



MINISTRY OF STATE IN THE PRESIDENT'S OFFICE REGIONAL
ADMINISTRATION AND LOCAL GOVERNMENT

MARA WETLANDS INTEGRATED MANAGEMENT PLAN



USAID
FROM THE AMERICAN PEOPLE



UNESCO-IHE
Institute for Water Education



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF STATE IN THE PRESIDENT'S OFFICE REGIONAL
ADMINISTRATION AND LOCAL GOVERNMENT
MARA REGIONAL COMMISSIONER'S OFFICE



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2018 – 2022

In Partnership with



USAID
FROM THE AMERICAN PEOPLE



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FOREWORD

REGIONAL COMMISSIONER

The Mara River Basin is an important transboundary water resource supporting over One million people and important ecosystems including the Serengeti National Park, a world tourism destination and recently named one of the New Seven Wonders of the World. The Mara Wetlands plays an important role in communities' socio-economics and in sustaining ecosystem processes in the Lake Victoria Basin. With ecosystem services valued at over USD five million, the Mara Wetlands has the potential to support local livelihoods and increase income from agriculture, water, livestock, fisheries, tourism and non-timber forest products.

Currently, the Mara Wetlands faces several challenges, including the proliferation of plans to develop dams in the basin, planned intra-basin water transfers in the upper catchments, unsustainable land management coupled with climate change that will continue to present a major drawback for communities living within the Mara River Basin.

We are happy to have developed the Integrated Management Plan (IMP) for the Mara Wetlands, which is not a stand-alone document but one that provides a roadmap for all stakeholders, including communities, technical experts, nongovernmental organizations and governments on how we can work together to resolve some of the challenges

we are facing within the Mara River Basin. We are also happy to say that this Integrated Management Plan for the Mara Wetlands in Tanzania has been developed through a participatory process with the engagement of key stakeholders. It therefore reflects the true aspiration of the wetlands and its people. It is my sincere hope that the IMP will provide a framework for action that will stir conservation, development and economic gain from the Mara region.

I want to express my sincere thanks to United States Agency for International Development (USAID) through the Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development (PREPARED) project for funding development of this Plan. Special thanks and acknowledgement goes to BirdLife International and the Delft-IHE team for facilitating this extensive and participatory process and all key stakeholders who participated in the process. I therefore call for support and collaboration in the implementation of this IMP and welcome donors, development partners and private sector investors to provide this support.

Regional Commissioner

Mara, Tanzania

REGIONAL ADMINISTRATIVE SECRETARY

The Mara Wetlands Integrated Management Plan has been developed at the right time amidst the ongoing challenges of overstocking and overgrazing, deforestation, pollution, unsustainable land use changes, climate change and limited resources to support management and conservation of natural resources and to support community development in the Mara region.

Integrated water resource management should be recognized at the highest level of decision-making because of its importance to food security, ecosystem services, health, economic development and local livelihoods. Transboundary river basins undergo rapid changes, both physically and economically, therefore it is important to enhance cooperation and dialogue on their management. Moreover, formation of a basin-wide committee will also support collaboration and sustainable management of the Mara River Basin for the benefit of communities and nature.

The successful management of water resources in the Mara River Basin and Mara Wetlands requires good baseline understanding of its biodiversity, ecosystem services, hydrology and their dynamics based on current and future scenarios of change.

The IMP will support collective downstream and upstream action to address challenges, including water demand and allocation, sustainable water

resources management in the basin and livelihood development by building blocks and protocols for enabling local and transboundary collaboration.

The Regional Administrative Office of Mara is happy to have engaged in the development of the IMP. As its rudimentary custodian, we will be working together with the Butiama, Rorya and Tarime districts to support its implementation. We thank the United States Agency for International Development (USAID) through the Planning for Resilience in East Africa through Policy, Adaptation, Research and Economic Development (PREPARED) project, BirdLife International and Delft-IHE for enabling the process. I also acknowledge the role of the National Environment Management Council (NEMC) for chairing the Interagency Technical Committee (IATC) together with all district participants. Finally, I welcome all stakeholders, including government, development partners, national and international donor organizations and private sector in supporting implementation of the IMP as one way of contributing to sustainable management and conservation of water resources of the Mara Wetlands.

Regional Administrative Secretary
Mara Region

EXECUTIVE SUMMARY

The vision of the Mara Integrated Management Plan (IMP) is “A well conserved Mara River Wetland, managed sustainably for people and nature”. Achieving this vision requires maintaining and, where necessary, restoring ecological structure and function of the surrounding landscape. It also requires dialogue with local and upstream users to ensure provision of adequate water flow, as well as control of sediment, nutrient and other pollutants, into the Lower Mara River and the wetlands. The vision reflects the ethos of the plan as one with local ownership and involving stakeholders in planning and implementation. The vision reflects the consultative process used in preparing the plan. The IMP is envisioned to guide management of the Mara Wetlands for five years, with an initial preparatory phase.

This vision is in line with the Ramsar Convention (1971) and its vision for “wise use of wetlands”, and it supports the goals of wetland management and planning of the national **Wetland Steering Committee** representing eight ministries of the United Republic of Tanzania. The Mara IMP will promote wise use of the Mara Wetlands and its environs for improved and sustainable livelihoods. It will connect strongly and be compatible with the objectives of the Mara River Basin Transboundary Integrated Natural Resources Plan 2016-2026 agreed between the governments of Tanzania and Kenya.

A key principle of the IMP is recognition that the wetland **is a dynamic habitat**, whose extent varies within and among years. The IMP will work to maintain and, where possible, improve the ecological character of the wetland over natural climatic cycles. The overall character of the wetland is that of a papyrus swamp dominated by *Cyperus papyrus*, with a transitional ecotone between aquatic and terrestrial dryland habitat subject to seasonal flooding that provides important grazing land and seasonal vegetable gardens, as well as important habitat for native and migratory biodiversity.

In meeting the overall objectives of the IMP – to promote sustainable and coordinated management and development of the Lower Mara Basin and surrounding lands, enhance public awareness on “wise use” principles, and respond to future climate shocks – a strategy is needed for information gathering to support the IMP objectives. An **adaptive management** approach is required that includes monitoring through formal and informal (citizen science) approaches. Such information gathering needs to be relevant to the needs of the plan; feasible and sufficiently resourced; responsive to variability of climate and other circumstances; and able to be clearly interpreted and acted upon. During the implementation of the IMP, further information needs will be identified. These needs will form the basis of a research agenda to better inform both geo-physical and social-ecological understanding of the Lower Mara and its people to support sustainable management.

Key actions of the IMP will focus on **land use and wetland management; awareness raising, capacity building and governance; sustainable alternative livelihoods; water sanitation and hygiene; and research information and data needs**. As such, the IMP will require clear and reliant coordination of activities and stakeholders, accompanied by an agreed and relevant communication strategy.

Coordination of the implementation of the IMP shall be the responsibility of the Mara Regional Administrative Secretary (RAS). As the lead organisation, the RAS office will take ownership and develop effective and accountable mechanisms for inclusivity and communication with a large range of stakeholders. As provided in the Water Resources Management Act, No. 9, 2009, the IMP Secretariat and the RAS will work closely with the Lake Victoria Basin Water Board (LVBWB) in resolving conflicts arising from implementation of this plan and from different water users and agencies.

The cost of implementing this management plan is estimated at **TSh 13,417 million or USD 6,098,727**.

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LIST OF ACRONYMS AND ABBREVIATIONS

CBD	Convention on Biological Diversity	NGO	Non-Governmental Organisation
CBO	Community-Based Organisation	NLUPC	National Land Use Planning Commission
CEPA	Communication, Education and Public Awareness Programme	PES	Payment for Ecosystem Services
CIP	Conservation Investment Plan	PREPARED	Planning for Resilience in East Africa through Policy Adaptation, Research and Economic Development
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	RAS	Regional Administrative Secretary
CMS	Convention of Migratory Species	SDG	Sustainable Development Goals
DAS	District Administrative Secretary	TFS	Tanzania Forest Services Agency
EAC	East African Community	UNCCD	United Nations Convention to Combat Desertification
EALA	East African Legislative Assembly	UNEP	United Nations Environment Programme
GIS	Geographic Information System	UNESCO-IHE	Institute of Water Education of the United Nations Educational, Scientific and Cultural Organisation
IATC	Interagency Technical Committee	UNFCCC	United Nations Framework Convention on Climate Change
IMP	Integrated Management Plan	USAID	United States Agency for International Development
IWRM	Integrated Water Resources Management	USD	United States Dollar
LVBC	Lake Victoria Basin Commission	VIFAFIO	Victoria Fishing and Farming Organisation
LVBWB	Lake Victoria Basin Water Board	WASH	Water, Sanitation and Hygiene
MRB	Mara River Basin	WET-Health	Wetland Health
NBS	National Bureau of Statistics	WUA	Water Users Association
NELSAP	Nile Equatorial Lakes Subsidiary Action Plan	WWF	World Wildlife Fund
NEMA	National Environment Management Act	WWF-TCO	World Wildlife Fund, Tanzania Country Office
NEMC	National Environment Management Council		

SECTION ONE: INTRODUCTION



1.1 Background

The Mara Wetlands is an integral part of the Mara River, which originates in the Mau Forest in Kenya and flows down the gentler slopes of the Mau-Mara landscape, continuing into the savannah plains of the greater Mara-Serengeti ecosystem. The inhabitants of this ecosystem depend on the Mara River to support their agriculture and livestock. It is an important resource for pastoralists who rely on the river for water and food for their livestock, especially during the drier seasons of the year. It also supports a wide variety of biodiversity. The river exits the Mara-Serengeti protected area and joins a section of small-scale agricultural landscapes in Tanzania. It then flows into the Mara swamp, depended on mostly by livestock keepers, artisanal fishermen and agrarian communities on the lower section before emptying into Lake Victoria.

The Lower Mara Basin is one the largest remaining tracts of papyrus swamp in sub-Saharan Africa. It provides a range of ecosystem services and supports livelihoods both locally and wider afield. The state of the wetland depends on sufficient allocation of water from the inflow of the Mara River, and its structure and function is affected by water quality and sediment inflows from the Mara River and from the neighbouring floodplain and sub-basins surrounding the wetland.

Under Tanzanian law wetlands are classified as state property. Management and protection of wetlands fall under several environmental and land acts (described in Annex 3 of Irvine et al. 2017). In 2000 Tanzania became a signatory to the Ramsar Convention of 1971 for the protection of wetlands. Although the Mara Wetlands is not designated as a formal Ramsar site, its protection and management falls within the National Sustainable Wetlands Management Strategy under the National Wildlife Policy of 2007. The Mara River is transboundary in nature, and both Kenya and Tanzania are signatories to the Treaty for the Establishment of the East African Community (EAC) and protocols for the Sustainable Development of the Lake Victoria Basin, falling within the auspices of the Lake Victoria Basin

Commission (LVBC). At the regional level, the Nile Equatorial Lakes Subsidiary Programme (NELSAP), an investment programme of the Nile Basin Initiative, has a Mara River Basin Management Unit. The most prominent specific legislation (elaborated in Irvine et al. 2017) that affects management of the wetlands and surrounding lands are: the Water Resources Management Act (2009); Water Supply and Sanitation Act No. 12 of 2009; National Environmental Management Act (2004); Forest Act (2002); Lands Act (1999); Land Use Planning Act, No. 6 of 2007; Village Act (1999); and Wildlife Conservation Act (2009). A detailed analysis of the legal and policy framework is provided in section two of this management plan. The opportunities and constraints provided by this legislation provides an essential legal framework for the management of the Mara. The Mara River Transboundary Integrated Natural Resources Management Plan of 2016 (LVBC 2016) provides a framework for management actions that link the Upper with the Lower Mara. The myriad legislation and regional policies and initiatives provide a complex backdrop for the management of the wetlands and adjacent lands. This IMP for the Lower Mara is aligned with these policies and provides the necessary procedures and good practices for inclusion of all stakeholder groups, from national government(s) to representatives of livelihood groups throughout its implementation. The need for such a management plan has been driven by both the recognition that current local and regional land use have led to a deterioration of the ecological condition of the wider catchment and peripheral floodplain areas, with consequential negative effects on people and their environment. The current drivers of change in Mara and its catchment have partly resulted in a continued increase of pressure on ecosystem services provided by the Mara Wetlands. Development initiatives, while essential for improved social well-being, have potential negative as well as positive outcomes.

1.2 Description of Mara Wetlands

Biophysical Features

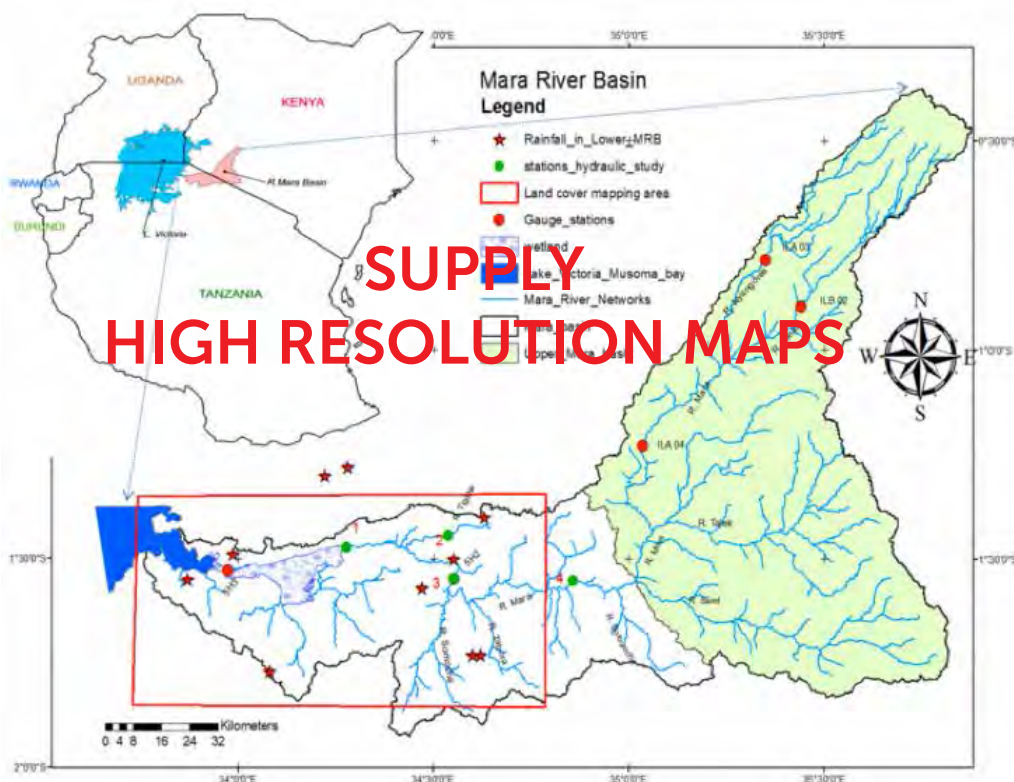
The Mara River Basin (MRB) is home to more than one million people (LVBC 2016), with annual population increases estimated at greater than 3 percent (Hoffman 2007). In the national census of 2012, 83 percent of the population of the Mara region were living in rural areas, with one of the highest percentages of female-headed households (37.9 percent) in Tanzania (NBS 2014). The population of the town of Musoma appears to have increased markedly since then, but apparent discrepancies among census data contained in various reports, suggest that a re-evaluation of census data is merited. Mostly, the rural populations of the Mara Wetlands floodplain and sub-basins live in households averaging about 5.6 persons (NBS 2012).

The Mara Wetlands is an extensive swamp dominated by papyrus (*Cyperus papyrus*), the extent of which fluctuates within and among years. A full description of the site, with maps and ecological character, can be found in the Mapping

and Inventory report (Irvine et al. 2017), which should be read in conjunction with this plan. The wetland is adjacent to Lake Victoria and at the lower end of the Mara River. The core of the wetland area is surrounded by a peripheral zone that is seasonally flooded and is within a wider sub-catchment of original dryland – mixed woodland. This dryland largely consists of agriculture, pasture and degraded land, with generally dispersed tree and shrub cover. The remaining woodland is more extensive on the northern than southern side of the wetland.

The Mara basin (*Figure 1*) is located between longitudes 33°47' E and 35°47' E and latitudes 0°38' S and 1°52' S and covers 13,750 square kilometres; 65 percent is in Kenya, and 35 percent in Tanzania (Mutie et al. 2006). The Mara Wetlands (also known as Kirumi, Masirori, and Masurura wetland) lies at the lower end of the MRB that rises at 2,932 metres in the Mau escarpment in Kenya, and flows about 395 kilometres, entering Lake Victoria near the town of Musoma, Tanzania, at an altitude of 1,134 metres.

