in conformity with requirements of the CBD. Kenya's National Biodiversity Strategy and Action Plan (NBSAP) was prepared in 1993. This strategy specifies the trends and priority goals of environmental management and protection, and sets the main short-term and long-term tasks to be achieved. The priorities presented in the strategy are taken into account when planning environmental activities, developing international co-operation and allocating national funds.
- (viii) Environment Management and Coordination Act 1999 (GoK 1999), which came into effect on 14th January 2000: The National Environmental Management Authority (NEMA) was established through the Environment Management and Coordination Act (1999). NEMA plays a coordination role between Government, Ministries, departments and other relevant institutions as they relate to the environment. Its other functions include developing strategies, monitoring and evaluation of development activities. Environmental Impact Assessment (EIA) is mandatory under the Act for all new projects which impact in some way on their surroundings. NEMA is the custodian of all international environmental conventions and protocols. The Department of Resource Survey and Remote Sensing (DRSRS), which falls under NEMA, is mandated to gather information, including data on livestock, wildlife, infrastructure, agriculture, forestry and other vegetations, and various land uses.
- (ix) National Water Policy (GoK 2000): Provides a framework for sustainable water resources management in Kenya.
- (x) National Tourism Policy (GoK 2006): Was developed to cater for the increased concern for environmental protection, following the adoption of Agenda 21 for the travel and tourism industry. The need to harmonize tourism, wildlife and land-use policies is also crucial for consistency between tourism and wildlife conservation, and to minimize human-wildlife conflict.



- (xi) Water Act (GoK 2002) enacted for the coordination of all development activities in the water sector including conservation, control, apportionment and use, monitoring of river regimes, pollution control and water quality.
- (xii) Agricultural Act Cap 318 Laws of Kenya as revised in 1986. This Act promotes and maintains stable agriculture, provides for soil and water conservation and good land husbandry and management. Biotechnology in agricultural development is key to increased food production and food security.³⁴ Biodiversity Strategy and Action Plan.
- (xiii) Sessional Paper No. 3 of 1975: Statement on Future Wildlife Management Policy in Kenya. It stipulates that it is important to protect critical habitats and secure migratory routes of animals outside protected areas (GoK 1975).
- (xiv) Wildlife (Conservation & Management) (Amendment) Act No. 16 of 1989, Cap 376 Laws of Kenya. This Act provides for the protection, conservation, management and utilization of wildlife (fauna and flora) in all areas of Kenya.
- (xv) Seed and Plant Varieties Act (1991), Cap 326 provides for the right of a plant breeder who has the authority to produce propagating material of the variety for commercial purposes.
- (xvi) Fisheries Act 1977, Cap 378 Laws of Kenya, the purpose of which is to protect fisheries resources and provide for the proper exploitation of fishery resources.
- (xvii) Plant Protection Act 1979, Cap 324 Laws of Kenya, the purpose of which is to prevent the introduction and spread of destructive diseases to plants.
- (xviii) Industrial Property Act 1990 Cap 509 Laws of Kenya, provides for the promotion of inventive and innovative activity and facilitates the acquisition of technology through the grant and regulation of patents, utility models, rationalization models and industrial designs.
- (xix) Suppression of Noxious Weeds Act 1983 Cap 379 Laws of Kenya, provides the Minister with power to declare a plant to be a noxious weed in any area or in the whole of Kenya.
- (xx) Science and Technology Act 1977 Cap 250 Laws of Kenya, the purpose of which is to establish machinery for making available to the Government advice upon all matters relating to scientific and technological activities and research necessary for proper development of the republic of Kenya, and for the coordination of research and experimental development.
- (xxi) Forest Act 979 Cap 385 Laws of Kenya, which provides for the establishment, control and regulation of forest estate, and sustainable forest management in Kenya.
- (xxii) Land Planning Act, Cap 303, Laws of Kenya, makes provision for the planning and use of land in Kenya. This Act promotes public participation in the preparation of plans giving proper consideration to the potential for economic and social development.
- (xxiii) Ministry of Local Government has a mandate to plan for the management of natural resources in their jurisdiction on behalf of the resident local community. The Ministry of Energy is responsible for mineral-based energy and renewable energy in the country. The Ministry plays a major role in management of natural resources since about 80% of the rural population depends on fuel wood for their domestic energy requirements.
- (xxiv) Kenya research and academic institutions (e.g. national universities) mandated to carry out research in their area of specialization.
- (xxv) Local NGOs with a mandate to protect biodiversity such as East African Wildlife Society (EAWS), Kenya Forestry Working Group (KFWG), and Kenya Wetlands Working Group (KWWG).
- (xxvi) Local CBOs whose main concern is benefit sharing from sustainable management of natural resources like forests, wildlife and water as well as rehabilitation of degraded areas.

