THE TRANS-BOUNDARY MARA RIVER BASIN STRATEGIC ENVIRONMENTAL ASSESSMENT (MRB SEA)

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Cover Photographs by Peter Jon Nelson:

"Next Generation" Children in Narok County
"New Economy" Motor Cycle Riders, Bomet County
"Natural Resources" Mara River and Swamp with Fishing Boat, Musoma Rural District

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Finally, special thanks go to the participants at the two SEA Workshops, and in particular the Tanzanian delegation who travelled the extra distance from their bases to the Fairmont and Narok Workshops.

CONVENTIONS

Throughout this report an attempt has been made to avoid complex scientific terminology or long justifications. The use of acronyms has also been kept to a minimum.

Where reference is made to the Mara River Basin, this may appear in full, or as the 'Mara Basin', the 'Basin' or 'MRB'. These different titles are used deliberately to help the flow of the text but they all relate to the area lying within the watershed of the River Mara.

DATA

This report draws on published sources for information and some of the data is now up to ten years old. Where possible to update reports with new information this has been done, but it will be an important requirement for the next stages of the SEA process to start generating new data.

List of acronyms

BSAP	Biodiversity Strategy and Action Plan
EAC	East African Community
EIA	Environmental Impact Assessment
GEF	Global Environment Facility
IUCN	International Union for Nature Conservation
LVBC	Lake Victoria Basin Commission
MMNR	Masai Mara National Reserve
MRB	Mara River Basin
NGO	Non-Governmental Organisation
NORAD	Norwegian Agency for International Development
PPP	Policies, Plans and Programmes
RQO	Resource Quality Objectives
SEA	Strategic Environmental Assessment
SIDA	Swedish International Development Agency
TTCC	Trans Mara County Council
USAID	United States Agency for International Development
WWF	World Wide Fund for Nature
PPP	Private Public Partnership

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Executive Summary

"The Mara is not a large river, and ever increasing abstractions are certain to, at some point in the future, severely degrade the riverine ecosystem and even impinge upon the most basic needs of people living along the river. The effects of such a dry down would be profound, both for people, livestock, wildlife and the basin's economy. For example it could very likely cause a crash in the wildebeest populations, leading to a breakdown in the entire migration cycle that sustains the Masai Mara – Serengeti ecosystem. The implications of a disruption to such a significant nature process are far-reaching, including not only devastation for the tourism industry that supports so much of Kenya's and Tanzania's economies but also a change in the entire structure of the ecosystem". Source: BSAP-MRB Report LVBC/ WWF 2008

Part 1: Introduction

This trans-boundary Strategic Environmental Assessment (SEA) Report integrates the findings of two important studies; the Biodiversity Strategy and Action Plan for Sustainable Management of the Mara River Basin (MRB) and the assessment of Reserve Flows for the Mara River – together with evidence and analysis from a wide range of publications and the views of key Stakeholders on the long term future of the Mara River Basin. As such, the SEA forms part of a five year programme initiated by the Lake Victoria Basin Commission (LVBC) and implemented by World Wide Fund for Nature (WWF). The programme aims to deliver the LVBC's commitments to facilitate sustainable development in the trans-boundary Mara River Basin, in accordance with its protocols and mandate established by the East African Community.

Information has been drawn together and new ideas have been generated using the process of Strategic Environmental Assessment (SEA). There are over 130 examples of SEA around the world, but relatively few have been undertaken in a trans-boundary context and the Mara River Basin SEA is seen as a Pilot for other trans-boundary river basins which lie within the Lake Victoria watershed.

The MRB trans-boundary SEA has been conducted in two phases; an initial study in 2008 and the subsequent process between February and August 2011. The first component involved extensive consultation and investigation of issues throughout the Mara Basin but its wide-ranging conclusions were not presented in a form that could be implemented with ease. Following a review in early 2011, the SEA process carried out further analysis, including examination of scenarios for the future by the principal stakeholders and the development of firm proposals for action.

The SEA process has followed the principles laid down in Trans-boundary Guidelines for Environmental Assessment adopted by LVBC (2005), together with the latest international thinking on SEA contained in the OECD Guidelines on SEA (2006) and Guidelines for Strategic Environmental Assessment in Policy and Sector Reform (The World Bank ,2011).

Part 2: Analysis

Chapter 2 describes past and current conditions in the MRB in terms of its environmental character, economic activities and social conditions. It presents evidence from the many scientific studies which confirm declining environmental sustainability as a result of population growth, conversion of forest, shrub and grassland habitats to intensive farming and diminishing water resources through poor management and effects of climate change. Restoration of the degraded areas of the Mau Forest is vital to the conservation and natural storage of water which affects flows throughout the basin and all downstream water users. A small section of the population has benefitted from the economic growth but the majority remains in poverty with poor standards of water supply, health and socio-economic development. Wildlife populations of herbivores have declined dramatically in the last three decades. This has the potential to damage the status of the Masai-Mara / Serengeti Ecosystem, which is one of the world's most important and famous biodiversity hot spot and is the basis of an international tourism market worth over US$100 million a year to the economies of Tanzania and Kenya.

"There is consensus that if current trends continue, the sustainability of the basin will be threatened with serious effects on local socio-economic development and national economies of both countries."

A key feature of a trans-boundary SEA is the focus which it puts on the institutions, political economy, laws, policies, plans and programmes (PPPs) that are designed to strengthen the economy, build human capacity in socio-economic development and protect the environment in separate member states. As such, trans-boundary SEA takes an all-embracing look at the institutional frameworks within which future growth, livelihoods, prosperity and environmental sustainability are managed. These issues are examined in two chapters.

In Chapter 3, the role of international organisations, governments, NGOs and other partners is explored. The SEA concludes that there is a good understanding of basic issues, strong support from all agencies at a policy level and considerable financial investment. However, on the ground there is a lack of coordination resulting in competing plans and programmes and no clear sense of how to manage future change in a holistic manner.

Chapter 4 reviews the legal framework and some of the relevant policies of both countries, from which it is concluded that there is a need for updating and harmonizing the majority of these documents in a trans-boundary context. It is also concluded that many PPP's are well crafted but they fail to have impact through lack of commitment or resources to ensure their implementation.

Following on from this review of the institutional framework a summary of the key issues that need to be addressed is set out in Chapter 6. This highlights issues of concern under the topics of:

- Land use and population
- Water resources
- Biodiversity
- Tourism
- The Economy
- Socio-economic development

The most important finding from the review of key issues is that while most people and organizations understand and accept the warnings of serious environmental degradation and loss of livelihoods, there is no mechanism for coordinating and managing the effort that is needed to reverse these changes. Willingness to recognize this fact and to act on it is in itself the biggest single issue that stands in the way of real progress.

In order to explore possible responses to change over the next twenty years to 2030, three scenarios are described in Chapter 7. The scenarios consider are the:

- Likely consequences of allowing existing trends to continue
- Prospects for arresting unfavourable trends and stabilizing the basin's environmental, social and economic conditions by 2030
- Achieving a reversal of unfavourable trends by 2030.

Each scenario is analysed in the text from which it is concluded that conditions outlined under (A) have a greater than 50% probability of triggering the disaster predicted in the opening quotation to this executive summary. The risk is lessened, but not removed, in both scenario (B) and (C). The stakeholder consultation process (2nd SEA Workshop in Narok) concluded unanimously that Scenario (A) is not an acceptable option. Although there was debate that conditions under Scenario (B) might have to be accepted due to inertia in changing direction. Delegates also agreed that Scenario (C) Reversing Current Trends has to be the way forward.

Part 3: Making Things Happen

Chapter 8 sets out proposals for a Goal, Vision and Mission for future management and coordination of PPPs in the Mara River Basin and lists twenty five areas of policy, plan and programme reform and development which are designed to secure a sustainable future of the Mara River Basin. These reforms and new initiatives cover all of the major issues identified in Chapter 6. The information is set out in the form of policy matrices which can be updated and expanded as part of a long term road map for the MRB.

The stakeholder consultation process was unanimous in its declaration that current institutional practice is failing to deliver the agreed policy objectives of both governments in the Mara River Basin and a new approach to coordination is needed. There is a need to strengthen the capacity in existing institutions but the overwhelming requirement is to find a new way of managing and coordinating the collective effort.

Chapter 9 sets out examples of different models for managing development within river basins, ranging from the all-encompassing role of a Basin Authority or Commis-

sion such as the Zambezi River Authority or Niger Basin Authority (Formerly Niger River Commission) to the European model of a Catchment Agency and Technical Committee under the Water Framework Directive. Current proposals being developed by the Nile Basin Initiative for a Mara River Basin Commission are also summarized. In analysing the strengths and weaknesses of different approaches, the SEA offers its own approach based on the need for any new institution to:

- Have a clear mandate, be kept simple, and demand the minimum level of new resources
- Build, wherever possible, on existing structures and organizations
- Involve regular monitoring and vetting at the highest possible level to ensure political commitment from both Governments
- Be attractive to sponsors and funding agencies.

The report outlines a management and coordination structure under the Lake Victoria Basin Commission that would prepare an Annual Report for submission to the Council of Ministers. The Annual Report would both monitor progress in delivering the goal and objectives of the trans-boundary SEA and also set the agenda for subsequent years' work programmes using the policy matrix framework described in Chapter 8.

Finally the trans-boundary SEA sets out a number of recommendations that were formally agreed upon during the consultation process. These are shown in the final chapter of this SEA document.

Lower Mara River in Tanzania. (WWF/Peter Nelson)

A Maasai woman milks a cow in the Mara. (WWF/Peter Nelson)

1 The SEA Process

1.1 INTRODUCTION

The findings and recommendations of the Strategic Environmental Assessment took place in two stages: an initial technical assessment in 2008 and a follow-up review in 2011. The result is a set of firm proposals and recommendations for action in the Mara River Basin. The report is divided into three sections: Context, analysis and proposals.

Strategic Environmental Assessment (SEA) is a process that seeks to engage stakeholders in open discussion about policy and planning options in order to inform decision-makers about the social, environmental and economic consequences of different approaches to development and conservation needs. A definition is provided in the Transboundary Guidelines for Environmental Assessment adopted by LVBC (2005) and followed in this report:

> **"Strategic Environmental Assessment (SEA) is a systematic, ongoing process for evaluating at the earliest stage, the environmental quality and consequences, of alternative visions and development intentions incorporated in policy, planning or programme initiatives, to ensure full integration of relevant biophysical, economic, social and political considerations".**

The rest of this chapter discusses the strengths and limitations of the 2008 SEA; the decision by the sponsors to commission an extension to the SEA in 2011 and the methodology used to prepare this report.

The second chapter provides a short analysis of the current situation in the Mara Basin which provides the context to the SEA process. It represents an edited version of the earlier work with additions to bring the information up to date. Chapter three looks at the institutional background as well as comments on the political economy. The fourth chapter discusses some of the key policies and legislation relating to development and management of natural resources in the Mara River Basin. Chapter five discusses the key issues that currently affect the Mara Basin and its sustainable development. The next chapter explores three scenarios of future change over the next twenty years to 2030; Scenario A examines the implications of the existing land use trends without intervention, Scenario B assumes that undesirable trends are arrested and Scenario C anticipates that positive interventions are made to reverse damaging forms of development.

Chapter 7 sets out the vision, policy matrices and a road map based on the outcome of a two-day stakeholders' meeting held in June 2011. The next chapter picks up the emerging themes and examines different examples of institutional structures for coordinating various activities and actors. Finally chapter nine ends the report with conclusions and a list of recommendations.

1.2 REVIEW OF 2008 SEA REPORT

The 2008 SEA process involved wide-ranging discussion with stakeholders and an extensive literature review culminating in a detailed report. Despite the positive results the report did not provide justification for further political commitment. The views of the Lake Victoria Basin Commission where not recorded. According to a review in March 2011,this might have been due to:

- The methodology was based on the European Union SEA Directive (2001). This is a prescriptive approach directed at existing policies, plans and programmes of Member States. It was therefore inappropriate for a resource based analysis in a dynamic and rapidly changing set of conditions like the Mara Basin
- The 'story line' was unclear. There was also lack of clarity on how problems would be solved. (Partially due to the general nature of the initial terms of reference of the SEA)
- The most critical gap was considered to be the absence of a clear road map for the way forward or what the SEA was expected to contribute.

The reviewer noted that SEA is a complex process in which interactions with stakeholders can be as important, if not more important than the final report. While the 2008 report had some shortcomings, the process itself had been conducted well and the study had provided an impor-

tant step towards gaining a comprehensive understanding of the issues that affect the Mara River Basin. The reviewer concluded that the earlier work could be built to deliver an effective policy planning and monitoring tool which would help to integrate the various activities undertaken by the Governments of Tanzania and Kenya, the Victoria Lake Basin Commission, international partners and NGOs and, most importantly, the residents of the MBR in managing their own future.

Box 1.1 Terms of Reference for the 2011 SEA

The Mara basin is one of the trans-boundary river basins within the Lake Victoria Basin (LVB) and is shared between Kenya (65%) and Tanzania (35%). This basin is famous for its rich biodiversity and natural beauty – supporting the Mara-Serengeti Ecosystem –home to the highest species diversity of large herbivores in the world. The Mara River, the lifeline for this ecosystem is the only perennial river and plays a vital ecological role in the wildlife migration between the two reserves, particularly the spectacular annual wildebeest migration which is considered one of the wonders of the world.

The Mara ecosystem faces a myriad of threats mainly associated with human activities. Not only have forests and savannah grasslands been cleared and turned into agricultural land, but charcoal burning, overgrazing and expansion of agricultural activities continues unabated (Mati et al, 2005). The rich natural resource endowment in the basin is a magnet to people from outside the basin—resulting in a population growth rate higher than national averages.

There is consensus that if the current trends continue, the sustainability of the basin will be threatened with serious effects on basin livelihoods and national economies of both countries.

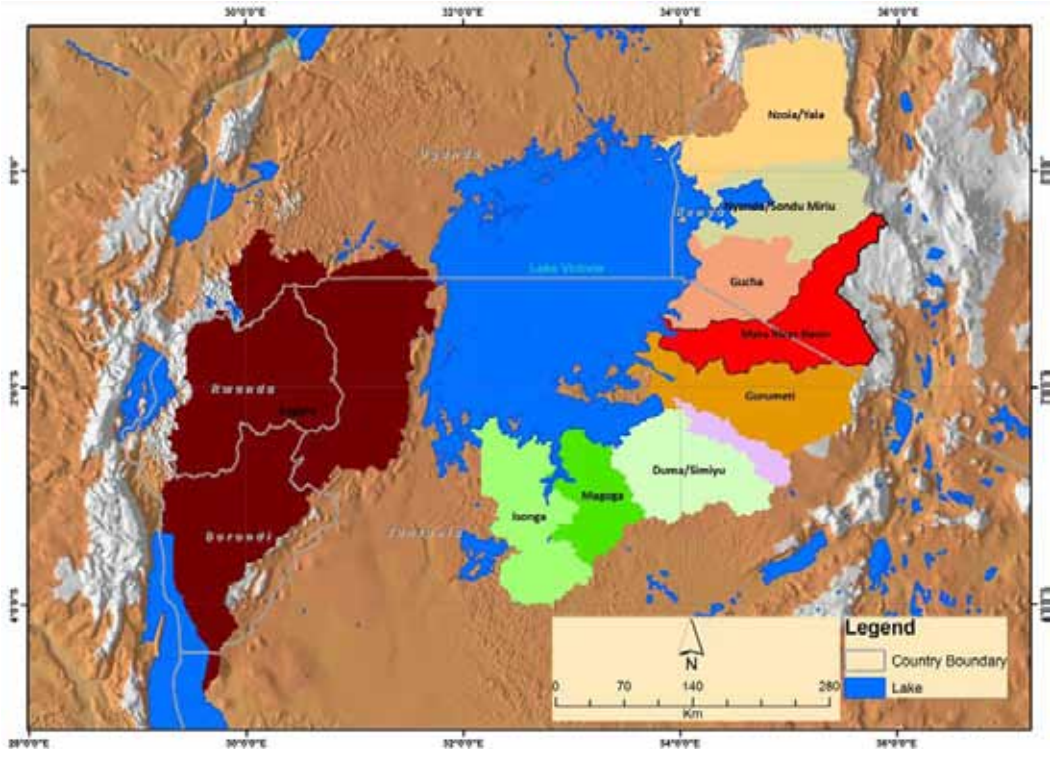


Fig. 1.1 Mara River Basin (in Red) with the other catchments forming the Lake Victoria Basin (Source: MRB SEA / WWF)

1.3 DEFINING THE GOAL OF THE 2011 SEA

The starting point for determining the goal, aims, objectives and scope of the continuing SEA was its terms of reference (Box 1.1) and those of the previous work, including the trans-boundary SEA guidelines (LVBC 2005).

One phrase stood out from these instructions which was:

"There is consensus that if current trends continue, the sustainability of the basin will be threatened with serious negative effects on local socio-economic development and national economies of both countries."

This suggested that the goal of the SEA should be;

'To examine the trends that, if left unchecked, threaten the sustainability of the Mara River Basin, with serious effects on livelihoods and the national economies of Kenya and Tanzania and to identify opportunities for dealing with the situation that are acceptable to the majority of stakeholders.'

1.4 AIMS AND OBJECTIVES

Within this overall goal certain themes were identified that needed to be examined under aims and objectives. Reference to Box 1.1 and the findings of the 2008 SEA suggested the following list:

- Protecting biodiversity
- Protecting forest and rangeland resources
- Securing adequate water resources and maintaining the reserve flow
- Managing population growth within the Mara River Basin
- Developing key sectors of the economy including tourism, agriculture and mining
- Improving human health
- Reducing poverty and sustaining livelihoods.

Analysis of these themes in the 2008 report (See Annex 1) confirmed that there was a fair degree of agreement about the nature and level of interaction and the causes of environmental degradation amongst stakeholders. There was however, far less certainty about how to deal with the issues arising.

1.5 INSTITUTIONAL FRAMEWORK

A preliminary examination of the 2008 Report suggests an overall lack of coordination in the way that different policies for development, environmental protection and nature conservation in the Mara River Basin are developed and implemented. This characteristic has varying degrees in other regions and countries but it is particularly critical in the Mara, which has some of the most important biodiversity and tourism interests in both Kenya and Tanzania. The March 2011 review of the 2008 SEA report concluded that there are likely to be a number of contributing factors to this lack of coordination:

1) The MRB lies within two separate countries each with its own legislation, culture and practices

2) There are a large number of different interest groups working independently within the area

3) Policies apply to different areas, some of which are defined by administrative boundaries like District Councils, some by geography and terrain (like the Basin itself) and others by biophysical and eco-regions like the Serengeti Plain

4) Different types of management and funding regime are applied, often overlapping with each other; including:

- Regional and Spatial Land Use Planning
- Development Planning
- Integrated Water Resource Management
- Environment and Natural Resources Management

5) Inadequate resources to meet the needs of the area

This discussion about institutional management and funding suggested that the SEA should have another key aim which is to improve understanding and coordination of policy and planning activities within the MRB.

1.6 GEOGRAPHIC AREA

There are many overlapping initiatives within the Mara basin. This raises the question about the extent of the geographic area that should be covered by the SEA. The MRB is a logical unit to consider from the standpoint of water resource management, but its boundaries (which relate to the natural watershed) are not contiguous with those of administrative regions. In addition the main eco-region to which both the Mara and Serengeti grasslands belong extends well beyond the basin. After discussion it was concluded that the catchment area lying within the basin watershed should be the primary target – while allowing for discussion of those issues that extend well beyond these limits. It was also recommended that decisions and follow-up actions should be clearly related to administrative areas and the zones for which statistical data and sampling / monitoring is capable of being gathered and performed.

1.7 APPLYING SEA PRINCIPLES

Having reviewed the potential goal, aims and physical extent of the SEA, it was appropriate to consider how the SEA might help to deliver the goal, aims and individual objectives. Based on the March 2011 review, it was determined that the specific objectives and deliverables for the SEA should be to:

1. Confirm the current baseline in terms of social, environmental and economic conditions within MRB
2. Clarify the likely effect of development trends on the environment and natural resources
3. Identify synergies and common aims amongst the numerous policies, plans and programmes that exist for the MRB
4. Reach agreement amongst stakeholders on the successes and failures (and related cause and effect) of these PPPs
5. Provide a framework for collection of future statistics and setting up indicators of change that are linked directly to intervention mechanisms
6. Develop a policy matrix to maximize success and minimize failures and link this to an action programme which clearly identifies individual targets, responsibilities; funding needs, and timescales for action
7. Establish a programme for continuous monitoring and regular performance review
8. Confirm agreement amongst all stakeholders on the delivery of the goal, aims and objectives
9. Establish who should oversee the implementation of the findings and recommendations
10. Submit an agreed report of SEA findings and recommendations to the Lake Victoria Basin Commission for endorsement at national and regional level.

1.8 APPROACH & METHODOLOGY

The trans-boundary SEA has been carried forward under the guiding principles of LVBC and the Transboundary Guidelines for SEA within the Lake Victoria Basin – by a trans-boundary group of stakeholders supported by a small consultancy team which would act as a Secretariat.

The methodology (see Box 1.2) noted that an outline report and recommendations for further work would be presented at the first stakeholder meeting. Following intensive discussion, individual stakeholders will be asked to contribute their thoughts and further background information which will be processed into working papers for a second stakeholder meeting. The meeting will review and agree on the format of the Policy Matrix and Action Programme. The results were written and developed into a draft SEA Report and circulated for written comments and endorsement (or if necessary qualification) by the stakeholders. A final version of the SEA Report, Policy Matrix and Action Programme would be presented to the sponsors (WWF, USAID and LVBC). The planned sequence of events has been followed with minor adjustments in timing.

Box 1.2 SEA Guidelines for International and Institutional SEA

The detailed methodology was based on:

• International Good Practice Guidance on SEA (OECD, 2006);

• SEA in Policy and Sector Reform (The World Bank, 2011);

• The methodology used for the Kenya Forest Act SEA (The World Bank, 2006- one of six world-wide pilots for institutional-centred SEA;

• Experience of the South Africa SEA of Water Stressed Catchments (DWAF, Govt. ZA, 2003);

• Reference to Tanzanian legislation on SEA and Kenyan SEA Guidelines.

Further details are contained in the Outline SEA Report (WWF, 2011).

2 Situation Analysis

2.1 INTRODUCTION

This chapter examines the current situation in the basin and explores the trends that have emerged in the last 20-30 years. The subject matter is divided into the three topics: Environment, social conditions and economic activities.

The analysis seeks to balance the treatment and coverage of baseline information on conditions in Kenya and Tanzania, but it is important to note that many of the issues which affect both countries have their origin in the upper parts of the catchment. Consequently, how water is conserved, stored and treated within Kenya has the greatest impact its availability and quality within the Serengeti National Park, lower reaches of the River Mara, the Mara Swamp and shores of Lake Victoria.

2.2 ENVIRONMENT

2.2.1 Characteristics of the Basin

The Mara River Basin forms one of 10 major rivers (Figure 1.1) that drain into Lake Victoria. It is also one of the main catchments in Kenya that originate in the forests of the Mau Escarpment. This small area plays a vital role in providing the bulk of the water that sustains these rivers and the livelihoods of many people. The Mara River is, however, particularly important because it is a transboundary watercourse with 65% of its catchment in Kenya and the other 35% in Tanzania (Fig 2.1). The total area of the Basin is about 13,750 km^2 . (O'Keeffe 2007), 13,834 km^2 (Mutie 2006)

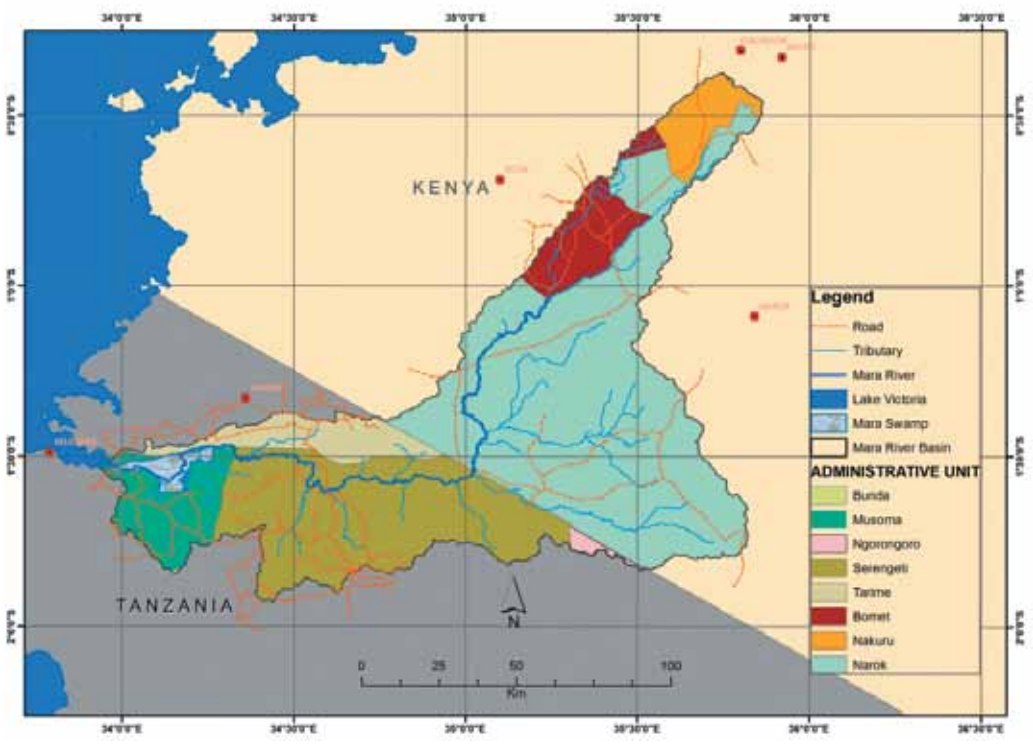


Figure 2.1 The Catchment of the River Mara. (Source: MRB SEA / WWF)

Tributaries of the Mara originate in the Enapuiyapui swamp at a height of 2,932 m above sea level and other sources on the Mau Escarpment. From its main source, the river descends over 1,000 m in a distance of around 200 km before it reaches the Old Mara Bridge at the start of the Masai Mara plains. The river then flows in a series of meanders for a further 150 km to Lake Victoria. Within Tanzania the main tributaries are the Rivers Semonche, Tighite and Tabora (Mutie, 2006).

The basin is divided into four distinct zones based on landscape, land use and ecology:

- The forested upper catchments
- Middle rangelands
- The savannah plains
- The lower basin.

2.2.2 Climate, Hydrology and Water Resources

Temperature: (Fig. 2.2) The Serengeti-Mara ecosystem lies south of the Equator. It receives close to the maximum amount of the sun's energy possible. Through out the year, there is a constant mean monthly maximum temperature of 27^{0}C to 28^{0}C (81-82^{0}F). The mean minimum temperature ranges between 16^{0}C (62^{0}F) in the hot months from October to March and 130C (55^{0}F) in the cooler months of May through August.

Rainfall: (Fig. 2.3) 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 up and down across the equator. It ushers in two main rainy seasons between March-June and November-December, although the timing varies by location. The rainfall patterns can be erratic, with both extreme wet and dry seasons in a year. Climatologists speculate 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. Global warming could be affecting both flood and drought frequency and intensity.