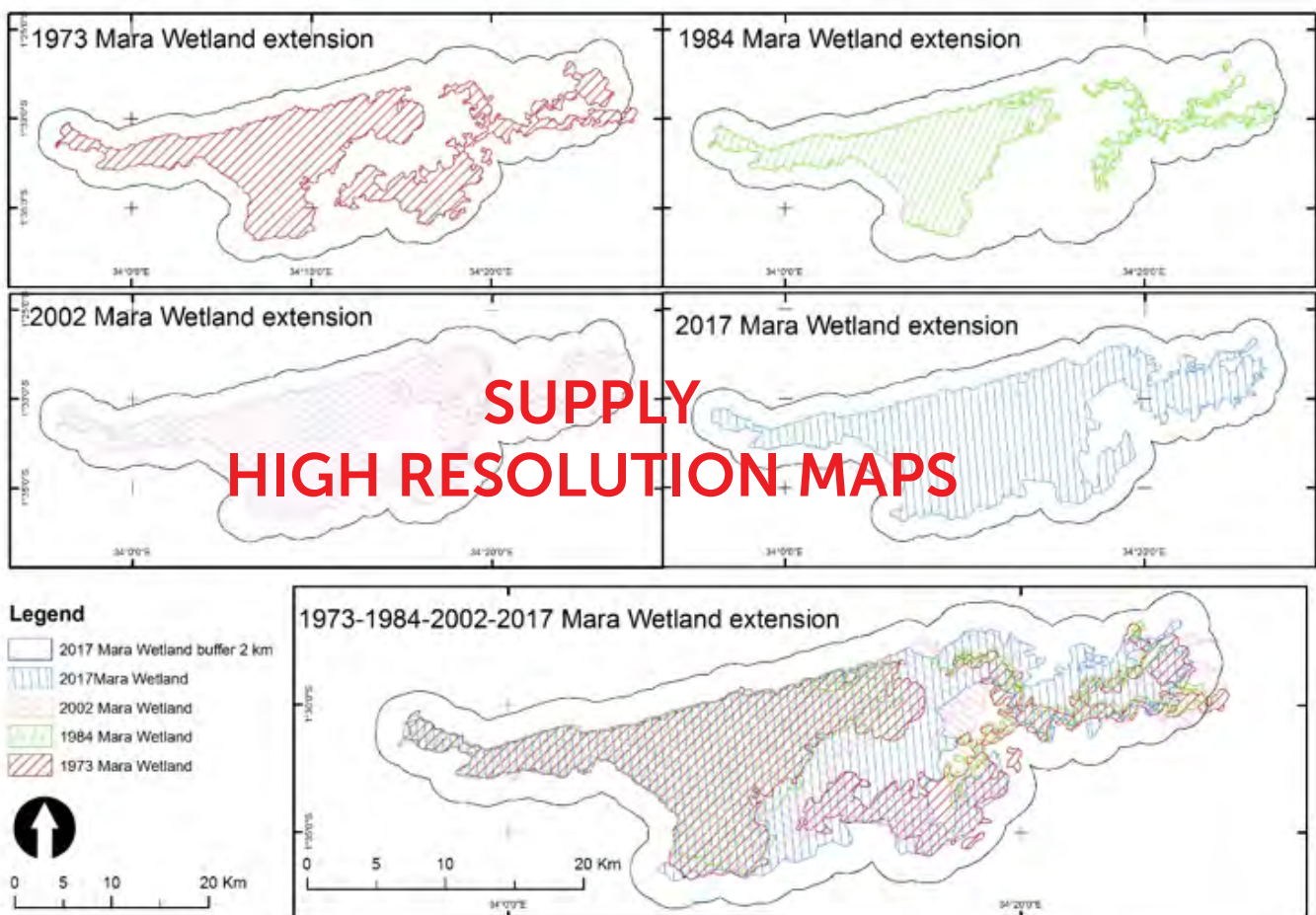
Figure 1: Extent and location of the Mara Wetlands (reproduced from Hurst, 2015)



The wetland is subject to both seasonal and longer-term fluctuations (Flohn 1987). Annual “long rains” throughout the catchment are typically mid-March to June with a peak in April, while “short rains” occur typically from September to December. Historical remote sensing images from 1973 to 2000 (Mati et al. 2005, Mutie et al. 2006,

Mturi 2007) show the expansion of the wetland, and reductions of shrub and grassland. From 1973 to 2000 the wetland had a conspicuous increase in size, more than a doubling of extent between 1986 and 2015 (LVBC 2016) and as depicted by the recent comparisons in 2017 (Figure 2).

Figure 2: Spatial distribution of the wetland at the mouth of the Mara River from 1973 to 2017



The maps produced from the field and desk work in late 2016 demarcated the drainage sub-basins of the Mara Wetlands (Figure 3) and confirmed current wetland extent bounded to the north by the Mara Fault escarpment, with steep slopes of 10 percent or more, that abuts into the wetland floodplain. The northern side has several short, steep and small streams draining directly from the escarpment into the wetland.

The wetland length was measured at about 55 kilometres from the mouth to Lake Victoria to the upper end of the wetland where it receives water

from the Mara River. The whole wetland area covers about 387 square kilometres, calculated using available images on Google Earth (May-July 2014). The boundary between the wetland and the fringe is visible nearly everywhere on the satellite images due to the presence of crops around the fringe. The wetland has a width of 8-13 kilometres in its widest portion, towards the eastern end and over about 35 kilometres, narrowing to 2-3 kilometres for approximately 9 kilometres upstream of the Kirumi Bridge. From the bridge to the exit into Lake Victoria it is 1-1.5 kilometres wide for about 4.5 kilometres.

The Mara Wetlands lies within four political jurisdictions: Butiama, Rorya, Serengeti and Tarime Districts; although Butiama covers only a small part of this overall area. While the central Mara regional administration unit for the wetland is in Musoma, local Rural District Councils are also responsible for management of water, agriculture, land and natural resources and community development, including primary and secondary education and public health (Health Protection, Primary Care and Hospitals). The river and northern shores of the wetlands form the boundary between Tarime and Musoma/ Serengeti Districts. The border between Serengeti and Musoma district is located between the villages of Wegero and Maji Moto. Altogether 20 villages surround the Mara swamp: in Butiama District Bukabwa, Buswahili, Kirumi, Kitasakwa, Kongoto, Kwisaro, Ryamisanga and Wegero; in Serengeti District, Majimoto, Merenga and Seresere; in Rorya District, Kwibuse, Marasibora and Nyanabakenye; and in Tarime District, Bisarwi, Kembwi, Nkerege, Nyamerambaro, Surubu and Weigita.

Although the focus of the Mara Wetlands is on the wetland, it is inextricably linked with the wider Mara catchment and the activities that occur there. There is also a need to look the wider international context of the rapid and ongoing disappearance and degradation of wetlands globally, and increasingly in Africa (Verhoeven and Setter 2010,

Davidson 2014, van Dam et al. 2014). While this loss is often driven by attempts to improve energy or food security (Falkenmark et al. 2007, van Asselen et al. 2013), the anticipated benefits arising from such conversions may not compensate for loss of ecosystem services offered by wetlands (Rossi et al. 2013), but it does drive the reduction of species (MacClean et al. 2014). Ecosystem services provided by the wetland are described in Irvine et al. (2007). Management of the wetland needs to identify goods and services within and among three zones: the inner core, a seasonally inundated peripheral, and the outer drylands. Accounting for longer and shorter wetland “permanence” of the zone surrounding the core area of the wetland is of importance for management actions, as is the connection with the outer dry zone as well as the larger upstream catchment of the transboundary Mara River. While this IMP does not consider the catchment upstream of the wetland, which is covered by a plan developed for the whole basin (LVBC 2016), implementation of detailed actions will require the attention, and hence involvement of, local and regional administration (RAS). It will also require awareness of the wider setting and relevant policies, and specifically attention to relevant issues within each sub-catchment of the Lower Mara (*Figure 4*).

Figure 3: The Mara Wetlands and catchment area (bounded in red) and administrative units

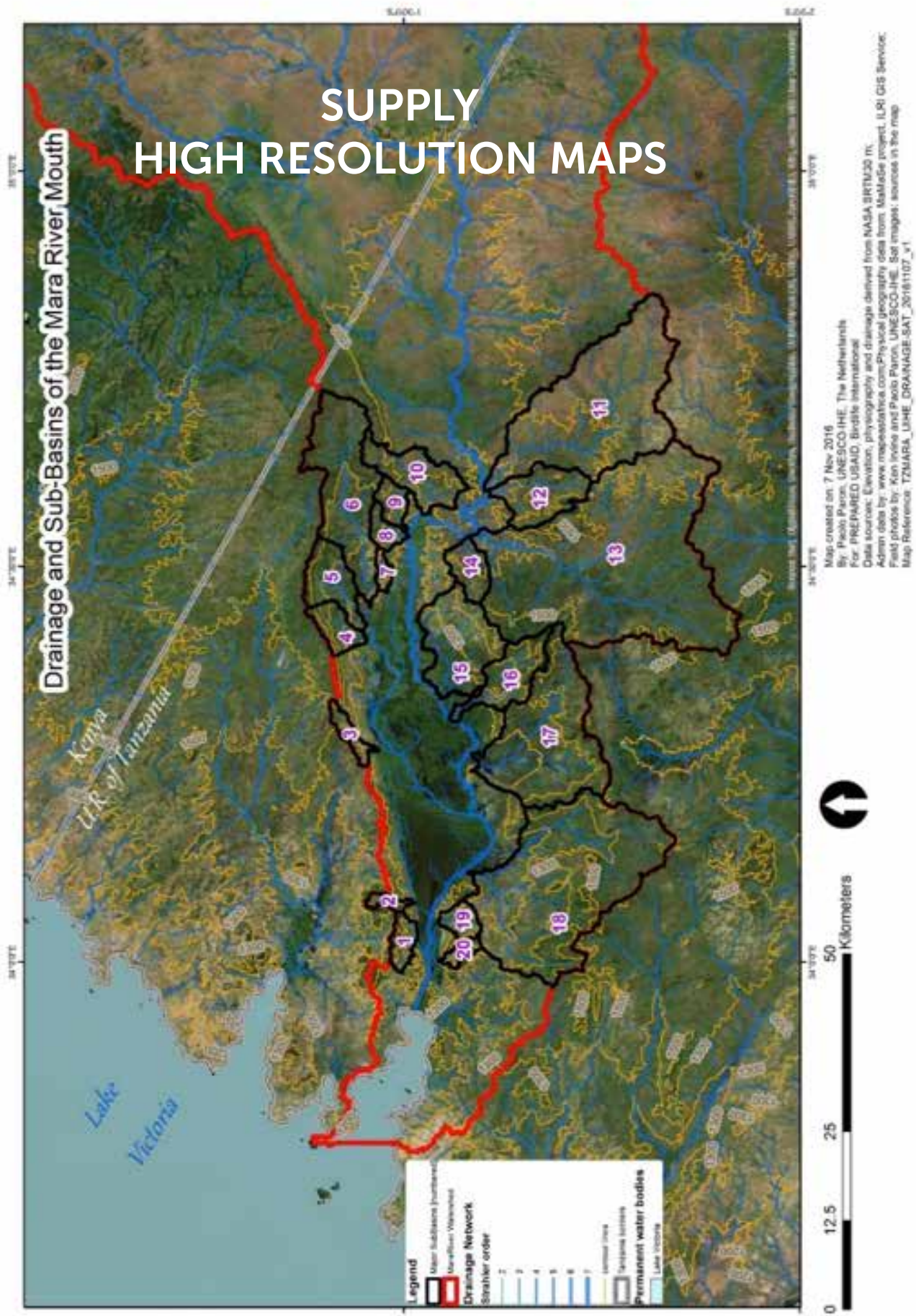
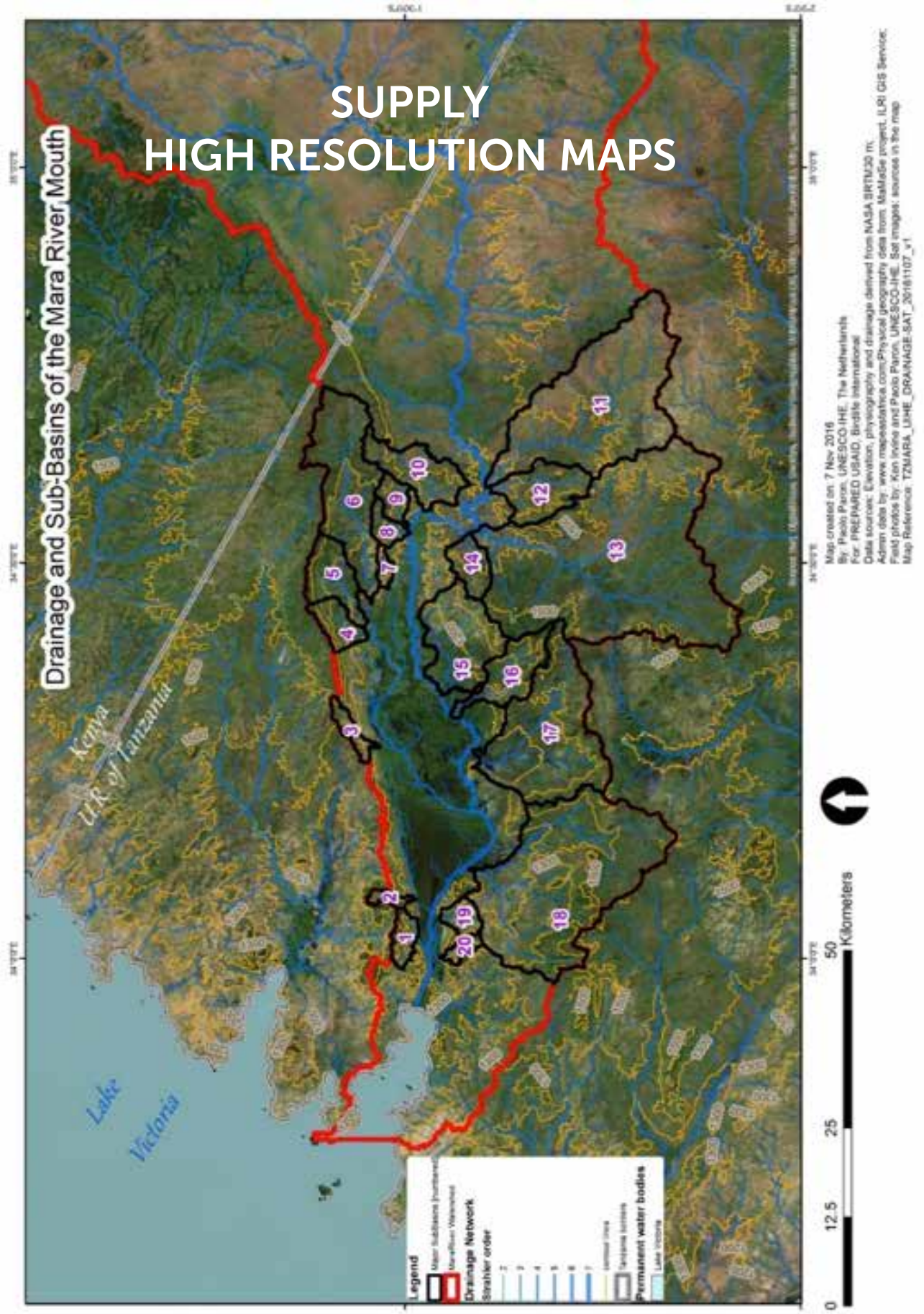


Figure 4: Drainage area feeding the Mara Wetlands and mouth of the Mara River



Ecosystem Services, Biodiversity and their Values

Ecosystem Services

Ecosystem services is defined by the 2006 Millennium Ecosystem Assessment as the benefits that people obtain from ecosystems. The Ramsar convention has always stressed that the value of wetlands should be recognised and communicated in order to enhance their sustainable management.

The Mara Wetlands provides an array of ecosystem services that include provisioning services, regulating services, supporting services and cultural services (USAID 2016). More specifically the wetlands support subsistence agriculture, fisheries, construction material, non-timber products (charcoal and firewood), livestock pasture and water. The wetlands support other ecological functions, such as water purification and habitat for a wide array of wetland animals and plants. Wetlands are internationally known to sequester carbon and the Mara Wetlands covers an area of about 387 square kilometres, providing this vital service. The Rapid Economic Value of the Mara Wetlands has been estimated to be TSh 6,341 million (USD 5 million) per year (USAID 2016), with crop agriculture contributing the most, followed by water for commercial use, livestock and fisheries, tourism and non-timber forest products.

The total land under cultivation in the Mara Wetlands is 10,340 hectares. Among the crops grown are maize, cassava, millet, sorghum and horticultural crops for subsistence, with the surplus being sold at nearby markets. More than 50 percent of the households keep livestock for milk, meat and ceremonies. The livestock population in the wetlands is estimated at more 2 million head, mainly local breeds, which have low production yields. Crop production in the Mara Wetlands has been estimated to be USD 1.39 million per year.

The forest cover is low, with most of the trees and shrubs constantly exploited for charcoal production, which leads to land degradation. Several efforts have been made by different governmental and non-governmental organisations, among them the Tanzania Forest Service (TFS), World Wild Fund for Nature (WWF) Tanzania and Vi Agroforestry, to establish tree cover and support the planting of woodlots in the area. Ninety percent of the population depends on firewood and charcoal as a

source of energy for cooking. Most of the firewood and charcoal production is from open woodlands managed by communities or from government forests or open areas under community management. The value of wood-based non-timber products in the Mara is estimated at USD 556,518.

Despite the availability of the river and the wetland, more than half the population of the wetland has no access to adequate and clean drinking water. The wetland is an important source of water for the local community with most of the population depending on wells and boreholes but part of the population drawing water directly from the wetland. The total value for domestic water is estimated at USD 555,421 per year. The wetland is also an important source of water for irrigated agriculture and watering livestock. The total value for water in the Mara was estimated at USD 671,259 based on willingness-to-pay. The total value of fodder for livestock in the Mara Wetlands was estimated at USD 395,397 per year.

Papyrus is one of the important ecosystem services the wetlands provide for people. It is harvested mainly for producing mats, which are mostly sold by women for income. The annual estimates of papyrus in the wetland was estimated at USD 23,008. Honey production also occurs within the wetland, although the industry is not well developed and is mostly carried out in a rudimentary way using traditional hives. Honey production was estimated to be TSh 14.17 million (USD 11,140 million) per year.

Most of the capture fisheries in the Mara Wetlands is artisanal and ends up being sold locally or in Musoma town. The value of capture fisheries in the Mara is estimated at USD 414,393 per year.

The wetland has important ecological and hydrological roles such as providing suitable breeding habitat for fish, increasing soil fertility, and sediment trapping. The wetland also acts as a sink for waste and residue (*Figure 5*) and is important for groundwater recharge but it also plays a significant role in carbon sequestration. The estimated value carbon sequestration for the Mara Wetlands is USD 835,989 per year (USAID 2016).

Figure 5: High sediment loads in the Mara River before entering the wetland (left) and clear water released into Lake Victoria (right) (September 2016)



The Mara Wetlands is a destination for recreation and is important for tourism, game hunting, biodiversity and conservation. The wetland has beautiful scenery, landscapes, species and sites that are of spiritual significance. The wetland also

supports research and education and has done so over many decades. The total value of cultural services in the Mara is estimated at TSh 25.04 million (USD 19,688 million) per year (USAID 2016). The value of all services is summarised in Table 1.

Table 1: Estimated gross returns from the Mara Wetlands in 2015 (USAID 2016)

Type of Service	TShs (millions) per year	USD (million) per year
Crop production	1,771	1.39
Water for livestock	854	0.67
Water supply for domestic use	706	0.56
Capture fishery	527	0.41
Wood based and non-timber products	708	0.57
Grass for fodder	503	0.40
Honey production	14	0.01
Other wetland products	170	0.13
Cultural tourism	25	0.02
Carbon sequestration	1,063	0.84
Grand total	6,341	5.00

Biodiversity

Munishi (2007) has described the biodiversity of the Mara Wetlands. The dominant vegetation is *Cyperus papyrus*. About 14 types of fish species are known to exist in the swamp, though at different levels of abundance. Three fish species that are also of great socioeconomic significance to the local communities are catfish (*Clarias sp.*, Kambale), African lungfish (*Protopterus*, Kamongo), and Nile

tilapia *Oreochromis nilotica* (local name, Nimgu). Others include *Schilbe mysteus* (Nembe), Nile perch (*Lates nilotica*, Sangara), *Cynodontis afrofishery* (Gogogo), elephant fishes (*Momyridae*; Domodomo, Perege), *Rastrineobola argentea* (a silver cyprinid species known by its local names as dagaa in Tanzania, omena in Kenya and mukene in Uganda), *Clarius aluwardi* (Vigugu), Furu and Kuyu.