Tanzania



- (i) Wildlife Conservation Act, No. 12 of 1973: This Act makes provision for the protection, conservation, development, regulations and control of Fauna and Fauna products and for matters incidental thereto and connected with this Act.
- (ii) Wildlife Acts, No 12 of 1974: This act restricts the grazing of any livestock in game reserve without the written permission of the Director.
- (iii) Wildlife Policy, 1998: The Tanzania wildlife policy vision for the wildlife sector is to; promote conservation of biological diversity, administer, regulate and develop wildlife resources, involve all stakeholders in wildlife conservation and sustainable utilisation, as well as in fair and equitable sharing of benefits, promote sustainable utilisation of wildlife resources, raise the contribution of the wildlife sector in country's Gross Domestic Product (GDP) from about 2% to 5%, contribute to poverty alleviation and improve the quality of life of the people of Tanzania, and, promote exchange of relevant information and expertise nationally, regionally and internationally, 35 Sustainable Management, Mara River Basin.
- (iv) National Environment Management Act, NR 20, 2004: The National Environment Management Council were created to undertake enforcement, compliance, research, facilitating public participation in environmental decision making, raise environmental awareness and collect and disseminate environmental information
- (v) National Parks Policy, 1994: This policy encourages protection of National Parks and tourism.
- (vi) Forest Policy, 1998: The policy details the manner in which the forest and tree resources would be managed sustainably to meet the needs and desires of the society and nation.
- (vii) Forest Acts, 2002: The Forest Act, 2002, not only replaces the 1957 Forest Ordinance, but also the Export of Timber Ordinance (Cap. 288) and Grass Fires Ordinance (Cap. 135). The most significant changes are concerned with biodiversity conservation and community forest management Biodiversity protection is included throughout the Act. Provision is made for establishment of a fund which includes the purpose of assisting Tanzania to benefit from international initiatives and funds for biodiversity conservation. Environmental impact assessments are required in forested areas and watersheds for certain developments. National forest reserves may be declared as nature forest reserves to maintain and enhance biodiversity and genetic resources. Outside the reserves, conservation of trees includes both protection of natural water supplies and biodiversity; and provision is made for protection of wild plants and animals listed in the government gazette. Sovereignty over "biological resources, their derivative products and intangible components" is also affirmed.
- (viii) Fisheries Policy and Strategy, 1997: The National Fisheries sector policy and strategy statement was adopted in December 1997. The statement focuses on the promotion of sustainable exploitation, utilization and marketing to provide food, income, employment foreign exchange earnings and effective protection of aquatic environment to sustain development. The overall goal of the National Fisheries Policy is to promote conservation, development and sustainable management of the Fisheries Resources for the benefit of present and future generations.
- (ix) Fisheries Acts, 2003: Acts provides laws on sustainable development, protection, conservation, aquaculture development, regulation and control of fish, fish products, aquatic flora and it products and for related matters.
- (x) National Environmental Policy, 1997: The policy provides the framework for making fundamental changes that are needed to bring environmental considerations into the mainstream of decision making in Tanzania. It seeks to provide policy guidelines, plans and give guidance to the determination of priority actions, and provides for monitoring and regular



review of policies, plans and programmes. It further provides for sectoral and cross-sectoral policy analysis in order to achieve compatibility among sectors and interest groups and exploit synergies among them.