Highest annual rainfall occurs on the Mau Escarpment (averaging 1,000-1,750 mm/year). The middle rangelands receive approximately 900-1,000 mm while the lowlands around Musoma-Mugumu receive only 500-800 mm, (Fig.2.3). 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 here, it percolates as ground water to sustain the year round base flow in the Mara River. Without this constant supply the Mara, which is the

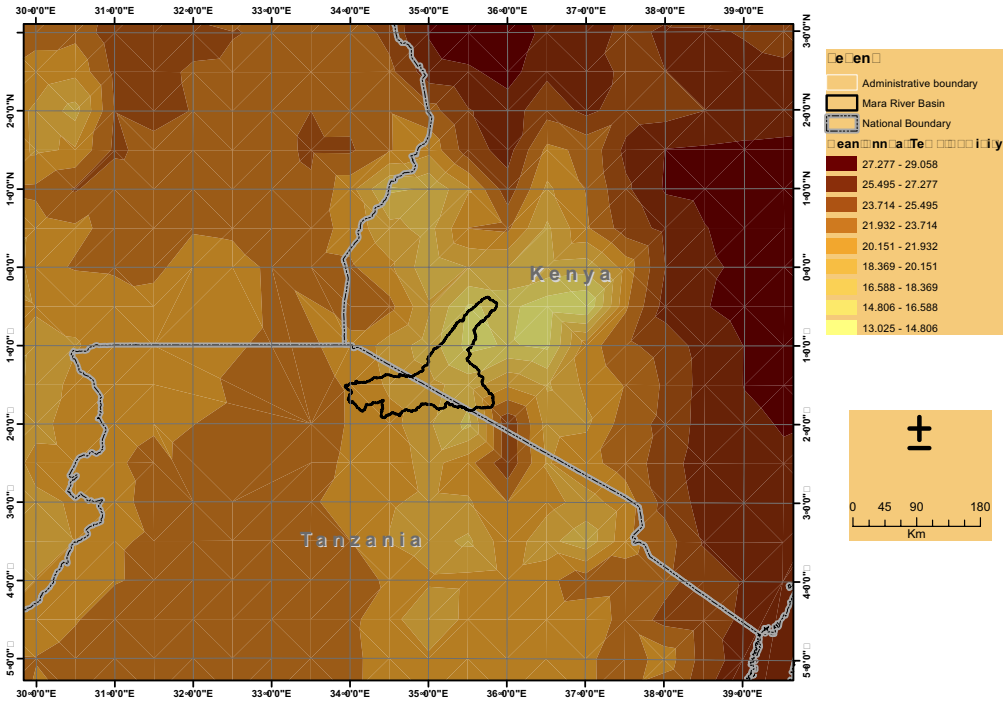


Figure 2.2Annual Temperature in the Mara River Basin

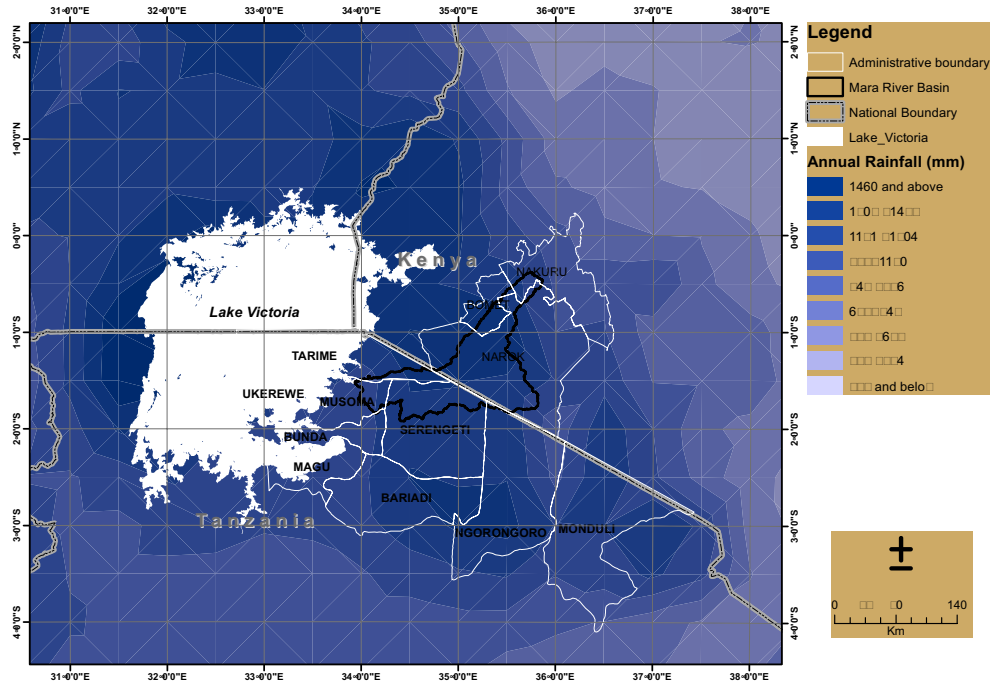


Fig. 2.3 Annual Precipitations around the Mara River BasinSource: WWF

only perennial river, would cease to flow in the dry seasons with 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. (Figure 2.4).

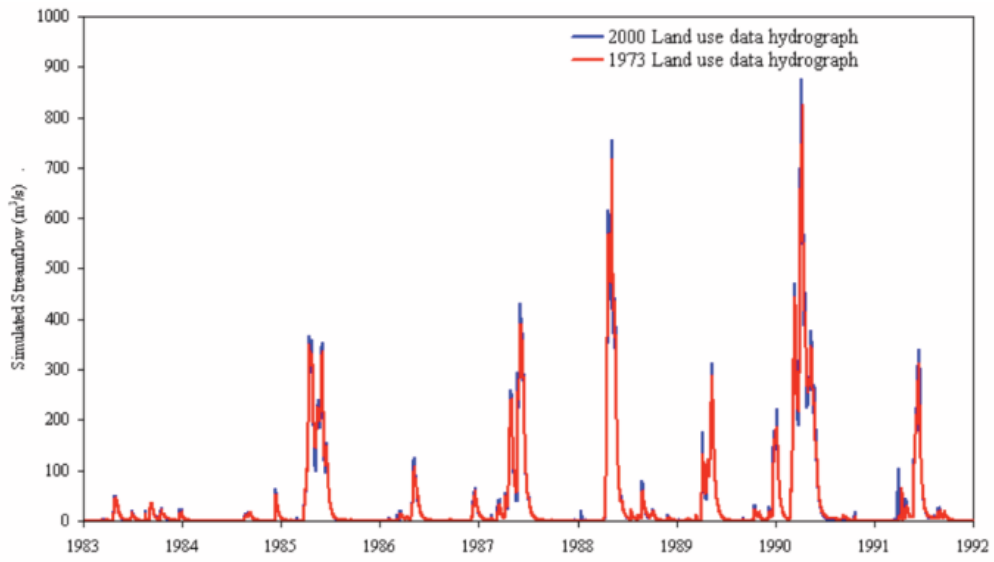


Fig 2.4: River Mara Hydrographs 1983 – 1992

A detailed study has been undertaken on the hydrology of the River Mara under the auspices of the Lake Basin Development Authority (LBDA) with the support of WWF and USAID (Assessing Reserve Flows, 2010). Kenya and Tanzania should establish reserve flows for the Mara River 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. It 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 technical studies confirm two annual peaks in flow levels in March-June and November–December (as illustrated in Fig. 2.4). Volume and discharge rates increase with distance downstream. Flood flows in the upper Mara range from 8 to over 150 m^3/s with an average of 30 m^3/s, while in the lower reaches (at the Kenya/Tanzania border) the range is from 90 to over 400 m^3/s with an average of 300 m^3/s. In dry years low flows can fall to 1 m^3/s or less over the entire length of the main river, while tributaries like the Sand and Talek Rivers dry up completely.

In order to define the flow regime needed to meet the Resource Quality Objectives (RQOs), these conditions of indicator species of plants, insects and fish where studied. These flow conditions, which vary every month are measured in terms of the magnitude of discharge (m^3/s), depth of water in metres and volume (million cubic metres).

The underlying concept of the reserve flow is to provide minimum standards that are met in each month and 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).

2.2.3 Geology and Soils

Geology strongly affects the depth and quality of soil in any locality. This in turn influences 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 practical ways to decide on future land use in the Mara River Basin.

The underlying strata in the Basin is composed of very old igneous and metamorphic rock of Cambrian and Pre-Cambrian ages (more than 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 lake sediments.

These basic rock types condition the nature, depth and fertility of soils in the Basin. 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, clay soils have accumulated, in the river valleys and low-lying wetlands which, when initially cultivated, are fertile and enriched with organic sediment.

2.2.4 Nature Conservation and Biodiversity

Vegetation: Natural vegetation passes through a sequence of zones. These range from high enclosed canopy forest (moist montane forest) on the escarpment through dry upland forest (for example at Loita) to scattered woodland and then the extensive grasslands of the Savannah, with areas of scrub and thorn trees. There are wetlands and swamps throughout the Basin. They are however concentrated in the river's floodplain, (Fig. 2.5). 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 more attention, through to Savannah and riverine zones is critical in terms of conserving biodiversity.

Fauna: The Masai Mara and Serengeti Plains are internationally renowned for having the highest density and most diverse combination of large herbivores on earth. Estimates in 2003 (BSAP, 2010) indicated about 1.3 million wildebeest, 200,000 zebras and 440,000 gazelles roam and depend on these systems. Amongst the larger carnivores are 9,000 hyenas, 3,000 lions and 250 cheetahs. The majority of the herbivores participate in the annual circular migration that is stimulated by the onset of rains bringing new grass to the plains. (Fig. 2.6) When the rains fail, these herds are exposed to reduced grassland. In 1993, a severe drought in Serengeti killed around 400,000 wildebeests.

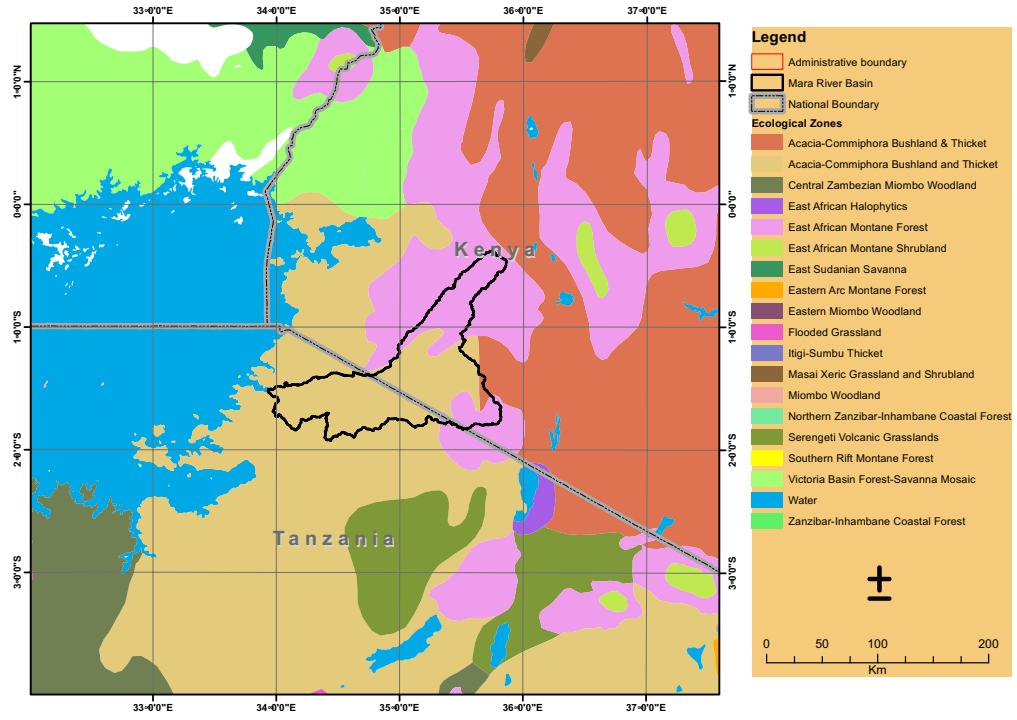


Fig 2.5: Biodiversity Zones (Source: MRB SEA /WWF)

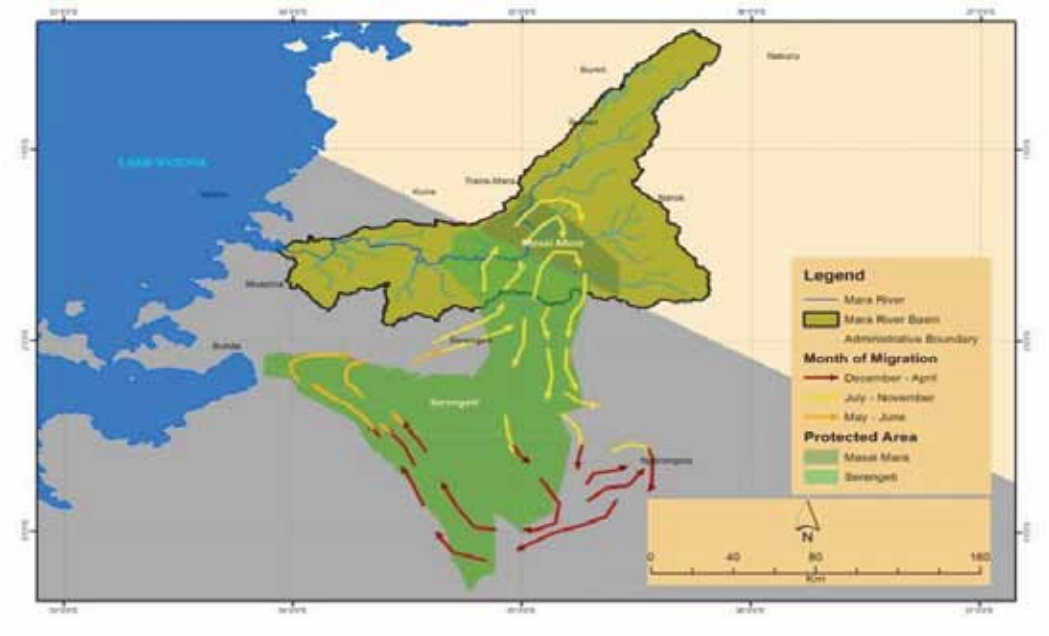


Fig 2.6 : Track of Annual Migration (Source: MRB SEA / WWF)

In 2003, a study to assess the potential impacts of the then proposed Amala Hydropower Project, modeled the relationship between livestock numbers and drought conditions. It showed that the entire ecosystem of the lower Mara is vulnerable to loss of water. In the absence of river flow for more than two weeks up to 30% of the wildebeest would die, (Gereta, 2003)

Individual surveys of ungulate species (giraffe, hartebeest, impala, warthog, topi, waterbuck and zebra) indicate a decline in numbers in the periods 1989-2003, (Ogutu et al., 2011). The greatest losses been are 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).

Protected Areas: The Mara Wildlife Sanctuary was first established in 1948. It covered a total of 520 km^2.

In 1961, Narok Council (NCC) took over its management. It then became a Game Reserve with an additional 1,300 km^2.

Part of the Game Reserve was given National Reserve status in 1974 and the remaining 159 km^2 were handed back to the local communities. In 1976 and 1984, following further removal of land, the reserve was left with a total area of 1,520 km^2 (580 m^2).

The TransMara County Council (TMCC) was formed in the Western part of the reserve in 1995 and shares control and management with Narok County Council. One further change came in 2001 when a non-profit Mara Conservancy was set up to manage the Mara Triangle. The Narok County Council manages the Masai Mara Game Reserve, whereas the Mara Conservancy (Mara Triangle) is under the Transmara County Council.

Serengeti National Park was first established as the Serengeti Game Reserve in 1929. It covers only 228,600ha —a preserve for lions which where previously viewed as 'vermin'. In 1949, a section of the reserve was declared a protected area. And then 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.

The total area of the Mara-Serengeti ecosystem covers more than 25,000 km^2.

2.2.5 Biodiversity Strategy and Action Plan (BSAP)

The Lake Victoria Basin Commission, together with the World Wide Fund for Nature (WWF) and USAID will develop a biodiversity strategy to assist Kenya and Tanzania manage the trans-boundary biodiversity resources of the Mara River Basin. The BSAP has five objectives:

- Provide regional watershed protection
- Reduce the rate of environmental degradation
- Protect and manage biodiversity
- Take advantage of the tourism potential
- Take a coordinated approach to socio-economic development.

The strategy seeks to conserve three critical habitats:

1. Forest habitats of the Mau Forest Complex and Mara Riverine Forests,
2. Serengeti-Masai Mara Ecosystem
3. Aquatic ecosystem of the Mara River.

The BSAP proposes a number of guiding principles and detailed objectives for each of the main habitat types, together with an implementation mechanism which is discussed in more detail in Chapter 6.

2.3 SOCIAL CONDITIONS

2.3.1 Human Settlement

The basin is well known for the culture and lifestyle of the Masai, as well as its wildlife. However, there are other indigenous groups within the basin in both Kenya and Tanzania. The discussions on ethnic origin is relevant to the future of the Mara Basin— to distinguish between long standing communities and the influx of new settlers that has, in recent years, increased the population.

Examples of population expansion occur throughout the Mara Basin (see Box 2.1).

Box 2.1 Patterns of Settlement Growth

Over the last few decades, many Maasai 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 just one of these ranchlands, the Koyiaki ranch, the number of bomas surged from 44 in 1950 to 368 in 2003, while huts increased from 44 to 2735.

2.3.2. Population Growth

Kenya and Tanzania gained their independence from Britain in 1963 and 196 respectively. Their populations totaled less than 24 million (Kenya 10.9 million; Tanzania 12.3 million). Today, this figure is over 73 million (Kenya 38.6 million; Tanzania 34.5 million). The fastest growth in both countries has naturally been centered on areas with the best resources including the Rift Valley and central mountains of Kenya and around the Mau Escarpment (Fig. 2.7) Mwanza and Arusha in Tanzania.

Population growth has been, and remains, a significant political issue in both countries. It is of special concern in those areas like the Mara Basin where the traditional economic relationship between human beings and nature is dependent on the survival of enclosed forests and open rangelands and savannah grassland.

There are no documented precise population figures of the Mara Basin. In the 19th Century when the Europeans started to explore and colonize the area, the indigenous population was very small, widely scattered and largely nomadic. The population increase is attributed to an inward migration due to the favorable climatic and economic conditions in the Basin. Population figures of over 1 million people have been quoted for the Basin area but these relate to the totals for all districts that have land within the Basin, regardless of the proportion of each district that actually lies within the Basin.

In the year 2000, an estimated 660,320 people lived in the Basin, BSAP (2010). This number rose to 838,701 in 2010. It is expected to rise to over 1,350,000 in 2030, according to Hoffman (2007) undertaken before the 2009 Census. The SEA process requires accurate statistics obtained from the latest census findings for small areas (i.e. Districts) and

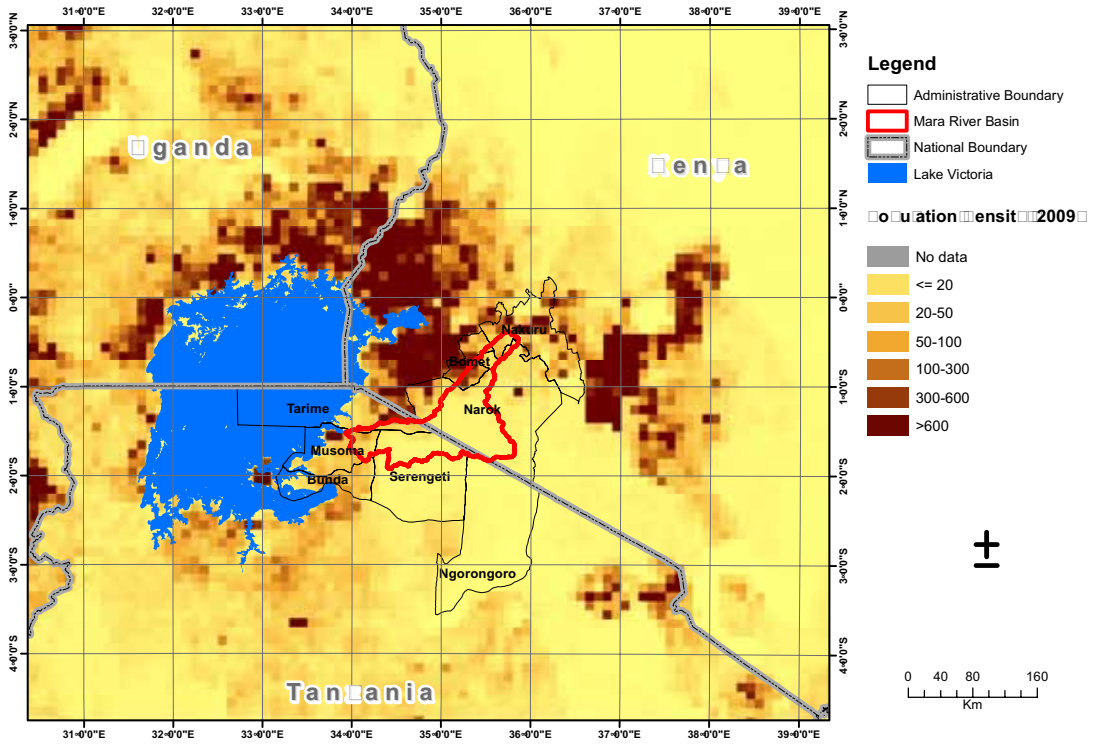


Figure 2.7 Population in the Mara River Basin. (Source: MRB SEA /WWF)

GIS evidence on settlement and population density. This information can then be used to quantify the impacts of population growth, and associated land use change on the economy and biodiversity. Figure 2.8 shows the increases in population for six districts which cover most of the Basin. Those for Kenya cover a 20 year period while the equivalent figures for Tanzania cover a span of 35 years. The Basin contains parts of 3 districts in Kenya and 4 districts in Tanzania.

2.3.3 Poverty and Livelihoods

The MRB supports some of the most profitable economic activities in Kenya and Tanzania including tourism, agriculture and mining—which collectively contribute between 10-15% to their Gross Domestic Product (GDP). However, over 80% and 60% of the Tanzanian and Kenyan populations respectively, lives below the poverty line.. One in ten children die before the age of five and a third of children less than five years are stunted through malnutrition. Cultural practices are prejudicial to women's health and enforced female genital mutilation (FGM) exceeds 80% in some areas. 30% of families experience food shortages in most years. 60% of all residents in the Basin obtain their water from the Mara and its tributaries.

2.4 ECONOMIC ACTIVITY

2.4.1 Land Use

Both Kenyan and Tanzanian rural populations depend on farming and livestock rearing as its source of livelihood. Historical development in the upper catchment involved creation of Kenya's famous tea estates, but over the last 20 years there has been rapid expansion in small holder farming at the expense of natural scrub and forest vegetation as shown in the land use time series (Figure 2.9) reproduced below (Mutie et al. 2006).

Agricultural land has expanded from 826 to 2,504 ha. (an increase of 203%). Tea plantations and open forest cultivation has grown from 621 ha to 1948 ha (+214%) and areas of wetland in the lower valley have grown from 286 ha to 1,394 ha, largely due to flooding caused by siltation (an increase of 387%).

The expansion in farmland is at the expense of the natural habitats, as shown in Figure 2.10. The biggest change occurred in former shrub lands, which have decreased from 5,361 km^2 to 3,546 km^2 (a decline of 34%). Natural forest areas have also shrunk from 1008 to 689 km^2 (a loss of 32%) while water bodies have effectively halved from 104 to 55 km^2.

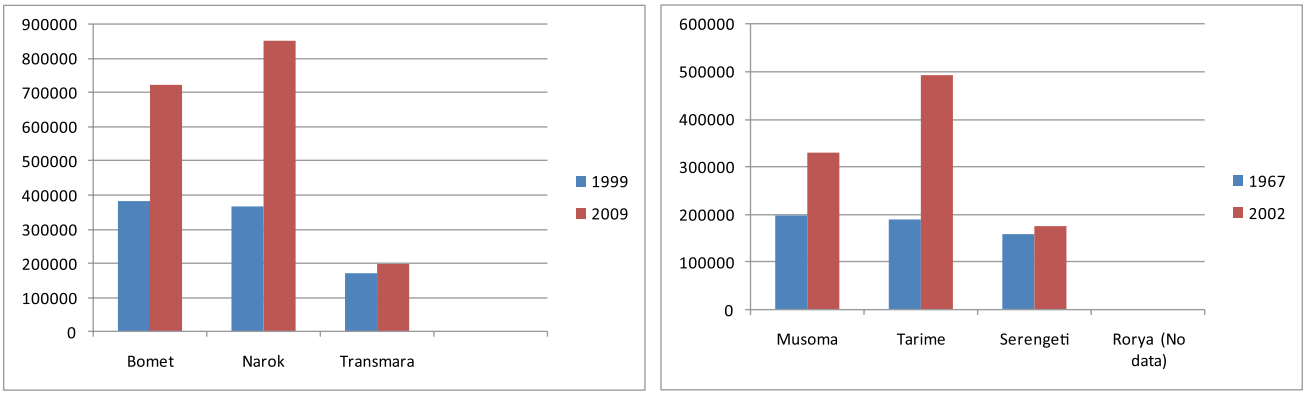


Figure 2.8 Population Increase in Kenya and Tanzania Districts encompassing the MRB.

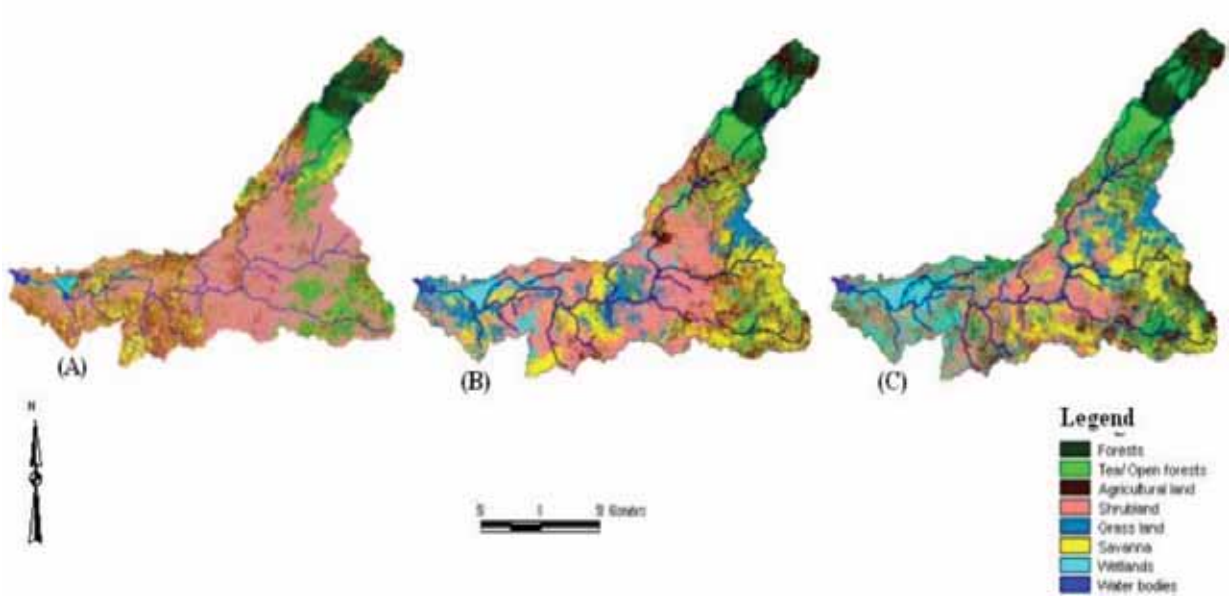
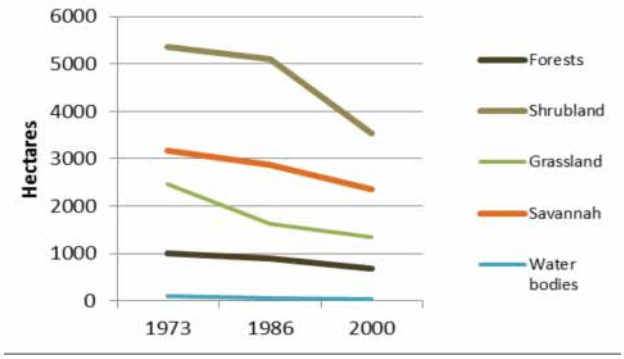


Figure 2.9 Land Cover Maps for 1973, 1986 and 2000



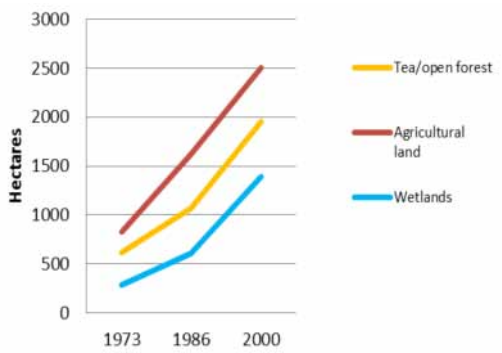


Figure 2.10 Declining Land Cover

Mutie and others argue that "The clearing of natural vegetation and the increase of agriculture has resulted in severe soil erosion in the basin. Sediment deposition in water bodies has reduced their aerial extent by 47%. In the lower basin deposition of sediment at the river mouth has caused a rise in elevation of the river channel resulting in riverbank backflow during rainy seasons. The overflowing water has led to an increase of the basin wetlands by 387%." (Mutie 2006).

2.4.2 Agriculture

Within the upper catchment of the Mara Basin, there are extensive tea plantations, large holdings of irrigated wheat, maize and French bean farming and also investment plans for cotton growing (O'Keeffe, 2007). There has been progressive sub-division of land holdings, creating less economic units and reducing smallholder 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, including the waiver of import tariffs, fluctuations in world food prices and the existence of disease and pests.

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 favored by the Masai is being encroached upon by smallholder cultivation. The establishment of small settlements and farms around the Mara reserve cuts off the existing wildlife habitat areas. It also blocks off areas that have traditionally been part of the annual migration routes (Gathanju 2009). In addition to livestock rearing the rangelands support there is 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. The principal crops grown include, cotton, finger millet, sunflower and rice. Seasonally flooded areas are also important for grazing since they produce good grass. It is estimated that there may be 1.3 million cattle, 600,000 goats and 190,000 sheep within Musoma and Tarime Districts.

2.4.3 Forestry

The forests of the Mau Escarpment are some of the largest remaining blocks of moist forest in Kenya. They were originally reserved and gazetted in the early 1900s specifically for the protection and conservation of water catchment areas. The South-west Mau, West Mau, East Mau, Olposimoru, Maasai Mau and Transmara forests lie on the steep slopes of the escarpment. Many small tributary streams drain the area trending generally in a north-east to south-west alignment. There has been a progressive reduction of moist forest in the area caused by land fragmentation and settlement during the 1970's. As a result, only 10% of the original Lake Nakuru catchment forest remains. A report suggests that between 1994 and 2000, about 200 km^2 had been destroyed (Environment News Service, 2000) and (Gereta, 2003). Forest resources are used by local communities for timber, firewood, charcoal making and a wide range of non-timber products including medicinal plants, fruits and honey.

Plans to de-gazette 60,000 ha of the Mau forest area were advanced in 2001 in order to provide additional space for human settlement. These proved highly controversial and were withdrawn in 2009. Significant encroachment has nevertheless occurred, and there is now a major programme to relocate the settlers and reclaim damaged areas of forest.

Other forest patches especially the riverine habitats along Mara river including Loita forest and Gurumet forest; Forests patches along tributaries with streams such as Tigite, Tabora, Borogonja and Somancha on the Tanzanian side and the Nyangores, Amala and Sandy on the Kenyan side, have been subjected to human encroachment and expanding trade in charcoal. Efforts to rehabilitate these important parts of the Mara river have been inadequate.