About 30 species of terrestrial and semi-aquatic mammals have been reported in the swamp at different times, among them are hippo (*Hippopotamus amphibious*), sitatunga (*Tragelaphus spekii*), olive baboon (*Papio anubis*) and vervet monkey (*Cercopithecus aethiops*). Several others were reported by locals to inhabit the swamp, these include bushbuck (*Tragelaphus scriptus*), wild pig (*Potamochoerus lavatus*), warthog (*Pharcochaerus aethopicus*), spotted hyena (*Crocuta crocuta*), spotted-neck otter (*Lutra mauilcollis*), reedbuck (*Redunca redunca*), waterbuck (*Kobus ellipsiprymus*) and topi (*Damaliscus lunatus*). Nile crocodile (*Crocodilus niloticus*) is also found there. Some of these visit the wetland seasonally to search for food, water, or shelter, especially during the dry season.

Different types of insects reside in or around the wetlands (Munishi 2007). Common insects include senene, luba scorpions (*Scorpionoidea spp.*), grasshoppers (*Caelifera spp.*), mosquitoes (*Culicidae spp.*), tsetse flies (*Glossina spp.*) and butterflies (*Rhopalocera spp.*). These species occur in different seasons.

A total of 226 bird species has been recorded in the Mara Wetlands through surveys conducted by BirdLife in 2016 and 2017. The sighted species are from 58 families, 18 of them water birds. The list includes vulnerable (VU) species i.e. shoebill, woolly-necked stork, martial eagle and papyrus yellow warbler. Among the endangered (EN) species are the grey-crowned crane and grey parrot. Near threatened (NT) species include Fischer's lovebird and bateleur. The bird list also has critically endangered (CR) species of white-backed vulture. This biodiversity is a significant reason the swamp has high regional, national, and global significance.

More than 20 families of plants have been recorded in the wetland (Muraza, Mayo and Norbert 2013). The wetland is dominated by Typha (*Typha domingensis*), Papyrus (*Cyperus papyrus*) and Phragmites australis, which are mostly found in monotype form. Other monotype plant species found within the wetlands include *Azolla spp.*, *Acacia brevispica*, *Psidium guajava* and *Ocimum spp.* Together these account for more than

50 percent of the plant species recorded in the wetlands.

Threats to and Pressure on Ecosystem Services and Biodiversity in the Mara Wetlands

Among the main challenges to biodiversity and ecosystem services in Mara Wetlands are the following:

1. Development of the MRB: The basin has been targeted for the development of four dams. A report produced by the Alliance of Leading Environmental Researchers and Thinkers says that the proposed dams in Kenya include a 10-metre high Norera Dam, mainly for irrigation and a 65 metre high Amala Dam, deep in the Mau Forest, mainly for hydropower. One or two dams (30 to 70 metres high each) on the Nyangores River, a key Mara tributary, mainly for irrigation. Tanzania has also proposed the Borenga Dam, though it would occur further downstream on the Mara, past the Serengeti. Within these plans is also an interbasin water transfer that is proposed from the Amala River to the Ewaso Ngiro South River.

2. Agricultural expansion: Both smallholder farmers and industrial scale agriculture is posing a threat to the sustainable management of the MRB. Most of the development projects are oriented towards supporting irrigation projects in the upper and lower sections of the basin. Land use and land cover change, mainly due to agricultural expansion, is also leading to increased soil erosion and sedimentation within the catchments. The expansion of the Mara Wetlands over the years has been attributed partially to the increasing sediment deposits in the river channel resulting in a growing flood area.

3. Poor coordination and management of wetland: The Mara Wetlands lies within the MRB which extends from the Mau Forest in Kenya to Lake Victoria, traversing a complex landscape of different land uses and governed by different legislation in Kenya and Tanzania. The Mara Wetlands is under the jurisdiction of national, regional and village governments. The LVBWB plays an important role by supporting and building the

capacity of water user associations, which are local conservation groups. There is poor coordination and support of roles first across the different tiers of actors – government, NGOs and LVBWB. Further, the Mara Wetlands lies within the larger MRB and its survival depends on sustainable management of the basin. Currently, the transboundary management dialogue that will enable integrated management of the basin is inadequate.

4. Fire: Wetlands are inherently dynamic ecosystems, with high productivity. This provides a high degree of ecological resilience, so that regrowth of aquatic plants can replenish areas harvested for reeds and colonise newly inundated areas so that these rapidly attain a wetland character. The rapid regrowth and the density of the papyrus swamp also promotes practices of burning of papyrus to clear access for fishing, or to promote other activities such as entrapment of game. While fires can be widespread, and are frequently visible, it is not clear what impact this has on the ecological character of the wetland, although it is clearly an identified pressure on the ecosystem health of the wetland.

5. Pollution: Fundamental changes to hydrology and increased pollution loading can lead to long-term degradation of wetlands. Therefore, changes in the patchwork of habitats and successive expansion and contraction of the swamp and adjoining ecotones are less important than long-term linear effects and changes in ecological community structures during ecological character assessment of wetlands. At the same time, natural colonisation of shallow wetlands with shrubs followed by trees is not so much a sign of degradation (or improvement) as a manifestation

of ecological succession and patch dynamics. Interpretation of habitat and species changes requires an appreciation that wetlands are not static, but understanding how identified pressures can lead to clearly defined or longer-term impact in the design of monitoring programmes and management objectives.

6. Climate change: Increased and intense rainfall and evapotranspiration represents the greatest concern for the Mara Wetlands. This will result in more frequent floods and siltation (Mango et al. 2011) with far-reaching economic, social and health impacts at the local level and planning and budgeting impacts at the national level (Government of Kenya and UNEP 2012). The wetland is already experiencing increased pressure from human populations, settlements and activities along the Mara River, such as overgrazing, unsustainable agriculture, overfishing, increased demand on water resources, deforestation and overharvesting of wetland products as presented in this chapter. Climate change will aggravate these pressures through the impacts of increased periodic flooding, soil erosion, silt accumulation, sedimentation and eutrophication, with far-reaching effects that threaten the continued existence of the wetland (Tshering 2011). In addition, increased flooding and runoff will affect infrastructure, buildings and institutional facilities. Increased temperatures and runoff will also encourage breeding of disease vectors, spread of waterborne diseases and favourable conditions for contracting pulmonary illnesses such as asthma. Table 2 summarises the impacts of climate change in different sectors of the Mara Wetlands.

Table 2: Analysis of the impacts of climate change in different sectors

Sector	Impact	Causes or factors contributing to the impact
Agriculture	Loss of soil fertility; crop failure	Increased spatial and temporal rainfall variability, increased runoff, increased soil erosion
Water	Water scarcity	Increased variability of rainfall, unreliable rainfall quantity, changes in temporal and spatial distribution of rainfall, Increased evapotranspiration from increased temperature
Environment and natural resources	Loss of ecosystem services and biodiversity	Rainfall variability, increased mean temperature, population growth, overharvesting of resources, environmental degradation and destruction, loss of habitats
Health	Increased disease incidences	Increased flooding incidence, shortage of fresh potable water
Road and infrastructure	Destruction of roads and infrastructure	Increased flooding incidence, violent storms and extreme weather events

Assessment of the impacts of pressures on wetlands and the ecosystem services they provide is complicated by several factors, not least the need to use and where necessary develop reliable indicators and metrics (Beuel et al. 2016, Maltby and Acreman 2011). A complementary approach is to develop protocols for assessing the ecosystem services that the wetland provides (Figure 6). Linking such a framework to the proximate and underlying causes of existing pressures for the Mara Wetlands (Figure 7) provides a basis for management. Underlying causes for the Mara Wetlands are the market, policy, institutional and other structural economic conditions that cause, encourage or force people to produce and consume in ways that affect the status of the wetland. Proximate causes of pressure in the area include overfishing, overgrazing and deforestation (mainly for charcoal production), which can be

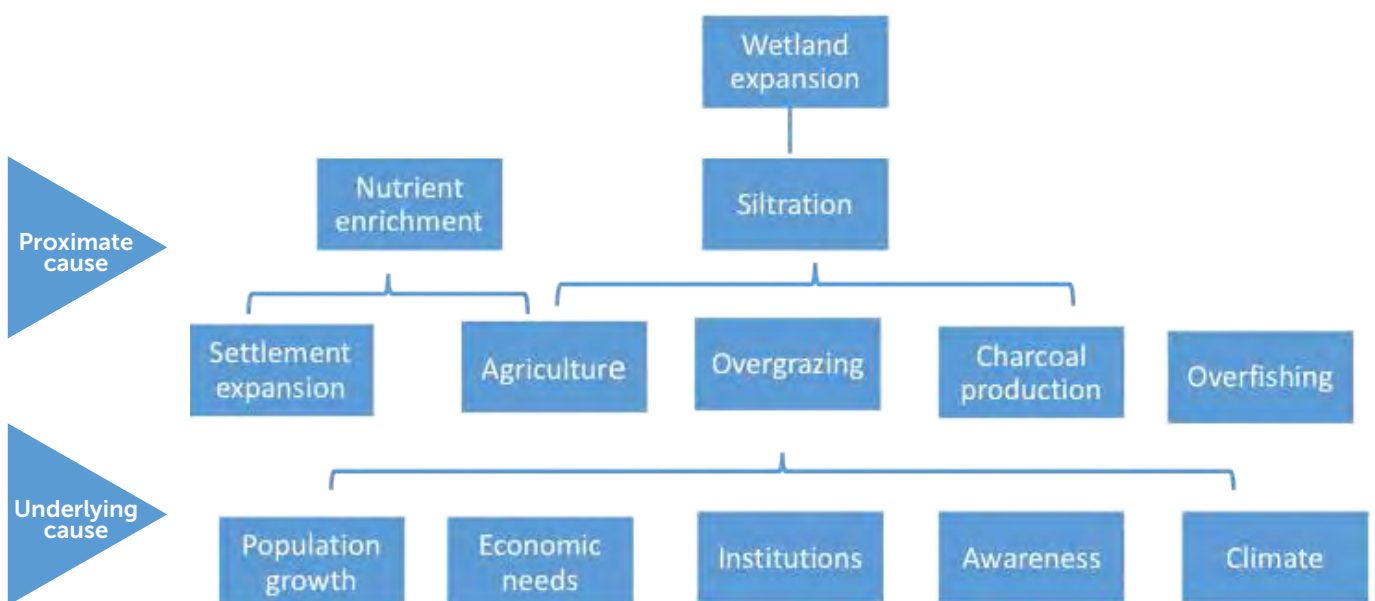
explained by the wider socioeconomic needs and population growth.

Details and discussion of key pressures and threats are contained in Irvine et al. (2017). In the Mara catchment, large-scale deforestation, conversion of grasslands into agricultural lands, and reduction of riparian zones over the past 50 years have contributed to increased sediment and nutrient loads to the Mara River (Mati et al. 2008, Masese 2015). In the upper catchment, there has been a large increase in tea plantations. Elsewhere there has been a steady increase in crop lands, commensurate with a decline in savannah. Irrigation for the larger farms in the upper catchment can affect water flows, and plans for new irrigated command areas throughout the river as well as adjacent to the wetland are highly relevant for management planning.

Figure 6: Ecosystem service status and degradation (reproduced from Maron et al. 2017)

Category	Defination	Threshold
Functionally extinct	Service no longer supplied in the region and is practically unrecoverable	Lost
Dormant	Service no longer supplied in the region but is potentially recoverable	
Critically endangered	Current levels of demand exceed supply: ratio of supply to demand declining or expected to decline	Undersupplied
Endangered	Current levels of demand exceed supply: ratio of supply to demand is stable but supply is declining	
Stable but undersupplied	Current levels of demand exceed supply: neither supply nor ratio of supply to demand declining	
Vulnerable	Ratio of supply to demand is declining or expected to decline such that supply is likely to be insufficient to meet demand within a set time horizon	At risk
Least concern	Supply currently meets or exceeds demand and does not meet the criteria for vulnerable	Secure
Data deficient	Inadequate information is available about either or both of supply and demand to assess the level of threat	

Figure 7: Connecting underlying and proximate causes of current ecosystem pressures and impacts in the Mara Wetlands (adapted from Van Asselen 2013)



SECTION TWO: POLICY, LEGAL AND INSTITUTIONAL FRAMEWORKS



2.1 Legal and Policy Frameworks

A myriad of legislation and regional policies provide a legal and operational framework for the management of the Mara Wetlands and adjacent lands. The IMP therefore needs to align with those policies and with the necessary procedures and good practices for inclusion of all

stakeholder groups, from national government(s) to representatives of particular livelihood groups. The most important international instruments, regional and national policy and legal provisions relevant to management of the Mara Wetlands are presented in Table 3, 4 and 5.

Table 3: International instruments related to management and conservation of the Mara Wetlands and relevant to this management plan

No.	Policy	Notes/remarks
International Treaties and Conventions		
1	The Sustainable Development Goals (SDGs), 2016-2030	Goal 13 of the SDGs aims to combat climate change, while goal 15 aims to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt or reverse land degradation and stop biodiversity loss. These two goals have stringent targets for significantly reducing soil, water, land, wetland and forest degradation by 2020 and are therefore relevant to this management plan.
2	The Ramsar Convention, 1971	Tanzania is one of the signatories of the Convention. Although the Mara Wetlands is not a designated Ramsar site, it meets the criteria. The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".
3	The Convention on Biological Diversity (CBD), 1992	The CBD is the legally binding agreement on the use and conservation of biological diversity. Wetlands such as the Mara Wetlands is a concern of the Convention, as is evident from the definition of biological diversity and ecosystems in Article 2 of the Convention. Biological diversity is defined as "the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems". The Convention obligates states to develop national strategies, plans or programmes for conservation and sustainable use of biological diversity, and to integrate the conservation and sustainable use of biological diversity into sectoral or cross-sectoral plans, programmes and policies.
4	The Convention on the Conservation of Migratory Species (CMS) of Wild Animals, 1979	The Mara Wetlands is home for migratory bird species. The CMS Convention is an environmental treaty under the aegis of the United Nations Environment Programme. CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats.
5	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	CITES is an international treaty to prevent species from becoming endangered or extinct due to international trade. Under this treaty, countries work together to regulate the international trade of animal and plant species and ensure that this trade is not detrimental to the survival of wild populations. Any trade in protected plant and animal species should be sustainable, based on sound biological understanding and principles.

6	United Nations Convention to Combat Desertification (UNCCD), 1994	UNCCD is a convention to combat desertification and mitigate the effects of drought through national action programmes that incorporate long-term strategies supported by international cooperation and partnership arrangements. Sustainable management of the Mara Wetlands will mitigate the effects of drought that may be brought about by degradation of the resource.
7	United Nations Framework Convention on Climate Change (UNFCCC), 1992	The UNFCCC objective is to “stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. The Framework outlines how specific international treaties (called “protocols” or “Agreements”) may be negotiated to set binding limits on greenhouse gases. Wetlands like the Mara play a significant role in micro-climate enhancements.
8	Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997	The Kyoto Protocol is an international treaty that extends the UNFCCC and commits parties to the Convention to reduce greenhouse gas emissions, based on the premise that (a) global warming exists and (b) human-made CO ² emissions have caused it.

Table 4: Regional and national policies and plans related to management and conservation of the Mara Wetlands and relevant to this management plan

No.	Policy	Notes/remarks
Regional Policies and Plans		
1	The East African Community (EAC) Treaty, 1999	The regional context for wetlands conservation and management is defined by the EAC, the regional integration framework that groups Tanzania together with Burundi, Kenya, Rwanda, South Sudan and Uganda. Article 5 of the EAC Treaty links the achievement of economic development to “the promotion of sustainable utilisation of the natural resources of the Partner States and the taking of measures that would effectively protect the natural environment of the Partner States”. Furthermore, Chapter 19 of the treaty provides for cooperation in environment and natural resource management to realise objectives that include ensuring “sustainable utilisation of natural resources like lakes, wetlands, forests and other aquatic and terrestrial ecosystems”.
2	EAC Protocol for Sustainable Development of the Lake Victoria Basin, 2003	The EAC partners have signed the protocol for sustainable development of Lake Victoria Basin. The protocol allows the Partner States to cooperate in conservation and sustainable utilisation of resources of the basin, including equity and reasonable utilisation of water resources and development and management of wetlands.
3	EAC Protocol on Environment and Natural Resource Management, 1999	The EAC has developed a protocol on environment and natural resource management to further strengthen cooperation. Although this protocol is not yet binding, Article 14 deals with sustainable management and wise use of wetland resources, and commits the Partner States to develop, harmonise and adopt common policies, laws and strategies for the purpose.

4	The MRB Transboundary Integrated Natural Resource Management Plan, 2016-2026	The transboundary integrated natural resources management plan is intended to provide a framework within which both strategic and operational decisions should be taken by the MRB stakeholders within the period 2016-2026 focusing on these threats and challenges. The plan therefore sets out the vision, mission, strategic objectives and monitoring plan that will help guide MRB stakeholders in their work over the next 10 years.
National Policies, Strategies and Plans		
1	Tanzania Development Vision 2025	The overall aim of the National Vision 2025 is to transfer Tanzania from a least developing to a middle-income country. This transfer is envisioned to turn the Tanzanian economy into a strong, competitive industrial economy that will provide improved socioeconomic opportunities, public sector performance and environmental management. This vision is based on the principle of sustainable development, which is also proposed by this management plan.
2	Wildlife Policy, 1998	The main objectives of the policy are to conserve areas with great biological diversity, to promote involvement of local communities' participation in wildlife conservation, to increase foreign exchange earnings, to integrate wildlife conservation with rural development etc. The Mara Wetlands are endowed with wildlife resources that can be used in ecotourism and community-based ecotourism and provide the government and local communities with foreign income.
3	Forest Policy, 1998	The overall goal of the forest policy is to enhance the contribution of the forest sector to the sustainable development of Tanzania and the conservation and management of its natural resources for the benefit of present and future generations. The main policy areas are forest land management, forest-based industries and products, and ecosystem conservation and management.
4	National Environmental Policy, 1997	The overall objectives of the policy are to ensure sustainability, security and the equitable use of resources and to raise public awareness and understanding of the essential linkages between environment and development. The policy also provides for cross-sectoral and sectoral policy guidelines, instruments for environmental policy and the institutional arrangements for environmental management.
5	Tourism Policy, 1999	The objective of this policy is to assist in efforts to promote the economy, peoples' livelihoods and poverty alleviation by encouraging the development of a sustainable and quality tourism industry that is environmentally sustainable, ecologically sound and economically viable. The availability of diverse bird species in the Mara Wetland attracts tourist and can bring local communities and the government foreign income.
6	Agriculture and Livestock Policy, 1997	The main objectives of the policy are to improve standards in the rural areas and earning of foreign currency through increased income generation from agricultural and livestock production, processing, marketing and exportation. It also emphasises promotion of integrated and sustainable use and management of natural resources. Local communities in the Mara Wetlands have recommended the introduction of livestock harvesting and milk processing industries for diversification of their income.