- (xi) Tourism Policy, 1999: The policy ensures sustainable tourism development in Tanzania; here includes establishment of Tanzania Tourist Board, improvement of private sector participation, and the approval of tourism related sectors and projects.
- (xii) Tourism Acts, 2008: This Act provides institutional framework, administration, regulation, registration and licensing of tourism facilities and activities for related matters.
- (xiii) Water Policy, 2002: The policy aims at ensuring that beneficiaries participate fully in planning, construction, operation, maintenance and management of community based domestic water supply schemes. This policy seeks to address cross- sectoral interests in water, watershed management and integrated and participatory approaches for water resources planning, development and management. Also, the policy lays a foundation for sustainable development and management of water resources in the changing roles of the Government from service provider to that of coordination, policy and guidelines formulation, and regulation.
- (xiv) Mineral Policy, 1997: The role of this policy is to stimulate and guide private mining investment by administering, regulating and facilitating the growth of the sector through a well organised and efficient institutional framework. The policy provides a clear guidance towards sound exploitation of natural resources for the mutual benefit of private investors, the government and entire people of Tanzania.
- (xv) Mining Act, No. 5 of 1998. GN No. 171 of 1999: This Act provides laws for minerals, mining and dealing with minerals and any other related matters. 36 Biodiversity Strategy and Action Plan.
- (xvi) Agriculture and Livestock Policy, 1997. The policy goal is the improvement of the well being of the people whose principal occupation and way of life is based on agriculture and livestock. Most of these people are smallholder and livestock keepers. The focus of this policy is to commercialize agriculture so as to increase income levels.
- (xvii) Agriculture and Livestock Acts, 1977: This Act provides laws to implement policy whose goal is the improvement of the well being of the people whose principal occupation and way of life is based on agriculture and livestock.
- (xviii) Lands Acts, 1999: On 11 February 1999 the Tanzanian Parliament passed The Land Act, 1999 and The Village Land Act, 1999. The first deals with general land, including urban areas and private estates outside the customary sector, and the second deals with village lands, the main objectives of these laws are to provide for the basic law in relation to land, management of Land, settlement of disputes and related matters. Act No. 4 deals with Land other than village land and Act No. 5 concerns Village Land.
- (xix) Land Policy, 1996: The Land Policy states that all Land in Tanzania is public Land vested in the President as trustee for all citizens, all Tanzanians men and women above 18 years have rights to acquire and own Land, all existing rights are recognized and protected including customary titles, Land should be used productively and that such use complies with the principles of sustainable development, that land has value, amount of land to be granted to any person or company be regulated, full, fair and prompt compensation be paid to owners in the event that, land is acquired for public purposes, facilitate the operation of market in Land, to provide for an efficient, effective economical and transparent system of Land administration and people of all sexes be represented in all decisions regarding fora for land issues.



Team No.	Member 1	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7
Team Leader	Member 2	Member 3	Member 4	Member 5	Member 6	Member 7	Member 8
GPS User	Member 3	Member 4	Member 5	Member 6	Member 7	Member 8	Member 9
Run No	Continue Observation remarks						
REMARKS							
<p>PAC Crop destruction: acreage, type of crop, animal responsible Human deaths/injury: Age, animal responsible, Action taken Human threat: Animal responsible, Action taken Property damage: property type, animal responsible, Action Predation: Animal affected, no., Animal responsible, Cause (PAC or community), Type of animals, Number of animals, Action taken</p>		<p>REMARKS Mammals, Reptiles, Birds, Invertebrates Carcass: For Rhinos & Elephants only, record: Carcass age, Cause of death, Motive for killing, Tusks retrieved? Gender, Age-class, Tusks measurement) Signling: Record activity (hunting, running, resting, drinking, feeding) Signs: Include: Browse, Footprints, Droppings, Call, Nests, hideouts, Wildlife Resources Water pan: Dry, wet</p>		<p>REMARKS Illegal Activities: Suspects/poachers: number of people seen, cautioned, warned or arrested Weapons/items seen or confiscated: automatic weapons (AK47, N18, CCK) + serial number, home-made gun, axe, arrow, bow/telescope, bow/ bullets (head, case or whole cartridge, chainsaw, canteen, fishing net, flash light, hand grenade, knife, machine, meat, skin, skull, stomach, kg of collectibles Poaching (direct and sign): sign or number of, bullets, traps in use, fish nets, gun shots heard, foot prints, wire snares, poached animals (species, number and cause of death) Plant Harvesting (direct and sign): number, species and size, kg of harvest Encroachment (direct or sign): length, width, area (sq. m) of encroached area Fire (direct and sign): fire controlled or not, area burned (sq. m)</p>			
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Figure 2. 3 Ranger Bases Monitoring Forms