2.4.4 Mining

The mineral resources of the Mara Basin are substantial with active mining taking place for gold, slates and sand. There are two large open-pit gold mines in the lower Mara at Buhemba (Musoma District) and Nyamongo (Tarime District, see Plates 2.1 and 2.2). Other potential resources include kaolin, limestone and gemstones. Mining activities are disruptive to other land uses, can cause significant long term environmental despoliation and often make heavy demands on water resources.

Plates 2.1 and 2.2: Mining in the Lower Mara Basin

2.4.5 Tourism

In the year 2000, there were over 300,000 visitors to the main game parks in Kenya. The tourism industry is growing at a rate of 12% a year. Annual revenues to the parks alone exceed US$ 6 million and represent a large part of Kenya's tourism income.

The regulation of tourist accommodation and other facilities is creating increasing concern. In April 2005, a joint

task force between the Ministries of Local Government and of Tourism and Wildlife recommended a moratorium on all developments in the Mara, pending an evaluation of the reserve's carrying capacity. Despite this advice, 35 new camps and lodges where built within Masai Mara Reserve between 2005 and 2009 – all licensed by the National Environment and Management Authority (NEMA) following submission of EIAs (Kenya Tourism Federation, 2009). The MM Reserve now has more than 140 facilities with a total bed capacity of over 4,000.

Tourism earns over KSHS 650 million within the Masai Mara alone representing 8% of Kenya's overall tourism income —which is close to US$1 billion. The tourism industry is not only big business in terms of returns on investment from overseas visitors but it is also a major employer. The Mara is reported to support 50,000 livelihoods, including 10,000 youths who work in the hospitality industry, a further 10,000 mostly girls and women who act as souvenir and curio traders, 2,000 park and reserve management staff and up to 28,000 suppliers of fresh produce, dry goods, fuel and accommodation supplies like furniture and furnishings (Kamadi, 2009).

Tourism in Serengeti National Park 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 as seen in the Figure 2.11 below.

2.4.6 Trade and Commerce

With the exception of mining and some timber processing ,there is little industry within the MRB, but all primary land use activities including forestry and agriculture generate substantial demands for equipment, services, vehicles, fuel, maintenance and fertilizer as well as producing significant quantities of foodstuff and meat for sale through local and national markets. The tourism industry is particularly important in generating demands for additional services which have a 'multiplier' effect as noted in the previous section. Trade and commerce therefore makes an important contribution to the local economy.

2.5 INFRASTRUCTURE

2.5.1 Water Resource Development

Most perennial rivers in Kenya have at least one hydro-electric or multi-purpose dam within their catchment. The River Mara was considered as a source of what in the past. In the 1990's the Kenya Government proposed the construction of a cascade of three hydro-electric dams on the Ewaso Ngiro River which would have been supplied with water by diverting water from the Amala River, a principal tributary of the River Mara. The plan would generate up to 180 Mw of electricity but it was bitterly opposed

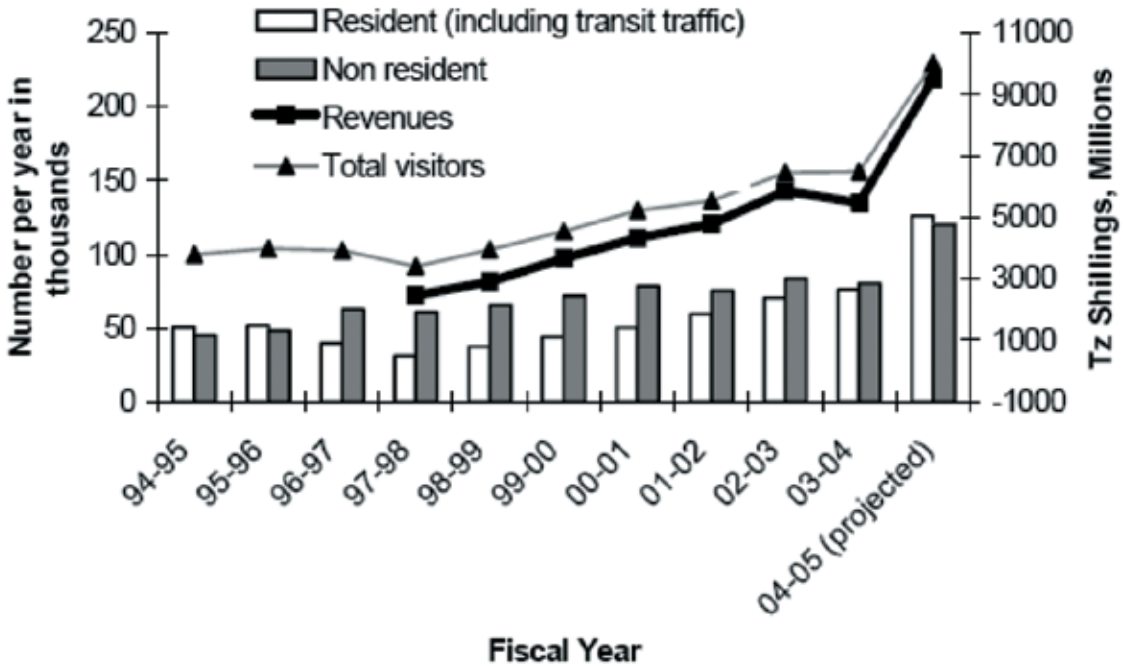


Figure 2.11: Trends in visitor number and revenues for Serengeti National Park from 1994 to 2004 (Source: Serengeti GMP, 2009).

by the Tanzanian Government on the grounds of loss of water to wetlands in the lower reaches of the Mara and by conservation groups. The plan became a politically sensitive issue within the Nile Basin Initiative for the nine member countries and was eventually put on hold. Its current status is unknown.

Tanzania has also explored the possibilities of using Mara river water for a wide range of development projects, including major irrigation schemes for sugar production on 10,000 ha in the Ikongo valley and rice cultivation on 20,000 ha of paddy. Another option considered the scope for utilizing a fall of 300 m to pipe water between the Mara River at the Tanzanian border and the Mara Mines, in order to drive hydro-electric turbines. This scheme would generate about 380 Mw of electricity.

The Mara River Basin project, under the Nile Basin Initiative is supporting an Integrated Watershed Management project for the Mara River basin with support from the World Bank through the Nile Basin Trust Fund (NBTF). This should address watershed degradation and optimal and sustained production of the integrated use of natural resources of the watersheds— while ensuring that environmental degradation is addressed. The study commenced in February 2011.

The project has received financial support from the Swedish and Royal Norwegian Governments to undertake Preliminary Assessment of Potential Sites for Multipurpose Storage Reservoirs in the Mara River Basin. The objective of the study was to undertake rapid appraisal of potential sites for construction of multipurpose storage reservoirs with a view of addressing water scarcity, food insecurity and improvement of livelihood. The specific objectives were to:

(i) Study the existing water storage and bulk water transfer systems with a view of determining the necessary interventions to strengthen water security measures within the sub-basin

(ii) Survey and map the potential storage reservoir sites taking into account the potentials for hydro power generation, irrigation development, water supply and sanitation, fisheries development etc.

(iii) Provide preliminary cost estimates of the proposed infrastructure facilities, including a comparison of long term costs of construction and maintenance of the proposed project infrastructure. A list of 32 potential sites was identified for development and 5 medium- small hydropower schemes, with 2 priority sites selected for further analysis to feasibility stage.

A pre-feasibility design study is now being planned for a small dam on the Nyangores River in Kenya and a similar dam on the Mara River downstream of the Serengeti Protected Area in Tanzania.

2.5.2 Roads, Airstrips and Water Transport

The main road linking Nairobi via Narok to Musoma is in general good condition and has a tarred surface throughout. Although some sections are heavily pot-holed, they are currently under repair. Except for a short section in Narok and Bomet Counties, this road lies entirely outside the basin and there is no accessible route within the basin (the frontier crossing between Kenya and Tanzania within the Masai Mara and Serengeti protected area is closed to passing traffic). In both countries, the majority of local distributor roads that connect villages to the main road are un-surfaced. Lateritic red soils rapidly turn to mud during rainy periods whereas sandy loam soils soon dry after rain. These variable soil conditions severely affect accessibility by road. Although previously considered, there are no current proposals to develop a road across the Northern part of the Serengeti National Park. An unsurfaced road which is used by local traffic, including goods vehicles and buses, links Mugumu with Arusha via the B144.

There are a number of small airstrips within the Mara Basin that are used to transport tourists and private business users, including mining personnel . There is an international airport in Arusha.

Musoma formerly experienced a substantial amount of trade from trans-shipment on Lake Victoria but this was displaced by long distance road haulage for the majority of goods and exports.

The long term development of roads, airports and potentially water transport has an important bearing on trading patterns, and the nature of urban development. Wherever roads and junctions are improved there is a natural attraction for urban development. At present such settlements are entirely unplanned, and this presents issues for future servicing including water supply and sewerage. Infrastructure development requires careful planning and SEA or Environmental Impact Assessment (EIA).

3 Political Economy & Institutional Analysis

3.1 INTRODUCTION

This chapter introduces some of the key stakeholders whose views and actions are critical in determining the future of the Mara River Basin. At this stage the text is purely descriptive, but during the first stakeholder's meeting an exercise will be undertaken to form a collective overview of the relative influence that these bodies have on policies and development in the sub-region of the Mara River, Masai-Mara and Serengeti Plains.

SEA is one of the processes and tools used by the Lake Victoria Basin Commission and other bodies that have mandates to promote cooperation on natural resource development and environmental issues in the region. As such, the SEA will need to be closely integrated with all existing and proposed initiatives.

3.2 GOVERNMENT MINISTRIES AND AGENCIES

A number of ministries have an immediate interest and concern in future planning for development and conservation in the Mara River basin as illustrated in Table 3.1.

Table 3.1: Ministries in Tanzania and Kenya which have key responsibilities in parts of the Mara River Basin

Tanzania	*Kenya*
Ministry of Finance	Ministry of Finance
Ministry of Agriculture, Food Security and Co-operatives	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 Council (NEMC).	Ministry of Environment and Mineral Resources
	Office of the Prime Minister
Ministry of Natural Resources and Tourism	Ministry of Tourism
Ministry of Water	Ministry of Water and Irrigation
	Ministry of Forestry and Wildlife
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
Ministry of Transport	Ministry of Transport
PMO (Regional Administration and Local Governments	Ministry of Local Government
	Ministry of Regional Development

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 basin's natural resources. These include the coordinating roles of the Ministry for Environment and Mineral Resources, Kenya and the Ministry of Water and Irrigation, Tanzania, who are the respective focal points for the Lake Victoria Basin Commission. (See Chapter 4 BSAP, 2010)

3.3 COUNTY COUNCILS

Mara river basin covers four District Councils in Tanzania: Musoma, Tarime, Rorya and Serengeti. In Kenya, it covers three Counties: Bomet, Kericho, Bomet and Narok.

The 2008 SEA describes the institutional infrastructure for environmental management as "weak, partly because of inadequate political commitment by the respective countries. The district environmental offices are ill-equipped (facilities and personnel) to ensure compliance with environmental legislation, especially those sections relating to watershed management."

3.4 PROTECTED AREA CONSERVATION BOARDS AND PROJECTS

The major natural habitats and protected areas are administered by different authorities throughout the MRB. In Kenya, the Masai Mara Game Reserve (MMNR) controlled by Narok and Mara Triangle under the Trans Mara County Councils, under contracted management by the non-profit Mara Conservancy). Tanzania National Parks Authority controls the Serengeti National Park. The other initiatives are private game ranches (Now called the Community Wildlife Management Groups) and community based programmes and projects. Examples of the latter include the Community based Integrated Forest Resources Conservation and Management Project (COMIFORM) which works with communities surrounding the Masai Mau Forest.

3.5 INTERNATIONAL AND REGIONAL ORGANISATIONS

Nile Basin Initiative is a partnership of nine countries through whose territory the River Nile flows. A Council of Ministers of Water Affairs oversees it. Their aim is to develop the river in a cooperative manner by sharing substantial socio-economic benefits and promoting regional peace and security. The NBI reflects the need for participatory dialogue in the entire basin that is 'characterised by water scarcity, poverty, a long history of dispute and insecurity and rapidly growing populations and demand for water' (Extract from official website, Patrick Rutagwera, 2010).

East African Community: The EAC is made up of Kenya, Uganda, Tanzania, Rwanda and Burundi. It acts as a forum for regional policy development. An EAC Protocol on Environment and Natural Resources Management (2005 which commits Member States to cooperate in the management of environmental and natural resources was adopted in 2005. A number of principles bind members to:

- Work for sustainable development
- Undertake prior informed consent or notification where activities have potential transboundary impacts,
- Adopt strategic environmental assessment and EIA of projects, policies and activities
- Apply precautionary principles in natural resource decision-making.

The vision of EAC is a prosperous, competitive, secure, stable and politically united East Africa.Its mission is to widen and deepen economic, political, social and culture integration in order to improve the quality of life of the people of East Africa through increased competitiveness, value added production, trade and investments.

The Lake Victoria Basin Commission was officially launched in Kisumu, Kenya in June 2007. It acts and serves as the 'steward and custodian of the Lake' and its resources. The vision of the commission is 'to promote, facilitate and coordinate activities of different actors towards sustainable development and poverty eradication' in the Basin. With the help of sponsors from the international community, some programmes where initiated 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
- The Safety of Navigation on Lake Victoria project.

The specific initiatives of the LVBC are to:

1. Establish a trans-boundary agreement to ensure water flows to sustain the biodiversity of the Mara-Serengeti ecosystem
2. Encourage implementation of harmonized river basin management practices and policies

3. Facilitate cross boundary management of natural resources in the Mara River basin.

The Mara Basin Trans Boundary Water Users Forum (TWUF) was established in 2008. This forum encourages water users in Kenya and Tanzania to plan and manage the water resources of the MRB.

The Mara Regional Secretariat (MRS) proposed to encourage dialogue between all stakeholders in the MRB. This includes representatives from communities living in the Mau Forest Complex, small and large-scale farmers, the tourist lodges, mining and other industries, and artisanal fishers among others.

3.6 INTERNATIONAL PARTNERS AND NON GOVERNMENTAL ORGANISATIONS

There are many international inter-governmental organizations, NGOs and development agencies (BSAP, 2010) with interests in the long term development and conservation of natural resources in the MRB. These include:the African Development Bank (ADB). African Wildlife Foundation (AWF), European Union (EU) Global Environment Facility (GEF), Norwegian Agency of International Development (NORAD), Swedish International Development Agency (SIDA), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United States Agency for International Development (USAID), World Bank, World Conservation Union (IUCN) and World Wide Fund For Nature (WWF).

WWF is actively engaged in the protection of the Mara-Serengeti ecosystem. Its mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature by; conserving the world's biggest biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

WWF has played a key role in initiating a number of major studies including the Biodiversity Strategy and Assessment of Reserve Flows in the MRB. The programme was initiatied in 2003. The main project is funded by NORAD and WWF Norway. Key project components have been funded by the USAID and the BMZ through WWF Germany. It has also implemented the WWF Mau Forest Conservation Project. This project seeks to restore the ecological functioning of over 100,000ha in the upper catchment of the Mara River.

A WRUA meeting in progress in the Mara. (WWF/Scott Davis)

4 Policy Consistency Analysis

4.1 INTRODUCTION

This chapter reviews policies and legal frameworks related to land, water, forest, biodiversity, economic planning and community livelihood within Kenya and Tanzania. It is based on a review of the relevant legal documents and other published sources for the two Governments. The final section considers the East African Community Protocol on Environment and Natural Resources management and the policies of the Lake Victoria Basin Commission.

4.2 REVIEW OF POLICIES

4.2.1 Vision 2025 and Vision 2030

The goal of vision 2025 is to strengthen Tanzania's capacity to compete in the world markets. This can be achieved, with public input— by establishing advanced technological capacity, high productivity, modern and efficient transport and communications infrastructure and highly skilled manpower. The vision anticipates that Tanzania will have become a middle-income economy by 2025, moving from a low productivity agricultural economy to a semi-industrialised one with a strong service sector. Some of the goals are:a) to achieve high quality livelihoods for all people living in peace, stability and unity. B) Offer good governance and education. C) Reduce donor dependency by its people. Specific targets include establishment of high quality livelihoods, food security, improved education, higher standards of human and particularly child health and better water supply.

Vision 2030 sets out Kenya's development blueprint for the period 2008-2030. It comprises three pillars focusing on economic, social and political goals. The overall goal is to transform Kenya into a newly industrialised 'middle-income' country providing a high quality of life to all citizens. The Vision is being implemented through a series of Medium Term Plans with different economic sectors being led by the Government's flagship projects. Under the social pillar the vision is to "achieve a just and cohesive society enjoying equitable social development in a clean and secure environment." Land reform is a key element of the overall agenda. Tourism is set to quadruple in income generation and the Mara wildebeest migrations is singled out as offering great potential as a premium park. Under the agricultural sector, ambitious plans are presented to utilise a million hectares of currently uncultivated land.

Vision 2025 and 2030 do not address environmental sustainability. This positions SEA and EIA to a pivotal role in shaping flagship projects to achieve their maximum benefits without compromising the environment and natural resources base.

4.2.2 Land

Kenya does not have a comprehensive policy on land. However, the Sessional Paper No. 3 of 2009 on National Land and Land Use Policy gives guidance on land matters. It addresses land administration, access to land, land-use planning, restitution of historical injustices, environmental degradation, conflicts, unplanned proliferation of informal urban settlements, outdated legal framework, institutional framework and information management. It designates all land in Kenya as Public, Community or Private. It also recognises and protects customary rights to land. It further states that dealings in land based resources will be guided by conservation and sustainable utilisation principles outlined in national environmental laws and policies.

The overall aim of the Tanzania National land Policy (1997) is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources and to facilitate or endangering the ecological balance of the environment. The policy, among other things, governs land tenure, land use management and administration. It requires all range lands to be reverted to its original use as soon as existing activities cease. The pastoral people in Tanzania have been the most prominent victims of protected areas and wildlife conservation policies and practices widely acknowledged at present. Today, they occupy less than two thirds of their former territory and there are indications that this will go on dwindling (Ole Ngurumwa, 2010).

4.2.3 Population

The mandate of the Kenya National Population Policy (2000) is to:

1. Raise awareness among decision makers and development planners about the effect of population change on social and economic development, and the benefits of lowering fertility.
2. Match the population growth to the available national resources over time in order to improve the well being and the quality of life of the individual, family, and the nation as a whole.
3. It recognizes that population increase is putting greater pressure on natural resources. The policy implies a responsibility within the population and health sectors to deal with environmental issues and lays the foundation for population-health-environment cross-sectoral collaboration (Thaxton, 2007).

Tanzania has a revised National Population Policy (2006). Its aim is to coordinate and influence other policies, strategies and programmes that ensure sustainable development of the people and promoting gender equality and the empowerment of women. It is implemented through a multi-sectoral and multi-dimensional, integrated approach.

4.2.4 Environment

Kenya does not have a comprehensive umbrella policy on the environment. The main guidance on the Government's approach to the environment is contained in Sessional Paper No. 6 of 1999 on Environment and Development. Its overall goal is to integrate environmental concerns into the national planning and management processes and provision of guidelines for environmentally sustainable development. It specifically cites poverty, population growth, rural-urban migration, and urban environmental degradation and pollution as key challenges to achieving this goal. (Thaxton, 2007).

The Tanzania National Environmental Policy (1997) identifies land degradation, lack of accessible, good quality water for urban and rural inhabitants, environmental pollution, loss of wildlife habitats and biodiversity, deterioration of aquatic systems and deforestation as majorproblems to be addressed by sectoral policy.

4.2.5 Water

The Sessional Paper No. 1 of 1999 on National Water Policy on Water Resources Management and Development, outlines the policy on management and development of water resources in Kenya—provides a framework promoting a comprehensive water resources management and development. In order to guarantee the sustainability of this policy, the participation of the private sector is paramount. The water policy, however, does not have specific provisions for trans-boundary water resources management. It also does not give any policy direction on the management of shared water resources. Kenya has a harmonized riparian reserve policy that promotes the planting of indigenous trees and other wetland vegetation behind the setback lines of Riparian land. It advocates for the removal of Eucalyptus trees from riparian land and the relocation of illegal settlements from wetlands and riparian land.

The aim of the Tanzania National Water Policy (2002) is to develop a comprehensive framework promoting the optimal, sustainable and equitable development— and use of water resources to benefit all Tanzanians. With respect to water supply and sanitation, the policy emphasizes the adoption of a Demand Responsive Approach (DRA) principle which will lead to:

- Community ownership and management of water/ sanitation facilities
- Promotion of effective private sector participation
- Integration of water supply and sanitation
- Decentralization of service delivery from central government to district councils.

The policy also provides for water supply for livestock, agriculture, industry, mining, energy, fisheries, environment, wildlife and tourism, forestry, beekeeping and navigation. The policy also makes explicit provisions for the management of Tanzania's trans-boundary water resources. It recognises Tanzania as a riparian state sharing several of its trans-boundary water resources with neighbouring countries (Nile Basin Initiative, 2007).

4.2.6 Forestry

The policy framework for forest development and management in Kenya is under the Kenya Forest Development Policy Sessional Paper No. 9 of May 2005 whose objectives affect conservation of water catchment.

One of the guiding principles of the Tanzania National Forest Policy (1998) is its emphasis on the involvement of all stakeholders in the management of forest resources. It encompasses involvement of communities through participatory forest management and private sector involvement. Its objectives are to ensure sustainable supply of forest products and services by maintaining sufficient forest area under effective management, increased employment and foreign exchange earnings through sustainable forest-based industrial development and trade, ensured ecosystem

stability through conservation of forest biodiversity, water catchments and soil fertility and enhanced national capacity to manage and develop the forest sector in collaboration with other stakeholders.

4.2.7 Wetlands

Kenya is in the process of developing a wetlands management policy. The Kenya Wildlife Service currently manages wetlands protected under the RAMSAR Convention. NEMA and the WRMA both have jurisdiction over specific wetlands, each arising from its respective statute, (NileBasin Initiative, 2007).

Tanzania also has no specific Wetlands Policy. However, the National Wildlife Policy (2007) has provisions on the management of wetlands in the country. The National Environmental Policy of Tanzania also recognizes the important role played by wetlands in environmental protection and water resources sustainability, (Nile Basin Initiative, 2007).

4.2.8 Minerals

Kenya does not have a mineral policy. The Tanzania Mineral Policy of 1997, guides the development of the mineral sector. It addresses poverty and economic development, and incorporates mineral sector reforms as one of the several related components which, when combined, offer a multi-sector approach to poverty reduction and economic growth.

4.2.9 Agriculture and Fisheries

Kenya does not have both the National Agriculture and Fisheries policies. However, this report infers to the 2010 Agriculture Sector Development Strategy (ASDS) in Kenya. The ASDS seeks to progressively reduce unemployment and poverty, and encourage growth in the agriculture sector. The strategy views the overall development and growth of the agriculture sector, in Kenya, as being anchored in two strategic thrusts; increasing productivity, commercialization and competitiveness of agricultural commodities and enterprises as well as developing and managing key factors of production.

Tanzania has a National Agriculture Policy (1997) which recognizes the need to improve agricultural technologies and practices to enhance agricultural production in Tanzania. The policy highlights development of smallholder irrigation systems based on water harvesting technology. The aim of the National Livestock Policy (2006) is to promote the livestock industry so as to increase production and productivity to enhance farmers' income, production of hides and exports of both live animals and other products

The aim the National Fisheries Policy (1998) is to promote conservation, development and sustainable management of the fisheries resources for the benefit of present and future generations. The strategy statement focuses on the promotion of sustainable exploitation, utilization and marketing of fisheries resources to provide food, income, employment, foreign exchange earnings and effective protection of aquatic environment to sustain development.

4.3 REVIEW OF PRIMARY LEGISLATION

In Kenya the Environmental Management and Coordination Act, 1999 provides for 1-Proper environmental management to achieve sustainable land use. 2- the protection of rivers, lakes and wetlands and establishes regulations to protect them from degradation.3- Protection of hilltops, hillsides, mounain areas and forests so as to protect water catchments areas, prevent soil erosion and regulate human settlement. The Act mandates NEMA, acting in consultation with relevant lead agencies, to prescribe measures necessary for the conservation of biological diversity. It also empowers NEMA to issue environmental restoration orders.

In Tanzania, the Environmental Management Act (2004), Cap. 191 provides for trans-boundary environmental management programmes. This extends to trans-boundary water resources. The Act requires the Minister responsible for environment to consult with neighbouring countries on environmental management programmes and measures aimed at avoiding and minimizing trans-boundary environmental impacts. The Act also provides for the need of SEA to be carried out where a mineral or petroleum resource is identified and before specific details are planned or hydroelectric power station is planned or a major water project is planned.

4.3.1 Land

In Kenya, land is governed by the Land Acquisition Act (1983,Rev;2010), Land Control Act (1989, Rev;2010) and Land Planning Act. However, the rules governing the demacation of trust land are contained in the Trust Land Act (1970,Rev;2009). The power of compulsory acquisition provided in the Land Acquisition Act, provides the state with a useful instrument for the conservation of environmental resources in the public interest (Akech, 2006).

The Land Act, 1999 gives the President, as a trustee of its citizens, ultimate control and authority over land. The state owns the land. The Land Act establishes three categories of land i.e. General Land, Village Land, and Reserved Land. The relevant category of land as far as natural resource

management is concerned is Reserved Land (Nile Basin Initiative, 2007).

4.3.2 Agriculture

In Kenya, the Agriculture Act (2009), CAP 318 has significant provisions on the management of water resources generally and catchments in particular. It aims to promote and maintain a stable agriculture sector, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry. In light of the fact that the predominant form of land use in the MARA area is agriculture, agricultural laws are an integral and important component of the policy, legal and institutional framework for the integrated management of water resources of the area (Nile Basin Initiative, 2007).

The agriculture sector in Kenya is also governed by the Agriculture (Basic Land Usage) Rules, 1965, and the Agriculture (Farm Forestry) Rules, 2009.

4.3.3 Water

The main statute governing water resources in Kenya is the Water Act, 2002 which vests the rights over all surface and ground water in the state, except for water that is wholly situated in a landowner's domain. It creates the Water Resources Management Authority (WRMA) as being responsible for the regulation of the use and management of water resources advocating for water resource management undertaken on a catchment basis. The WRMA has designated six catchment areas. Lake Victoria South covers the Mara area (Nile Basin Initiative, 2007). The Act also provides for the formulation of water resources management strategies at national level and at catchment area level

Water resources management in Tanzania is governed by the Water Utilization (Control and Regulation) Act, Cap. R.E. 2002.The Act vests all water resources in Mainland Tanzania to the United Republic. The water is allocated to users through the water rights system. It provides for the sustainable use and protection of water resources in Tanzania. It also provides for situations where water rights may be compulsorily acquired. The water officer may do so where he determines that a certain quantum of water is needed for 'public purposes'.

4.3.4 Regional Development

In Kenya the Lake Basin Development Authority Act (1979), provides for the establishment of Regional Development Authorities (RDAs). It empowers them to plan for the proper use, conservation and development of natural resources at catchment level, and to coordinate development in their respective catchment areas.

4.3.5 Fisheries

In Kenya, fisheries are regulated by the Fisheries Act (2003) and the Maritime Zones Act (1991). The Fisheries Act regulates matters such as fishing equipment, the sizes of fish which may be caught, landing and landing site requirements, and the transfer of fish from and to specific waters. Conversely, the Maritime Zones Act sets out the limits of Kenya's territorial waters as extending outwards to 12 nautical miles from the baseline, and the Exclusive Economic Zone (EEZ) as extending to 200 nautical miles from the baseline.

The Fisheries Act, 2003 is the main fisheries legislation in Mainland Tanzania. It establishes the Fisheries Departments and vests in them the powers to undertake monitoring, control and surveillance activities.

It contains provisions on the protection and management of both the aquatic environment and surrounding terrestrial environment and the Government would take measures aimed at strengthening regional and international collaboration in the sustainable utilization, management and conservation of resources in shared water bodies such as Lake Victoria (Nile Basin initiative, 2007).

4.3.6 Biodiversity

The main statutes dealing with biodiversity in Kenya are the Forest Act (2005) and the Wildlife (Conservation and Management) Act (2010). The Forest Act empowers the relevant minister to declare un-alienated government lands to be forest areas, and to vary the boundaries of such forest areas. Further, the minister may declare a forest area or some part of it to be a nature reserve, for purposes of preserving the flora and fauna found therein. It provides for the establishment of forest conservancy areas and committees to regulate the management of forests in their respective areas. Forest management is an important aspect of integrated water resources management because many gazetted forest areas coincide with water catchments (Nile Basin Initiative, 2007).

The Tanzania Forest Act, 2002 emphasizes the management of forest resources as national heritage for the benefit of her people. It incorporates modern concepts and principles of environmental management such as sustainable development and Environmental Impact Assessment.

Conversely, the Wildlife (Conservation and Management) Act (2010) in Kenya provides for the protection, conservation and management of wildlife. It provides for the establishment of game parks and reserves and pro-

hibits deforestation, cultivation of land within a national park as this might hamper the proper management of wild animals. These provisions have relevance to water resources management to the extent that protected wildlife areas are often significant water catchments (Nile Basin Initiative, 2007).

In Tanzania, the Wildlife Conservation Act, 2009, governs consumptive and non-consumptive use of wildlife resources together with their habitats in game reserves, partial game reserves, game controlled areas and general land. On the other hand the Tanzania National Parks Act governs non-consumptive wildlife resources and their habitats in national parks.

4.3.7 Land Use Planning

The Physical Planning Act (1996), in Kenya, provides for the preparation and implementation of physical development plans, which are critical in setting out the nature and extent of use, which may be carried out in particular areas. It provides that a Regional Physical Development Plan may be prepared with reference to any Government land, private land or trust land within the area of authority of a county council. It provides areas with unique development potential or problems to be considered as a special planning area. (Nile Basin Initiative, 2007).