7	Land Policy, 1995	The overall objective of this policy is to promote and ensure a secure land tenure system, to encourage optimal use of land resources and to facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment. Mara Wetlands stakeholders have proposed support for the development of land use plans to resolve ongoing land conflicts between users and with government administrations.
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Table 5: Legal frameworks related to management and conservation of the Mara Wetlands

No.	Legal Instrument	Notes/remarks
1	Constitution of the United Republic of Tanzania (1977)	Article 14 stipulates that every person has a right to life and to the protection of life by society. This right was by judicial interpretation extended to include the right to a safe, clean and healthy environment.
2	Tanzania Fisheries Act No. 22 of 2003	The act provides for legislation and guidelines for fishing activities. It also provides for management and control of the fishing industry and conservation of fisheries resources.
3	National Environmental Management Act (NEMA) No. 20 of 2004	The NEMA provides for protection and management of rivers, river banks, wetlands, lakes, lakeshores and marine shorelines. Prohibition of human activities in certain areas. The act also requires all Basin Water Boards when prioritising different uses of water to ensure that adequate water is made available for environmental purposes.
4	The Water Resources Management Act No. 11 of 2009	The act provides the institutional and legal framework for sustainable management and development of water resources and facilitates sectoral coordination and coordinated planning on aspects that may impact on water resources. The act also provides for procedures of approval and registration of water users associations.
5	The Water Supply and Sanitation Act No. 12 of 2009	The objective of this act is to promote and ensure the right of every person in Tanzania to have access to efficient, effective and sustainable water supply and sanitation services for all purposes. The act also provides for protection and conservation of water resources and development and promotion of public health and sanitation.
6	Forest Act No. 14 of 2002	The act provides for the management of forests, to repeal certain laws relating to forests and for related matters. It also pledges to ensure ecosystem stability through conservation of forest biodiversity, water catchments and soil fertility. The act also promotes coordination and cooperation between the forest sector and other agencies and bodies in the public and private sectors with respect to the management of natural resources of Tanzania.
7	Tanzania Tourism Act No. 29 of 2008	The act provides an institutional framework, and provides for the administration, regulation, registration and licensing of tourism facilities and activities.

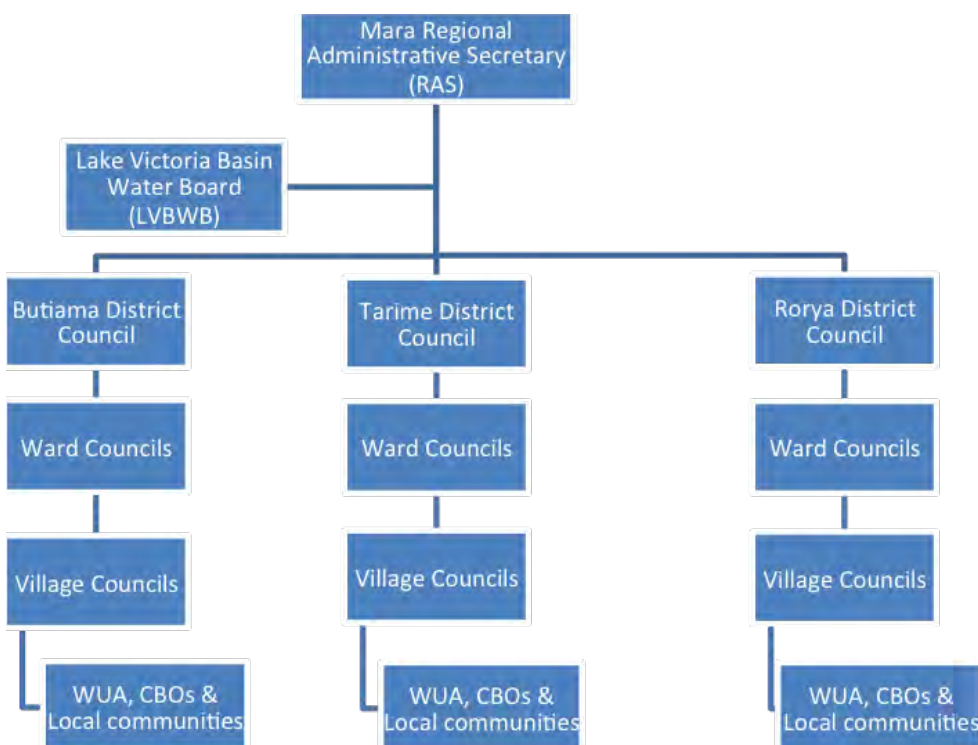
2.2 Institutional Frameworks and Arrangements

An effective institutional setting and verifiable governance is essential for the adoption and implementation of the Mara Wetland IMP. Without this, the objectives of the plan are unlikely to be achieved and certainly not in an integrated way. The IMP will need to set priorities. Adoption of the IMP will require a secretariat and competent professional technical and administrative support, meeting criteria that define the knowledge and understanding of staff. After discussions and consultations with Inter-Agency Technical Committee (IATC) and stakeholders, the Mara RAS office in the Mara Regional Commissioner's office was agreed to be the custodian of this management plan. The implementation of the plan on the ground will be led by the Butiama, Rorya and Tarime district councils in collaboration with the LVBWB, ward and village councils, water users associations (WUAs), community-based organisations (CBOs) and local communities. This will require the respective institutions to incorporate the IMP activities into their planning cycles. The RAS office will take ownership and develop effective and accountable mechanisms

for inclusivity and communication with a large range of stakeholders and their representatives.

The decision to house the IMP at the RAS office was made because district councils are the key government institutions responsible for formulation, coordination and supervision of the implementation of all plans for economic, environmental, land use planning, livestock development, industrial and social development as well as for coordinating development plans, projects and programmes of villages to serve the cross-sectoral IMP. The Mara RAS office is the highest regional administrative unit with the responsibility and authority to advise, supervise and monitor all district councils in projects and activities implementation in their jurisdiction at the regional level. With that mandate, the RAS office was the best institution for monitoring and supervising IMP implementation, reporting, monitoring and evaluation as well as resources management and monitoring. Figure 8 presents the institutional framework for implementation of the Mara Wetland IMP.

Figure 8: Mara Wetlands IMP institutional framework



The Mara RAS office and the established IMP Secretariat shall coordinate this IMP and develop locally relevant and consistent procedures for data compilation, analysis and reporting. An effective locally owned enabling environment and funding structure is essential to translate plans into actions. Local action plans can be housed with the appropriate locally mandated entities. For example, it was proposed that the North Mara Community Action Plan would be housed by the North Mara WUA and the implementation of this plan will engage the village council government and the local communities in the corresponding villages. Attention to the skills set needed for

implementation of the IMP should be initiated from the start. Technical skills monitoring should include GIS, analysis of data, modelling, water quality assessment, hydrology, and use of web-based platforms. While some of these can be contracted out, competency in understanding the relevant management and technical issues should be locally enabled. Competency profiles are best applied to both the individual and institutional dimension, because competent individuals are of most benefit when working within effective institutions. The roles and responsibilities of RAS and the district councils in the implementation of this IMP are presented in Tables 6 and 7.

Table 6: Roles and responsibilities of Mara RAS in IMP implementation

No.	Role/responsibility	Notes/remarks
1	IMP Custodianship	The Mara RAS office will be the custodian of this plan. As the lead organisation, the RAS office will take ownership and develop effective and accountable mechanisms for inclusivity and communication with a large range of stakeholders and their representatives.
2	Development and adoption of Secretariat for IMP implementation	IMP implementation will require an IMP Secretariat with fair institution representation considering competent professional technical and administrative support and meeting criteria that define the knowledge and understanding of staff. The IMP Secretariat will need to set priorities for implementation of this plan.
3	Reporting, monitoring and evaluation	The Mara RAS office will ensure that implementation of management actions identified by stakeholders in this plan is reported in a timely manner and that monitoring and evaluation are done as proposed by the Monitoring and Evaluation framework for the plan.
4	Resource management and mobilisation	The Mara RAS office will ensure that all mobilised resources are used accountably and as planned together with the finance resource mobilisation to be facilitated by the Conservation Investment Plan. The RASs office, in collaboration with other key stakeholders, including donors, will participate and support resource mobilisation for IMP implementation.
5	Setting priority actions for IMP implementation	The Mara RAS office and the IMP Secretariat will facilitate stakeholder discussions to identify priority actions and sites.
6	Conflict resolution	The implementation of the IMP will involve different stakeholders who may have conflicting interests in the Mara Wetland and regarding the implementation of the plan. Using the existing government frameworks and procedures, the Mara RAS office will lead conflict resolution processes.

7	Facilitate and support discussions with upper catchment stakeholders and authorities	As a transboundary resource, effective management of the Mara Wetlands will require dialogue between the governments of Kenya and Tanzania. In collaboration with other national and regional institutions and organisations, the RAS office should support and facilitate these discussions.
8	Training and in-house capacity development	The Mara regional secretariat will be engaged in mobilising resources and providing in-house training on use of Geographic Information Systems (GIS) and tools in monitoring, hydrological modelling, water quality assessment, etc.

Table 7: Roles and responsibilities of district councils in IMP implementation

No.	Role/responsibility	Notes/remarks
1	IMP Implementation	By using the available key departments and technical staffs, district councils will: lead the implementation of this IMP on the ground; allocate development funds to relevant IMP activities within the different districts; and where possible support the processing of microloans for community groups for community development within their jurisdiction.
2	Communication with stakeholders	District councils shall ensure there is communication and flow of information amongst stakeholders on the ground and with the IMP Secretariat.
3	Reporting, monitoring and evaluation	District councils will be responsible for production of reports and shall be involved in monitoring and evaluation of this IMP.
4	Setting priorities and action Plan for IMP implementation	With the experience, data and information they have on issues on the ground, district councils will advise the RAS office and IMP Secretariat on the priority actions and sites for implementation of IMP Management actions.
5	Review of management actions	Management Planning is a process and should allow for reviewing of management actions proposed by stakeholders. District councils will play a big role in management planning.

Roles and Responsibilities of LVBWB

The LVBWB, established by the National Water Resources Management Act No. 9 of 2009, is a very important stakeholder in the implementation of this plan. Among their legal responsibilities, provided in the National Water Resources Management Act, are collecting, processing and analysing data for water resource management; resolving intra-basin conflicts, and others. The LVBWB will advise

and support the RAS office and the Secretariat in the implementation of plan activities falling under their mandate, i.e., water quality and hydrology monitoring, regulation of water abstractions, issuance and revoking of water use and discharge permits, water flows assessments, etc. Table 8 presents their main roles and responsibilities in the IMP implementation.

Table 8: Roles and responsibilities of LVBWB in IMP implementation

No.	Role/responsibility	Notes/remarks
1	Assessment of water flows	The LVBWB shall coordinate and support water flows assessment using existing and new water gauging stations.
2	Water quality monitoring	Using the existing water monitoring points and infrastructures, the LVBWB shall coordinate and support monitoring of water quality in the Mara Wetland and lower MRB.
3	Intra-basin conflict resolution	As provided in the Water Resources Management Act, LVBWB shall work closely with the RAS office and IMP Secretariat in resolving conflicts arising from implementation of this plan and between different water users.
4	Hydrology regime monitoring	The LVBWB shall coordinate and support monitoring of water hydrology of the Mara Wetland. This can be done in collaboration with key scientists and researchers, i.e., UNESCO-IHE.
5	Review of management actions	The LVBWB shall provide feedback and information to the IMP Secretariat for the need of review of management actions.

Roles and Responsibilities of Ward and Village Councils

Ward and village councils have an important role in adjudicating land and related matters at the local level. They provide guidance regarding the use of land, including settlements, agriculture, as well as for management and conservation of natural resources and development just to

mention a few. They are under the jurisdiction of the national government under the Regional Commissioner's office. Table 9 presents the roles and responsibilities of ward and village councils in the IMP implementation

Table 9: Roles and responsibilities of ward and village councils in IMP implementation

No.	Role/responsibility	Notes/remarks
1	Coordination	The ward and village councils shall work closely with district councils, LVBWB and the IMP Secretariat in coordinating implementation of actions on the ground. This includes raising awareness in communities about the implementation of the IMP.
2	Resolve conflicts	Ward and village councils, in cooperation with district councils, shall be involved in resolution of conflicts.
3	Enforcement of laws and regulations	Village governments are responsible for ensuring adherence to laws and regulations pertaining to the management of wetlands.
4	Development and enforcement of by-laws relevant to wetland management	Ward and village councils shall participate in development and enforcement of by-laws that are necessary for supporting management actions identified in this plan.

Roles and responsibilities of WUAs, CBOs and local communities

Water Users Associations in Tanzania are mandated to apply water user rights, which includes the collection of water fees, monitoring existing and approving new rights for abstraction, which primarily is expected to ameliorate water resource

conflicts at local level. WUAs are typically an amalgam of several CBOs and groups recognised as water users. Table 10 presents the roles and responsibilities of WUAs, CBOs and local communities in IMP implementation.

Table 10: Roles and responsibilities of WUAs, CBOs and local communities in IMP implementation

No.	Role/Responsibility	Notes/Remarks
1	Coordination	Support coordination of IMP implementation among local communities
2	Implementation of local conservation and management actions	Support and promote implementation of management actions and activities
3	Resolution of conflicts between water users	WUAs have responsibility for resolving the local user resource conflicts at the first instance

Functions of Mara Wetland IMP Secretariat

The Mara Wetlands IMP will be implemented under the oversight of the IMP Secretariat and shall be comprised of key lower MRB stakeholders, including Mara Regional Commissioner's office, Butiama, Rorya and Tarime district councils, LVBWB

and National Environment Management Council (NEMC) with representation from ward councils, village councils and local conservation groups, i.e., WUAs. The Secretariat shall ensure accountability compliance.

2.3 Regional Institutions and Organisations

The Mara Wetlands is only a small part of the larger MRB. As a transboundary resource covering Tanzania and Kenya, several regional platforms

have been established to address regional issues. Table 11 provides the most relevant platforms for the MRB.

Table 11: Regional platforms that can be used in the implementation of this plan for management of the Mara Wetlands

No.	Institution	Roles and Responsibilities
1	East Africa Community	Provides for the management and regulation of transboundary ecosystems of the EAC and establishes commissions for the management of transboundary ecosystems. EAC will play an important role in establishing laws and policies that will build a framework to enhance effective management and conservation of the MRB resources.
2	Lake Victoria Basin Commission	A specialised institution of the EAC established through the Protocol for Sustainable Development of the Lake Victoria Basin to coordinate various interventions in the Lake Victoria Basin region and to turn the basin into an economic growth zone. The LVBC will have a role in uniting stakeholders starting with the key departments from the countries responsible for the management of the MRB as well as other stakeholders. Their role will also be to enhance dialogue between the stakeholders to achieve an effective joint management of resources.
3	East Africa Legal Assembly (EALA)	The mission of the East African Legislative Assembly is “to legislate, do oversight and represent the people of East Africa in a bid to foster economic, social, cultural and political integration”. Within the IMP, the EALA has a legislative role to ensure that the countries can resolve disputes that arise related to the management of transboundary resources. For the Mara Wetlands, EALA will help ensure that joint management of the MRB works.
4	The Mara River Basin Joint Technical Committee	This technical committee consists of the governments of Kenya and Tanzania and is responsible for joint management of the MRB. Its role includes developing strategies for management of the transboundary resource as well as ensuring that development within the basin is inclusive and considerate of interests of both governments. In addition, the committee is responsible for resolving resources conflicts that are of a transboundary nature.

SECTION THREE: MANAGEMENT PLANNING PROCESS



3.1 Methodology, Approach and Process

The development of this IMP engaged key stakeholders as far as possible in the planning process, including national and regional government, districts, village councils, local community and civil society organisations.

Primary and secondary sources of data were collated to develop an understanding of the wetland resources, the challenges they face and the ongoing actions at different levels to address them. IHE-Delft led the IMP development and

inventory through studying and mapping the Mara Wetlands and its resources in September 2016 for the dry season and in March 2017 for the wet season.

The engagement process was participatory at several levels with processes and tools adapted to the stakeholders to ensure that the IMP reflects the aspirations and visions of Mara Wetlands stakeholders. The details of the methodology are outlined below.

3.1.1 Establishing an Interagency Technical Committee (IATC)

The Interagency Technical Committee consisted of the NEMC–Lake Zone Regional Office, Mara Regional RAS, Mara Regional Community Development Office, Mara Regional Land Planning office, National Land Use Planning Commission (NLUPC), LVBWB, Butiama, Rorya and Tarime district councils, North and South Mara local community representatives, WWF and the Nile Basin Initiative–NELSAP Programme. Their duty was to guide the process and ensure that the development process

was credible, legal and inclusive at all levels.

A total of three IATC meetings were conducted during IMP development; September 2016, February 2017 and June 2017. These meetings were key to setting the agenda and process for development of the IMP, reviewing several draft IMPs before presenting them to stakeholders and the validation workshop. The team also provided advice and support in between the meetings.

3.1.2 Participatory Management: Stakeholder Engagement and Participation

The **Ramsar resolution VIII.14: New Guidelines for Management Planning for Ramsar Sites and Other Wetlands** recognised that wetlands are dynamic areas, open to the influence of natural and human factors. Therefore, to maintain their biodiversity and productivity and to permit the wise use of resources, it is essential to engage managers, owners, occupiers and other stakeholders through a management planning process.

The **Mara River Basin Transboundary Integrated Natural Resources Management Plan (LVBC 2016)** identified an extensive number of stakeholders throughout the basin and categorised them as **primary and secondary stakeholders**, with a summary of their interests. In the Lower Mara, identification of key stakeholders occurred through extensive discussions with district authorities and WUAs. Stakeholder workshops were held in

Musoma at the end of February and beginning of March 2017, with subsequent validation workshops with the local communities (Annex 1). While many primary stakeholders focus on locally defined geographical sub-units, their input in the development of the Mara Wetlands IMP, together with input from RAS and NGOs, provided a more extensive remit and a more integrated perspective to management.

Implementation of the IMP will involve an array of stakeholders operating across scales of governance. The community workshops brought together a range of such stakeholders across the Mara districts that should be involved in implementation of the IMP. The list provided in Annex 1 illustrates a range of locally based organisations that can play a role in the IMP.

3.1.3 National and Regional Mobilisation Meetings

In July 2016 and June/July 2017, BirdLife International facilitated a mobilisation meeting with stakeholders at the national level, including Ministry of Agriculture Livestock and Fisheries, TFS, Tanzania Wildlife Authority, Africare, WWF–Tanzania Country Office, Tanzania Forest Conservation Group, the Nature Conservancy, NLUPC, Mara Regional Commissioner’s office, Mara RAS’s office and NEMC.

The objective of the national-level meetings was to introduce the project and to receive recommendations on the best IMP development

approach. The meeting was also aimed at creating awareness of the IMP development among government ministries and departments. Three meetings were held. The first meeting was held in June 2016 in Dar es Salaam, the last two were held in June and July 2017 in Dar es Salaam and Dodoma respectively. The meetings were successful in strengthening the ownership and they provided a platform for more discussion on the transboundary resource management issues and challenges and possible solutions.

3.1.4 Regional and District-Level Engagement

About eight monthly consultative meetings were held with Butiama, Rorya and Tarime district councils. These meetings were used to update the district councils on the IMP development progress and to strengthen ownership. The consultations were held with district councils, district executive directors, district administrative secretaries (DASs) and relevant heads of departments. Moreover, monthly consultations for the same were held

with the Mara Regional Natural Resource Office and Community Development Office. Several consultation meetings were also held with the Mara Regional Commissioner and Mara RAS.

The NELSAP, LVBWB, NEMC, NLUPC, village and ward councils and North and South Mara WUA were consulted regularly throughout the development of the IMP.

3.1.5 Community and Village-Level Engagement

The North and South Mara WUA, a representative body of the community, was engaged through a Participatory Rural Appraisal in August and September 2016. These workshops were attended by a total of 65 participants (17 females). The workshops produced data and information that was used to develop a Community Action Plan, information that was adopted in developing the IMP.

Awareness raising meetings with village councils in the North and South Mara communities were conducted with an aim of building the capacity of leaders on legal and policy frameworks for

management and conservation of the Mara Wetlands. Sixteen village leaders (2 females) participated in the North Mara meetings and 17 village leaders (2 females) participated in the South Mara meetings. The village leaders learned and improved their understanding and technical capacity on the existing policies, laws and regulations related to wetland management and conservation. The knowledge gained will be applied in their daily wetland management activities. These meetings were also used to strengthen ownership of the IMP and to build consensus on the process.

3.1.6 Participatory Drafting and Validation Workshops

Stakeholders' workshop for drafting the IMP for Mara Wetlands was conducted on March 2017. The workshop engaged all key Mara Wetlands stakeholders and was attended by local community representatives; the WUA; eight ward councils (councillors and ward executive officer) in the Mara Wetlands area; Butiama, Rorya and Tarime district councils; NLUPC; LVBWB; NEMC; Project Concern International; Musoma Water Quality Laboratory; Mara Regional Secretariat; and others. The meeting was facilitated by IHE-Delft and BirdLife. The workshop provided stakeholders with a platform to participate in the drafting process. After the meeting, key recommendations and agreements were collated on the IMP contents, structure and way forward.

The IMP review and validation process involved District Council Management Team (CMT), Mara Regional Secretariat special task force, local governments and communities, i.e., ward council government, village government, WUAs and representatives of local communities. At the Mara RAS office, 10 technical staff members (4 females) were engaged in the review and commenting of the first draft IMP. The staff represented key departments, i.e., agriculture, fisheries, natural resources, community development, business and trade, etc. At the district level, the review and validation of the first draft IMP involved the district CMT consisting of heads of departments at the respective district councils.

At the local community level 110 participated, including 31 female representatives. The participants represented the 8 wards and 16 village councils, and included groups of farmers, charcoal burners, papyrus harvesters and livestock keepers.

In Butiama, Rorya and Tarime districts, 75 CMT members were engaged in IMP validation, of which 8 were females. The comments and reviews from these meetings were used to update the first draft and produce the second draft.

The regional IMP validation meeting in August 2017 was held at the Regional Commissioner's office in Mara with 21 people in attendance (5 females) from the Butiama, Rorya and Tarime district councils, LVBWB, Musoma Water Quality Laboratory, WWF and technical staff from the Mara RAS office.

The meeting was opened by the Mara Regional Commissioner and the discussion was facilitated by the RAS and technical staff from the region and the districts. The final IMP validation meeting strengthened the ownership of the IMP and was used to discuss the next steps, including resource mobilisation and resource leveraging at the Mara RAS office and at district council offices. The meeting also marked an important milestone for stakeholder participation in the IMP development process and commitment in sustainable management and conservation of the Mara Wetlands.

SECTION FOUR: MARA WETLANDS IMP VISION, GOAL AND MANAGEMENT PROGRAMMES AND ACTIONS



Chapter 4 is the core of this management plan. It defines the vision, goal and objectives of the plan and describes the management programmes

and actions that will be undertaken to realise the goal and objectives.

4.1 Vision

As agreed at the IATC meetings and stakeholders' workshops, the vision of the IMP is:

"A well conserved Mara River Wetland, managed sustainably for people and nature"

Achieving this vision requires:

1. Maintaining and, where necessary, restoring ecological structure and function of the surrounding landscape.
2. Dialogue with upstream users to ensure provision of adequate water flow, and control of sediment, nutrient and other pollutants, into the Lower Mara River and wetland.

4.2 Goal of the Management Plan

The **goal** of the Mara Wetlands IMP is:-

"To improve the conservation and sustainable management of Mara Wetlands ecosystem for the purpose of securing community livelihoods and building resilience to climate change".

4.3 Objectives of the Management Plan

The overall objective of the Mara Wetlands IMP, as agreed by key stakeholders, is the retention or, as necessary, restoration of its ecological character as an extensive papyrus-dominated wetland, in support of ecosystem services for the benefit of local populations. The management plan is guided by good international practice (Chatterjee et al.

2008) in keeping with the commitment of the Government of United Republic of Tanzania to the Ramsar Convention and "Wise Use of Wetlands" as defined by Ramsar (2007) (Box 1), and compliant with national legislation and international agreements.

Box 1

"Wise use of wetlands is the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development." <http://www.ramsar.org/handbooks4/>

Specific management objectives, agreed and developed with local stakeholders, are compatible with the objectives of the **Mara River Basin Transboundary Integrated Natural Resources Plan 2016-2026 (LVBC 2016)**.

A key principle incorporated into the Mara Wetlands IMP is the recognition that it is a dynamic habitat, whose extent varies within and among years. The IMP will work to maintain and, where possible, improve the ecological character of the

wetland over natural climatic cycles. The overall character of the wetland is a papyrus swamp dominated by *Cyperus papyrus*, with a transitional ecotone between aquatic and terrestrial dryland habitat subject to seasonal flooding that provides important grazing land and seasonal vegetable gardens. Accommodating these elements into the IMP is essential. Management of the surrounding, largely degraded, dryland habitats should be an integral part of management,

with the IMP considering both the wetland and surrounding lands in the lower catchment and floodplain to achieve objectives of conservation and enhancing local livelihoods. While the overall features of the wetland can be described (Irvine et al. 2017), a systematic programme is needed to better understand the hydrology and ecological functioning of the wetland and the ecosystem goods and services that it provides. The wetland and surrounding land should be considered as one social-ecological unit and managed and developed as such.

The Mara Wetlands IMP embraces an *adaptive management approach* that allows those concerned with management to learn through experience; respond to changing factors that affect the features of the wetland by developing or refining management processes; and demonstrate that management is appropriate and effective (Ramsar 2007). This provides an ongoing process that effectively addresses the pressures and opportunities that arise from developing circumstances, whether driven by change of pressures, policy or assessment techniques.

For the Mara Wetlands IMP to integrate effectively with the management planning and objectives of the wider MRB (LVBC 2016), the development and implementation of both plans should be collaborative, involving all relevant stakeholders.

4.4 Management Programmes

The scoping of issues in the Lower Mara and the stakeholder engagement informed the need for management actions, involvement and responsibilities. These align well with, and informed, key ecosystem services identified in Irvine et al. (2017) and identified by LVBC (2016). The ecosystem service benefits, and threats to them, are important to guiding management actions for the restoration, conservation and ecological and social integrity of the wetland and surrounding areas. The management plan identifies feasible and durable priority actions suggested by representatives of three districts, independently of each other (Table 13). These were similar in many aspects. The top

The threats to the Mara Wetlands identified by local stakeholders (Irvine et al. 2017) align well with those presented by LVBC (2016).

Further formal stakeholder consultation can help provide a more extensive assessment for management following the well-known Drivers-Pressures-Impact-State-Response model. Techniques such as those developed by Peh et al. (2013) can also be used to assess the impact of land use changes on ecosystem services. This can guide identification and response to significant management issues within each district or sub-catchment and identify the network of stakeholders that are required for effective management.

Progress in implementing the IMP requires further gathering of information relating to both biophysical features of the wetland and surrounding land and the use of those areas by local stakeholders. While knowledge and data deficits need to be further addressed, gaps in knowledge should not prevent initiation of management or setting management objectives. While a wider research agenda cannot be achieved without effective funding and institutional collaboration, basic data collection to guide management can, nevertheless, proceed in the short-term. Much data to guide management already exists but it needs to be systematically collated.

priority was related to building awareness of the need for management and protection of the Lower Mara. This is in keeping with the remit of the WUAs to build awareness in promoting conservation and sustainable management of the water and wetland resources at the local level. Developing local skills and knowledge also featured prominently among the communities. This included activities that would use existing livelihoods and develop alternative ones. Energy and water use efficiency and enforcement of existing laws and regulations were identified by different actors across the participant groups from each district. None of the priority actions were considered unimportant by

participants from districts other than those who proposed them. Several other important activities provided in the preliminary draft IMP and raised in discussion during the workshops were also considered important, though they are not in

the priority list (Table 12). They include related issues such as informed decision making, wise use of natural resources, fostering political will, local biodiversity management and land use planning.

Table 12: Ten priority actions for management in ranked order of most preferred action within three districts by stakeholders at the Musoma Stakeholder PREPARED meeting

Butiama	Rorya	Tarime	Ranking
Create community awareness	Create awareness	Create awareness through village councils	1
Plant trees	Build capacity	Establish tree nurseries for community groups	2
Develop skills in organic farming	Enforce laws on wetland management	Enhance technical knowledge	3
Support alternative livelihoods (bees, horticulture, chicken, paddies)	Plant trees	Establish demonstration sites for sustainable agriculture	4
Establish fish ponds	Support alternative livelihoods (bees, sunflowers, sesame)	Improve livestock management	5
Introduce soil retention measures	Introduce zero grazing	Monitor water and soil quality	6
Research impacts of invasive species	Use organic manure for agriculture	Support small-scale miners for reduced impact	7
Construct water harvesting infrastructure	Strengthen communication strategy	Expand rainwater harvesting	8
Research water flow in Mara River	Establish terrace farming	Create and enforce laws promoting wetland management	9
Enhance transboundary communication to reduce anthropogenic pressures on the natural resources	Monitor the wetland and its resources	Promote fuel saving stoves and energy efficient measures	10

Many of the priority management actions proposed for the Lower Mara are interacting. For example, tree planting can necessitate developing skills for nurturing young trees, land planning and implementation of existing by-laws, enhance awareness of the benefit of tree cover among citizens, and development of energy and heating supplies that does not rely on charcoal. Similar synergies can be found among many of the priority actions. Realising priority actions requires

focus on specific activities and the enabling environment that facilitates that. Where provision for management actions already exists, or used to exist, supporting ongoing activities or reviewing the causes for their cessation should be built into future management practices.

Overall the required management actions identified by the local stakeholders can be grouped into four programme areas:

- A. Land use and wetland management;
- B. Awareness raising, capacity building and governance;
- C. Sustainable alternative livelihood;
- D. Water sanitation and hygiene; and
- E. Research information and data needs.

The plan is proposed to fall within the ownership of the RAS as presented in section 2. The **Mara IMP should be considered in conjunction with Section 7 of the Transboundary Integrated Natural Resources Management Plan for the Mara River Basin (LVBC 2016).**

The timeframe is envisaged as **five years**.

4.5 Management Actions

The management actions have been informed by the socioeconomic and ecological functions, problems and threats facing the Mara Wetlands and other factors that are currently influencing the management of the wetland as defined by the stakeholders. Cost estimates have been provided for the management actions. These are inevitably broad approximations, but they can act as stimuli for longer-term unsubsidised sustainable management. This can include the development and use of micro-financing schemes. All actions require identification of an implementing authority, with clear and verifiable responsibilities.

These specific actions will be primarily implemented in Butiama, Rorya and Tarime districts in the Mara region, but several actions will require engagement across the districts, regions and the wider MRB. Bunda, Musoma and Serengeti districts will be key for the implementation of some of the actions that resolve issues which are cross-linked with neighbouring district councils, while the Kenya and Tanzania governments, as well as such regional bodies as LVBC, EAC and NELSAP, will be key in ensuring the wider coordination of MRB interventions.

4.5.1 Land Use and Wetland Management Programme

The Land Use and Wetland Management Programme has been designed to maintain and improve the ecological character of the Mara Wetlands through sustainable land use and management practices. Within this programme, the following issues will be addressed: land degradation, soil erosion, alternative energy sources, livestock and fishery management, land use planning, conservation of biodiversity and ecosystems services, climate change and water abstraction.

Programme objective: To enhance the application of the “wise use” concept to land use and wetland resource management. The activities identified include the following.

Activity 1.1 Promote agroforestry practices to address soil erosion and land degradation

Within the Mara basin in Tanzania roughly 300 square kilometres of shrub land was lost between 1986 and 2015 (LVBC 2016) owing mostly to domestic and commercial harvesting of trees for energy and firewood. The degraded area is mostly covered with patchy forest and scrub land. This exposes the wetlands catchment to further soils erosion, which increases the level of siltation and sedimentation in the river channel. Agroforestry practices will be promoted and used to rehabilitate the degraded land.

Target in five years: A rehabilitation target over the first three years of the IMP is a net redress of 10 percent of current loss, or 30 square kilometres and 90 percent cessation of new loss. The degraded area will be planted with indigenous and exotic trees. Extension services, post-planting care and protection of the planted trees will be provided.

Enabling factors: Supportive government policies, laws and by-laws on agroforestry and energy issues; availability of seeds; and government and donor agroforestry support.

Legislative support required: Review and implementation of existing and proposed by-laws.

Activity 1.2 Promote sustainable production and management of livestock

The Mara Wetlands is under pressure from overstocking of livestock leading to the poor regeneration of grass and browse resources, resulting in increased soil erosion. Loss of grazing land is also specifically a concern within the wetlands, which receives an influx of livestock from adjacent communities, especially during the dry spells. Specific actions are needed to address this problem, such as fiscal interventions for pastoralists to embrace modern livestock production methods that will increase the livestock economic outputs per unit of land.

Target in five years: A 20 percent reduction in total livestock numbers, piloting modern livestock production methods projects in three villages surrounding the wetland.

Enabling factors: Existing livestock extension services, enhanced capacity and knowledge of livestock keepers and potential development of a livestock products value chain.

Legislative support required: National policies promoting sustainable livestock production, land use plans, by-laws outlining controlled cattle grazing and watering zones, and national and regional policies providing incentives for sustainable management of livestock.

Activity 1.3 Develop land use plans

Few villages in the Mara Wetland have a land use plan. Land use plans are important for demarcating and zoning land for different uses that may include conservation, agriculture, settlement, towns, markets and support of socioeconomic activities at village level. Lack of these plans impede efforts to enjoin the communities and stakeholders in a coherent approach to the management

and conservation of wetland resources. Land use plans will also address the issue of wetland encroachment.

Burning of papyrus is rampant in the wetlands. The motivations, impacts and best response for papyrus burning need to be understood. Research will be undertaken to map out the sites prone to burning and their impacts on the wetland and related biodiversity. Socioeconomic studies will also be done to understand the motivation for burning by the local communities. Action plans will then be developed based on the knowledge generated from these studies.

The National Land Use Planning Commission facilitates the development of land use plans for Tanzania and coordinates the implementation of these plans. Four land use plans will be developed as pilot projects in the three districts over the next five years: two villages in Butiama, and one village each in Rorya and Tarime. Further to the development of these plans, the districts will be supported to implement the plans through establishment of village land use committees to enforce the plans.

Target in five years: Creation of four land use plans at pilot villages (two in North and two in South Mara communities). Priority will be given to villages with high numbers of land conflicts; reduction of papyrus burning in the Mara Wetlands.

Enabling factors: Land use commission support, districts support, Regional Commissioner's office support, WUAs and NGOs support, extension services availability that can be used to enhance capacity and empowering of local communities in land use planning.

Legislative support required: National policies supporting the development of land use plans.

Activity 1.4 Promote conservation of biodiversity and ecosystem services

The Mara Wetlands is important for its biodiversity, which includes birds, mammals, fish, microorganisms, invertebrates and plant species, but also for its ecosystem services, which include water provision for its inhabitants, water quality

regulation, carbon sequestration, food provision both from fish and agriculture, to mention a few. Managing biodiversity and ecosystem services is therefore key to maintaining the health of the landscape and supporting livelihoods sustainably. This will be achieved through a systematic progressive documentation of biodiversity and subsequent conservation plans for the species and their habitats.

Target in five years: Conduct a complete inventory of biodiversity and ecosystem services of the Mara Wetlands in support of the implementation of this management plan. Control of invasive and alien species such as water hyacinth; demarcate important sites for biodiversity conservation and ecosystem services through the land use plans in three villages in the Mara Wetlands.

Enabling factors: Existing avenues for engagement of technical experts at the regional and district levels and enhancing the technical capacity of different groups of stakeholders, including government, communities and community service organisations to participate in the collection of relevant ecological data and monitoring of sites, support from institutes of higher learning to develop key tools and provide training; funds availability, hyacinth removal technology and knowledge.

Legislative support required: National policies on integrated water resources management and biodiversity conservation; regional, national and international interest in reduction of invasive species in wetlands.

Activity 1.5 Build community resilience to climate change

Climate change affects biodiversity and ecosystem services in many ways. For example, changes in onset and end of seasons and the fluctuation of mean temperature and rainfall may alter species population, distribution and dynamics depending on their ability to adapt. Among the impacts of climate change are droughts and floods, which can be caused by changes in the spatial and temporal distribution of rain as well as unpredictable weather patterns. In many cases, this will lead

to crop failure, lack of pastures and water stress conditions that directly affect the livelihoods of local communities. To address this problem, vulnerability assessments to climate change need to be done to map out the hazards and their impacts, followed with proper action plans that reduce the exposure and associated risk.