The Land Use Planning Act, 2007, governs land use planning in Tanzania. It sets out procedures for the preparation, administration and enforcement of land use plans. It requires relevant land use planning authorities when preparing land use plans, among others, to include matters relating to preservation of protected or sensitive areas, parks, game reserves, biodiversity colonies and other flora and faunas as well as preservation of the quality and flow of water in a dam, lake, river or aquifer.

4.3.8 Mining

The Mining Act, Cap 123 R.E. 2002, in Tanzania, deals with prospecting for minerals and mining in Mainland Tanzania. However, it does not apply to the search for or production of petroleum (Nile Basin Initiative, 2007). Applicants of mining licences must submit along with their applications an environmental management plan, including proposals for the prevention of pollution, treatment of wastes, protection and reclamation of land and water resources and for minimising the adverse effects on the environment from mining operations. The Act empowers the Commissioner for Minerals to prohibit any wasteful practices by the holder of the mineral right.

4.4 NEW CONSTITUTION OF KENYA, 2010

In Kenya, the constitution that was promulgated on August 4th, 2010 requires that laws and policies are streamlined to accommodate structured governance contained in various sections. These reviews are being acted upon. The legislation used under this SEA for Kenya will be affected by the review and the SEA document provides for its review to take into account the changes made.

4.5 INTERNATIONAL CONVENTIONS AND PROTOCOLS

Both Kenya and Tanzania are signatories to a large number of international conventions and protocols in the environmental field including:

- Protocol on Biodiversity
- Climate Change Policy
- Climate Change Response Policy
- Protocol on environmental and natural resources.

As part of the next stage in the evolution of the Transboundary SEA for the Mara River basin it will be appropriate to investigate exactly how far the process of 'domesticating' international conventions has gone in the two Partner States.

4.6 PROTOCOL ON ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT

This Protocol has the objectives to:

- Promote sustainable growth and development of the partner states through sustainable use and management of the environment and natural resources through prevention of activities that are detrimental to the environment and natural resources
- Foster closer cooperation for judicious, sustainable and coordinated management, conservation, protection and utilization of the environment and natural resources and deepen integration and poverty alleviation
- Promote capacity building and environmental awareness in environment and natural resources management

- Promote shared responsibility and cooperation in the management of environment and natural resources including those that are trans-boundary in nature among partner states; and
- Promote development and harmonization of policies, laws and strategies for environment and natural resources management to support sustainable development

4.7 PROTOCOL AND POLICIES OF THE LVBC

A protocol for sustainable development of Lake Victoria Basin was signed on 29th November 2003 between the founding members of the East African Community. This sets out clear objectives and responsibilities on partner states for delivery of sustainability objectives including recognition that a clean and healthy environment is a prerequisite. The preamble notes that:

A) Water is a finite and vulnerable resource essential to sustain life, development and the environment and must be managed in an integrated and holistic manner, linking social and economic development with protection and conservation of natural ecosystems; and

B) Water is an economic good having social and economic value, whose utilisation should give priority to most economic use taking cognizance of basic human needs and the safeguarding of ecosystems.

Under the protocol, partner states have agreed to cooperate in areas relating to conservation and sustainable utilisation of resources including:

(i) the sustainable development, management and equitable distribution of water resources

(ii) sustainable development and management of fisheries resources

(iii) promotion of sustainable agricultural and land use practices including irrigation

(iv) promotion of sustainable development and management of forestry resources

(v) promotion and development of wetlands riparian ecosystems amongst others

(vi) environmental protection and management of the Basin

(vii) promotion of public participation in planning and decision-making

(viii) integration of gender concerns in all activities in the Basin

(ix) promotion of wildlife conservation and sustainable tourism development.

Principles enshrined in the Protocol include:

- Equitable and reasonable utilisation of water resources;
- Taking appropriate measures to prevent environmental harm rather than attempting to repair it after it has occurred;
- Prior notification of planned activities;
- Requirements for Environmental Impact Assessment and Audit;
- Taking necessary measures to prevent environmental degradation from threats of serious or irreversible harm to the environment, despite lack of full scientific certainty regarding the nature and extent of the threat;
- Public participation whereby decisions about a project or policy take account of the views of stakeholders;
- Prevention, minimisation and control of pollution of watercourses so as to minimise adverse effects on fresh water resources and their ecosystems including fish and other aquatic species and on human health;
- The protection and preservation of ecosystems of international watercourses whereby ecosystems are treated as units, all of whose components are necessary for their proper functioning and that they be protected and preserved to the extent possible;
- Recognition of the community of interests in an international water course whereby all States sharing an international watercourse system have an interest in the unitary whole of the system;
- Promoting gender equity in development and decision-making;
- Recognition that water is a social and economic good and a finite resource, and
- The principle of subsidiarity.

Individual articles of the Protocol develop these principles in greater detail and they have been closely followed in the preparation of this SEA.

In addition to the Protocol, the SEA process has had regard for the Trans-boundary Environmental Assessment Guidelines for Shared Ecosystems in East Africa published by the East African Community in May 2005.

4.8 CONCLUSION

The existing policies have embraced the spirit of cross-sectoral collaboration. However, Kenya lacks clear legal frameworks and institutional guidelines necessary to make integrated projects a reality and help the nation realize the Kenya Vision 2030.

The Kenya Poverty Environment Initiative (PEI) was established as a partnership between the Ministry of Planning and National Development and United Nations Development Programme in 2007—to include environmental concerns in the development policy, planning, and budgeting process. It aims to improve understanding of environment-poverty linkages, strengthen the government's capacity to implement environmental policy that benefits the poor, develop tools for the integration of environment into development plans and budget processes, and increase effective participation of stakeholders in environment and de¬velopment policymaking and planning processes (Thaxton, 2007).

Market Day in the Mara. (WWF/Scott Davis)

5 Key Issues

5.1 INTRODUCTION

The critical issues affecting the Basin have been well documented for more than a decade.Studies and research identify deteriorating conditions for the environment, biodiversity and community livelihood situation. The Lake Victoria Basin Commission — with its supporting partners, USAID and WWF — has made significant progress in identifying some of the steps that need to be taken to secure reserve flows of the Mara River and to protect biodiversity by introducing a strategy and action plan. However, it is abundantly clear that much remains to be done before it is possible to secure the economy, environment and human wellbeing for the future. This chapter sets out to list the actions that need to be taken.

5.2 THE NEED FOR A COORDINATED RESPONSE

The evidence examined as part of the preparatory phase for this SEA suggested that a much greater degree of urgency is needed for a coordinated response to threats in the basin. Willingness to recognize this fact and to act on it is in itself the biggest single issue that stands in the way of real progress.

The problem is that while most people and organizations understand and accept the warnings, there is no mechanism for coordinated and management of the effort needed. This approach should cover a wide range of disciplines and professions from water resource engineering, mining, and farming to tourism, wildlife conservation economic and livelihoods development, health and education.

5.3 MANAGING HUMAN POPULATION AND LAND USE

The Masai-Mara and Serengeti plains support one of the most exceptional ecosystems on the planet. Large herds of herbivores follow an annual migration in search of food and water, controlled by seasonal rainfall patterns. This internationally famous phenomenon is also closely associated with the flow regime of the River Mara and the spectacle of the migration attracts large numbers of tourists who contribute greatly to the local economies of both Tanzania and Kenya. Unfortunately, the link between survival of the ecosystem and the generation of wealth is not obvious to many local people who face increasing competition for land and resources. For example, there is a polarization of views between conservationists and local opinion about plans for a new road through the northern part of the Serengeti. While conservationists argue that the integrity of the Mara is at stake, the locals, through the Serengeti District Council argue that people have to prosper as well as animals.

Important Quotes

"To arrive at practical management solutions for the Mara River, dialogues between upstream and downstream stakeholders and between the two basin countries will need to be started to define joint management objectives and implementation strategies", (O'Keeffe, 2007)

"Although there are policy frameworks governing an integrated approach in managing natural resources in the basin, it is evident that in practice there is a lack of coordination in planning and management of natural resources"..(Majule ,2010)

'There is need for a detailed management plan to guide management of the Masai Mara and its environs as well as a long term conservation and development strategy for the area. These growing pressures require increasingly sophisticated mechanisms to ensure that a delicate balance is maintained between conservation and human development in the Masai Mara Region. BSAP for Sustainable Management of the Mara River Basin, (LVBC and WWF ESARPO, 2010)

Previous conflicts over the balance between land for livestock grazing and wild animals, the use of water for energy generation and irrigation and, now, transport and animal movements highlight the fact that as the population of the Mara River Basin grows, so does the level and intensity of competing demands for diminishing resources.

Raising the topic of population growth is invariably an emotive issue since it could be taken to imply a demand to enforce restrictions on family size. There are, however, other contributing factors to the rise in population, including inward migration and resettlement which can accelerate growth rates. In countries where the general standard of living has improved for all citizens, it has generally been found that natural growth rates decline. But where poverty, poor health and restricted education remain the norm for many people, population levels generally rise.

Statistics presented in Chapter 2 on population growth and land conversion show that, within only a few decades at current rates, the unique ecosystem of the Mara—Serengeti will be largely destroyed, resulting in the loss of one of the main drivers of the economy. There will be increased hardship for more than half a million people through sub-division of land holdings and reduction in soil fertility, and probable conflicts between groups practicing different livelihoods.

An important role for the SEA has been to examine different scenarios for land use change and propose appropriate policy adjustments to achieve a more sustainable future for the region. These may include introduction of more effective land use zoning, stronger agricultural and forestry policies and the development of incentives for alternative livelihoods.

5.4 MANAGING WATER RESOURCES

Initial steps have been taken by a consortium of partners to define the reserve flows that need to be maintained in the Mara River. The agencies involved include the East African Community, (through the Lake Victoria Basin Commission), USAID, the Global Water for Sustainability program, Florida International University, World Vision, Water Resources Management Authority, CARE and WWF. Publication of the report 'Assessing reserve Flows in the Mara River' in 2010 represents significant progress with the definition for the first time of flow recommendations based on scientific assessment, supported by verifiable indicators.

However, the challenge remains immense. As the report notes, 'Because of the interconnected nature of river systems, choices that are made in one section of the river basin implicitly impact on those living downstream. People must make choices about what goods and services they want the river to provide, and then work together across local and national boundaries to manage the entire system from top to bottom'.

The process of developing policy matrices as described in Chapter 7 of this report constitutes one of the principal tools for reaching agreement on the choices and balances that have to be made in terms of future allocation of water resources. In this context, the SEA needs to be allied closely with current thinking on integrated water resource management being explored under the relevant legislation of both countries (The Kenya Water Act, 2002, and Tanzania Water Resources Management Act, 2009).

5.5 MANAGING BIODIVERSITY (Forestry, Wetlands and Wildlife)

A Biodiversity Strategy and Action Plan for Sustainable Management of the Mara River Basin (BSAP 2010) has been produced by the same group of agencies who have recommended adoption of reserve flows on the Mara River. Both of these issues are inextricably linked because, under drought conditions, it is only the existence of low flows in the Mara River that prevents total ecosystem collapse. However, protection of biodiversity in the many habitats which make up the MRB extends far beyond management of water resources. The major threats quoted in BSAP include "habitat loss and or modification due to increasing human population, conversion of wetlands, deforestation, farming, over-grazing, human settlements, illegal hunting, infrastructure and tourism. Global warming and climate change are also identified as emerging threats for most habitats and species." (BSAP, 2010, page 2).

This report is very clear in setting out a number of guiding principles for addressing issues, problems and challenges of biodiversity conservation and management in the MRB; together with a set of objectives for managing the three key habitats (the Mau Forest and Mara riverine forest, the Serengeti-Masai Mara Ecosystems and the aquatic ecosystems of the Mara River and Mara Swamp).

The concluding sections of the BSAP set out a proposed implementation mechanism for the BSAP and clearly identify roles for the ministries responsible for environment, water and natural resources, together with other stakeholders including local institutions. In this respect, the SEA aims to build on these recommendations by addressing the sectors that are not covered in as much detail including socio-economic development and alternative livelihoods and the introduction of spatial land-use planning, concepts, survey and monitoring of land use change.

5.6 MANAGING TOURISM

Tourism has proved to be one of the strongest growth areas in the local economy of the MRB and makes a major contribution to the gross domestic product (GDP) of Tanzania and Kenya. This expansion in foreign earnings is driven principally by the biodiversity of the region and in particular the annual migration of wildebeest and other herbivores. Described as the eighth wonder of the world, the migration is under threat from numerous development sources, but largely as a result of growing population leading to loss of grazing through conversion to farmland, and loss of water in the Mara River due to deforestation and increased cultivation. It is easy for the debate to become polarized into a simplistic argument "Do we need land and water for wild animals or for human beings?" but the reality is that both will suffer severely if a proper balance is not achieved over the next decade.

Tourism has varying impacts depending on whether it is practiced in the true sense of eco-tourism in which nothing remains of the tourists' visit except spectacular memories of encounters with nature, real income in the hands of local people who manage the resource, and a management fee and reasonable profit to those who provide the investment. The alternative of poorly managed lodges with high through-put of visitors, excessive movement of vehicles, provisioning and staffing from outside the region and the transfer of profit to foreign destinations does little for the local economy and adds pressure on the natural resources.

Finding a way of equating growth in the local economy with improved tourism and protection of biodiversity is a key element in developing an effective policy matrix under the SEA.

5.7 MANAGING THE OVERALL ECONOMY

The 2008 SEA Report noted that although there are only a few urban centres within the MRB (Mulot town and Bomet Municipality in Kenya, Tarime and Musoma in Tanzania), an increasing number of urban-like activities are clustering along the major roads leading to the Masai Mara National Reserve and Serengeti National Park. The drivers of urbanization are tourism, mining, livestock production, commercial farming and fishing. The 2008 SEA notes that most of these development areas have no sewerage or solid waste management systems. It recommends that 'measures geared towards the sustainability of the MRB and its socio-economic activities must ensure structured and functioning human settlement – with a human settlement plan, clearly defined land subdivision strategy, conservation of wildlife habitats and improved farming practices to reduce pollution risks.'

It would appear that there is no overarching land use plan for the MRB and there are no mechanisms in place for guiding development of the overall economy in accordance with sustainable principles. This is one of the key issues that have been addressed in the second phase of the SEA.

5.8 MANAGING COMMUNITY LIVELIHOOD SITUATION

The focus of studies and management processes in the Mara River Basin has been on trying to arrest the decline in biodiversity and establish a proper scientific understanding of the water flows within the basin. There are also a number of on-going pilot projects aimed at linking biodiversity and water management with the development of alternative livelihoods for the thousands of people who have migrated into the area over the last twenty years and have contributed to the clearance of natural forest and rangeland vegetation. However, for a permanent solution to be arrived at in terms of the balance between sustainable economic growth and protection of nature there is an urgent need to link the third pillar of sustainability into the equation – this is improvement of community livelihoods. Unless standards of health and education are raised for those in poverty and alternative livelihoods are provided, there is little prospect of reversing the current trends towards more families subsisting on smaller areas of land as further land sub-division occurs, with diminishing water supplies, poorer quality soils and the spiral of environmental and human degradation which this vicious cycle leads to.

The county councils are in the forefront of the attack on poverty and greater support needs to be given to their efforts to coordinate positive planning that will lead to improvement in livelihood of communities in the basin. The SEA can assist with this process by helping to identify where interventions can be most effective through the policy matrix.

5.9 DEVELOPING A VISION AND GOAL FOR THE MRB

In chapter 1, a goal was set out for the SEA process which is, 'To examine the trends that, if left unchecked, threaten the sustainability of the Mara River Basin, with serious effects on livelihoods and the national economies of Kenya and Tanzania and identify opportunities for dealing with the situation that are acceptable to the majority of stakeholders.'

It is the second part of this goal which deserves greatest attention, since much has already been written about the causes and trends towards deteriorating natural and human resources within the MRB.

As a first step, the stakeholders were asked to discuss and debate what they believe is the most desirable end-state for the Mara River Basin in perpetuity. Should its future be based on securing absolute protection of biodiversity – or human development – or a combination of the two? How can these different end states be defined in practical terms? In other words, what will the Mara River Basin actually look like in future under the different options?

Based on a consensus of the views that have emerged the SEA has set out a vision and mission statement for achieving the desired goal. It has also started to articulate the aims and objectives and the targets and indicators that can be used to reach the desired end-state. In doing so, the SEA has drawn extensively on other management processes that are currently being promoted to ensure that there is full compatibility in approach. The findings are summarized in the final chapters of this report, alongside the outputs of the Policy Matrices.

Schoolchildren fetch dirty water for drinking. (WWF/Scott Davis)

6 Scenarios For Land Use and Economic Change

"Partner states shall take necessary measures to prevent environmental degradation from threats of serious or irreversible harm to the environment, despite lack of full scientific certainty regarding the nature and extent of the threat." Article 4 (2) f – LVBC Protocol

6.1 INTRODUCTION

There is a growing feeling amongst many stakeholders that 'something has to be done' about the deteriorating conditions of the Mara River Basin. However, there is still uncertainty about the scale and urgency of the challenges and the best way of dealing with them. This chapter creates three scenarios up to 2030. To provide a platform for discussion and debate, it must be emphasized that they are based on a wide range of assumptions, not all of which may happen in practice.

The process of developing scenarios for future land use depends upon interpretation and projection of past trends to create a 'do nothing' baseline. The next step is to identify potential policy, plan and programme interventions which can be used to change the direction of the baseline trends.

Sophisticated modelling techniques have been developed for analyzing land use change – and partial models have been developed for individual sections of the MRB, for example the Nyangores catchment (Mango, 2011). An initial study of water demand for the basin has also been undertaken (Hoffman, 2007) but at present there is an absence of reliable land use data for the Mara River Basin which would allow an overall model to be constructed. There is also little or no disaggregated data on the value of different economic activities. It has therefore been necessary to construct potential scenarios using published information and guesstimates.

Having created land use scenarios, it becomes possible to assess the effects of these changes by examining the social, environmental and economic consequences.

6.2 SCENARIO-BUILDING EXERCISE

Three scenarios have been developed in order to illustrate the likely consequences of:

A) Allowing existing land use and population growth trends to continue;

B) Introducing measures to slow and then stop trends that are damaging key habitats;

C) Introducing measures to stop and then reverse trends to improve key habitats.

Each scenario contains the following information

Land Use: The base land cover data for these scenarios is taken from the Land Use Change Study (Mutie et al, 2005). This only provides information up to 2010. It has therefore been necessary to extend the trends observed between 1986 and 2000 using the historic annual rates of change to create a 'current' set of figures for 2010. Professor Mati(full names) has confirmed that this is a reasonable hypothesis from personal observations of current conditions. The land cover data has then been used to project the consequences of the three different scenarios as shown in Figures 6.2, 6.6 and 6.7.

Population: Overall population levels have been projected based on assumptions about annual growth rates for the seven districts. Additional information is being sought on variations in growth rates within the basin. Table 6.1 shows the range of population estimates based on annual growth rates ranging from 2.3% to 2.9%.

Table 6.1 Range of Population Estimates for the Mara Basin 2010-2030

Growth Rate	2010	2020	2030
2.3	858000	1053000	1322000
2.6	861000	1084000	1401000
2.9	863000	1116000	1486000

Source: Based on initial data from Hoffman (2007), Base year for calculation 2008.

Water Demand and Consumption: The primary source of information on water use in the Mara Basin was prepared in 2007 and used data gathered between 1999 and 2005. These limitations were acknowledged by the author (Hoffman, 2007). The data nevertheless provides a good starting point for examining future water demands. Figure 6.1 shows the breakdown between different water users as estimated in 2008. For calculating current human consumption Hoffman reasonably uses the rural standard of 20 litres per person per day, which gives a measure of current consumption. In practice, however, actual demand for water is much higher (as demonstrated in urban situations with piped water supplies where 40 to 60 litres per person per day is the norm).

Community livelihood situation: Local health statistics have been used where available, or national data has been employed where detailed information is lacking.

Economy: Assumptions have been made about the proportion of Gross Domestic Product attributable in both Kenya and Tanzania to the Mara River Basin – based on published data on National GDP per Capita, adjusted to take account of the contributions made by agriculture, tourism and mining. The concept of payment for ecosystem services is also employed to account for the real value of natural resources that are not factored into current market mechanisms.

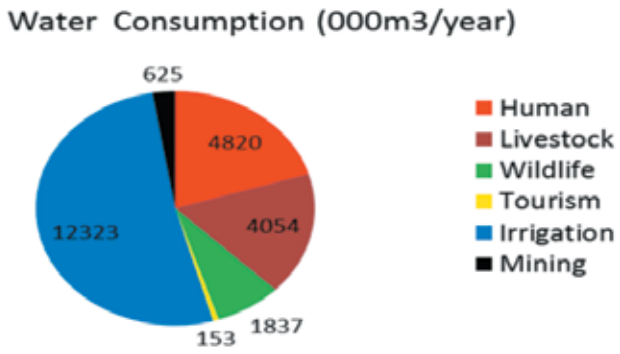


Figure 6.1 Estimate of Water Consumption in the MRB in 2008 (based on Hoffman, 2008)

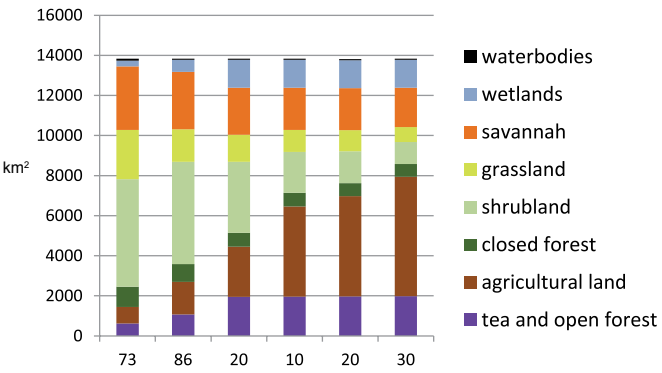


Figure 6.2 Projected Land Cover Change

6.3 SCENARIO 'A' - THE BASE LINE - CURRENT CHANGE CONTINUES

Land Cover: Figure 6.2 shows overall change in land cover on the assumption that mixed and mono-crop agriculture, tea planting and other crops continue to extend into the shrub land, grassland and savannah habitats at current rates. It is assumed that this expansion is driven by existing policies for expanding irrigation, current market forces and the perceived economic benefits to individual and community landholders. The anticipated changes in land cover are set out in Table 6.2.

Population, socio-economic development and poverty levels: For the continued growth model represented by Scenario A, a growth rate of 2.9% per annum is assumed. (This is based on natural growth but also continued inward migration to the basin because of its favourable condition relative to other areas of Tanzania and Kenya).

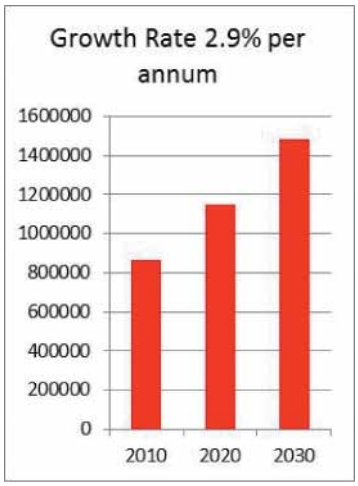


Figure 6.3 Projected Population Growth

Community livelihood situation:

Poverty, hunger and malnutrition affects 60% and 80% of the population in the MRB. With an increase in population over twenty years of 623,000 (72% increase on current level) the challenge that exists under Scenario A is to address these needs in terms of food, shelter, water and the other essentials of life like health care and education is immense.

Water Demands and Consumption:

In considering the long-term demand for water in the Mara River Basin it would be wrong to assume that rural standards – dictated by the need to fetch and carry water – should prevail in future. It has, therefore, been assumed that domestic water use will increase to 30 litres/head by 2020 and 40 litres/head by 2030. The effects of such an increase are clearly shown in Figures 6.4 and 6.5, where the difference in total demand results largely from increased domestic consumption.

Water consumption by livestock and wildlife will fluctuate with the number of animals – but for present purposes, it is assumed that the current stocking levels are at their maximum and existing figures have therefore been used for both 2020 and 2030. Tourism consumption is also assumed to be at a maximum level. Mineral development is being actively promoted in Tanzania and current consumption has been increased by 50% by 2030 on the assumption that a further mine is developed.

Under Scenario A, water demand for irrigation will continue to rise in proportion to the area under cultivation. For modelling purposes this is assumed to be a 50% increase on existing levels by 2020 and a doubling of the area by 2030. The effects of these increases in water demand and consumption are illustrated in Figures 6.4 and 6.5.

Water Supply:
The assumption is that there is no change in the availability of water supplies under Scenario A.

Biodiversity:
The large scale expansion of agriculture will further reduce the foraging area for herbivores which currently use shrub and range land under drought conditions.

Tourism:
Interest and demand in tourism remains high but by 2020, the numbers start to fall in response to the increasingly erratic pattern of the annual migrations.

Agriculture:
An additional 1,470 km^2 of farmland is assumed to be created by clearing and reclaiming shrub land and grassland.

Economy:
The current pattern of economic development is anticipated to continue with greater emphasis on large scale agricultural investments, infrastructure development (paved roads, water supply and sanitation projects).

Table 6.1 Land Cover Projections under Scenario A from 2010 to 2030 (in ha)

Land Cover Type	1973	1986	2000	2010	2020	2030
Tea and open forest	621	1073	1948	1960	1970	1980
Agricultural land	8263	1617	2504	4504	5000	5958
Closed forest	1008	893	689	670	650	640
Shrubland	5361	5105	3546	2048	1590	1100
Grassland	2465	1621	1345	1100	1060	738
Savannah	3163	2867	2354	2104	2090	1970
Wetlands	286	604	1394	1394	1400	1394
Water-bodies	104	54	55	55	55	55

Source: SEA projections from Mutie, 2005

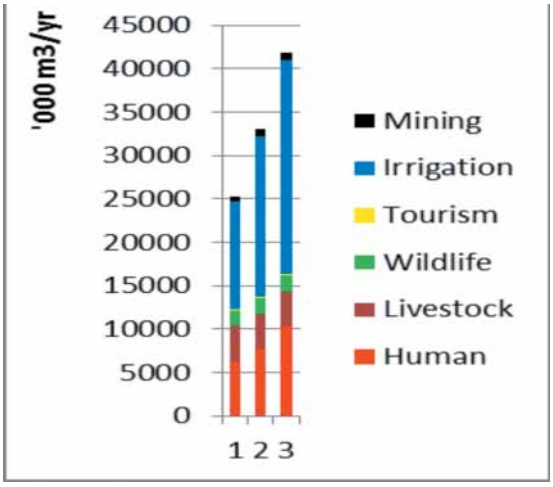


Figure 6.4 Water Consumption (20 litres/p/d)

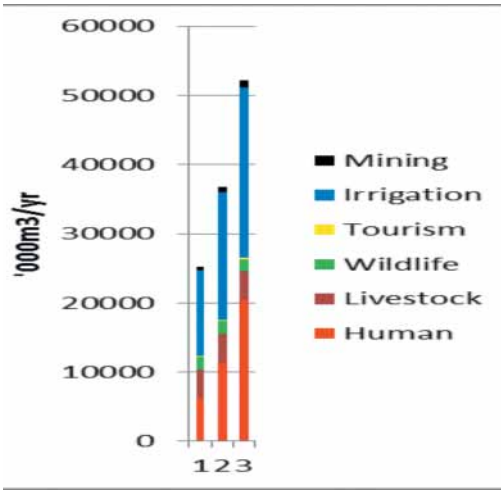


Figure 6.5 Water Consumption (40 litres/p/d)

Note: The three columns in figures 6.4-6.5 labeled 1,2 and 3 refer to water consumption requirements in 2010,2020 and 2030 respectively.

6.4 SCENARIO 'B' - ARRESTING THE TRENDS IN LAND CONVERSION

Most of the assumptions outlined against 'Scenario A' would continue to apply to 'Scenario C' throughout the next decade (2011-2020) because of the difficulty of reversing trends that have become ingrained. However, over this ten year period, progress would be made in refining and implementing policies, plans and programmes for sustainable growth. As a result, the rate of conversion of scrub and grassland would be reduced and eventually halted although sub-division of existing agricultural land is assumed to continue as the population grows from around 800,000 to 1.4 million at an annual rate of 2.6%. Efforts to encourage family planning and improve local livelihoods are assumed to lead to a gradual reduction in the annual birthrate from 2.6 to 2.3 in the period 2020-2030. This will still see rapid growth in overall numbers of people in the MRB.

Changes in land cover:

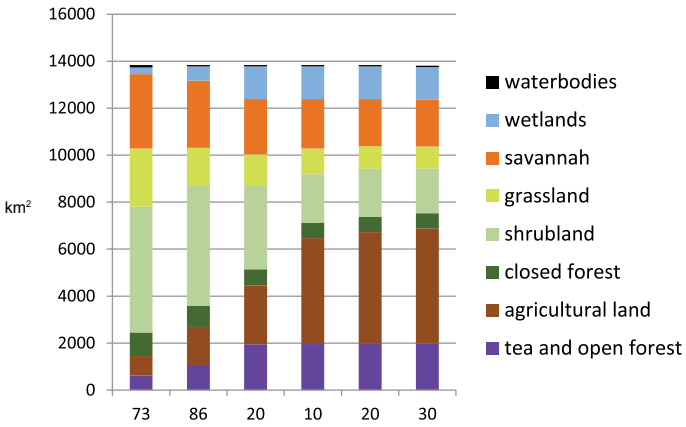


Figure 6.5 Rate of land use change is arrested by 2020

Population, Livelihoods and Poverty Levels:
Although measures taken to encourage family planning start to take effect under this scenario, the overall population in the Mara Basin is still predicted to rise by over half a million in the 20 year period based on a population growth rate of 2.6 until 2020, declining thereafter.

Human population growth and socio-economic development:
Lowering of the annual growth rate to 2.6% would reduce the increase in population by around 85,000 (compared to Scenario A) but would still result in over half a million additional people. The challenge to meet their needs– in terms of food, shelter, water and the other essentials of life like health care and education–remains immense.

Water Demands:
Under this scenario the amount of new irrigation is restricted to a 50% increase over existing levels.

Water Supply:
The continuing loss of natural water storage in the upper catchments is brought under control by 2020 and rain water harvesting makes a contribution to domestic water needs.

Biodiversity:
Agricultural expansion is halted but increasing population throughout the Basin accentuates the existing human/wildlife conflict and there is a continuing decline in the vi-

Table 6.2

Land Cover Type	*1973*	*1986*	*2000*	*2010*	*2020*	*2030*
Tea and open forest	**621**	**1,073**	**1,948**	**1,960**	**1,970**	**1,980**
Agricultural land	**826**	**1,617**	**2,504**	**4,504**	**4,750**	**4,900**
Closed forest	**1,008**	**893**	**689**	**670**	**650**	**650**
Shrubland	**5,361**	**5,105**	**3,546**	**2,048**	**2,050**	**1,900**
Grassland	**2,465**	**1,621**	**1,345**	**1,100**	**958**	**938**
Savannah	**3,163**	**2,867**	**2,354**	**2,104**	**2,008**	**1,988**
Wetlands	**286**	**604**	**1,394**	**1,394**	**1,394**	**1,394**
Waterbodies	**104**	**54**	**55**	**55**	**55**	**55**

Source: SEA projections from Mutie, 2005

ability of rangeland habitats and the numbers and diversity of wildlife.

Tourism:
Interest and demand in tourism remains high but by 2020 numbers start to fall in response to the increasingly erratic pattern of the annual migrations.

Agriculture:
Following the introduction and firm application of land use zoning to protect sensitive
environmental habitats, the focus on agriculture turns to improved management of existing farm land.

Economy:
The current pattern of economic development is anticipated to continue with greater emphasis on large scale agricultural investments, infrastructure development (paved roads, water supply and sanitation projects.

6.5 SCENARIO 'C' - THE PATTERN OF LAND USE CHANGE IS REVERSED

In this scenario, a concerted effort is made to stop– and then reverse–undesirable land use changes that are damaging the key habitats of the Mara River Basin. For such an approach to succeed, it will be necessary to stabilize the current rapid rate of population growth at a level. This will allow future generations to support themselves without relying on subsistence farming by engaging in other forms of economic activity. It will also require introduction of a formalized land use planning system which regulates the types of land use within geographical zones. This is the current policy in a number of districts, for example Narok, but in practice the plan is largely ignored.

The most important change under this scenario will be the encouragement and promotion of large scale tourism and wildlife conservancies to be created on land which is currently being used for monoculture agriculture.

Changes in land cover:

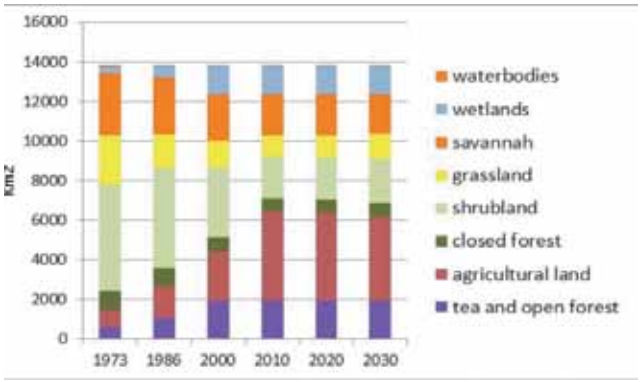


Figure 6.7 Rate of land use change is arrested by 2020

Population, Livelihoods and Poverty Levels:
Measures taken to encourage family planning start to take effect under this scenario and the annual rate of population growth is reduced to 2.3%. Despite this major improvement the overall population in the Mara Basin is still predicted to rise to 1.32 million by 2030 amounting to an additional 460,000 people.

Human population growth: Over a period of twenty years a population growth rate of 2.3% represents an increase of 20,000 to 25,000 people a year. While still representing a major challenge for socio-economic services this scenario comes closer to the objective of being able to provide a reasonable standard of wellbeing.

Table 6.3

Land Cover Type	1973	1986	2000	2010	2020	2030
Tea and open forest	621	1,073	1,948	1,960	1,970	1,950
Agricultural land	826	1,617	2,504	4,504	3,758	2,750
Closed forest	1,008	893	689	670	650	698
Shrubland	5,361	5,105	3,546	2,048	2,800	3,500
Grassland	2,465	1,621	1,345	1,100	1,200	1,500
Savannah	3,163	2,867	2,354	2,104	2,008	1,988
Wetlands	286	604	1,394	1,394	1,394	1,394
Waterbodies	104	54	55	55	55	55

Source: SEA projections from Mutie, 2005

Water Demands: Under this scenario water demand and water consumption continue to rise. However, water conservation policies are introduced and strong regulation is introduced to ensure that the major water user, which is irrigation, is restricted during the dry season and only used to supplement rain-fed crops when rainfall is inadequate during wetter seasons. Exceptions are made where farmers make direct investments and payments under ecosystem service agreements towards the full restoration and management of upland marshes and water retaining habitats in the upper catchments.

Water Supply:
Major investment is made in community rainwater harvesting and storage schemes and, in suitable locations within the catchment, small reservoirs are created solely for community use in providing drinking water, fisheries and small scale hydro for local electricity supply.

Biodiversity:
Major new developments are planned within the community ranches in the form of wildlife reserves and conservancies. Protective fencing is erected around designated areas of agricultural land and designed to create wildlife corridors providing essential access for migrating animals to the new conservancies.

Tourism:
Greater emphasis is placed on community based tourism following the model of SNVs work in the Tanzanian section of the MRB. Dispersal of tourism lodges and camps and the reduction of overcrowding restores the' wilderness adventure' and overall tourism numbers and income increases as the visitor season is extended throughout the year.

Agriculture:
Areas of land that have always been unsuitable for agriculture because of poor soils and other farmland that has become degraded from over-cropping and over-stocking are returned to shrub and rangeland under compensation schemes. Here the owner agrees to surrender the land title back to the local communities. The focus of agricultural activity is on those areas with most fertile soils and zones that are less affected by drought. This is accompanied by measures to address weak farming practices including better fertilizer and pesticide management, improved drought resistant seed and crop varieties, and lower stocking levels.

Economy:
The rationalization of land use and focus on community farming, ranching and tourism leaves more money in the local economy and stimulates the development of value-added and downstream activities.

6.6 ASSESSING THE LIKELY OUTCOMES FOR THE THREE SCENARIOS

In this analysis, the likely effects of the three scenarios are considered under the same basic criteria as have been described above. Following are the discussions and likely outcomes of the above scenarios.

6.6.1 Likely effects of scenarios

Land Cover:
Scenario A assumes an increase in the existing farming area (6,460 km^2) of 1,470 km^2, or a 23% increase. (see Figure 6.8). This would result in the total loss of remaining rangeland and shrub land in the Upper Mara catchment and significant encroachment into wetland areas and degraded riverine forest in the Tanzanian lower catchment. Only 3,800 km^2 of the prime habitats for herbivores would remain, compared with the current area of the Masai Mara dispersal area of 4,200 km^2. Although in years of high rainfall substantial profits would be made from agriculture, these would not compensate for losses due to the increasing frequency of sporadic rainfall and droughts with climate change. Declining flows of water in the River Mara and its tributaries, the extension of periods of low flow and completion for water from other users would significantly reduce the scope for irrigation while increasing costs.

'Scenario B' would result in similar effects to those outlined for 'Scenario A', although the severity of adverse effects on other sectors, including livestock farming and wildlife habitats would be lessened. Agricultural expansion would see an increase (6%) in cultivated area of 1,470 km^2 leaving prime wildlife habitat of 4820 km^2.

Scenario C would see a reversal of the trends outlined above. The area under cultivation would drop from 6,460 km^2 to 6,165 km^2, a decrease of 300 km^2 or 4.6%. Although the area under cultivation is reduced, it is assumed that increased yields from the remaining farmland would more than compensate – and farming would remain a major sector of the economy.

Population, Livelihoods and Poverty Levels:
With all three scenarios, population growth is expected to continue and the increase in the additional number of people living in the MRB by 2030 is likely to be in the range of 459,000 to 623,000. Based on the Kenyan government guidelines for annual food consumption of 1.5 bags per person, the extra number of people will require an additional 688,000 to 934500 bags of maize, together with other foodstuffs. The production of 25 bags of maize per hectare, an area of 27,000 – 37,000 hectares (270-370 km^2) will be required to feed the new population. In the case of 'Scenario C' which assumes an overall reduction in agricultural area of 300 hectares, the area required for growing food would need to be converted from large scale mono-culture cropping areas.

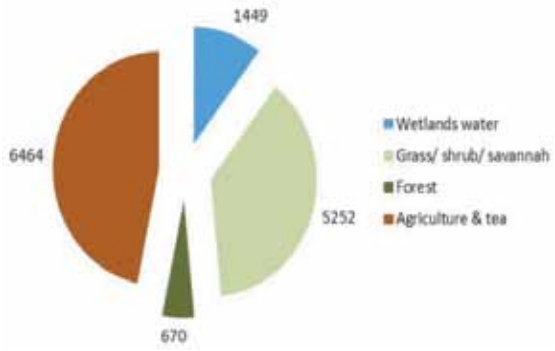


Figure 6.8 Existing Situation (2010)

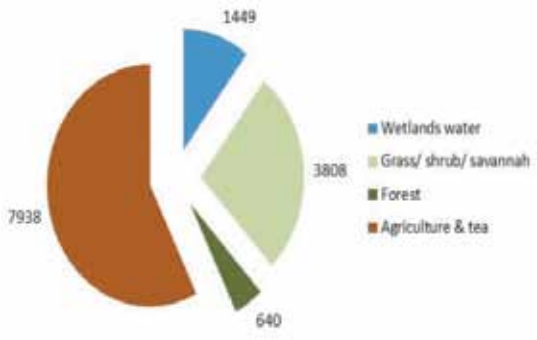


Figure 6.9 Scenario A Trends Continue (2030)

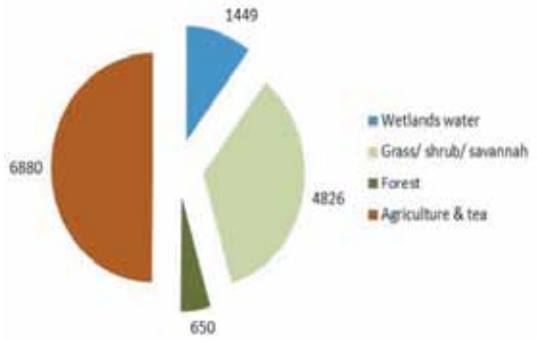


Figure 9.10 Scenario B Trends Arrested (2030)

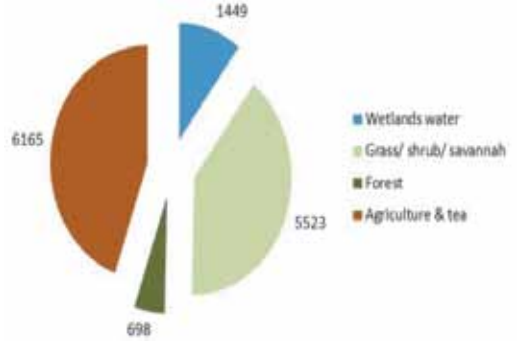


Figure 9.11 Scenario C Trends Reversed (2030)

Increased population will also result in higher demand for land conversion and sub-division of land holdings. Since many land holdings are already too small to support a family, this will necessitate either the relocation of new family members to other places within or outside the MBR, or the allocation of alternative land which will increase pressure, along with expansion of commercial farming in Scenarios A and B on the remaining natural habitats.

Under the higher growth forecasts it is unlikely that the full range of measures to address poverty, low education standards and poor health can be achieved, but even under the lower forecasts, the challenge of reducing poverty across the basin is immense.

Water Demands:
Forecast water demand and consumption for the Basin ranges from the equivalent of flows in the Mara River of 1.2 m^3/s-1.5 m^3/s under Scenario C to 1.5 m^3/s - 2.0 m^3/s for Scenario A by comparison with the current estimate of 0.8 m^3/s - 1.1 m^3/s. Over 60% of the population in MRB depends on the river for water, so its long term performance is essential to improvement of socio-economic wellbeing of people and sustenance of biodiversity.

Water Availability:
The River Mara has flows in excess of 15 m^3/s for more than 50% of the time (Fig 7, p. 13 E-Flows Study, 2010), which presents no difficulty in meeting all foreseeable water needs. However, rainfall in the catchment is variable; there are both wet and dry years and the pattern of rainfall within any one year is not predicable. This can result in long periods with river flows below 10 m^3/s. Figures 6.12 to 6.14 show three periods of flow in the River Mara at the boundary between the Masai-Mara and Serengeti National Park which illustrate these characteristics. (Continuous records of stream flow data are only available for short periods so the time of year varies for each figure).

6.6.2 Meeting Environmental Reserve Flows

The environmental flows study (LVBC/WWF 2010) defines two guidelines for environmental flow requirements— representing the normal maintenance flow for the river in good conditions in the range of 6 m^3/s -15 m3/s, and a reserve flow of 2 m^3/s - 6 m^3/s, during drought when the river is under stress .

Figure 6.17 was constructed from the water demand estimate for 2008 prepared by Hoffman, and the low flow requirements for the Mara Bridge (Site 3). It is based on Table 6.4. The blue line in Figure 6.17 represent the actual monthly average flow in 1986 (a dry year) reduced by the water demand in 2008. The adjusted monthly flow drops

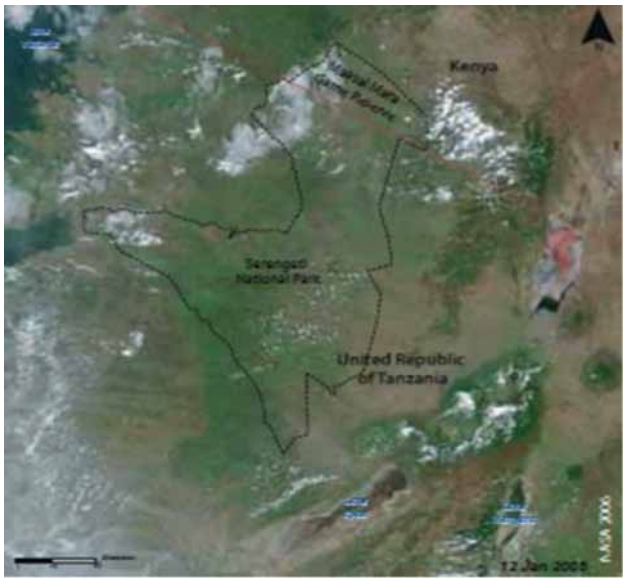


Figure 6.15 Mara/Serengeti in 2005 (Source: UNEP)

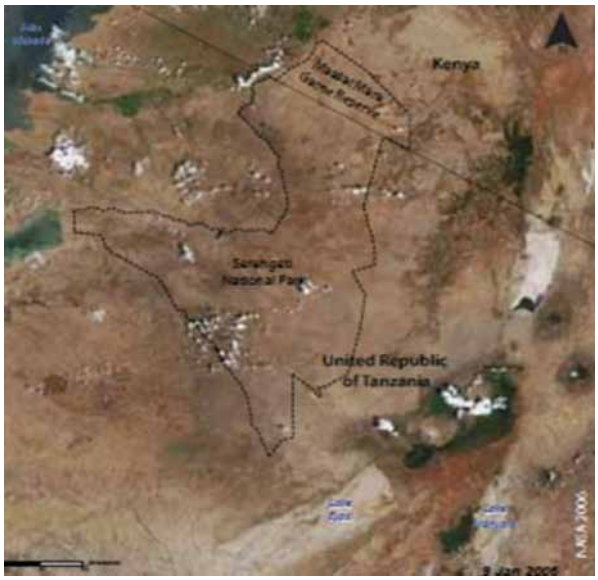


Figure 6.16 Mara/Serengeti in 2006 (Source: UNEP)

below the drought reserve flow (shown in red) three times in this year in February, June and September to November. In simple terms this means that if the conditions that prevailed in 1986 were to have re-occurred in 2008, the reserve flow could not have been satisfied for close to three months. This is not an isolated occurrence since reference to Figure 6.12 shows graphically that flows at the Mara Bridge stayed below 5 m^3/s for three months from December 2005 to March 2006. During this period, flows fell below 2.3 m^3/s for two weeks and the river almost stopped flowing on two days with a discharge of only 0.01 m^3/s

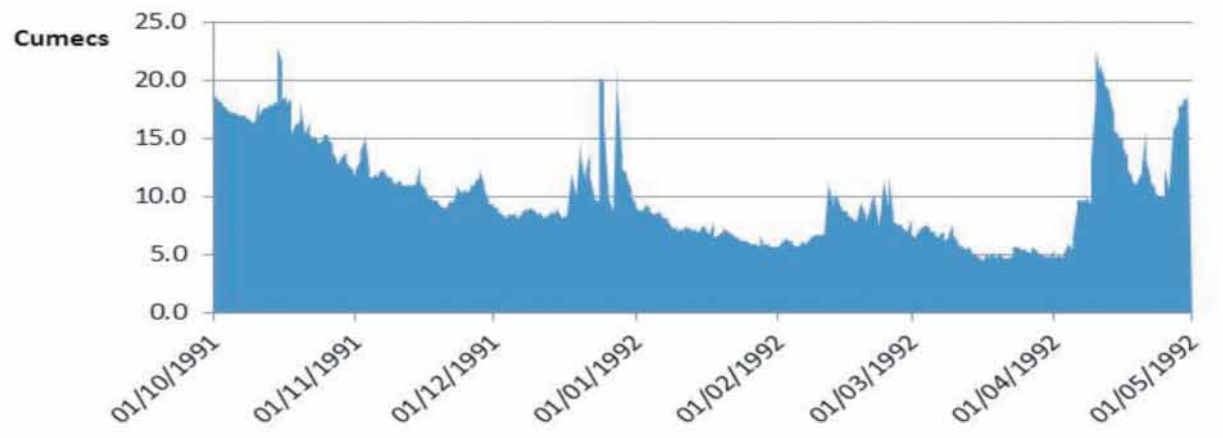


Figure 6.12 Flows over 5 months in a 'normal' year at the Mara Bridge (1 Oct. 1991- 1 May 1992)

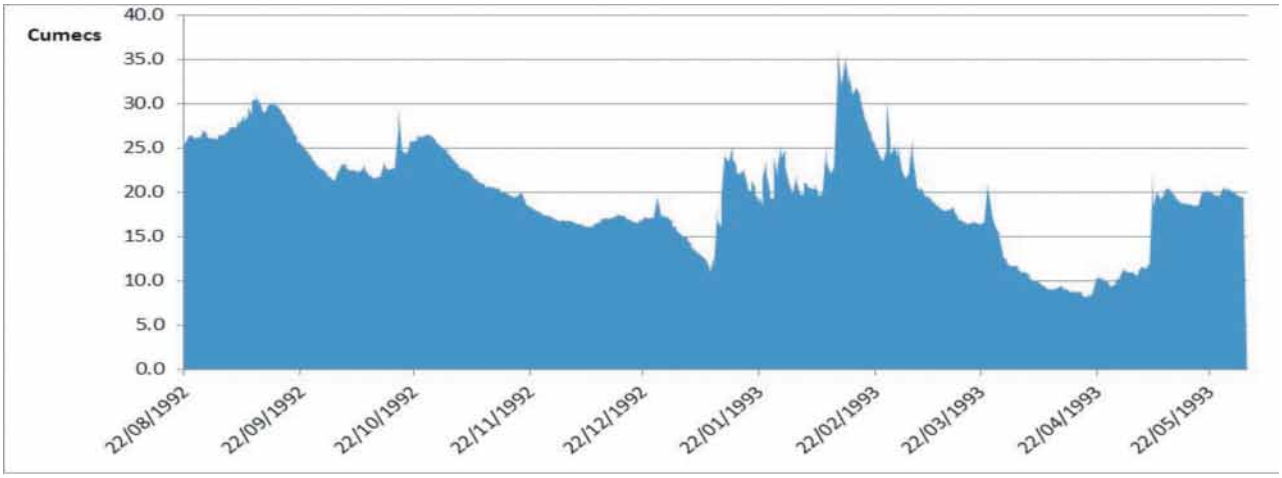


Figure 6.13 Flows over 5 months in a 'wetter' period at Mara Bridge (22 Aug 1992-22 May 1993

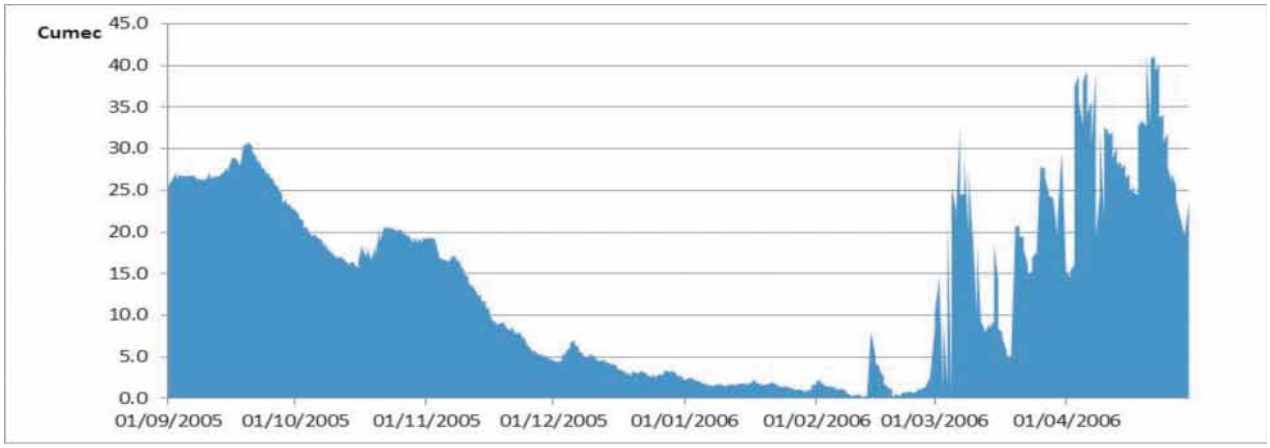


Figure 6.14 Flows over eight months including prolonged drought conditions at Mara Bridge (1Sept 2005 and 1 May 2006)

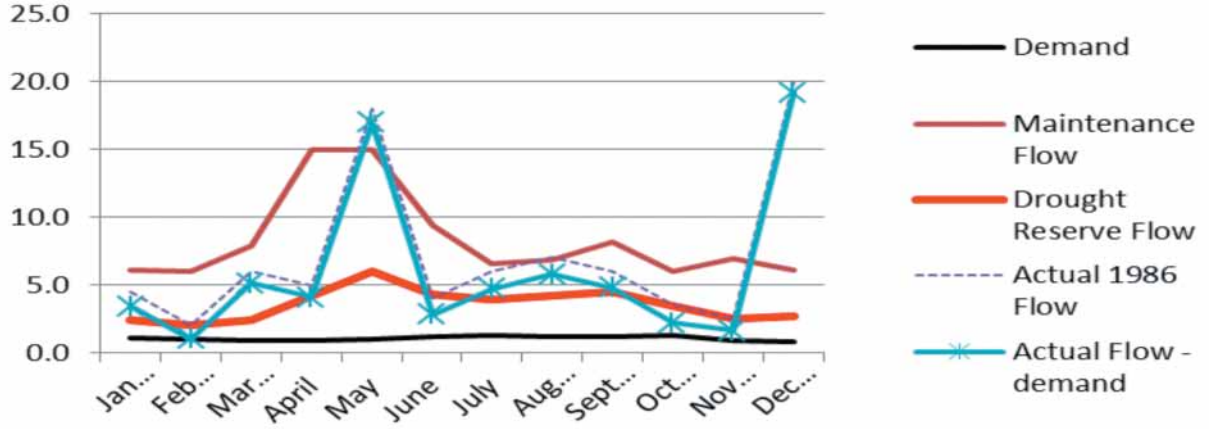


Figure 6.17 Comparison of the Maintenance and Drought Reserve Flows with actual flows in 1986 at the Mara Bridge (reduced to show the impact of water abstraction at 2008 levels).

Table 6.4 Comparison of a Dry Year Flow (1986) at the Mara Bridge with the reserve flow guidelines for normal and drought conditions

Month	Demand	Maintenance Flow	Drought Reserve Flow	Actual 1986 Flow	Actual Flow -demand
January	1.1	6.1	2.4	4.5	3.4
February	1.0	6	2	2	1.0
March	0.9	7.9	2.4	6	5.1
April	0.9	15	4.2	5	4.1
May	1.0	15	6	18	17.0
June	1.2	9.4	4.3	4	2.8
July	1.3	6.6	3.9	6	4.7
August	1.2	6.8	4.2	7	5.8
September	1.2	8.2	4.5	6	4.8
October	1.3	6	3.4	3.5	2.2
November	0.9	6.9	2.5	2.5	1.6
December	0.8	6.1	2.7	20	19.2

The information presented above confirms that conditions already exist, in which the Mara River's flow virtually ceases for 2-3 days based on water consumption levels in 2008. Predicted increases for water demand in 2030 would raise current abstraction levels by between 50% and 100% depending on the Scenario adopted. Under 'Scenario C', river flows would fall below the drought reserve level for more than four months (June – October) based on abstraction rates equivalent to 1.5 m^3/s in the sort of weather conditions that occurred in 1986. In a repeat of a year like 2005/6 river flows would cease entirely for weeks on end.

The situations predicted for 'Scenarios B' and 'C' would be less extreme but even under the most environmentally sustainable option ('Scenario C') rising population levels will exacerbate an already high risk situation.

Biodiversity:
The habitats that support the Mara/Serengeti ecosystem have been under increasing pressure for the last forty years. If the trends under Scenario A continue, the rangelands and reserve habitats of the Masai Mara will reduce tourism interests and limit visits outside the protected reserve. Driven by lack of forage, the remaining herds of the main

species will be concentrated within the remote parts of the Mara/Serengeti.

However, increased pressure from agricultural expansion would be of minor importance compared to the impacts of predicted levels of water use – and the likelihood of increased periods of low rainfall and higher temperatures resulting from climate change. The probability of the Mara River experiencing a prolonged drought on the scale that typically occurs on a seven year cycle within the next twenty years is greater than 50%. Without intervention, this is likely to lead to total cessation of river flow for two to three weeks. If this event occurred during the annual migration, it has been predicted (based on past evidence) that up to 400,000 wildebeest would die, (Gereta et al, 2003). A critical feature of the Mara Serengeti ecosystem is the time it takes for the population of animals like the wildebeest to recover from crashes caused by drought or disease. Within the timescale of the next twenty years and based on the land cover and water resource changes outlined in 'Scenario A', it is likely that the repetition of droughts could remove the opportunity for recovery in intervening wet years. This would permanently degrade the habitat.

Agriculture:
More than 80% of the rural population in the MRB depend on agriculture as their dominant economic activity. Smallholder farming is particularly important in the lower reaches of the river, while Narok in the upper reaches is dominated by large commercial wheat and barley farms. While expansion of farmland under 'Scenario C' would offer potentially greater economic returns than either 'Scenarios B' and 'C', this would only apply if sufficient water for irrigation was available, and major inputs of fertilizer and herbicides were used (with potential adverse effects on river water quality downstream). Tanzania is proposing to develop irrigation schemes in the lower Mara River Basin based on run-of-river flows, including substantial Sugarcane production— and is also constructing on-line storage by damming a section of the Mara River. It has not been established to what extent such storage is designed to accommodate reserves for irrigation in drought conditions but since most of Musoma's agricultural production relies on river flow it is anticipated that significant reduction in water flow in the dry years in the upper catchment will have major consequences for downstream users.

Any effects of upstream water use for agriculture would be lessened under 'Scenario B' but only 'Scenario C' would see an improvement in flow conditions in the Tanzanian section of the MRB.

Tourism:
Since tourism in the trans-boundary sections of the Masai Mara and Serengeti is driven primarily by the combined interests of wildlife viewing and the Masai culture, the adverse effects of 'Scenario A' would progressively reduce tourist activity from its present levels over the next twenty years – due to the loss of rangeland habitat combined with increased human/wildlife conflicts in the extended farming areas. 'Scenario B' would have similar but less pronounced effects.

'Scenario C' offers an alternative approach by actually reducing the area of cultivation and actively promoting the extension of tourism into peripheral areas through the development of game conservancies. Under this model, there would be opportunities to expand tourism income and activity, especially at the community level.

With all three of the scenarios considered in this report it is necessary to state that the current pattern of tourism is vulnerable to external events linked with farm expansions, rising population, increases in water demand, and climate change.

The E-flows study produced the first evidence that the Mara River flow is falling below the drought reserve level but the SEA, by extrapolating, suggests that the critical event defined in the Amala model (Gereta et al 2003) could occur at any time in the next 10-20 years with a probability of 20%-50% occurrence. This event would constitute a two to three week cessation of flows which would trigger losses of 20%-80% of migratory animals in the Mara-Serengeti ecosystem – should it occur during the dry season between July and October.