Adaptive management that considers the long-term consequences of climate change on species and ecosystem services by factoring the changes observed in the ecological processes and those that are perceived to occur from climatic stress is also needed. Adaptive management tools will be used to develop strategies for managing areas of the wetland demarcated for conservation as well as developing an action plan that takes climate change into account.

Communities will also be supported to increase their water harvesting capability to alleviate water shortages. Funds for domestic supply could be established through a competitive grant scheme coupled with low interest loans. Priority for this action should be in villages with serious water deficit for domestic and livestock uses.

Target in five years: Pilot an ecosystem-based adaptation approach in at least two villages; conduct community vulnerability assessments in the Mara Wetlands; pilot water harvesting technologies and establish demonstration site at village scale; develop hazard maps for the Mara Wetlands; and develop community disaster preparedness plans for the North and South Mara communities.

Enabling factors: Support from local and international NGOs, framework for engaging multiple stakeholders in the Mara Wetlands, and sufficient awareness among stakeholders regarding climate change.

Legislative support required: Regional and national policies encouraging mainstreaming of climate change into sectoral planning; by-laws to support the sustainable management of harvested water.

Activity 1.6 Control of soil erosion, rehabilitation of soils and terracing

The Mara Wetlands faces inadvertent pressure primarily from intensive agriculture and cultivation,

which leads to loss of vegetation cover and widespread soil erosion, manifest in the wetlands by increased sedimentation and deposits in the river channel and reduced soil fertility. In fact, the local people attribute increased peripheral flooding and expansion of the wetland to increased sedimentation in the channel, which has clogged over the years and consequently diverts the water during high peak rainfall. Soil erosion is ubiquitous in landscapes but the first step to address it is to ensure that sustainable land management takes into account reduction of soil erosion.

Target in five years: Establish 5 kilometres of new terracing as pilot demonstration sites in two villages to the North of the Mara Wetlands.

Enabling factors: Agricultural and land resource management extension services from the district and region, and secure land tenure rights.

Legislative support required: By-laws for protection of land through terracing and livestock control.

Activity 1.7 Regulate water abstraction

Development projects are proliferating in the MRB and they are expected to increase the water demand in the basin. Coupled with small-scale abstraction from artisanal miners, small-scale agriculture, livestock and domestic use, there is poor understanding of the supply and demand functions of the wetland. A good understanding of water supply and demand together with an effective monitoring system will be established. This will be preceded by an environmental flows (eflows) assessment that will provide more information and data on the seasonal water fluctuations of the river and the environmental flow that is essential for supporting biodiversity.

Target in five years: Baseline developed depicting eflows of the Mara Wetlands; water demand for the Mara Wetlands mapped.

Enabling factors: Sufficient capacity of stakeholders to understand and implement integrated water resources management (IWRM), extension services from the district and regional government; support from universities and NGOs in undertaking comprehensive studies..

Legislative support required: Policies encouraging the adoption of payment for ecosystem services (PES) approach; establishment of by-laws empowering WUAs and other stakeholders to monitor and approve water abstraction; and policies supporting the implementation of IWRM.

Activity 1.8 Support sustainable fishing methods

Fishing in the Mara Wetlands generally is driven by domestic demand with the surplus going to market, mainly in Musoma town. Overfishing is common as fishermen try to meet the market demand for some wetland species. Specific action will include estimating the annual fish stocks against the demand across different seasons and building the capacity of fishermen in sustainable fishing methods.

Target in five years: Develop a baseline for fish stock in the Mara Wetlands and reduce illegal fishing methods.

Enabling factors: Availability of reliable fish stocks data for the Mara Wetlands; sustainable rights-based management approach for fisheries sector; extension services to support fisheries.

Legislative support required: By-laws addressing illegal fishing; policies supporting sustainable fishing at regional and national levels; and by-laws controlling access to wetlands and burning; land use plans.

Table 13: Detailed actions on the Land Use and Wetland Management Programme

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ¹
Deforestation and land degradation	1.1. Promote agroforestry to address soil erosion and land degradation	Regional Administration Secretary (Mara); district administrations; ward councils; village councils; local communities; LVBWB; WUAs	Subsidise provision of seed and mulch; enhance and establish local native and fruit tree nurseries; support established village forests; tree planting; create awareness; enforce by-laws; improve extension services; develop skills in tree nursery management; promote on-farm woodlots	USD 131,000/ TSh 288 million
Soil erosion, overgrazing, water pollution and land degradation, overstocking	1.2. Promote sustainable production and management of livestock	Regional Administration (Mara), district administrations; ward and village councils; WUA; LVBWB; local communities	Educate and sensitise communities on sustainable livestock production as guided by land carrying capacity; provide subsidy schemes to reduce cattle; promote dairy and meat processing industry; pilot alternative livelihoods projects; establish modern livestock husbandry demonstration sites; develop livestock infrastructure; build stakeholders capacity on enforcement of laws and by-laws; develop markets for livestock and livestock products; demonstration; train extension workers on soil management; improve access to veterinary services	USD 145,000/ TSh 319 million
Unstructured and unsustainable land use, lack of accessible spatial maps at relevant scales for planning and management	1.3. Develop land use plans	Regional Administration (Mara), district administrations, ward and village councils; local communities, National Land Use Planning Commission	Develop land use plans in four demonstration villages (two in North and two in South Mara communities); establish by-laws in land use zones under accountable administrative arrangements; develop zone management strategies; build capacity and skills in GIS for spatial planning and monitoring; educate and sensitise communities on land use plans; train farmers and extension workers on sustainable land and soil management; control papyrus burning; develop inclusive natural resources databases for GIS information available at district level	USD 200,000/ TSh 448 million

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ¹
Loss of biodiversity and ecosystem services in the wetland	1.4. Promote conservation of biodiversity and ecosystem services	Regional Administration (Mara), ward and village councils; farmers and livestock keepers; government extension workers	Assess key species and ecosystem services targeted for conservation; identify conservation interventions and actions for specific species and ecosystems; develop and implement land use actions plans; control deforestation and soil erosion; educate and sensitise the communities and stakeholders on species and biodiversity conservation and management; pilot terracing and use of cover crops to control soil erosion; promote the adoption of sustainable agricultural practices (use of mulch, manure, etc.)	USD 380,000/ TSh 836 million
Community vulnerability to floods and natural disasters related to climate change; lack of cohesive actions to address climate change adaptation across the development sectors	1.5. Build community resilience to climate change	Regional Administration (Mara); district administration; national government ministries; LVBWB; NGOs; universities; local communities; WUAs; schools and hospitals	Conduct climate change vulnerability assessment; conduct hazard mapping around the wetland; create awareness and build the capacity of local institutions and people to adapt to climate change; implement natural resource policies that address the impacts of climate change across sectors including farming livestock, fisheries, water and wildlife; construct charcoal dams and water pans for water harvesting; pilot small-scale water harvesting engineering demonstration sites in one village; pilot ecosystem-based adaptation approaches to address issues of climate change vis-à-vis biodiversity conservation	USD 505,000/ TSh 1,111 million
Soil erosion, sedimentation and loss of soil fertility	1.6. Control of soil erosion, rehabilitation of soils and terracing	Regional Administration (Mara); LVBC; LVBWB; district administrations; ward councils; farmers; WUAs; pastoralists; NGOs;	Train extension workers on soil management technologies; pilot terracing along the steep slopes of the catchment	USD 50,000/ TSh 110 million

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ¹
Unstructured access to use and payment for water as an ecosystem service	1.7. Regulate water abstraction	Regional Administration (Mara); LVBC; LVBWB district administration; ward councils; farmers; WUAs; pastoralists; NGOs	Conduct an eflows study of the lower MRB, including the Mara Wetlands; develop by-laws for water abstraction and regulation	USD 200,000/ TSh 440 million
Overfishing and destruction of the wetland through unsustainable fishing methods	1.8. Support sustainable fishing methods	Regional Administration (Mara), district administration, ward councils, village councils, livestock keepers, livestock and extension officers; WUA, Ministry of Livestock Agriculture and Fisheries	Develop a baseline for fish stocks in the Mara Wetlands; reduce illegal fishing methods; train extension workers on sustainable fish management and aquaculture; pilot aquaculture in the wetland	USD 65,000/ TSh 143 million

¹Exchange rate 1 USD = 2,200 TSh.

4.5.2 Awareness Raising, Capacity Building and Governance Programme

The Awareness Raising, Capacity Building and Governance Programme has been designed to enhance stakeholders' knowledge and attitude change, build adequate institutional capacity across relevant sectors with a view of enhancing sustainable management of the Mara Wetlands.

Within this programme, the following issues will be addressed: stakeholder engagement, capacity among and within stakeholders, policy and institutional management arrangements, transboundary coordination, awareness of natural resource management and climate change adaptation.

Programme objective: To enhance conservation awareness, capacity and good governance for the sustainable management of the Mara Wetlands.

Activity 2.1 Enhance communication and capacity among the Mara River Basin stakeholders to support effective conservation and management of the wetland as a transboundary resource

The effective management of the Mara Wetlands depends on the engagement of all stakeholders, including the local community, government (village, district, regional and national), NGOs and the private sector. Awareness is also necessary for developing a better appreciation for the wetlands, its biodiversity and ecosystem services values, pressures and threats. Capacity building will target all groups, including youth, women and school children, with a view of achieving transformational change. Capacity building cuts across several sectors and multiple topics and will therefore be targeted at different strategic priority levels with a lot of focus to ensure the necessary skills required to sustainably manage the Mara Wetlands are constantly developed.

Target in five years: The capacity of local institutions, such as WUAs, develop skills in the technical, organisational, conservation and management aspects of wetland resources; awareness increased among the stakeholders on the value of biodiversity and ecosystem services of the Mara Wetlands; communication enhanced among local stakeholders in the Mara Wetlands and

in the transboundary management of the MRB; and pilot conservation programmes established in two schools.

Enabling factors: The stakeholders of the Mara Wetlands allocate resources to communication and capacity development, and existing platforms bringing together stakeholders.

Legislative support required: Strong policy and institutional frameworks bringing together stakeholders for the joint management of the MRB.

Activity 2.2 Review existing policy and institutional arrangements and legal frameworks

The Mara Wetlands is under no formal protection and its management is under the jurisdiction of the government of Tanzania, adjudicated through the local village councils. This presents a complexity when it comes to its management and conservation because in many cases, the local councils and communities lack the necessary capacity and technical know-how to reach informed decisions on land use. Multiple policies guiding the use of the wetland resources, such as potable water, agriculture and livestock, among others, are sometimes in conflict with the objectives of biodiversity conservation. It is therefore imperative to establish what the existing policies of wetland management are — including their frameworks of implementation — and assess their effectiveness in guiding the management of the wetland. It is also important to identify gaps in capacity or resources and to develop a plan for strengthening the implementation.

Target in five years: Policies on wetlands management, lands use planning and integrated water resources management reviewed in the context of Mara Wetlands.

Enabling factors: High-level political commitment by the Kenyan and Tanzanian governments, having a coordination body that can bring together different arms of government.

Legislative support required: Policies allowing stakeholders to participate in reviews and amendments of policies.

Activity 2.3 Establish clear institutional arrangements for the management and governance of the wetland resources (focusing on the Mara Wetlands in Tanzania)

The Mara Wetlands IMP is a strategy for achieving effective and sustainable management of the wetland. For this to be realised, an efficient and effective coordination mechanism that ensures that all the stakeholders are actively engaged and able to take actions is needed. Implementation of the IMP also requires the engagement of stakeholders in three districts and the active participation of other stakeholders, including NGOs, the private sector, the governments of Kenya and Tanzania government and other regional organisations, such as the LVBC, EAC and NELSAP.

Target in five years: Constitute an effective inter-sectoral platform that is representative of the Mara Wetlands that can engage with other coordination mechanism of the MRB. Hold at least three coordination meetings for the lower MRB.

Enabling factors: Joint sectoral meetings at the regional level and between Kenya and Tanzania on the MRB.

Legislative support required: Support and guidelines from the EAC on transboundary natural resource management protocol; national policies and guidelines on natural resource management.

Activity 2.4 Enhance government accountability on climate mitigation measures

Climate change is a relatively new area for public policy and is expected to have a significant impact on national economic development and directly on people's lives and livelihoods. However, at present there is limited understanding of the cost of responding to climate change. An important starting point is to identify the financial resources that the government currently spends to fund climate change-related activities and raise awareness about these initiatives. To do so, discussion on climate change needs to start engaging relevant ministries and stakeholders and climate change responses need to be coherently planned.

Target in five years: Two meetings convened per year that specifically discuss the issues of climate change and engage all relevant departments in planning for climate change adaptation and mitigation in the key districts of Mara Wetlands.

Enabling factors: Climate change reporting framework in place at regional, district and local level.

Legislative support required: Support from the regional and district offices to equip and establish the climate resource centres.

Activity 2.5 Promote the best climate change adaptation technologies in the Mara Wetlands

Climate change is an issue that communities, nations and the world have to contend with. However, the subject of climate change is not easily understood due to its multifaceted interaction with different sectors and subsequent impacts on people's livelihoods. Deforestation, which contributes to adversity of climate change is being driven by the domestic and commercial energy needs. Communities are dependent of firewood for cooking while they produce and sell charcoal commercially in the urban centres. More awareness needs to be created about climate change and the capacity of communities to adapt to climate change needs to be enhanced, including though increasing adoption of relevant technologies.

Target in five years: Increased community awareness of climate change adaptation, 20 percent of communities adopt climate change adaptation strategies and innovations.

Enabling factors: Existing technical capacity on climate change and extension support, existing government policies and plans on climate change, existing climate changes initiatives, such as smart agriculture and alternative energy sources.

Legislative support required: Strategies and plans mainstreaming climate change, law and policies providing incentives for the development and use of alternative energy sources, smart agriculture and tree planting.

Activity 2.6 Integrate and improve coordination of transboundary conservation and management of Mara Wetlands resources (building capacity to participate in MRB management)

The Mara River is a transboundary natural resource that benefits more than 1 million inhabitants within the basin. Currently, a joint transboundary management committee with representatives from the governments of Kenya and Tanzania exists but it is not effectively achieving its mandate in facilitating transboundary discussions. A proper management framework must be cognisant of that nature and need to put in place a structure that will allow for the engagement of both governments and their stakeholders in the management of the resource.

Target in five years: A functional and effective transboundary management committee in place to support the implementation of the IMP.

Enabling factors: Existing legal mechanisms for transboundary water resource management, funding mechanisms for platform and strong political support.

Legislative support: Policy support for the collection and use of data for sustainable management of the MRB, participation of LVBC and EAC in building capacity of the stakeholders and convening and facilitating transboundary management meetings.

Activity 2.7 Create awareness of natural resources and biodiversity conservation and management

Biodiversity is important to maintain life on the planet and especially to sustaining livelihoods at the local level. Thinking globally and acting locally is key to addressing global conservation. Awareness of biodiversity and natural resources conservation in the Mara is low among the stakeholders based on the results of the participatory rural appraisal exercises. Awareness of biodiversity and natural resource conservation is therefore key to influencing the attitudes and behaviour of local people towards sustainability.

Target in five years: The capacity of local institutions, such as WUAs, is developed regarding technical, organisational and management of wetland resources.

Enabling factors: Support of local government, districts and regional institutions, NGOs and civil society organisations in building conservation capacity.

Legislative support required: Policy support for strengthening community capacity and exacting mandates on local communities to manage and conserve.

Activity 2.8 Rehabilitate community information infrastructure, including community centres in villages where information is shared

Information infrastructure is an effective way of communicating in the rural setting. Communities in the Mara Wetlands have access to information through information boards strategically placed within the community in public places, including government offices and hospitals. However, most of this infrastructure is in a dilapidated state or not being used to their full capacity. Rehabilitating and maintaining this infrastructure will ensure widespread dispersion of information pertinent to the management and conservation of the Mara Wetlands.

Target in five years: Education and communication centres refurbished and established, where necessary, in at least two villages, one north of the Mara Wetlands and one south of it.

Enabling factors: Good will from public centres to maintain and update infrastructure, support from the regional and district offices to equip and refurbish existing centres and establish new resource centres that support communities with information, including climate change.

Legislative support required: Policies supporting the strengthening of community rights to information access on wetland management and conservation.

Table 14: Detailed actions on Awareness, Capacity Building and Governance Programme

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ²
Low understanding of biodiversity and ecosystem services values, inadequate capacity in conservation and management of natural resources	2.1. Enhance communication and capacity among the MRB stakeholders to support proper conservation and management of the wetland as a transboundary resource	Regional Administration; ward and village councils; farmers, livestock keepers; government extension offices; relevant districts; LVBWB; LVBC; governments of Tanzania and Kenya; NGOs; universities	Assess awareness capacity needs and design appropriate strategies and plans to address capacity gaps; design training materials; hold stakeholder awareness meetings; develop communication plans; conduct community exchange visits; review the MRB memorandum of understanding; develop educational materials; pilot two conservation school programmes in two schools (North and South Mara); establish community awareness offices in each district; build capacity on wetland management and conservation organisational management and institutional development	USD 29,545/ TSh 65 million
Lack of effective policies in guiding the management and conservation of the Mara Wetlands	2.2. Review existing policy and institutional arrangements and legal frameworks	RAS (Mara); WUAs; LVBWB; district administration and technical experts on policy analysis, conservation and natural resources management; universities; NGOs	Review and develop appropriate policies and guidelines; analyse existing policies around the wetlands and existing institutional arrangements	USD 70,455/ TSh 155 million
Inadequate implementation coordination arrangements for conservation and natural resource management of the Lower Mara Wetlands	2.3. Establish clear institutional arrangements for the management and governance of wetland resources	RAS; district administration; LVBWB; NGOs; EAC; LVBC; NELSAP; governments of Kenya and Tanzania; universities; WUAs	Conduct an institutional capacity assessment; enforce policies, laws and guidelines developed for wetland governance; hold regular MRB stakeholder meetings to establish coordination mechanisms for transboundary resources management	USD 300,000/ TSh 660 million

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ²
Limited knowledge on climate change initiatives	2.4. Enhance government accountability on climate mitigation measures	RAS; district administration, LVBWB; NGOs; EAC/LVBC; NELSAP; climate change research organisations; universities; local communities; WUAs	Hold cross-sectoral coordination meetings to enhance climate change planning, monitoring and reporting; build stakeholder capacity on good governance	USD 59,091/ TSh 130 million
Limited understanding of climate change	2.5. Promote the best climate change adaptation technologies in the Mara Wetlands	RAS (Mara); district administrations; village councils; pastoralists; livestock, fisheries and agricultural extension officers; WUA; national ministries on livestock, fisheries and agriculture	Build community awareness on climate change adaptation; promote tree planting; promote climate-smart agriculture; promote energy conservation alternatives including use of improved stoves	USD 122,727/ TSh 270 million
Weak transboundary natural resource management policies for the MRBn	2.6. Integrate and improve coordination of transboundary conservation and management of Mara Wetlands resources	RAS; district administration; government agencies; NGOs; donors; EAC; LVBC; NELSAP; governments of Kenya and Tanzania; research organisations; universities; local communities; WUAs	Strengthen the participation of local communities, including WUAs, districts, and regions in the management of the MRB; hold transboundary meetings; facilitate the participation of local stakeholder in regional strategic meetings; training on natural resources governance and management	USD 72,727/ TSh 160 million
Encroachment on wetland and destructive activities affecting biodiversity and ecosystem services	2.7. Create awareness on natural resources and biodiversity conservation and management	RAS; village councils; WUAs; local communities district administration; NGOs	Conduct institutional capacity assessment for MRB institutions; educate and sensitise stakeholders on natural resources management, ecosystem services and biodiversity conservation; assess the motivations of wetland encroachment; support enforcement of laws and by-laws	USD 70,000/ TSh 154 million

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ²
Inadequate communication on wetland management and conservation issues	2.8. Rehabilitate community information infrastructure, including community centres in villages where information is shared	District administration; ward and village councils; LVBWB; WUAs; NGOs and CBOs; local communities	Basic repair and rehabilitation of communication centres in four villages	USD 100,000/ TSh 220 million

² Here and for the following tables, exchange rate used 1 USD = 2200 TSH.

4.5.3 Sustainable Alternative Livelihood Programme

The degradation of natural resources such as forests, fisheries, papyrus and fisheries in the wetland is due to overexploitation of these resources for peoples' livelihoods and incomes. This situation is exacerbated by poverty and population growth, which are underlying causes of environmental degradation. The Sustainable Alternative Livelihood Programme has been designed to improve community livelihoods (in the agriculture, livestock and fishing sectors) with a view to enhancing the sustainable management of the Mara Wetlands. Livelihoods at the local level will be improved by enhancing income from current enterprises and diversification of income from other sustainable alternative livelihood sources. The activities that will be covered by this programme include ecosystem restoration, sustainable land management alternatives, such as fish farming, climate-smart agriculture, bee-keeping, aquaculture, tree nurseries, poultry farming, ecotourism, smart agriculture and value addition to papyrus products.

Programme objective: To reduce the pressure on wetland resources by promoting sustainable alternative livelihood strategies.

Activity 3.1 Promote ecosystem restoration and sustainable land management through tree-based business

Planting trees has multiple benefits, it reduces soil erosion, sequesters carbon, increases farm yields, provides fruits and food, mitigates climate change and provides direct income. This makes tree-based

business an effective approach to conservation. Forests and trees in the Mara Wetlands have been cleared over a long period for charcoal production and agricultural production. This has resulted in soil erosion within the catchments from increased runoff, leading to increased sedimentation of the river channel, thereby increasing flood incidence during the rainy seasons. Tree-based business will not only provide the much-needed vegetation cover within the ecosystem but also provide income for households and address conservation issues at a broad scale within the wetlands.

Target in five years: 25 percent of households in Mara Wetlands engage in sustainable tree-based business within the Mara Wetlands.

Enabling factors: Land tenure security; accessibility and availability of tools, resources and expertise on tree planting; tree product market development; research and extension.

Legislative support required: Enforcement of by-laws and national policies on wetland resource management and development of land use plans; policy incentives on tree production.

Activity 3.2 Promote sustainable fishing methods and fish farmin

In general, fishing in the Mara Wetlands is driven by domestic consumption with the surplus sold in the nearby urban market, mainly in Musoma town. Overfishing for some wetland species is common as fishermen try to meet the market demand. Specific action will include estimating the annual

fish stocks against the demand across different seasons and building the capacity of fishermen in sustainable fishing methods.

Target in five years: Develop a baseline for fish stock in the Mara Wetlands, 50 percent reduction of illegal fishing methods; 10 percent of the community adopt sustainable fishing methods and fish farming.

Enabling factors: Extension services, accessibility and availability of tools, resources and expertise on aquaculture, development of market linkages.

Legislative support required: By-laws addressing illegal fishing and policies supporting sustainable fishing at regional, national and local levels.

Activity 3.3 Promote the use of improved cooking stoves and energy saving equipment at the household level

The Mara Wetlands communities depend mostly on firewood as a source of energy and produce charcoal as a source of income. As a result, biomass resources are under growing pressure as they are continually being depleted. To address this issue, alternative energy sources should be sought and efficient household energy use should be promoted in the long-term.

Target in five years: Pilot projects on improved cooking stoves and energy saving alternatives launched within the first two years in the South and North Mara Wetlands communities and expanded to reach at least 10 percent of the households within the first five years.

Enabling factors: Household settings and technical knowledge on improved cooking stoves, acceptable costs of innovation adoption, energy efficient equipment market development, and energy use regulations.

Legislative support required: By-laws supporting alternative energy production and policies supporting sustainable energy sources development at regional and national levels.

Activity 3.4 Enhance bee-keeping and honey production

Bee-keeping and honey production is a conservation enterprise that holds promise in

many communities when it comes to sustainably managing wetlands and promoting livelihoods. Bees also provide essential ecosystem services such as pollination, which makes bee-keeping a preferred diversification from the normal livelihood source.

Target in five years: At least 3 percent of the households adopt bee-keeping as a source of income.

Enabling factors: Extension support services, access to technical capacity, and market development for bee products.

Legislative support required: By-laws supporting alternative bee-keeping and land use plans providing areas of bee-keeping and honey production.

Activity 3.5 Enhance production and sale of papyrus-based products

Papyrus has an essential role in wetlands, it provides ecosystem services such as flood control and spawning grounds for fish, but it also supports the development of papyrus products, which are used domestically and sold for income. Papyrus grows and regrows quickly. It is harvested and sun-dried before it is used for making mats, furniture, baskets and other products. The weaver communities of the Mara Wetlands are already developing some products from papyrus, but there is a lot of potential in developing their skills and diversifying their products as well as identifying markets for these products.

Target in five years: Enhancement of quality of papyrus products through market-oriented training and development; development of market linkages for papyrus products.

Enabling factors: Market development for papyrus products, access to expert knowledge on papyrus product development, regulation and legislation on use of papyrus and related products, and access to financing.

Legislative support required: By-laws supporting the use and protection of papyrus, land use plans and policy incentives supporting the production of papyrus products.

Activity 3.6 Promote ecotourism in the Mara Wetlands

Serengeti national park lies within the MRB and is one of the iconic wildlife tourism destinations in Africa, hosting many foreign and local tourists every year. The Mara Wetlands has tourism potential, especially with relation to birds, wildlife and wetlands. It would therefore important to explore the potential and put in place the necessary infrastructure that will enable communities to tap into tourism as an alternative source of income.

Target in five years: Conduct a tourism market potential assessment, identify tourism linkages and

networks, formulate tourism strategies, develop a Mara Ecotourism portal, create awareness and develop skills in ecotourism.

Enabling factors: Ecotourism circuit expansion towards the Mara Wetlands; ecotourism infrastructure; capacity of the wetlands to deliver ecotourism experience.

Legislative support required: Regulations and laws supporting tourism development.

Table 15: Detailed action on sustainable alternative livelihoods programme

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ⁵
Unsustainable felling of trees for charcoal and domestic energy	3.1. Promote ecosystem restoration and sustainable land management through tree-based business	LVBWB; RAS; TFS; Victoria Fishing and Farming Organisation (VIFAFIO); WWF; BirdLife; district administrations, ward and village councils; local communities, universities; Vi Agroforestry Project; WWF	Establish commercial tree nurseries; create awareness of agroforestry; provide training and incentives on tree planting to the local community; promote tree planting within the wetlands; create market linkages for tree seedlings and products	USD 83,182/ TSh 183 million
Increased pressures on fish stocks, overfishing and illegal fishing methods	3.2. Promote sustainable fishing methods and fish farming	RAS, district administrations; ward and village councils; LVBWB; LVBC; WUA; VIFAFIO; fishermen	Establish fish ponds; fish caging; build the local community capacity for fish farming/ entrepreneurship; create market linkages for fish products	USD 34,277/ TSh 75.3 million
Pressures on wetland and land resources	3.3. Promote the use of improved cooking stoves and energy saving equipment at household level	RAS; Tanzania Renewable Energy Association (TAREA); Mobisol Simu solar companies; NGOs; Lake Victoria Ecosystem Sustainability Network; NGOs	Build the capacity of local communities on renewable energy; training of trainers on production and marketing of energy saving stoves and biogas; promote use of solar power; support local communities to attend local and international energy exhibitions; develop skills in installation and use of energy efficient stoves and production and use of bio-briquettes	USD 40,909/ TSh 90 million

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ³
Pressures on wetland and land resources	3.4. Enhance bee-keeping and honey production	RAS; NGOs; LW-BWB; TFS; district administrations, ward and village councils; local communities, universities; Vi Agroforestry, NGOs; research institutes; WUAs	Train communities on bee-keeping; construct and install beehives for communities; establish honey processing and marketing linkages for the local community	USD 18,205/ TSh 40.05 million
Pressures on wetland and land, and low income	3.5. Enhance production and sales of papyrus-based products	LVBWB; RAS; TFS, NGOs; district administrations, ward and village councils; local communities, universities; Vi-NGOs; research institutes; WUAs	Train stakeholders on papyrus product development; provide seed funding to allow communities to access capital of investing in papyrus business; market papyrus products; support exchange visits for the communities to visit other communities where papyrus products are being produced and used	USD 23,000/ TSh 50.6 million
Pressures on wetland and land, and low income	3.6. Promote ecotourism in the Mara Wetlands	LVBWB; RAS; TFS, NGOs; district administrations, ward and village councils; local communities, universities; NGOs; WUAs; TAWIRI; TANAPA	Conduct market assessment of ecotourism potential visitor demand and industry interest; formulate landscape-level ecotourism strategy; conduct strategic environmental assessment and social impact assessment for sector development; develop Mara ecotourism portal; raise awareness of ecotourism; build community capacity to manage ecotourism around Mara Wetlands	USD 304,000/ TSh 750 million

³ Exchange rate 1 USD = 2200 TSH.

4.5.4 Water Sanitation and Hygiene Programme

Water, sanitation and hygiene are inextricably linked to well-being and development. Most households living adjacent to the Mara Wetlands do not have access to clean water and quality hygiene. The Water Sanitation and Hygiene (WASH) Programme has been designed to improve water quality, hygiene and waste management with a view of improving the well-being of people living around

the wetland. This programme will address hygiene, sanitation, waste disposal and water supply.

Programme objective: To strengthen the participation of local communities in improving water, sanitation and hygiene management.

Activity 4.1 Promote the construction and use of toilets for the communities surrounding the Mara Wetlands

Waterborne diseases such as cholera and other diarrhoeal diseases are common in the Mara Wetlands due to the lack of proper human waste disposal coupled with seasons of flooding across the wetland. This can be addressed by creating awareness and training the community on proper human waste disposal.

Target in five years: 100 percent of communities are aware of the importance of the use of toilets for human waste disposal; at least one demonstration toilet in each village for human waste disposal with an additional 16 constructed in each village in five years.

Enabling factors: Coordination at local, district and regional levels; capacity of community health workers to training in human waste management; relevant financing.

Legislative support: District by-laws and regulatory measures that support funding priorities concerning water, sanitation and hygiene, with specific emphasis on provision of public toilets for solid waste disposal.

Activity 4.2 Establish sanitation and hygiene clubs within the community

One way of achieving the Millennium Development Goals related to safe water supply, sanitation and hygiene is by providing schools with safe drinking water, improved sanitation facilities and hygiene education that encourages the development of healthy behaviours for life. Sanitation and hygiene approach in schools is therefore an important approach for inculcating healthy behaviour within the Mara Wetlands.

Target in five years: At least 50 percent of the schools in the district, both primary and secondary, are reached with messages to increase awareness of sanitation and hygiene.

Enabling factors: Coordination of WASH education at the regional level; WASH education capacity of extension workers.

Legislative support required: District council by-laws allowing the establishment of sanitation clubs in schools.

Activity 4.3 Establish domestic water supply schemes

Water supply in the Mara Wetlands is inadequate, making it difficult to improve healthcare and food security for the thousands of people living around the wetland. Most of the wetland people depend on either drawing water directly from the wetland or on community boreholes, which reach a minority population. The provision of clean potable water therefore remains necessary to achieving the WASH programme objective of this management plan.

Target in five years: 20 percent of Mara Wetlands communities have access to clean piped water within reach of their homesteads.

Enabling factors: Access to finances; joint planning meetings between the three districts (Rorya, Tarime, Butiama), institutional structures determining mechanisms of infrastructure development and water supply.

Legislative support required: Support at national and regional level including the relevant ministries to invest in developing domestic water supply schemes.

Activity 4.4 Build the capacity of community health workers

Community health workers are instrumental to providing lifesaving interventions in the community, and equipping households with essential knowledge and skills to prevent diseases by promoting good nutrition, sanitation and hygiene and linking families to essential services. They are therefore essential in providing WASH training and education to households. The current capacity to effectively deliver WASH education is unknown but needs to be assessed and strengthened.

Target in five years: 80 percent of district community health workers are trained on WASH approaches and equipped with the necessary knowledge through training of trainers sessions.

Enabling factors: Good coordination mechanism between different sectors (water, health, agriculture and environment); access to finance.

Legislative support required: Policies enhancing community right to health and hygiene access.

Activity 4.5 Develop solid waste management infrastructure

The status of solid waste management in the Mara Wetlands cannot be ascertained as most of it is available only at the urban and peri-urban centres, with most of the waste handled by individuals rather than collectively by the councils. Waste management is currently not a big issue, but it will take centre stage with the increasing population and urbanisation occurring within the three districts. It is therefore imperative to take proactive measures to ensure that systems and infrastructure are in place for the management of waste, especially for villages surrounding the wetland.

Target in five years: The three districts and 16 villages surrounding the Mara Wetlands have a clear plan for solid waste disposal that includes the integrated management of waste, sanitation and hygiene. Priority for this action will be villages where most poor households do not have solid waste disposal facilities.

Enabling factors: Effective coordination of solid waste management; understanding and acceptability of solid waste management systems and protocols; financing; public-private partnerships; public knowledge and awareness of solid waste management.

Legislative support required: Enforcement of local and district by-laws on solid waste management.

Activity 4.6 Promote hand-washing programme within the community

Hand-washing is a basic, everyday process, but it is also a skill and behaviour that must be learned as a child. As with all skills, the earlier that a child learns and incorporates the action into a routine, the more likely it is to become a lifelong habit. This is a structured approach to educating young people in the Mara Wetlands on WASH issues and inculcating positive behaviour for improved management of the wetland and its resources.

Target in five years: Establish hand-washing programmes covering 80 percent of the schools surrounding the Mara Wetlands in five years.

Enabling factors: Public-private partnerships; coordination of partners and programmes across districts; access to finance.

Legislative support required: Legislation promoting WASH approaches in schools.

Table 16: Detailed actions on WASH programme

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ⁴
Poor household sanitation, especially in districts with waterlogged soils	4.1. Promote the construction and use of toilets for the communities surrounding the Mara Wetlands	RAS, district administrations; ward and village councils; private sector; WUAs and local communities	Create awareness and provide education on construction and use of toilets for human waste disposal; design architectural plan of toilets and distribute the plans to communities; support the construction of pilot demonstration toilets in surrounding villages	USD 436,364 /TSh 960 million
	4.2. Establish sanitation and hygiene clubs within the community	RAS, district administrations; ward and village councils; private sector; WUAs and local communities	Establish school clubs and provide WASH education to the club members	USD 50,795/ TSh 111.75 million

Lack of access to potable water for drinking and domestic use	4.3. Establish domestic water supply schemes	RAS, district administrations; ward and village councils; private sector; WUAs and local communities	Community mobilisation (villagers) meetings; provide education on domestic water supply schemes, identify water sources and design appropriate water projects	USD 1,405,455/ TSh 3,092 million
Limited knowledge on community health and WASH	4.4. Build the capacity building for community health workers	District administration; ward and village councils; WUAs; schools; health centres and dispensaries; NGOs and local communities	Mobilise and provide training for community health workers on WASH	USD 38,182/ TSh 84 million
Poor waste disposal facilities	4.5. Develop solid waste management infrastructure	District administration; ward and village councils; WUAs; schools; health centres and dispensaries; NGOs and local communities	Mobilise communities and identify collection points for solid waste; construct disposal sites for solid waste management; establish cost-effective waste disposal systems	USD 498,182/ TSh 1.096 million
Limited knowledge on community health and WASH	4.6. Promote hand-washing programme within the community	District administration; ward and village councils; WUAs; schools; health centres and dispensaries; NGOs and local communities	Train stakeholders on the public construction of hand-washing facilities; install cost-effective hand-washing systems; develop and enforce by-laws that promote hand-washing	USD 90,000/ TSh 198 million

⁴ Exchange rate 1 USD = 2200 TSH.

4.5.5 Research Information and Data Needs Programme

It is clear from the historical records that the Mara Wetlands is a highly dynamic system, subject to inter- and intra-annual fluctuations in extent, and a lagged response through the wetland following seasonal rains. Basic information on the hydrology, and the connection between surface and groundwaters, is unknown. This is a major

gap in knowledge, requiring standard hydrological techniques to resolve. Modern satellite and drone technology (as used in the Mapping and Inventory report, Irvine et al. 2017) can be used in conjunction with estimates of surface and subsurface flows to map and quantify the hydrological dynamics of the wetland. The Research Information and Data

Needs Programme has been designed to empower conservation organisations to be able to collect data and conduct the necessary analysis to improve wetland management.

Programme objective: To collect and analyse information and data on regular basis to build the requisite knowledge needed for management of the Mara Wetlands.

Activity 5.1. Collate data on climate, social, hydrology and environmental aspects on the Mara Wetlands and adjacent areas

A foundation for management of any wetland is collating data on climate, geography and land use, and to initiate effective monitoring of hydrology and other key environmental and social aspects.