The consequences of such an event were carefully assessed in 2003 and showed that lost revenues to Tanzania alone, through collapse of the tourism industry in the Serengeti, would amount to US$70 million (2011 prices) (Gereta et al 2003). Estimates for the value of the Masai-Mara tourism products are provided in the Masai-Mara National Reserve Management Plan (2010), which range from US$ 25 to 45 million based on existing conditions and planned changes under the management plan. Taking the lower figure as the current value, this indicates that the combined recurrent losses to the economies of Kenya and Tanzania would amount to around US$100 million annually for an indefinite period.

Socio-economic development:
None of the scenarios considered would remove the fundamental challenge of providing for the anticipated 460,000–620,000 additional people in the MRB by 2030—while also meeting the needs of the 60%-80% of the current population who live below the poverty line. However, the range of policies associated with 'Scenario C', which emphasize community involvement and sharing of water and land resources offers the best approach. A significant failure in the flow of the Mara River Basin's main water supply, even if only for two weeks, would create a short term crisis in terms of human health and wellbeing.

Economy:
The three scenarios offer different levels of risk and opportunity. Continuation of existing policies and trends under 'Scenario A' could give rising economic returns to the major investors in tourism and agriculture but with increasing strains on the environment and social economic development at increasingly high risk. These changes would operate against the principles for prudent investment and sustainable development set out in the LVBC Protocol.
In the event of a major water crisis involving the cessation of the Mara flow, the overall losses to the economy could approach US$ 0.5 billion (taking into account not only the collapse of tourism, but also loss of agricultural production and temporary restrictions on mining and other activities together with humanitarian relief for up to a year). Needless to say, the worst-case scenario would destroy the 2030 Vision of the Masai Mara as Kenya's flagship ecosystem, and would severely damage the Serengeti National Park.

The realisation of 'Scenario B' would partially reduce its outlined risks. It is only 'Scenario C' that involves policies and plans to reduce long-term risk.

6.7 Conclusion

The issues highlighted in this review of scenarios can be best summed up by a direct quotation from the assessment of reserve flows for the Mara River (LVBC 2010) – which takes a cautious and considered scientific view.

"Demands on the river continue to grow. Human population in the MRB is growing at an annual rate of more than 3% (Hoffman 2007). This has been accompanied by a 55% increase in agricultural lands in the last fourteen years at the expense of nearly a quarter of the basin's forests and grasslands (Mati et al. 2005) In addition to the associated effects of deforestation, water abstraction for livestock, agricultural irrigation and other industries are on the rise. The Mara is not a large river, and ever increasing abstractions are certain to, at some point in the future, severely degrade the riverine ecosystem and even impinge upon the most basic needs of people living along the river. The effects of such a dry down would be profound, both for people, livestock, wildlife and the basin's economy. For example it could very likely cause a crash in the wildebeest populations, leading to a breakdown in the entire migration cycle that sustains the Masai Mara – Serengeti ecosystem. The implications of a disruption to such a significant nature process are far-reaching, including not only devastation for the tourism industry that supports so much of Kenya's and Tanzania's economies but also a change in the entire structure of the ecosystem".

Herding is a significant livelihood in the Mara River Basin. (WWF/Scott Davis)

7 Vision, Policy Matrices and Road Map

7.1 INTRODUCTION

This chapter is divided into three parts. The first part sets out the vision for sustainable development of the Mara River Basin over the next 20 years. It reflects discussions through the SEA workshops on the issues facing the MRB and the potential scenarios for the future discussed in the previous chapter.

Part two looks at the work of participants in constructing policy matrices to cover each of the main themes identified in the SEA. This represents the first step towards refining existing policies, plans and programmes. The aim is to give PPPs real meaning by defining who will be responsible for leading the reviews, who will participate, what the deliverables are, what the targets are in terms of timescale and how success will be measured. The SEA represents the starting point for a process of delivery which should be continued until it is no longer required. Specific proposals are set out in Chapter 8 for its completion.

Finally, Part Three sets out a Road Map for turning the recommendations from the SEA process into reality.

7.2 THE VISION FOR THE MARA RIVER BASIN

7.2.1 Setting out the Vision

A number of mission and vision statements have been generated for the Lake Victoria Basin and its constituent parts as re-stated below.

The Vision of EAC is a prosperous, competitive, secure, stable and politically united East Africa; and its Mission is to widen and deepen Economic, Political, Social and Culture integration in order to improve the quality of life of the people of East Africa through increased competitiveness, value added production, trade and investments.

The Lake Victoria Basin Commission acts 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.

The shared vision for the Lake Victoria Basin is "a prosperous population living in a healthy and sustainably managed environment providing equitable opportunities and benefits". (Quoted from BSAP, p19)

The overall goal for the MRB is to have "a region rich in biodiversity which benefits the present and future generations and ecosystem functions". (Quoted from BSAP, p.19)

These vision statements have been summarized for the Mara River Basin through the Stakeholder Working Groups for the Mara SEA as:

"People living in harmony with nature while achieving human wellbeing and sustainable economic development in perpetuity".

7.2.2 The Mission for the Mara Basin

"In future all policies, plans and programmes in the Mara River Basin recognize that nature conservation and protection of the environment lie at the heart of sustainable economic development and concerted action is taken by the Governments of Tanzania and Kenya and their partners to deliver this objective on the ground".

7.2.3 The Goal of the SEA

'To reverse the social, economic and environmental trends in current land use practice that, if left unchecked, threaten the sustainability of the Mara River Basin, with serious effects on livelihoods and the national economies of Kenya and Tanzania – and to propose practical solutions for dealing with the situation that are acceptable to the majority of stakeholders'.

7.3 DEVELOPING POLICY MATRICES

7.3.1 Introduction

On the 2nd and 3rd of June, 2011, stakeholders met at Fairmont Lodge in the Maasai-Mara to discuss the findings of the Outline SEA Report on the Mara River Basin. Six key themes were reviewed and confirmed as a sound

basis for discussing how existing policies, plans and programmes might be improved and better coordinated within the Kenyan and Tanzanian administrations, and amongst local communities, the private sector, NGOs, Civil Society and international partners.

Details of the emerging policy matrices, which will need to be refined and developed over time, are in Annex 2 . Each working group selected five priorities to act upon. Their selection is presented in Figure 7.1.

Out of 30 topics, eighteen activities are specific to water resource management, biodiversity and environment and tourism. Land use planning features in five of the priorities while socio-economic development is highlighted as a top priority by three of the groups. Also included are education, agriculture and mining.

The participants recognised that both Kenya and Tanzania need to reform a number of their laws. However, this change will take time to develop since they are connected to other national priorities. On the other hand, policies, plans and programmes are easier to deal with at a regional and sub-regional level and many of the suggestions made by the six groups can be handled within the Mara River Basin. The individual recommendations are discussed below.

7.3.2 Cross-Cutting Recommendations

1) Setting up a Mara River Secretariat: A number of studies (NBI 2008, WREM 2008) have proposed the formation of a coordinating body within the Mara River Basin to meet specific requirements for water resource management or for biodiversity and tourism. The difference with this proposal is that the driving force for introduction of the Secretariat came from the June workshop group focussing on economic development.

- The group highlighted a large number of initiatives that would benefit from basin-wide coordination including the:
- Development of investment incentives for small business enterprises
- Introduction of downstream value added industry (for processing raw materials that are exported from the basin–in particularly foodstuffs)
- Promotion of domestic as opposed to international tourism, fish farming
- Diversification of farming including mixed crop and fruit production and bamboo harvesting.

The concept of a basin-wide secretariat and coordinating body was generated independently by the Water Resources Group and the Population and Land Use Group.

2) Reviewing Land Policies and Data Bases: Reform and implementation of land policies is particularly critical in Kenya, as part of the new Constitution. However, the Population and Land Use, Economic and Socio-economic development groups observed the need for clarity on land ownership and sub-division. In addition to improving the land policy, the groups have advocated for the formation of a specialist team to monitor and improve the collection and storage of land ownership data.

3) Developing a Land Use Master Plan (LUMP): The need for a basin-wide approach to land use planning was identified by the Economic, Socio-economic development and Population and Land Use Groups. The goal behind it is to rationalise the use of land so that all economic sectors benefit directly or indirectly from each individual activity. For example, controls over the expansion of agricultural land would help to ensure that the overall costs and benefits of promoting a particular crop (for example, wheat) are shared within the economy as well as individual interests. As part of this activity the group also recommended the creation of a trans-boundary coordinating agency and implementation unit, and the setting up of a shared database.

7.3.3 Sectorial Recommendations

Water Resources:

4) Water Resources Management Strategy (WRMS): The Water Resources Group advocates for the preparation of a Mara River Basin Water Resource Management Strategy under the leadership of LVBC, LVBWB and WRMA. Its function will be to guide water resources management decisions. The Management Plan would be implemented through specific regional action plans.

5) Trans-boundary Water Allocation Plan: A related product to the WRMS is a Water Allocation Plan. This would take into account the competing demands for water in both parts of the Mara Basin and develop criteria for equitable distribution of the water resource. In order to deliver this objective, there is need for precise and reliable data on current water abstraction, existing and future demand and the identification of all stakeholders.

6) Institutional Arrangements for instituting water resources reforms: The Water Resources Group emphasises the need to develop an institutional framework for handling the two previous activities and ensuring that water sector reforms are effectively implemented at local, regional and national level. This initiative needs to be led by LVBC with support from LVBWB, WRMA and the Ministers of Water for Tanzania and Kenya. The success of the process will depend on funding, political goodwill, strong leadership, public participation and private sector involvement.

7) Updating and extending the Environmental Flows studies: The 2010 study provides the first building blocks for understanding the essential environmental needs of the river system, and the measures needed to protect reserve flows. However, the sites used for evaluation stop at the international border. A similar survey and gauging point in the lower basin should be developed .

8) Introducing new financial mechanisms for water services: It is widely recognised that water is an under-valued resource which is used as a free good by most abstractors. The costs of protecting and developing the resource are considerable and often fall on other land users and local communities – who receive no direct benefit for their stewardship. The group strongly advocates for the development of new mechanisms to allocate and share costs and benefits of water – by introducing payments for environmental services (PES) and exploring the role of carbon credits for forest catchment management.

Biodiversity:

9) Updating Kenya's expired National Biodiversity Action Plan (2000): The Biodiversity Group felt strongly that many of the challenges with sustainable development in the MRB stem from the inadequacy of existing policy and in particular the Kenya NBAP. There is also a need to develop more effective ways of implementing biodiversity legislation and policies.

10) Implement the Mara Biodiversity Action Plan: This plan prepared for EAC needs to be implemented under the leadership of the two Focal Points (MENR in Kenya; Ministry of Water and Irrigation in Tanzania). Implementation needs to include close links to wider government, regional and international policies and legal instruments. For these measures to succeed, it will be necessary to 'domesticate' international conservation principles and laws and delegate work to national institutions that should focus on interventions at the local level.

11) Finalise Kenya's Wetland Policy: The absence of any effective policy on wetlands in Kenya is severely hampering progress on wetland and river restoration throughout the Mara Basin. The current draft policy has been in production for more than ten years. An essential task that should be spear-headed by the policy is the mapping of wetland resources—which have a major economic function in conserving and regulating the flow of rivers like the Mara.

12) Develop Range Management Plans: Large parts of the grass and shrub lands used as livestock grazing areas are over-stocked— resulting in lasting damage to the productive value of the ranges and lower economic returns from cattle, sheep and goats. The preparation of RMPs is urgently required and should be led by the respective Ministries of Agriculture, Livestock and Wildlife with support from stakeholders including county councils and pastoralist organisations.

13) Implement a Tanzania National Biodiversity Policy: The existing policy, that is integrated in the National Environmental Policy under NEMC, should be implemented to address threats to natural resources affecting the lower part of the Mara Basin.

The Economy:

(The main recommendations of the Economy Group have been treated as cross-cutting- see Mara Basin Secretariat and MRB Land Use Plan)

14) Encourage the development of Value-Addition Activities: A high proportion of investment in the MRB results in the export of agricultural products in an unprocessed state. In order to stimulate the local economy greater emphasis needs to be given to promoting land reforms that will give local entrepreneurs greater security and enable them to obtain micro-credit and other financial support. The initiative should target farmers and livestock keepers, investors, financial institutions and international agencies. Current investment decisions based on inadequate knowledge of both production and marketing conditions have resulted in major losses for individual investors and the banks themselves, as witnessed by over-planting of wheat crops and major losses at harvest.

15) Improve Education and Training Opportunities: The low levels of training in most economic sectors within the MRB creates urgency to raise skill levels through education and training. Appropriate courses need to be devised and work experience opportunities provided.

16) Population Management: The value of a growing population is its ability to provide increased knowledge, skills and labour for existing and new enterprises. However, if there is no prospect of providing worthwhile employment, rapid increase in population simply adds to infrastructure and service costs. Current growth rates are too high and will pose a major burden on future wage earners and livelihood providers, education and health services. Greater emphasis needs to be given by both governments, international agencies, the youth and religious organisations to these issues.

Tourism:

17) Integrated Tourism Policy: There is a need to rationalise policy statements and commitments in existing tourism policies – so that the trans-boundary issues of tourism in the Mara-Serengeti tourism destination are dealt with comprehensively and in a complementary manner. At present there is little inter-change across the border, (largely to protect revenue flows) but the economic and socio-economic development issues in the region need to be handled in an integrated way.

18) Implementation of Tourism Policy and Development Plan: Revisions to policies and the development of an integrated tourism plan for the Mara-Serengeti ecosystem should be followed up with effective tourism management, leading to greater overall sustainability.

19) Tourism Benefit Sharing Plan: (See also under Socio-economic development) A tourism benefit sharing plan should lead to management empowerment, co-ownership options and the concept of tourism providers having custodial responsibilities on behalf of the communities on whose land they operate.

20) Promoting Best Practice: A review of the hotel, lodge and camping permit and rating systems should be undertaken and built around the three pillars of sustainability (economic, social and environmental performance).

7.3.4 Socio-economic development

21) Mining Policies and Community shareholding: Local communities are often excluded from land, or sell or lease their rights to land without understanding the financial agreements between investors and developers. These issues arise with all key sectors of the economy (Mining, Tourism and Agriculture). All policies need to be reviewed to ensure that they take account of community needs for transparency, and appropriate payment mechanisms, including shareholding dividends and other forms of benefit-sharing.

22) Tourism Policies and Community Investment: Issues relating to mining apply equally to tourism. There is a need to review policies and forms of agreement to ensure that communities receive adequate compensation for community land that is invested in wildlife management. In addition, measures need to be strengthened to ensure that individual families benefit through household income.

23) Implementing Planning Policies: All planning authorities need to to implement the existing planning policies on housing and settlements in order to protect the environment and improve the quality of life within the settlements.

24) Implement Health and Sanitation policies: There is an urgent need to give effect to existing policies on health and sanitation by implementing local schemes for clean water provision to villages and centres – and reducing the maximum distance for carrying water to 500 metres in order to maintain and where necessary improve water quality in the Mara River and its tributaries.

25) Develop Water Resource Policies and Programmes: Ensure that all policies and programmes have the aim of optimizing socio-economic development benefits while maintaining the ecosystem functions and reserve flows in the Mara River.

7.4 THE ROAD MAP

7.4.1 Turning the Vision into Reality

The concept of a 'basin' works well in a scientific sense when planning the management of water resources or conserving biodiversity. However, from a socio-economic development and economic perspective the concept of a basin is less obvious. Local people may see the basin as 'just another line on the map' in the same way that district and even national boundaries have little significance when people live on one side of the line but have their livelihoods or schools, markets and hospitals on the other. It is therefore essential that the vision and goal of the MRB is shared widely with local communities.

Rising population, expansion of settlements and subdivision of land-holdings in both Kenya and Tanzania affect the entire region. The increased pressure on forest resources is being experienced throughout the Mau Escarpment and in the headwaters of other rivers. The demand for land is rising all along the Lake Victoria shoreline not just in the Mara River section.

These issues have been discussed for the last forty years or more, see Box 7.1. Despite growing awareness of the issues, the preparation of policies and the publication of numerous reports, not much has been achieved in practice.

Box 7.1 Statements taken from the 1984 Population Policy Guidelines for Kenya

- **Kenya's population is among the fastest growing in the world (3.8%)**
- **This growth places considerable constraints on the social and economic development goals**
- **Effects of population growth are already manifest in social problems such as a high and growing dependency burden, unemployment unplanned parenthood and increased demand for basic services such as health, education, nutrition and shelter.**
- **Over the last two decades (1960's-70's) these problems have increasingly become the key concern of the Government.**
- **The Government is convinced that as these concerns come to be understood in terms of effects on family welfare and quality of life, parents will adjust their decisions (on family size) in favour of smaller families.**

Table 7.1 Policy Matrix Summary Table (colour-coded to show the main topics)

POPULATION & LANDUSE	WATER RESOURCE MANAGEMENT	BIODIVERSITY MANAGEMENT	TOURISM MANAGEMENT	ECONOMIC MANAGEMENT	SOCIO-ECONOMIC DEVELOPMENT
Land Use Policy; Land Use Plan;	MRB water resources management strategy	Review expired national biodiversity action plan (Kenya)	Test and refine national tourism policy	Set up Mara River Basin Secretariat	Mining policies should provide more for local communities and protection of the environment
Human Health Policy	Trans boundary water allocation plan and equitable allocations	Finalise wetlands policy	Prepare Regional Plan for tourism	Development of Master Plan for Basin	Tourism policy should allow for adequate compensation of community land
Planning Policy	New financing mechanisms	Develop a range management plan	Develop benefit sharing in tourism	Encourage mixed farming	Implementation of planning policies to improve settlements and MRB environment
Environmental Policy	Institutional development for augmenting water sector reforms	Develop a National Biodiversity Policy	Promote good practice in tourism	Improve education	Implement Socio-economic development policies that protect the Mara River system
Agriculture and Livestock Policy	Review and update e-flows study to river mouth	Mara Biodiversity Action Plan	Integrated Tourism Development Plan	Strengthen population control measures	Implement water resource policies which benefit communities

The policy matrices introduced in the previous section indicate the range of activities that local policy makers believe are essential to delivering the vision and goal of the MRB. However, past efforts to achieve similar results have largely failed and it therefore falls to the SEA – as a strategic assessment process to ask the critical question – why have previous efforts failed?

There are many factors that can be advanced by way of explanation – but the main reason is considered to be the lack of a policy and institutional framework – which can keep the wide range of environmental, social and economic issues under constant review in a holistic manner.

At present, each government agency and most international partners and NGOs set out their own programmes, set of priorities and objectives. Agricultural and food security initiatives explore options for extending the area under cultivation; water resource and energy programmes investigate the potential to use untapped sources to deliver clean water and power; health programmes sensitize communities to the realities of HIV-AIDs, without addressing the underlying constraints of poverty, food security and low levels of education. Local authorities prepare detailed development plans but the mechanisms and resources to deliver the individual policy goals and objectives do not exist. While each programme can be justified in its own right, they are often planned in isolation. The consequence is that financial resources are dissipated or duplicated, unnecessary competition arises and the sum of this overall effort falls short of expenditure on the individual parts.

The SEA concludes that, in order to improve the standards of socio-economic development, attain prosperity of the people in the MRB and to preserve the unique biodiversity of the Mara River Basin, a new approach is required. All six themes addressed by the policy matrices are important but two are singled out as the highest priority in terms of delivering holistic solutions. These are to manage human development and introduce strategic planning for land use change covering all sectors of the economy. The proposals that are outlined below can all be delivered within the existing national and local government framework, but a

greater degree of urgency and commitment is called for and there is a need to establish a supervisory board (see Chapter 8) which has sufficient authority to ensure that things get done.

It should be emphasized that all of the recommendations in the Road map are made from the standpoint of integrating environment and biodiversity concerns into the delivery of sustainable development, but in a number of areas the actions that need to be taken to secure this goal have more to do with people and the economy than nature conservation for its own sake.

7.4.2 First Imperative - Managing Human Development

The highest priority in the Mara River Basin should be to deliver the UN Millennium Development Goals. Current forecasts for Tanzania and Kenya suggest that most if not all of the eight goals are unlikely to be delivered by the target date of 2015, but this should not be seen as a 'make or break' deadline. If the long term sustainability of the MRB is to be secured continuous effort will need to be applied to the goals which are:

- Ending poverty and hunger
- Providing universal education
- Achieving gender equality
- Improving child health
- Improving maternal health
- Combating AIDs
- Achieving development through environmental sustainability
- Developing global partnerships.

Given the time horizon chosen for this SEA to 2030, what this means in practice is that every family in the Mara River Basin should have access to clean water, sufficient and varied food to give a healthy diet, good medical care, easy access to education, protection of children from all forms of abuse, proper respect and equal opportunities for women and disadvantaged or vulnerable groups, economic growth and an environment which is protected from degradation and despoliation.

The scale of the challenge can be seen when it is considered that these conditions do not currently exist for the majority of the existing population of 830,000 people in the Basin and predictions for the minimum increase in the number of inhabitants are put at 400,000 in the next twenty years.

In order to ensure that all programmes directed towards socio-economic development (and those covering infrastructure development, natural resources and biodiversity) are properly coordinated and delivered on the ground the SEA proposes the establishment of a Mara River Basin Management and Coordination Board. The role and functions of this body are discussed in Chapter 8.

7.4.3 Second Imperative – Introducing Effective Spatial/Land Use Planning

Socio-economic development and environmental conditions will continue to deteriorate in the MBR as long as state-owned entities, private companies and individuals are free to acquire and develop land within the Mara River Basin without any effective review or control by planning authorities which needs to be undertaken in the national interest of both countries.

The evidence presented in Chapter 6 on potential trends shows the likelihood of disastrous impacts on the economy, biodiversity and socio-economic progress within the next twenty years unless positive steps are taken to avert an impending crisis.

One of the most important steps which needs to be taken immediately (i.e. in 2011) is to establish an effective land use planning system with proper data-gathering, surveillance and long term monitoring which will allow the two Governments to assess the success or failure of a large number of policies, plans and programmes as they are carried out and take appropriate corrective or preventative measures.

This Strategic Land Use Planning approach needs to:

- Accurately record and display the current pattern of land use, the distribution of settlements, and the availability of natural resources (water, minerals, etc.) on interactive maps
- Set out specific targets for restricting population density in sensitive areas based on the concept of zonation and carrying capacity
- Divide the entire basin into land use and development zones (as initiated in existing District plans) but with greater accuracy using satellite imagery
- Institute specific land use policies for each zone specifying the percentage of land to be used for specific purposes including settlements, smallholder farming, commercial farming, nature conservation and wildlife, tourism and economic activities and infrastructure.

The outputs of the Spatial Plan should include mandatory guidelines for all government ministries in terms of the way in which land is allocated and managed for water storage, agriculture, energy, industry, commerce, tourism and new urban development.

7.4.4 Third Imperative: Protecting Biodiversity in MRB in the interests of sustainable development

The SEA has reviewed a large number of scientific studies (see Bibliography) which point to an impending crisis for the Masai-Mara and Serengeti ecosystem. Failure to act on diminishing water and forestry resources, poor land use and environmental management, deteriorating water quality land conversion and rising population could severely damage the ecosystem with immediate adverse impacts on a massive scale affecting not only wildlife but the regional economy.

7.4.5 Fourth Imperative- Managing Water Resources Sustainably

The Mara River and its tributaries carry substantial volumes of water in periods of high rainfall. However, their regime is highly variable – and there are long periods of dry weather flow when the amount of water is barely sufficient to meet existing water demands. During drought, there is insufficient water to meet both the reserve flow requirements to protect the region's biodiversity and consumer's demands.

The imperative for future water resource management in the Basin is to restore its natural water retention and storage capacities by rehabilitating existing forest, wetland, swamps, marshes and riverine habitats; adopting agricultural conservation practices that will allow the regeneration of grassland, shrub land and land cover – which causes least interference with water infiltration, ground storage and maintaining the natural flow characteristics of the river system.

Only when these options have been exhausted within specific sub-catchments should consideration be given to the introduction of large scale water storage in dams and reservoirs in order to safeguard the long term ecological and socio-economic development needs in the Basin.

A fundamental principle that will be observed by all promoters of this SEA is that the water resources of the RMB will be used in the future exclusively for the protection and enhancement of the Mara-Serengeti ecosystem, the livelihood needs of people residing within the basin, and economic activities within the basin that meet the sustainable development requirements of ecosystem protection and local community development agenda.

7.4.6 Fifth Imperative – Managing Tourism Sustainably

The contribution of the Mara-Serengeti ecosystem to international tourism activity and to the combined economies of Tanzania and Kenya far outweighs the relative importance of the area (in terms of the physical extent and size of resident population). However, the level of payments which the tourism industry makes for ecosystem services provided to the local population is inadequate to ensure the long-term sustainability of land and water resources and the cultural integrity, well-being and standard of living of the local communities on which the industry depends. Future policies, plans and programmes for the Mara River Basin will ensure that sustainable tourism development plays its full part in protecting and enhancing the "seventh wonder of the world".

7.4.7 Sixth Imperative – Managing Sustainable Economic Growth

Land and water resources within the Mara River Basin are finite and, in combination with human ingenuity, effort and financial investment, represent the sum of inputs available to sustain the economy and socio-economic development. The major industries in the basin, (tourism, mining and agriculture) currently use these resources without contributing fully to the principles of sustainable development. Future policies, plans and programmes within the MRB will be designed to ensure that all forms of economic activity make their respective contribution to the long term environmental and social sustainability of the basin and are designed and managed in ways that do not conflict with or prejudice other sustainable land uses and community needs.

8 Institutional Framework for SEA Implementation

8.1 INTRODUCTION

Institutional reforms are being considered in both Tanzania and Kenya for a number of reasons. In Kenya, this includes fundamental restructuring of the civil service and regional government under the new constitution. However, for the SEA, this chapter is concerned with the measures that are necessary, independent of the existing reforms that will ensure a change of attitude and new ways of tackling the basic issues of why policies relating to biodiversity, land use planning and environmental protection and enhancement are not satisfactorily implemented.

As discussed in Chapter 3, the critical policies relating to sustainable development of the Mara River Basin are not practiced on the ground for the following reasons:

- International institutions and partners sometimes compete in offering resources to national governments which can result in conflicting policies and programmes being promoted
- Government administrations may be encouraged to adopt and endorse policies because it is politically expedient to do so, but without any real intention of implementing them
- The complex relationships between policies, plans and programmes are not fully understood by those who are charged with implementing them
- Some agencies and local authorities lack the expertise, staff and finance to make real progress on the ground
- Despite good intentions some policies are difficult to implement at the practical level because in the initial phase, local peoples' livelihoods may be affected and strict enforcement or regulation becomes politically unacceptable
- New 'hot' issues frequently appear, stimulating financial commitment from governments and international partners. The new initiatives are created at short notice and the established programmes may lose funding and impetus.

Given this background, any plan for implementing and monitoring PPPs for sustainable development in the Mara Basin will need to:

- Have a clear mandate, be kept simple, and demand the minimum level of new resources
- Build, wherever possible, on existing structures and organisations.
- Involve regular monitoring and vetting at the highest possible level to ensure political commitment from both Governments
- Be attractive to sponsors and funding agencies.

8.2 POTENTIAL APPROACHES TO IMPLEMENTING THE SEA RECOMMENDATIONS

The SEA process has highlighted a number of overlaps and gaps in the existing legislation, and in different policies, plans and programmes which directly or indirectly affect the pursuit of sustainable development in MRB. A number of key decisions should be made in order to ensure that all PPPs are effectively coordinated and implemented in accordance with the agreed findings of the SEA.

- Agree on the appropriate form of institution to provide basin-wide planning, monitoring and review of all issues affecting sustainable development in the MRB. (Four models are provided to illustrate the range of choice)
- Agree on a strategy and work programme
- Establish a budget and funding arrangements

The SEA suggested some for discussion and debate at the second stakeholders' meeting.

8.2.1 Alternative Forms of Institutional Framework

There are many existing models to integrate policies and plans within river basins, including River Authorities, Catchment Management Agencies, Standing Committees and Commissions (of which the Lake Victoria Basin Commission is a prime example). Some of these alternative policies and plans are reviewed in WREM International Inc.'s report (2008). Choosing the right model depends on the scale and complexity of the work, the nature of the existing institutions and the political economy within the existing jurisdictions, (in this case two national governments) and access to technical support and funding. Four different approaches are outlined and compared below.

The "River Basin Authority" Model

Large river basins often perform multiple functions including water supply, power generation, irrigation, drainage, navigation and wastewater disposal. The resulting physical infrastructure is complex including dams, canals, pipelines, power stations, and ports and harbours. In consequence, a sophisticated management structure is required which often involves an autonomous authority with its own powers to raise finance and control a wide range of land use activities. The Tennessee River Authority and Murray-Darling River Basin Commission are two examples. These authorities often become dominant decision-making bodies within the river basin. Their powers are greater than the local authority's and are constituted under a separate Act of Parliament.

Developing appropriate institutions for a large river basin can take many years. The examples quoted above were developed over 20-30 years and their functions continue to change. (Delli,1996; Mumma-Martinon, 2010). The Mara River is relatively short with a moderate flow and only a limited number of abstraction points at the present time. Consequently the type of institutional structure that is being developed across Europe to respond to the Water Framework Directive may be more appropriate as outlined below.

"Catchment Management Agency"

Integrated Water Resource Management (IWRM) is a well-established framework for managing water resources. It invariably involves an overseeing Authority which may be a Ministry of Water Resources or other governing body. In Europe, the Water Framework Directive requires all member states to prepare water management plans for their river basins. The Irish Government anticipated the requirements of the directive early in 2002 by setting up a pilot process for the Shannon River. (This example has been chosen because the river begins in Northern Ireland and as a trans-boundary river, it drains a catchment almost identical to the Mara River Basin. Rather than establish a single river authority, the Irish model created a Technical Steering Committee which includes representatives of central and local government (see Box 8.1).

Box 8.1 Pilot Shannon River Basin

The River Shannon is the largest river in Ireland draining an area of 14,700 km2. It embraces two eco-regions; (rivers and lakes and coastal) 73% of the catchment is agricultural land, 3% forests and 8% peatbogs (wetlands). The river discharges an average 200m^3 / sec and its flow is regulated to aid navigation and facilitate production of hydro-power. The river has a deep water port on the Atlantic seaboard.

The Pilot established in 2002 was intended to run for four years with the following objectives:

- **Implementation of a catchment-wide monitoring system for the SRB**
- **Development of a Geographic Information System (GIS) for the basin**
- **Management of a public consultation programme**
- **Preparation of a programme of measures**
- **Preparation of a river basin management strategy.**

Participants in the SRB include 18 local authorities. The Basin Initiative was overseen by a Technical Steering Committee comprising representatives of Government Ministries, the Central Fisheries Board, Office of Public Works and others.

The output of the Technical Steering Committee's work has been the preparation and adoption of a Shannon River Management Plan.

A "Mara River Basin Commission"

The Nile Basin Initiative under NELSAP has been pursuing another model for trans-boundary cooperation on water resources development—the establishment of a Mara River Basin Commission under a legal agreement to be entered into by the Governments of Tanzania and Kenya. The objectives of the Commission are set out in Box 8.2.

Box 8.2 A Mara River Basin Commission

Article 11

1. The objectives of the Commission shall be to foster cooperation among the riparian states, harmonize national measures for the sustainable utilization of the resources of the Mara River Basin.

2. To achieve these objectives, the Commission shall have the function and responsibility to:

(a) Promote the proper management and equitable utilization of the resources of the basin

(b) Enhance capacity building of existing institutions and develop additional institutions dedicated to, or likely to contribute to, the purposes of this agreement in cooperation with existing institutions established in or by the East African Community and with such international, regional or nongovernmental organizations as may be appropriate

(c) Provide a forum for discussion of the impacts of initiatives dealing with the environment and resources in the basin and maintain a strong liaison with the existing bodies and programs

(d) Provide for the conduct of research concerning the water resources of sub-basin, including without limitation the quality of water resources

(e) Encourage, recommend, coordinate and, as appropriate, undertake training and extension activities in all aspects of water resource management

(f) Consider and advise on the effects of direct or indirect introduction of any non-indigenous aquatic animals or plants into the basin and adopt measures towards the introduction, monitoring, control or elimination of any such animals or plants

(g) Serve as a clearing-house and data bank for information on the basin and promote the dissemination of information, without prejudice to industrial property rights, by any appropriate form of publication

(h) In respect of any or all of the foregoing, adopt budgets, seek funding, formulate plans for financial management and allocate funds to activities of the Commission, or to such activities of the riparian states as it may determine to be in furtherance of the purposes of this agreement

(i)Undertake such other functions as it may determine to be necessary or desirable in order to achieve the purposes of this agreement

Article 13

Organs and Responsibilities

1. The organs of the River Basin Commission are:

(a) The Council of Ministers

(b The Basin Sectoral Committee

(c) The Basin Technical Committee

(d) The Basin Consultative Forum

(e) The Basin Secretariat

(f) The Mara River Basin Fund

2. The Council of Ministers may set up such committees or other subsidiary bodies, as it may deem necessary to perform the functions of the Commission.

3. The Council of Ministers may set up such sub-committees or working groups as it may deem necessary for the work of the committees or it's own work.

Detailed discussion has already taken place on a draft agreement which provides for powers to cover the establishment of a permanent body – with a central headquarters and staff and the scope for sub-offices to be opened as necessary. The Commission is intended to have substantive powers for the appointment of staff and the management of trans-boundary water management projects in the Mara Basin – including the development of water resource storage, treatment and infrastructure according to the terms of the draft agreement.

The Mara River Basin Commission represents a structure closer to a River Basin Authority than the Catchment management Agency and Technical Steering Committee approach adopted by most European States—where trans-boundary issues have arisen over shared responsibilities for water resource management and many other planning and land use issues.

The stakeholder consultation process reviewed various potential institutional arrangements for SEA implementation. It was agreed that LVBC, which has an established track record in developing and monitoring programmes in the Mara River Basin as part of its wider mandate for the entire Lake Victoria Basin, should develop a suitable framework and mechanism for SEA implementation and monitoring.

A farmer tills his land. (WWF/Scott Davis)

9 Summary of Conclusions, Agreements & Recommendations

"Water is a finite and vulnerable resource essential to sustain life, development and the environment and must be managed in an integrated and holistic manner, linking social and economic development with protection and conservation of natural ecosystems".

LVBC Protocol

9.1 INTRODUCTION

For more than two decades an international debate has taken place over the issue of how far human activities have been responsible for triggering climate change. There is now very little disagreement that climate change is happening and human influence has played its part. Ample evidence of the power of natural forces and our relative inability to resist them once they start is provided by current droughts and famine in the Horn of Africa (July 2011).

On a smaller scale the Mara River Basin represents a microcosm of the global picture. Scientific warnings about the long term consequences of land use change, population growth and uncontrolled use of water on this world famous ecosystem began in the 1970's. In less than 40 years, the land use of the MBR has been dramatically altered. Destruction of forests in the Mau Escarpment and the conversion of shrub land to intensive farming has reduced the extent and reliability of runoff to the rivers (Amala, Nyangores and Mara) to the extent that there are already short periods in times of drought when the Mara River is virtually dry as it enters the Masai Mara and Serengeti National Park. Rivers that once powered water mills for grinding corn no longer flow and the Sand and Talek rivers are perennial streams.

These conditions have contributed to a massive reduction in the reserve rangelands that once supported Kenya's resident Wildebeest population and other game animals, but if the Mara river ceases to flow for even a few weeks scientists predict this will bring an end to the "seventh wonder of the world", the annual migration of over a million herbivores and their predators from the Serengeti National Park to the Masai Mara. Collapse of this complex ecosystem will bring in train the loss of one of the main drivers of international tourism to Tanzania and Kenya. The annual influx of visitors from around the world to observe the migration is worth an estimated US$ 100 million to the two economies, and its significance to the 830,000 people who currently live in the MRB is immense.

The risk that the scenario painted above will become reality is now greater than ever and the time available to take remedial action is less than ten years. This is because we are dealing with a highly dynamic range of pressures rather than a static situation as outlined below.

The population of the Mara River Basin is rising at a rate of more than 20,000 people a year. By 2030, the overall population in the MRB will exceed 1.4 million at current rates (an increase of 600,000 over the current population of 830,000).

Areas under intensive agriculture are expanding at the expense of shrub and grassland, despite repeated crop failures from drought and disease, promoted in the interests of food security and the reduction in imports, but also by private sector gain.

Traditional livestock herding which was in tune with nature and maintained a balanced way of life for the Masai is being replaced by farming and trading.

Stocking levels of livestock on remaining rangeland are far too high to produce a secure economic return for their farmers.

Water demand is predicted to rise from 25 million cubic metres a year to over 45 million cubic metres a year by 2030, a doubling of current usage resulting in major shortage under drought conditions.

Climate change could result in an increase in annual temperature of 2.0 degrees, with higher evaporation and more varied rainfall leading to more severe and frequent droughts.

In the face of these pressures there are effectively two ways out of the dilemma; applying conventional wisdom or adopting a conservation approach.

Conventional wisdom assumes that we can produce technical solutions to any problem that confronts us. For example, a standard approach to water shortage would be to build large dams in the upper river catchments to store water against drought. Experience suggests that this invariably leads to greater demand for stored water for power generation, irrigation and industry with the result that within 20 years the situation reverts to its current position when it becomes necessary to build higher dams or new reservoirs.

Another example of conventional approach assumes that by improving crop strains and yields (with or without genetic modification) and increasing fertilizer and herbicide application, we can increase food availability and exports to increase foreign exchange earnings. This is often the case but in the MRB the highest priority is to find food for its growing population. More than 50% of Kenyans in Mara live below the poverty level and Musoma Rural District in the Tanzanian part of the MRB has one of the highest poverty levels of any district in Tanzania (158th out of 159 districts), despite the fact that its economy is based largely on agriculture and mining.

Conservation of all natural resources in balance with human needs for survival and development offers a very different strategy and way out of the dilemma. This route does not turn its back on technological progress but harnesses it within an ecological and sustainable development framework. It begins by recognizing that most problems and pressures stem from the way we use and abuse the environment.

The solution to long term water needs lies in achieving a balance between supply, demand and consumption. Instead of building large dams, replanting of forests and the restoration of marshes, wetlands and swamps which once served as natural sponges, the introduction of rainwater harvesting, coupled with proper water conservation and education and the elimination of harmful irrigation practices will help to restore river flows. Small reservoirs in strategic locations will also be necessary, but these must be designed to meet conservation needs (including local hydro power energy) rather than seeking to export resources to other catchments.

Under a conservation approach, agricultural production in the Mara River Basin will be aligned more closely with the food requirements of its people. There are encouraging signs of progress with permaculture and greenhouse propagation being adopted by some Maasai entrepreneurs, but it is significant that the production of green beans and wheat – the two principal crops in the Upper Mara – directed primarily at national and international markets. Much greater emphasis needs to be given to issues of land tenure, the problems of land division and the requirements of smallholder farmers so that local markets are supported and developed throughout the MRB.

The choices for future courses of action have been presented starkly as two opposites. However, the reality is that, since it takes time for society to adapt to change, a middle course will have to prevail but this does not weaken the significance of the SEA findings or the need for real and urgent action.

If the above challenges are dealt with effectively, there is still time to bring the Mara River Basin under sustainable management. By addressing the issues raised in this report, the wealth of the natural resources that sustain the tourism industry can be enhanced, conservatively increasing the economic returns from this sector by 20 million US$ by 2030 (at current prices). In the process, more than 20,000 new jobs can be created. Farming productivity can be increased by 10-20% while reducing the amount of land required to grow crops by 5%. Population growth can be reduced to manageable levels of 2.1% resulting in greater family food security and improved socio-economic portfolio by 25%. Water availability can be increased from the current 25 litres a day target for rural populations to 40 litres. In the process, areas that have been damaged by soil erosion and deforestation can be rehabilitated, and the Mara-Serengeti Ecosystem can be maintained as the greatest collection of large game animals on Earth.

9.2 WAY FORWARD ON THE SEA

Strategic Environmental Assessment proposes options and analyses the consequences but it does not take decisions. Consequently, the Governments of Tanzania and Kenya and the Lake Victoria Basin Commission should determine which of the SEA recommendations to accept and what route should be taken to implement them. There have been a number of high level studies conducted for the LVBC and the Nile Basin Initiative in recent years. Each has made recommendations about the type of institutional reform that should be introduced. The SEA assumes that each of these alternatives will be considered and regardless of which one is chosen, the majority of the SEA recommendations will remain valid and can be implemented within the existing or new administrative arrangements.

Institutional Arrangements:

A fundamental conclusion of this SEA is that a different approach is needed to some of the conventional models of government. This does not involve creating a large new institution or River Basin Authority that would take over the roles and responsibilities of existing agencies in the Mara River Basin. Instead, it is proposed that a small, efficient Secretariat with a technical support unit (which could play a wider role in future SEAs in the Victoria Lake

Basin) should be established under the Lake Victoria Basin Commission. Its principal task will be to liaise with all government ministries and agencies, international partners, project teams and NGOs in ensuring a more coordinated and joined-up approach to sustainable development in the Mara River Basin. To achieve this task the Secretariat will facilitate the establishment of a Technical Committee with professional representation from all the leading agencies of national and regional government in the Basin.

The stakeholders consulted during the SEA process reached agreement and made recommendations on a number of important issues set out below.

9.3 AREAS OF AGREEMENT AND RECOMMENDATIONS

The following was agreed by stakeholders:

a) Existing trends are damaging to the sustainable development of the MRB and should be reversed. The Partner States delegates and other stakeholders consulted were unanimous that Scenario A should be discounted.

b) Scenario C in this SEA document is the preferred outcome. However, according to the delegates was that it would be difficult to achieve and Scenario B might emerge as the default option.

c) 'Business as usual' approach on environment is not an option in MRB. A new way of doing business, that enhances environmental sustainability is required.

d) A coordinating mechanism in the Mara River Basin to implement the SEA recommendations need to be set up urgently under LVBC.

The above agreements led to the following recommendations:

1. LVBC shall facilitate implementation of SEA programmes for sustainable development outlined in the policy matrices (Annex 2) proposed by the Partner States in accordance with EAC protocols.

2. The LVBC secretariat shall facilitate and coordinate the establishment of a coordinating body to oversee implementation of the SEA recommendations.

3. LVBC secretariat shall coordinate Partner States and other stakeholders including community institutions to implement and monitor progress on SEA recommendations.

4. An annual report on the MRB SEA implementation progress shall be submitted by LVBC Secretariat for consideration by the Sectorial Council of Ministers for LVBC.

5. LVBC secretariat shall facilitate review and update of SEA document at least every five years or as deemed appropriate to examine whether new issues have emerged that affect the MRB's long term sustainability.

A Topi stands on a termite hill to survey its surroundings. (WWF/Peter Nelson)d

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11 Annexes

ANNEX 1: ISSUES IDENTIFIED IN THE 2008 REPORT

CHALLENGES	SOLUTIONS
Urgent remedial measures which need to be solved to ensure sustainability of the RMB. Increasing demand for water resources. Poor land use practices. Poorly managed water abstraction upstream affects downstream reaches Biodiversity facing completion with humanity for space and resources. Large mammals critically endangered or declining rapidly. Wildlife / human conflicts. Land transformation by mechanized agriculture and agro-pastoral communities. Weak institutional frameworks. Rapid deforestation. Vegetation clearance. Irrigation with inefficient technologies. Rapid growth of smallholder settlements. Weak infrastructure in tourist facilities. Soil erosion ad-hoc monitoring. Weak enforcement of existing legislation. Land division. Poor benefit sharing of tourism activities/ income. Proliferation of mining activities. Need for integration of biodiversity conservation and improvement in socio-economic development among residents of MRB. Inadequate soil conservation practice Rapid rate of urbanisation.	Integrated management of biodiversity and socio-economic development. Strengthen land use practices. Encourage production of high value natural resource based products. Strengthen local community awareness of conservation issues. Manage game populations within carrying capacity with game 'cropping'. Mobilise communities to define permissible land sub-division. Create an MRB Secretariat within LVBC /EAC. Resolve conflicts in policies for water forest wildlife environment agriculture and Physical planning and survey. Establish MRB transboundary joint steering committee. Establish National steering committees. Produce popular versions of laws and regulations. Develop forest management plans – to map secure and rehabilitate forests. Encourage use of non –timber forest products. Encourage development of eco-tourism. Develop alternative energy systems to charcoal – including biogas, dung, wind solar, biofuels and sawdust briquettes. Promote better on-farm water management. Develop hydroponic systems. Develop water budget for irrigation rationalization. Intensify livestock farming. Reduce livestock numbers and encourage zero grazing dairy farming. Promote steer fattening in the lower zone. Extend livestock carrying capacity model from Tanzania to other areas of the Basin Encourage switch from livestock rearing to wildlife management (e.g.Koiyaki-Lemek conservancy in Narok District. Enforce mining regulations. Encourage appropriate technologies for small scale and artisanal mining. Develop conventional and decentralized waste water treatment systems in urban centres. Develop solid waste management system for urban centres. Develop a wildlife management plan for Masai Mara – Serengeti ecosystem. Determine permissible minimum land sizes across the basin to support livelihoods, guarantee productivity and viability of land uses. Restructure group ranching system to support pastoralism and sedentary settlements. Clearly define land ownership and tenure system across the basin. Promote off-farm income generating activities like tourism. Strengthen resource user associations.

ANNEX 2: PROPOSED POLICY MATRICES

Introduction

On the 2nd and 3rd of June, 2011, stakeholders met at Fairmont Lodge in the Maasai-Mara to discuss the findings of the Outline SEA Report on the Mara River Basin. The seven key themes were reviewed and confirmed as a sound basis for discussing how existing policies, plans and programmes might be improved and better coordinated within the Kenyan and Tanzanian administrations, and amongst local communities, the private sector, NGOs, Civil Society and international partners.

Participants divided into six working groups following the initial selection of 'chairpersons' who were volunteered for each group based on known expertise in the subject. Tanzanian participants then joined a group of their preference to ensure, as far as possible that all parts of the Basin were represented.

Group Discussions

Each group was asked to identify a secretary / rapporteur and then spent half an hour reviewing the information in the SEA Outline Report relating to their specific topic or theme. Ideas were put forward and discussed for possible interventions, revisions or development of policies, plans and programmes and these were added to a 'long list' of possible actions.

Each group then debated what priority should be given to individual ideas and a list of the top five, in descending order of importance was created.

Following the lunch break, each group began to work through a policy matrix in order to identify in relation to their chosen five activities:

- What the current state of knowledge is on the topic?
- Who should be the main champion or lead agency?
- Who should be regarded as key stakeholders?
- What are the expected outcomes from the interventions being planned?
- What targets, milestones and time scales should realistically be set for delivering the planned outcomes?
- What conditions would need to be satisfied to ensure success?
- What indicators can be employed to measure success?

Finally, each group presented its findings to a plenary session. The results were agreed upon on the principles for refining the list of activities.

Managing Population And Land Use

Long list of potential policy/ plan and programme activities:

- Economic and Planning Policies,
- Human Health Policy,
- Forest Policy-with the goal of ensuring that farmers develop woodlots on farms to avoid encroaching into the existing forest for fuel wood,
- Agriculture/Livestock Policy-soil conservation and promote agroforestry,
- Land Use Policy-and the requirement to develop a land use plan for the Mara Basin,
- Environmental Policy
- Wildlife Policy
- Water Policy
- Tourism Policy
- Infrastructural development
- Biodiversity
- International / regional agreement.

Priority PPPs

The chosen shortlist of five priority policies deserving attention and ranked in descending order of importance is listed below;

- Land Use
- Human Health
- Planning
- Environment
- Agriculture/ livestock .

Table 1: Population And Landuse Draft Policy Matrix

PPP Activity and Proposed Action	**Develop Land Use Policy**
	Develop Land use Plan for the Mara Basin
	Create coordinating agency/implementing unit for the two countries
	Create database management system
State of Knowledge (1= Poor, 5=Very Good)	**3**
Champion (Lead Agency)	**Ministry of Lands**
List of Stakeholders	**Key Sectors i.e. agriculture, natural resource sector (wildlife, tourism, water)**
Expected Outcomes	**Sustainable Land Use**
Targets/ Milestones/ Timescale	**Land Use Plan Developed in 3 years**
Conditions needed to Secure Success	**Political goodwill at all levels to implement land use**
	Financial support to carry out public sensitization on land use
Indicators of Change	**Compliance with Policy;**
	Better land use management;
	Public awareness of the existence of land plan; Plan implementation with minimum supervision;
	Reduced conflict on land use

PPP Activity and Proposed Action	**Improve health status of the human population in the Mara river basin.**
	Support family planning programmes
	Improve sanitation within the Mara basin
State of Knowledge 1= Poor, 5=Very Good	**2**
Champion (Lead Agency) List of Stakeholders	**Ministry of health for both countries**
	Stakeholders
	Community
	Civil society organization(CSO)
	Private sector.
Expected Outcomes	**A healthy manageable population**
Targets/Milestones/ Timescale	**Training programme initiated for clinic staff in each district within the MRB**
	Training program for teachers within MRB
Conditions needed to Secure Success	**Financial support by the two governments**
	Public awareness
Indicators of Change	**Improved life expectancy (increased life span)**
	Reduced infant mortality rates
	Increased education performance

PPP Activity and Proposed Action	Carry out population and economic surveys
	Biodiversity inventory within MRB
State of Knowledge (1= Poor, 5=Very Good)	1
Champion (Lead Agency) List of Stakeholders	Ministry of finance and planning
	Stakeholders
	CSOs and NGOs,
	Natural resource management sector
Expected Outcomes	Increased incomes within MR basin
	Reduced resource conflict within the basin
Targets/ Milestones/ Timescale	Come up with a biodiversity database within 3 years
	Develop resource management plan within 4 years.
Conditions needed to Secure Success	Financial support by the two governments and other stakeholders
	Availability of technical team
Indicators of Change	Availability of biodiversity data and resources
	Easy resource planning and allocation

PPP Activity and Proposed Action	Environmental Policy
	Prepared an updated Integrated action plan
	Prepare an environment investment plan
	Create database management system
State of Knowledge (1= Poor, 5=Very Good)	2
Champion (Lead Agency) List of Stakeholders	Ministry of Environment & Natural Resources,
	County/LGA's,
	NGOs, CSO, Private Sector, CBOs and Communities
Expected Outcomes	Integrated Resource Management Plan of the MRB
	Common Investment Plan for the two countries
Targets/Milestones/ Timescale	Have an updated resource database by 2012
	Integrated Action Plan by 2014
	An environmental investment plan by 2015
Conditions needed to Secure Success	Strong community participation in database updating and plans preparation
Indicators of Change	Political Goodwill
	Sustainable funding of the plans and database management

PPP Activity and Proposed Action	**Agriculture/Livestock Policy**
	Prepare an investment strategy
	Create database management system
	Develop Value addition and marketing of products
State of Knowledge 1= Poor, 5=Very Good	**4**
Champion (Lead Agency) List of Stakeholders	**Ministry of Agriculture and Livestock**
	Private Sectors
	NGOs
	KARI/ OKILIGURU Research Institute
	Farmers and Livestock keepers
	KCC,KMC
	NCPB(Kenya), TZ Coffee Marketing Board, TZ Cotton Association, TZ Cereal and Mixed Produce Board (TZ)
Expected Outcomes	**Improved income of Farmers and Livestock keepers**
	Improved farming and livestock rearing practices
Conditions needed to Secure Success	**Adequate Funding**
	Strong partnership and co-operation of stakeholders
	Give incentives to enhance stakeholder co-operation
Indicators of Change	**Updated agriculture and livestock database within the MRB**
	Improved livelihoods of farmers and livestock keepers
	Centralised marketing of agriculture and livestock products within the MRB

WATER RESOURCES

Long List of potential policy/plan and program activities

- Development of a Mara River Basin water resources management strategy
- Improvement of enforcement and compliance mechanisms
- Building awareness and education
- Capacity building for implementing institutions
- Updating and reviewing the e-flow study
- Implementing e-flows recommendations
- Preparing an MRB water allocation plan
- Achieving equitable allocation between up-stream and down-stream states
- Payment for environmental services by protected area management authorities
- Economic valuation of water
- Institutional development for implementing water sector reforms- basin wide and nationally
- Introducing new financial mechanisms-including carbon credits for the Mau forest.

Short list of five priorities ranked in descending order of importance

- Development of a Mara River Basin water resources management strategy
- Preparation of a trans-boundary water allocation plan, including equitable allocation between partner states and e-flow implementation
- Introduction of new financing mechanisms – including water valuation, PES and carbon credits
- Institutional development for implementing water sector reforms
- A review and updating of the e-flow study to include all sections of the River Mara up to its mouth.

Table 2: Water Resources Draft Policy Matrix

PPP Activity and Proposed Action	Priority 1. Develop Mara River Basin (MRB) Water Resource Management (WRM) development strategy
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	LVBC
	LVBWB
	WRMA
Expected Outcomes	Guiding of water resource management decisions
Targets/Milestones/ Timescale	Dec 2011
Conditions needed to Secure Success	Funding
	Stakeholder commitment
	Stakeholder participation at all levels
	Private sector involvement
Indicators of Change	Approved action plans for regional level derived from this strategy

PPP Activity and Proposed Action	Priority 2. Formulate basin-wide water allocation plan including equitable allocation between partner states and e-flow implementation
State of Knowledge 1= Poor, 5=Very Good	3
Champion (Lead Agency) List of Stakeholders	LVBC
	LVBWB
	WRMA
Expected Outcomes	Equitable allocation and use of water resources
Targets/Milestones/ Timescale	Dec 2012
Conditions needed to Secure Success	Funding
	Stakeholder commitment
	Reliable data on water abstraction, water demand etc.
	Private sector involvement
Indicators of Change	E-flows maintained
	Reduction in reports of water use conflicts

PPP Activity and Proposed Action	Priority 3. Develop financing mechanisms including water valuation, Payment for Environmental Services (PES) and carbon credits
State of Knowledge 1= Poor, 5=Very Good	2
Champion (Lead Agency) List of Stakeholders	LVBC
	LVBWB
	WRMA
Expected Outcomes	Improved conservation in upper catchment
	Strengthened institutions
Targets/Milestones/ Timescale	Dec 2013
Conditions needed to Secure Success	Funding
	Political will
	Private sector involvement
Indicators of Change	Improved quantity and quality of flows

PPP Activity and Proposed Action	Priority 4-Develop an institutional framework for implementing water sector reforms at regional, national and local levels
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	LVBC
	LVBWB
	WRMA
	Ministries of Water in both countries
Expected Outcomes	More adequate management and support
Targets/Milestones/ Timescale	December 2012
Conditions needed to Secure Success	Funding
	Political will
	Leadership
	Public participation
	Private sector involvement
Indicators of Change	Active involvement of private sector and local communities
	Active joint participation by partner states in management, planning and development of water resources

PPP Activity and Proposed Action	Priority 5. Review and update e-flow studies to include Mara River up to river mouth
State of Knowledge 1= Poor, 5=Very Good	3
Champion (Lead Agency) List of Stakeholders	LVBC
	LVBWB
	WRMA
	Development partners
Expected Outcomes	New and refined e-flows
Targets/Milestones/ Timescale	June 2013
Conditions needed to Secure Success	Funding
	Research collaborators
	Stakeholder commitment
	Private sector involvement
Indicators of Change	Adoption by stakeholders

BIODIVERSITY

Long List of potential policy/ plan and programmes Kenya

- Review the expired National Biodiversity Action Plan 2000.
- Finalise the Wetlands policy (over 10 years in preparation stage).
- Align the Wildlife Conservation Bill to the Constitution.
- Complete the National Land and Land Use Policy
- Align all related Biodiversity Acts to the Land Policy
- Develop an Integrated Management Plan on biodiversity and socio-economic development
- Develop range management plans. Tanzania
- Take note of the Environmental Policy 1997
- Implement Environmental Act 2004.
- Develop a National Biodiversity Policy.
- Develop an Integrated Management Plan on biodiversity and socio-economic development.
- EAC/ Nile Basin
- Kenya & Tanzania to ratify the Nile Basin Cooperative Framework
- Implement the Mara Biodiversity Action Plan.

Short list of five priorities ranked in descending order of importance

- Review the expired National Biodiversity Action Plan 2000.
- Finalise the Wetlands policy (over 10 years in preparation stage).
- Develop range management plans.
- Develop a National Biodiversity Policy.
- Implement the Mara Biodiversity Action Plan.

Table 3: Biodiversity Draft Policy Matrix

PPP Activity and Proposed Action	**Priority 1: Review the expired National Biodiversity Action Plan 2000 and implement it. (Ke). Review the expired National Biodiversity Action Plan 2000 and implement it. (Ke).**
State of Knowledge 1= Poor, 5=Very Good	**1**
Champion (Lead Agency) List of Stakeholders	**MEMR**
	MFW, MOA, MNH, MT, KFS, KWS, WRMA, National Museums , NCC, TMCC, Conservancy & Tourist Facilities,
	WWF, FOC, WRUAs.
Expected Outcomes	**Integrated sustainable management of Mara ecosystem.**
Targets/Milestones/ Timescale	**Regular production of drafts.**
Conditions needed to Secure Success	**Focal Point in all key stakeholder institutions.**
Indicators of Change	**Reserve flow. Increase in tree cover.**
	Regeneration of flora and fauna.

PPP Activity and Proposed Action	**Priority 2 Implement the Mara Biodiversity Action Plan (EAC).**
State of Knowledge 1= Poor, 5=Very Good	**1**
Champion (Lead Agency) List of Stakeholders	**In Kenya, the Ministry responsible for Environment and Natural Resources, as the Focal Point Ministry for the EAC.**
	In Tanzania, the Ministry in charge of Water and Irrigation, which is the Focal Point Ministry, will play a similar role. The technical sector Ministries and Departments, such as Agriculture, Livestock, Water Development, Tourism, Industry, Fisheries, Wildlife and Forestry,
	WWF, WRUA,
Expected Outcomes	**Link to the wider government, regional and international policies and legal instruments.**
Targets/Milestones/ Timescale	**Projects implemented..**
Conditions needed to Secure Success	**Domestication of the biodiversity conservation and management and delegation to national institutions to focus on interventions at a technical level.**
Indicators of Change	**Plans being implemented that are in conformity with strategy**

PPP Activity and Proposed Action	**Priority 3: Finalise the Wetlands policy (over 10 years in preparation stage) (Ke).**
State of Knowledge 1= Poor, 5=Very Good	**4**
Champion (Lead Agency) List of Stakeholders	**NEMA,**
	Kenya Wetlands Forum,
	WWF,
	Min. of Env, Min of Lands, Water, Agric, KWS, KFS,
Expected Outcomes	**Resources allocation and implementation plans.**
Targets/Milestones/ Timescale	**Identification and Mapping of wetlands.**
	Establishment of Community wetlands Ass.
Conditions needed to Secure Success	**Community based wetlands management plans of individual wetlands.**
Indicators of Change	**Regeneration of Wetlands.**
	Sustainable harvesting of wetland products. Regeneration of springs. Increase of water quality.

PPP Activity and Proposed Action	Priority 4: Develop range management plans (Ke}.
State of Knowledge 1= Poor, 5=Very Good	3
Champion (Lead Agency) List of Stakeholders	Jointly Min, of Agri, Livestock & Wildlife.
	Min. of Lands, County Councils, (Ke & Tz,) Kenya Land Alliance, Pastoralist organization (Ke & Tz.),
Expected Outcomes	Rotational Grazing, Carrying Capacity Management,
Targets/Milestones/ Timescale	No. of Completed plans
Conditions needed to Secure Success	Develop Livestock insurance packages. Off-take to be conducted at source.
Indicators of Change	Quality livestock and livestock products,

PPP Activity and Proposed Action	Priority 5:Develop a National Biodiversity Policy (Tz).
State of Knowledge 1= Poor, 5=Very Good	1
Champion (Lead Agency) List of Stakeholders	Min. Env.
	Min of Nat. Res. & Game Magm.,
	Min. Of Agric.,
	Min. of Water & Irr. Min. Of Livestock & Fisheries.,
	WWF, WUA,
Expected Outcomes	Resources allocation and implementation plans. Resources allocation and implementation plans.
Targets/Milestones/ Timescale	Work plans, Budgets.
Conditions needed to Secure Success	
Indicators of Change	Plans being implemented that are in conformity with strategy.

MANAGING THE ECONOMY

Long list of potential policy/ plan and programme activities

- Formation of an MRB(Mara River Basin) secretariat.
- Formation of vocational training institutes to help the youth
- Intensive use of family planning in order to achieve sustainable population growth.
- General education especially for women.
- Promotion of domestic tourism.
- Provision of appropriate investment incentives
- Review of Mining policy
- Formation of a MRB master economic plan.
- Focus on introduction of value additional enterprises.
- 10. Diversification of farming e.g. Development of fruit farming
- Preparation of physical plans for urban centres and the basin in general
- Encouragement of mixed cropping
- Promotion of fish eating in rural diet and introduction of fish farming
- Introduction of high value crops (eg Bamboo)
- Establishment of a research unit within the secretariat.

Short list of five priorities ranked in descending order of importance

The group set out a clear ranking of its priorities for action in selecting its shortlist below.

- Formation of Mara River Basin Secretariat
- Development of Master Plan for Mara River Basin
- Encourage mixed farming and introduce high value enterprise
- Improve education and training opportunities
- Strengthen population control measures

Table 4: Economy Draft Policy Matrix

PPP Activity and Proposed Action	**Establish Mara river Basin secretariat**
State of Knowledge 1= Poor, 5=Very Good	**4**
Champion (Lead Agency) List of Stakeholders	**LVBC**
	Prospective investors
	Local communities
	Private sectors
	International organisations
	GK/ST
Expected Outcomes	**MRB development activities strengthened and well established**
Targets/Milestones/ Timescale	**MRB secretaries established by June 2012**
Conditions needed to Secure Success	**Staff**
	Offices
	Budgets
	Technical assistance
Indicators of Change	**Staff**
	Offices
	Budgets
	Technical assistance

PPP Activity and Proposed Action	**development of master plan for MRB**
State of Knowledge 1= Poor, 5=Very Good	**4**
Champion (Lead Agency) List of Stakeholders	**Secretariat**
	Local communities
	Prospective investors
	Private sectors
	International organisations
	GK/ST
Expected Outcomes	**Approved development master plan for MRB**
Targets/Milestones/ Timescale	**Development of master plan for MRB attained by june 2013**
Conditions needed to Secure Success	**Staff**
	Office
	Budgets
	Technical assistance
Indicators of Change	**Progress report**

PPP Activity and Proposed Action	Encourage value additions
State of Knowledge 1= Poor, 5=Very Good	3
Champion (Lead Agency) List of Stakeholders	GK/ST
	Local farmers and livestock keepers
	Investors
	Financial institution
	International agency private sectors
Expected Outcomes	Improved incomes and employment increased
Targets/Milestones/ Timescale	To encourage value additions by 2014
Conditions needed to Secure Success	
Indicators of Change	increased GDP level

PPP Activity and Proposed Action	improve education and training opportunities
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	GK/ST
	Development partners
	Youth/farmers
	Private sectors
Expected Outcomes	High skilled manpower increased
Targets/Milestones/ Timescale	To improve education and training opportunities by 2013
Conditions needed to Secure Success	
Indicators of Change	Number of people trained and qualified

PPP Activity and Proposed Action	strengthen population control measures
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	GK/ST
	International agencies
	Youth
	Religious organisations
Expected Outcomes	To strengthen population control measures from 2.7% to 2.0%
Targets/Milestones/ Timescale	Budgets
	Staff
	Training
	Contraceptives
	Supportive policies
	Conditions needed to Secure Success
Indicators of Change	Number of children per households

TOURISM

Long list of potential policy/ plan and programme activities

- Integrated Tourism Plan - "regional tourism Plan/ policy Funding
- Benefit sharing - Participatory Park Management
- Tourism Planning in the Mara:
- Sustainable development
- Management Best practice .

Short list of five priorities ranked in descending order of importance

- National plan/ policy .
- regional tourism plan/ policy
- A Benefit sharing plan
- Management best practice.
- Integrated Tourism Development plan.

Table 5: Tourism Draft Policy Matrix

PPP Activity and Proposed Action	**Integrated tourism policy (regional and national)**
	Review for policy comprehensiveness, consistency and complimentarily
	Lobby for new and improved policy
State of Knowledge 1= Poor, 5=Very Good	**2 Assumption the plans are not good- TZ the policy is good?**
Champion (Lead Agency) **List of Stakeholders**	**LVBC/EAC**
	KTB, TTB, Hoteliers, tour companies, TANAPA, KWS, Local govt authority
Expected Outcomes	**Ecosystem effectively protected providing good and services to communities- supporting sustainable development (locally nationally and regionally)**
Targets/Milestones/ Timescale	**Review of existing policies by June 2012**
	New national and regional policy by June 2013
Conditions needed to Secure Success	**Strong political will to allow policy reform**
	Strong leadership/ championship by LVBC
	Empowered civil society
Indicators of Change	**Empowerment of local communities-**
	Benefit sharing
	Increase in use of Best practices

PPP Activity and Proposed Action	**Implementation of the national policy**
	Integrated Tourism Development plan for the Mara Basin in place
State of Knowledge 1= Poor, 5=Very Good	**4**
Champion (Lead Agency) **List of Stakeholders**	**Local govt Authority/ counties, group ranches, conservancies**
Expected Outcomes	**Effective mgt of the basin leading to environmental social, and economic sustainability**
Targets/Milestones/ Timescale	**Integrated plan in place by Dec 2013**
Start implementation by 2014	
Conditions needed to Secure Success	**Community empowerment and participation**
	Good governance
Indicators of Change	**Degree of community involvement**

PPP Activity and Proposed Action	Develop a Benefit Sharing Plan- communities and nature must benefit-management empowerment, co-ownership, custodianship.
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	Local govt/counties, private sectors(conservatives), community based organisations
Expected Outcomes	Improved revenue to communities and resources available for biodiversity conservation
Targets/Milestones/ Timescale	Groups are empowered to negotiate
	X numbers of communities hare revenue sharing agreement /mechanism in place
	Benefit flowing according to agreement
Conditions needed to Secure Success	Private sectors are willing to pay for the true value of the goods and services they are benefit from
	Community empowered to demand governance within the authorities to manage resources
Indicators of Change	Improved community infrastructure
	Increase household income
	Level of tolerance towards wildlife damage

PPP Activity and Proposed Action	4 Promoting Best Practice
	Review of the hotel rating system
State of Knowledge 1= Poor, 5=Very Good	5
Champion (Lead Agency) List of Stakeholders	Private sectors, tour operators and communities
Expected Outcomes	Tourism industry sustainably managed(economically, socially and environmentally)
Targets/Milestones/ Timescale	Rating system that consider three pillars of sustainability
Conditions needed to Secure Success	Effective Enforcement of Law,
	Regularly monitoring of tourism infrastructure, self regulation of the tourism industry
Indicators of Change	More tourist lodges acquiring international sustainability certification.
	Increased empowerment of community to manage tourism enterprises

PPP Activity and Proposed Action	Integrated Tourism Development plan
	Mobilization of key stakeholders
State of Knowledge 1= Poor, 5=Very Good	5
Champion (Lead Agency) List of Stakeholders	KTB/ TTB, Private sectors, LGA's and Communities
Expected Outcomes	Appropriate tourism development within the carrying capacity of the MRB
Targets/Milestones/ Timescale	Guiding principles for approval of new development 2012
	Determination of the land carrying capacity of the MRB by 2013
Conditions needed to Secure Success	Strong participation of the key stakeholders in the preparation of plan.
	Sustainable financing of the implementation monitoring and evaluation of the plan
Indicators of Change	Degree of community involvement

MANAGING SOCIO-ECONOMIC DEVELOPMENT

Long list of potential policy/ plan and programme activities identified in Group discussion

- Mining policy need to be modified to increase household income
- Tourism policy should be reviewed
- Implementation of planning policies
- Implement public health and sanitation policies
- Implement policies and programmes on water resources
- Implementation of existing policies on education and environment
- Implementing infrastructure and planned settlement policies
- Harmonizing food security with the wildlife and tourism .

Short list of five priorities ranked in descending order of importance

- Develop mining policy/legislation in a way that provides share-holding/dividends for local communities, households/ individuals (apart from CSR)
- Review Tourism policy/legislation to emphasize; (1) adequate compensation of community land invested in wildlife (2) benefit sharing that targets household income. (3) Improved environmental health of communities
- Implement planning policies so as to improve the housing (including social amenities) and settlements in a manner that protects the environment of the basin
- Implement public health and sanitation policies and programmes to optimize socio-economic development while improving water quality/quantity in Mara River system
- Implement policies and programmes on water resources to optimize socio-economic development benefits while maintaining the ecosystem functioning and flow of the Mara River.

Table 6: Socio-Economic Development Draft Policy Matrix

PPP Activity and Proposed Action	**Develop mining policy/legislation in that provide shareholding/ dividends with local communities, households/ individuals (apart from CSR)**
State of Knowledge 1= Poor, 5=Very Good	**1**
Champion (Lead Agency)	**Community**
List of Stakeholders	**Executive Parliament**
Expected Outcomes	**Laws/policies/ criteria of shareholding/ dividends and benefit sharing are in place**
Targets/Milestones/ Timescale	**60% of the communities benefiting from the shared resources in 5 yrs**
Conditions needed to Secure Success	**Benefit sharing data/information.**
	Goodwill (cooperation) with the relevant ministries.
Indicators of Change	**Number of Communities benefiting from the shared resources**

PPP Activity and Proposed Action	Tourism policy/legislation should be reviewed to emphasize on; (1) adequate compensation of community land invested in wildlife (2) benefit sharing that target household income. (3) Improve environmental health of communities.
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	Community
	Executive
	Parliament
Expected Outcomes	Reviewed policy/legislation regarding compensation
Targets/Milestones/ Timescale	Reviewed policy/legislation to be in place in 4 yrs
Conditions needed to Secure Success	Goodwill (cooperation) with the relevant ministries and investors
Indicators of Change	Significance contribution of tourism/ wildlife revenue to household incomes

PPP Activity and Proposed Action	Implement planning policies so as to improve the housing (including social amenities) and settlements in a manner that protects the environment of the basin.
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	National Executive
	County/ Local government executive/ Regional executive
Expected Outcomes	Improved housing quality and settlement planning.
Targets/Milestones/ Timescale	Improvement of the housing and settlement plans by 50% in 5yrs
Conditions needed to Secure Success	Transparent processes
	Enforcement of planning protocols.
	Public awareness
Indicators of Change	Settlements built as planned.

PPP Activity and Proposed Action	Implement public health and sanitation policies and programmes to optimize socio-economic development while improving water quality/quantity in Mara River system.
State of Knowledge 1= Poor, 5=Very Good	4
Champion (Lead Agency) List of Stakeholders	National Executive
	County/ Local government executive/ Regional executive
Expected Outcomes	Improved sanitation, reduced contamination of the Mara River
Targets/Milestones/ Timescale	Sanitation coverage increase to 70% in 3 yrs.
	Distance to quality water source reduced to 500m.
	Contamination of Mara river reduced by 50% in 3 yrs.
Conditions needed to Secure Success	Law enforcement
	Service charter enforcement
Indicators of Change	Reduced incidences of water-borne diseases.
	Reduced levels of COD/BOD

PPP Activity and Proposed Action	**Implement policies and programmes on water resources to optimize Socio-economic development benefits while maintaining the ecosystem functioning and flow of the Mara River**
State of Knowledge 1= Poor, 5=Very Good	**4**
Champion (Lead Agency) **List of Stakeholders**	**National Executive**
	County/ Local government executive/ Regional executive
Expected Outcomes	**Assured access to quality water at reduced distances**
Targets/Milestones/ Timescale	**Water storage increased by 30% in 5 yrs.**
	Water and soil conserving technologies used by 30% of residents in 3 Yrs.
Conditions needed to Secure Success	**Investment on appropriate technologies**
	Willingness by residents to adopt appropriate technologies
Indicators of Change	**Improved per capita water storage**
	Reduced average distance to water point.
	Improved nutrition/food output

ANNEX 3: POLICY CONSISTENCY ANALYSIS

Table 1 : Comparison of Legislation and Policies relating to Land Use, Population, Environment, Forestry , Biodiversity and Wildlife, Socio-economic development (Livelihoods, Health, Education), Water, Energy, Planning, Economy Tourism and Agriculture.

DEVELOPMENT VISION	TANZANIA	KENYA
	1995 upto 2025	2008 upto 2030
POLICY	TANZANIA	KENYA
Agriculture policy	1997	
Education and training policy	1995	
Energy policy	1992	
Environment policy	1997	1999
Forest policy	1998	2005
Health	2003	
Human settlements development policy	2000	
Land policy	1997	2009
Mineral mining policy	1997	
Population policy	2006	2000
Resettlement policy	2008	
Tourism policy	1999	1999
Water policy	2002	1999
Wildlife	2007	
Statement on future wildlife management		1975
Biodiversity		
Economic		
Land use policy		
ACT	TANZANIA	KENYA
Agriculture act		1955
Education act		1968
The vocational education and training act	2006	
Energy act		2006
Rural energy act	2005	
Environment management act	2004	1999
Forest act	2002	2005
Hotels and restaurants act	2006	1986
Housing act		1953
Land act	1999	
Land acquisition act		1968
Land control act		1967
Land planning act		1968
Land use planning act	2007	1996
Mining act	2010	1940/86
Public health act	2009	1992
Tourism act	2008	
Tourist industry licensing act	1969	1968
Water resources management act	2009	2002
Wildlife conservation act	2009	1976

Table 2: Comparison of specific Legislation / Policies relating to individual topics

DEVELOPMENT VISION (Tanzania Development Vision 2025 / Kenya's Vision 2030)	Existence and Year of Publication	
	Tanzania	Kenya
Context of the Vision	•	•
Development Vision (High Quality Livelihood, Peace, Stability, Unity, Good Governance, Educated Society, Strong and Competitive Economy)	•	X
Foundations of the Vision (Macroeconomic Stability for Long-Term Development, Governance reforms, Equity and Wealth Creation Opportunities for the Poor, Infrastructure, Energy, Science, Technology and Innovation, Land Reform, Human Resources Development, Security, Public Service)	X	•
Past Visions and Impediments	•	
The Economic Vision and Strategy (Adding Value to our Products and Services)	X	•
The Social Strategy (Investing in the People)	X	•
The Political Pillar (Moving to the Future as one Nation)	X	•
Targets	•	X
Driving Forces for the Realisation of the Vision	•	X
Implementing the Vision	•	•

LAND (National Land Policy, Tanzania / Sessional Paper No. 3 of 2009 on National Land & Land Use Policy, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Land Tenure	•	•
All Land is Government Land	•	X
Land Categorised to Government, Trust and private Lands	X	•
Land Utilisation	•	X
Land Use Management	X	•
Protection of Sensitive Areas	•	•
Disposition	•	•
Revocation	•	•
Acquisition	•	•
Regulation of Property rights (Compulsory Acquisition, Development Control)	•	•
Land Values	•	X
Compensation	•	X
Land Administration	•	•
Access to Land	•	•
Settlement On alienated land	•	X
Village Titling	•	X
Surveys	•	•
Land Use Planning for Urban Development	•	•
Rangelands and Livestock keeping	•	•
Overlapping Land Use Areas	•	X
Large Scale Farms	•	X
Ecosystem Protection and Management	•	•
Areas of Population Pressure and Resettlement	•	X
Village Land Use Planning	•	X
Institutional Frameworks	•	•

FOREST CONSERVATION (National Forest Policy 1998, Tanzania / Sessional Paper No. 9 of 2005 on Forest Policy, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Sustainable Management of Forests and Trees	•	•
National Framework for Forest Policy Formulation	•	X
Ecosystem Conservation and Management	•	X
Forest Products and Industries	•	•
Legal and Institutional Arrangements	X	•
Institutions and Human Resources	•	X
Linkages with other Sectors	X	•
Roles and Responsibilities of Mani Stakeholders	•	X

POPULATION (National Population Policy 2006,Tanzania / Sessional Paper No. 1 of 2000 on National Population Policy for Sustainable Development, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Principles	•	•
Population and Development (Socio-economic setting, Demographic Situation, Population and Development Inter-relationships, Population and Gender)	•	•
Justification of the New Population Policy	•	•
Critical Population Issues and Strategie	X	•
Goals, Objectives, Issues and Targets	•	•
Institutional Framework	•	•
Resource Mobilisation	X	•
Summary of Priority Policy Actions	X	
Planning, Monitoring and Evaluation	•	X

WATER MANAGEMENT (National Water Policy 2002, Tanzania / Sessional Paper No. 1 of 1999 on National Policy on Water Resources Management and Development, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Principles	•	•
Water Resources Management	•	•
Water and Sewerage Development /Urban Water Supply and Sewerage	•	•
Rural Water Supply	•	X
Institutional Framework	X	•
Financing of the Water Sector	X	•

AGRICULTURE (Agricultural And Livestock Policy 1997, Tanzania)	Existence and Year of Publication	
	Tanzania	Kenya
SERVICES TO BE PROVIDED BY THE MINISTRY OF AGRICULTURE AND COOPERATIVES	•	X
A. Agricultural Extension Services	•	X
B. Agricultural Research	•	X
C. Training	•	X
D. Regulatory Services (Seeds, Plant Protection, Animal Health, Agricultural information and Marketing, Cooperative Development).	•	X
E. Technical services (Irrigation Development, Agricultural Mechanisation, Soil Conservation and Land Use Planning, Range Management, Policy Formulation and Management).	•	X
CROSS SECTORAL SERVICES	•	X
A. Land (Tenure, Access, Utilization, Village Titling, Urban Agriculture, Village land Use Planning, Agriculture Land Use, Rangelands and Livestock Keeping)	•	X
B. Industry	•	X
C. Infrastructure (Road and Railways)	•	X
D. Environmental Issues	•	X
E. Agriculture	•	X
F. Livestock	•	X
AGRICULTURAL PARASTATALS DIVESTITURE	•	X
FINANCING OF AGRICULTURAL AND LIVESTOCK SERVICES	•	X
Crop Sub-Sector Policies (Traditional Export, Coffee, Cotton, Cashewnuts, Tobacco, Tea, Sisal, Pyrethrum)	•	X
Non-Traditional Export Crops (Fruits, Vegetables and Flowers, Oilseeds, Pulses, Spices, Cocoa Beans, Dates, Kapok and Oil palm, Food Crops, Staple Food Crops, Drought Resistant Crops, Sugar)	•	X
LIVESTOCK SUB-SECTOR POLICIES	•	X
A. Importance of Livestock in the Economy (Livestock Development, Beef Industry, Dairy Industry, Small Ruminant Industry, Poultry, Piggery, Rabbits, Game).	•	X

ENVIRONMENT (The Environmental Management Act 2004, Tanzania / The Environmental Management and Co-ordination Act 1999, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
General Principles	•	•
Project Registration and Screening	•	X
Administration	X	•
Environmental Planning	X	•
Environmental Impact Assessment	•	•
Environmental Impact Statement	•	X
Review Process of Environmental Impact Statement	•	X
Access to Environmental Impact Statements and Information	•	X
Protection and Conservation of the Environment (Rivers, Lakes, Wetlands, Forests, Biological Diversity, Ozone Layer).	X	•
Environmental Audit and Monitoring	•	•
Environmental Quality Standards	X	•
Decision of the Minister	•	X
Environmental Restoration Orders, Environmental Conservation Orders and Environmental Easements	X	•
Inspection, Analysis and Records	X	•
Period of Validity	•	X
International Treaties, Conventions and Agreements	X	•
National Environment Tribunal	X	•
Environmental Offences	•	•

FOREST CONSERVATION (The Forest Act 2002, Tanzania / The Forest Act 2005, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
Objective of the Act/ Administration	•	•
Forest Management Plans	•	X
Private Forests	•	X
Forest Reserves (Village, Community)	•	X
Permits and Licences	•	X
Trade in Forest Produce	•	X
Conservation of Trees, Wild Plants and Wild Animals	•	X
Fires	•	X
Financial Provisions and Establishment of a Fund	•	X
Offences and Penalties/ Enforcement	•	•
Miscellaneous Provisions (Substituted service, Publication of notices, Rights of entry, Call for information, Facilitating and regulating research, Power to make regulations, Power to grant exemptions, Repeals amendments and savings) (Act to bind Government, Rules, Director to maintain register, International obligations, Cooperation regarding cross-border forests and forest produce, Environmental Impact Assessment)	•	•
Creation and Management of Forests	X	•
Community Participation	X	•
Transitional Provisions	X	•

LAND USE PLANNING (The Land Use Planning Act 2007, Tanzania / The Physical Planning Act 1996, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
Administration	•	•
Establishment and Composition of Physical Planning Liaison Committees	X	•
Physical Development Plans (Regional Physical Development Plans, Local Physical Development Plan)	X	•
Control of Development	X	•
Policy Framework	•	X
Financial Provisions	•	X
Machinery of Planning (Establishment of Land use planning authorities at National Regional, District and Village levels,Preparation and finalisation of plans)	•	X
Special Powers of Planning Authorities	•	X
Compliance, Enforcement and Co-Ordination	•	X
Offences and Penalties	•	X
Miscellaneous (Subdivision of Land, Disposal of Land, Extension of Lease, Access to Records, Secrecy, Preservation of Buildings of Special Architectural Value or Historic Interest, Regulations).	•	•

MINING (The Mining Act 2010, Tanzania / Mining Act, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
General Principles	•	X
Administration	•	X
Mineral Rights (Prospecting and Retention Licences, Special Mining and Mining Licences, Primary Licences, Processing, Smelting and Refining Licences, Supplementary provisions affecting mineral rights)	•	•
Exclusive Prospecting Licence	X	•
Licences for Dealing in Mineral or Minerals (Dealer and Broker licences)	•	X
General (Disposal of Minerals Obtained in Prospecting, Discovery to Be Reported, Payment of Compensation to Owners and Occupiers of Land, Revocation of Prospecting Right or Exclusive Prospecting Licence)	X	•
Leases	X	•
Mining	X	•
Royalties, Fees and other Charges	•	•
Inspection And Accidents	X	•
Restrictions, Reports and the Right of Entry	•	X
Disputes Settlement	•	•
Registration of Mineral Rights	•	X
Miscellaneous Provisions	•	X
Repeal and Savings Provisions	•	X

PUBLIC HEALTH (The Public Health Act 2009, Tanzania / The Public Health Act, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
Administration	•	X
Central Board of Health	X	•
Notification and Control of Infectious or Communicable and Non Communicable Diseases and Control of Mosquitoes	•	•
Inspection of Infected Premises and Examination of Persons Suspected to Be Suffering from Infectious Disease	X	•
Venereal Diseases	X	•
Anitation, Housing and Hygiene	•	•
Cemeteries	X	•
Food, Food Hygiene, Nutrition and Market Places	•	X
Protection of Foodstuffs	X	•
Public Water Supplies, Meat, Milk and other Articles of Food	X	•
Establishment of Leper Asylums	X	•
Vaccination	X	•
Application of Act as Regards Vessels	X	•
Institutions Generally (Lodging, Hotels and Guest Houses, Hair Dressing Salon and Barber Shops, Swimming pools and Massage Parlours, Schools and Training Institutions, Nursing homes) Contorl of irrigated land	•	•
Local Authorities to Maintain Cleanliness and Prevent Nuisances	X	•
Health Authorities to Prevent or Remedy Danger to Health from Unsuitable Dwellings	X	•
Miscellaneous Provisions	•	•

WATER (THE WATER RESOURCES MANAGEMENT ACT, 2009_TANZANIA) (THE WATER ACT, 2002_KENYA)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
Principles and Objectives of Water Resources Management	•	X
Ownership and Control of Water	•	X
Management of Water Resources	•	X
Water Resources Management Plans	•	•
Water Supply and Sewerage	X	•
Protection of Water Resources (Classification and Reserve, Restrictions during drought and Natural Disasters, Protected Zones, Groundwater Controlled Areas, Prevention of Pollution)	•	X
Water Abstraction and Use/ Water Used Charges	•	•
Surface Water	X	•
Groundwater	X	•
Water Quality Monitoring and Effluent Discharge	X	•
Water Users Association	•	•
Conservation of Riparian and Catchment Areas	X	•
Catchment Management Strategies	X	•
The Reserve	X	•
Provisions related to Water Resources Management Works	•	X
Dam Safety and Flood Management	•	X
Financial Provisions	•	•
Trans-Boundary Water	•	X
Protected Areas and Groundwater Conservation Areas	X	•
Offences, Penalties and Judicial Proceedings	•	X
Approval, Authorisation and Permits	X	•
General and Supplements	X	•
Appeals	•	X
Miscellaneous Provisions	•	•
Transitional Provisions	•	•

WILDLIFE CONSERVATION (The Wildlife Conservation Act No 05 Of 2009, Tanzania / The Wildlife Conservation & Management Act, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
Administration	X	•
The kenya Wildlife Service Fund	X	•
Officers	•	X
Control of Hunting	X	•
Hunting, Capturing and Photographing of Animals	•	X
Protected Areas and General Restrictions	•	X
Trophies and Live Animals	X	•
Registration of Certain Trophies	•	X
Dealing in Trophies	•	X
Government trophies	•	X
Enforcement	X	•
The Wildlife Fund	X	•
General Provisions as to Officers of the Service	X	•
Miscellaneous	•	•

HOTELS AND RESTAURANTS (The Hotels Act, Tanzania / The Hotels & Restaurants Act 2002, Kenya)	Existence and Year of Publication	
	Tanzania	Kenya
Preliminary Provisions	•	•
The Hotels and Restaurants Authority	X	•
Establishment of Hotels Boards	•	•
Licensing	X	•
Duties, Liabilities and Privileges of Hotel Keepers	X	•
Regulation of Prices	X	•
Catering Training and Tourism Development Levy	X	•
Hotels Levy	•	X


CHARACTER OF THE MA
LIVELIHOODS
Bee keepers in Trans-Mara
Charcoal bags on sale in Narok
Charcoal burning in the Mau Forest
Tourists gather to view wildebeest crossing
Fruit Vendors in Longisa
Boat being pushed at Mara Swamp
Maasai pastoralist
Artisan gold mining and processing at Buhemba
Animals crossing the River during a migra
Lake Victoria
Tarime
Musoma
Bunda
Serengeti
0°30'S
1°S
1°30'S
2°S
34°E
34°30'E
35°E

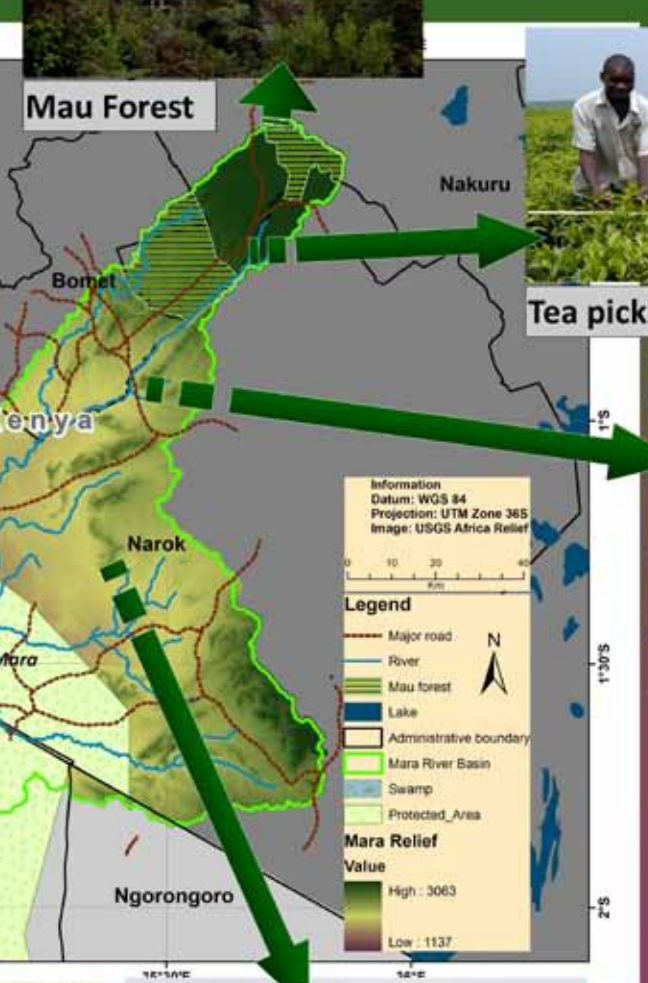
RA RIVER BASIN

Mau Forest

Donkeys loaded with Water from the Mara River Bridge

Tea picking at Olenguruone

Maize growing in Sigor Bomet



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An aeroplane spraying wheat grown in large scale in Narok

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