Collation of relevant information and new data collection requires collaboration among scientific disciplines and an accessible depository for information. For the Lower Mara, it is recommended that data needs for the wetland's management focus both on the wetland and adjacent areas. Data collected to support the wider Mara River Basin Integrated Transboundary Natural Resources Management Plan should lie within the remit of those authorities charged with the implementation of that plan. It is strongly recommended that effective and well-defined lines of communication be established between management of the upper and lower parts of the basin. To better understand the interacting effects of different land use and other pressures on the ecological character of the Mara Wetlands, greater understanding of the interplay of these factors is needed. Identifying information needs can be through collation of "expert" and "local" knowledge. Data that are likely to provide useful information for management include:

1. Land use and population densities in upper and proximate catchment, and in the Mara floodplain;
2. Measurement of seasonal extent of wetland coverage and definition of hydrogeomorphic units;
3. Estimates of seasonal water balance, including that of groundwater;

4. Estimates of seasonal loads of sediment, nutrient and harmful chemicals;
5. Assessment of livelihood activities, including livestock numbers, and income generation;
6. Climate variations over short and longer cycles;
7. Updated and fuller compendium of vegetation composition and biotic inventory;
8. Documenting the extent of invasive species; and
9. Current water abstractions and those proposed in the future that can affect water flow into the wetland.

Target in five years: Baseline developed for hydrological flow, biodiversity and ecosystem services of the Mara Wetlands, one data station rehabilitated on the MRB to enable regular data collection.

Enabling factors: Existing coordination framework for stakeholders including universities, practitioners and government to facilitate research.

Legislative support required: Policy support for collection and use of data for sustainable management of the Mara Wetlands.

Activity 5.2. Undertake specific and well-defined research studies to enhance knowledge on the functioning of the Mara Wetlands

Basic data needs to build a comprehensive understanding of the structure and functioning of the wetland can be complemented by specific and well-defined individual studies or research for better understanding of biophysical and social aspects. Together these can evaluate the ecosystem services, including the Total Economic Valuation (TEV) of the wetland and surrounding area. A rapid economic valuation of the value of ecosystem services and biodiversity has been conducted and a report produced through PREPARED project. Establishing specific research studies that should be undertaken at Mara Wetlands should be an early goal of the IMP.

Target in five years: Priority research issues—including hydrogeomorphology; ecosystem services and biodiversity and their values, importance, status and trends—are defined with clear baselines and monitoring protocols.

Enabling factors: Existing coordination framework research and development for the Mara Wetlands; capacity of universities (local and international) and NGOs to conduct the relevant studies; existing relevant platform for sharing outcomes on progress.

Legislative support required: Enforcement of laws, regulation and guidance on research and development in the Mara Wetlands.

Table 17: Wetland research priorities

Issues to be addressed	Management actions	Stakeholder involved	Specific activities	Estimated costs ⁵
General lack of data and information needed for monitoring of hydrology, environmental other social aspects	5.1. Collate data on climate, social, hydrology and environmental aspects on the Mara Wetlands and adjacent areas	RAS; NGOs; universities; district councils; village governments	Develop a baseline for eflows for the Mara Wetlands; conduct regular biodiversity surveys; social and demographic surveys; water level, quality and quantity surveys; repair data stations and reinvigorate regular data collections from them	USD 300,000/ TSh 660 million
Limited data to enhance knowledge on biodiversity and ecosystem services provided by the Mara Wetlands	5.2. Undertake specific and well-defined research studies to enhance knowledge on the functioning of the Mara Wetlands	RAS, NGO, universities, district councils, village governments	Study of the hydrogeomorphology of the Mara Wetlands; analyse status and trends of ecosystem services of the Mara Wetlands; monitor biodiversity of the Mara Wetlands	USD 360,000/ TSh 792 million

⁵ Exchange rate 1 USD = 2200 TSH.

SECTION FIVE:
CONFLICT MANAGEMENT,
COMMUNICATION AND
RESOURCE MOBILISATION



An effective institutional setting and verifiable governance is essential for the adoption and implementation of the Mara Wetlands IMP. Without this, the plan is unlikely to achieve its objectives and certainly not in an integrated way. The IMP will need to set priorities. The proposed lead organisation (RAS) will need to take ownership and develop effective and accountable mechanisms for inclusivity and communication with a large range of stakeholders and their representatives. Adoption of the IMP will require a secretariat and competent professional technical and administrative support, meeting criteria that define the knowledge and understanding of staff. An overseeing Lower Mara Management Unit could coordinate this process and develop locally relevant and consistent procedures for data compilation, analysis and reporting. An effective, locally owned enabling environment and funding structure is essential to translate plans to actions. Local action plans can be housed with the appropriate locally mandated entities. For example, it was proposed that the North Mara Community Action Plan would be housed by the North Mara WUA and the implementation of this plan would engage the village council government and the local communities in the corresponding villages.

5.1. Conflict Management

Any proposed allocation of water, or changes in land use, will raise the potential for conflicts among stakeholders, from regional to local levels. The IMP will need to develop defined and agreed mechanisms for conflict resolution. This cannot be prescribed in a draft plan but needs to be negotiated with stakeholders in an inclusive way. The mechanisms should take account of local, regional and national institutional structures.

A general view among stakeholders attending the workshops is that potential conflicts are most likely to arise from charcoal burners, village governments, farmers and livestock keepers because of shared resources and past breaches of local rules and norms. Conflicts relating to livestock keeping in the Mara Wetlands can be precipitated by the culture of the communities and a lack of

education and awareness of environmentally and economically sustainable management of land and animals. The dialogue between the WUAs and village councils and their respective remits can sometimes be misunderstood. The LVBC which has a legal mandate for the management and conservation of water resources in the Lake Victoria Basin can play an important role in conflict resolution and facilitating dialogue among the WUAs and local authorities.

5.2. Communication Strategy

The IMP requires the development of an agreed communication strategy that acts to both disseminate information and provide a platform for ongoing stakeholder dialogue and effective participation. Close liaison with upstream authorities and flow of information among institutions and different stakeholder groups is essential.

Important for any communication and participation strategy is knowing who to engage, when and how. These issues require knowledge, and scoping, of regulatory entities (and description of their accountability), allies and umbrella movements, media and the public, and opponents and critics. The IMP needs to have clearly defined and time-bound strategies for habitat management and needs to identify market and economic opportunities, and boundaries, for sustainable livelihoods, as well as social and cultural boundaries and factors that identify local stakeholders. The IMP should be accompanied by a well-defined Communication, Education and Public Awareness (CEPA) Programme as advocated by Ramsar (2007) including the use of local knowledge and awareness.

While a CEPA programme can be limited to provision of information and building awareness, it is proposed that the IMP includes more active stakeholder participation. This is anticipated to include collecting data under a citizen science monitoring programme that links with a more formalised monitoring programme. Participation of all stakeholders, as provisionally indicated in the previous chapters, should, therefore, be

demonstrably linked to development of their capacity. The setting of the Mara Wetlands merits particular attention to such a programme for capacity development of individuals and institutions, requiring a long-term vision of both the needs for technical and relational skills and competencies within the relevant institutions. This should be organised to create a network of decision makers working together for the sustainable management of the wetland.

5.3. Acquisition and Financial Management

The implementation of the IMP actions will require financial resources. It is therefore important to identify opportunities for financing and to mobilise adequate resources to key agreed objectives of the

management plan. In support of this management plan, a Conservation Investment Plan (CIP) for Mara Wetlands has been prepared as a separate document to serve as a marketing tool to mobilise conservation funds. Targeting potential donors and investors, the CIP offers a value proposition that outlines the economic returns to investing in biodiversity and ecosystem conservation and wise use in ecosystem management. This assumes that information about the value of biodiversity and ecosystem services presented in this plan will help to justify and make the case for the conservation interventions and investment packages that are proposed in the CIP and assist in better mainstreaming biodiversity priorities into government policies and budgets.

SECTION SIX: MONITORING AND REPORTING



6.1 Defining Monitoring Requirements and Trigger Signals

Ecosystem monitoring assesses the success of management objectives and guides policy, planning and interventions. It can identify possible links between pressures and impacts and act as a trigger for management actions.

Monitoring relies on the systematic collection of a data on a suite of indicators that are clearly described in a transparent manner. This requires the development of standard operating procedures (SOPs) for the selected indicators, which must be relevant to the circumstances, relatively easy to measure and cost-effective. The required attributes, as summarised by Jackson et al. (2000) and amended from UHU/UNEP (2016/in review), are:

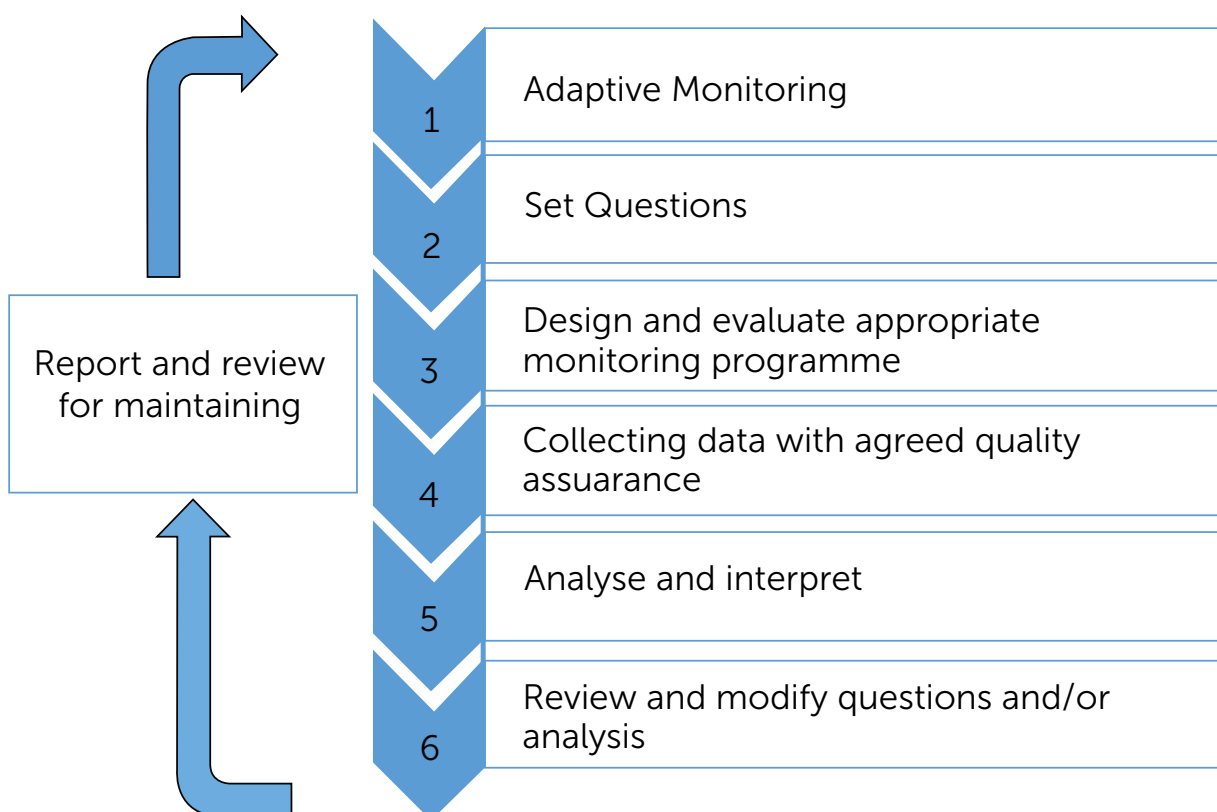
- 1: **Conceptually Relevant:** The indicator must provide information that is relevant to societal concerns about ecological condition.
- 2: **Feasible:** Adapting an indicator for use in a large or long-term monitoring programme must be feasible and practical.

3: **Responsive to variability:** It is essential to understand the components of variability in indicator results to distinguish extrinsic/irrelevant factors from a true environmental signal.

4: **Interpretation and Utility:** A useful indicator must produce results that are clearly understood and accepted by scientists, policy makers and the public (who are then ready to act upon information provided).

The monitoring and reporting of the IMP is well served by adopting an Adaptive Management and Monitoring approach that accommodates the development of objectives and is responsive to social learning. An adaptive monitoring framework (Figure 9) allows the monitoring to respond to new circumstances and knowledge, although it is important to keep in mind that consistency in monitoring allows for better comparison of site condition over time.

Figure 9: An adaptive monitoring framework (modified from UHU/UNEP, in press)



The adaptive management framework ensures that the IMP maintains relevance through a cycle of periodic reviews of monitoring, checking of quality assurance and adaptation (Pahl-Wostl et al. 2007). This necessitates meaningful dialogue and engagement with all stakeholders, from local communities to relevant tiers of government. A site as important as the Mara Wetlands would benefit from an international review and advisory board.

The ecological nature of the Mara swamp as a riverine and floodplain wetland, with associated shallow standing waters, means that methods designed for rivers, lakes and wetlands can be adapted for monitoring. Indicators used should be able to be deployed simply and effectively and be sufficiently reliable to provide at least a reasonable evaluation of a site's ecological quality. This is a particular important point for a wetland located in an area does not have readily accessible technical facilities or local expertise. In practical terms this means that any regular measurement of indicators needs to be done using locally based teams, or through remote sensing. Less frequent monitoring and field surveys can be done through contracts with national or international expertise; preferably in concert with local capacity development programmes. Combining satellite remote sensing and locally implemented information, communication and technology approach, with in situ monitoring by local agencies and citizens, complemented with targeted periodic survey of wetland habitats, could be an effective monitoring regime for the Lower Mara. However, developing such monitoring, and associated reporting protocols and agency responsibilities, will require time to set up and would need to include a programme for building effective local capacity.

Monitoring should capture both extent and quality of habitats, and socio-ecological factors. A putative baseline and initial (Phase 1) scheme for biophysical monitoring, subject to further stakeholder discussions, could comprise:

1. Monitoring seasonal extent of the wetland, floodplain and surrounding drainage areas through satellite imaging twice a year (September and March);
2. Drone-assisted site checks linked with above, following fixed transects for comparison. Additional aerial monitoring with drones can be done as circumstances require. This includes transect estimates of cover of papyrus, *Typha* and water hyacinth; and
3. Twice yearly monitoring coincident with 1 and 2 of basic water chemistry (conductivity, alkalinity, pH, turbidity, TN, Nitrate-N, TP, phosphate-P) at selected station at inflow and through main wetland channel and outlet near the Kirumi bridge.

Phase 2 could be based on further development of appropriate methods for the wetland and include monitoring of

4. Biota such as fish, birds, mammals and/or invertebrates;
5. WET-Health (Beuel et al., 2016) assessment of selected hydrogeomorphological units;
6. Development of the TESSA social-economic tool, and more extensive estimates of Rapid Economic Valuation following protocols for wetlands (Peh et al., 2013; Russi et al., 2013); and
7. Assessment of socio economics and livelihoods.

Development of local citizen science monitoring supporting these techniques can better connect local communities with the awareness of local habitats and their socioeconomic importance.

6.2 Reporting and Benchmarks for Ecological Integrity

There are two basic reasons for biophysical monitoring. The first is to identify trends over time to guide management decisions. The second is to

verify links between pressures and impact. Monitoring for the socio-ecological metrics can be done through identifying livelihoods and economic trends.

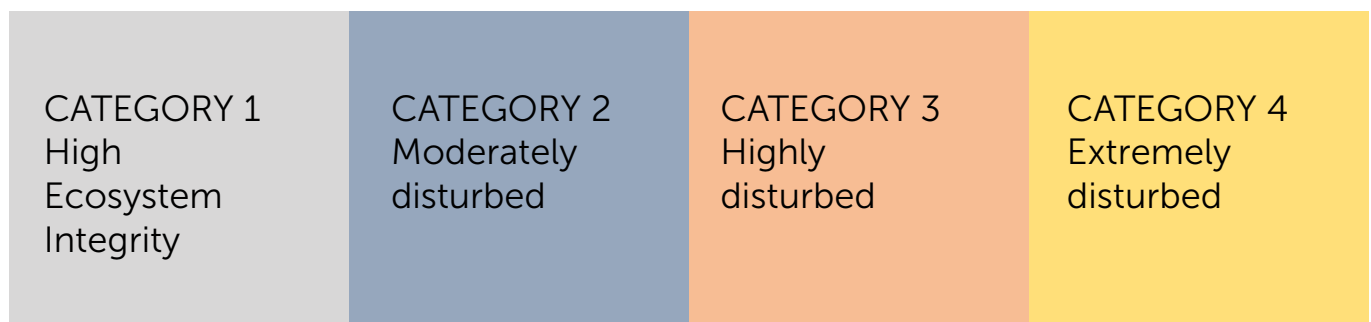
The boundaries of the Mara Wetlands naturally shift over time, and even within years, in response to hydrological inputs. Assessing the overall extent of the wetland at any given time is relatively straightforward and interpreting whether the wetland is expanding or contracting is essentially a matter of visual comparison. Basic water chemistry and hydrological monitoring is also straightforward, although interpreting the meaning of the results not always so. Assessing the quality of a wetland is more challenging as factors affecting ecosystem health within the wetland can result in different outcomes because variable and non-linear responses are possible. Similarly, relating micro- to macro-economic metrics is subject to sometimes complex and unexpected outcomes.

Interpretation of monitoring and management actions depends on measured or subjective estimates of baseline (or reference) conditions from which monitoring results are compared.

For example, the Wet-Health tool kit (Beuel et al. 2016) estimates condition of wetlands based on departure from a baseline “reference” state. The concept of reference, however, varies widely from historically un-impacted, best available in the prevailing circumstances, or anchored at the point of the initial assessment. For an extensive papyrus wetland such as the Mara that has also expanded in living memory, setting a reference state is inappropriate, although it is possible to make value judgements as an initial approach.

The UHU/UNEP international water quality guidance for aquatic ecosystems (UHU/UNEP 2016, in review) identified four main ecosystem quality categories (Figure 10), which can help broad categorisation. While using four categories with demarcated boundaries separating one state from another is subject to the risks of misclassification, it nevertheless provides a reasonable starting position for management.

Figure 10: Categories of ecosystem quality (from UHU/UNDP, in press)



From current “expert judgement”, the Mara Wetlands appears to fall within Category 2, although the surrounding land would be highly to extremely disturbed. While large areas of the wetland appear to be in generally good condition there is evidence of nutrient enrichment, and water hyacinth infestation is prevalent. Sporadic burning of papyrus is common. Importantly, large parts of the floodplains and neighbouring drainage areas are degraded, and terrestrial land that has notable impacts is immediately adjacent to the edge of (often cleared) papyrus stands.

Reporting on condition of the wetland and adjacent catchment will be a key element for monitoring the Mara Wetlands. While monitoring procedures need further development it is, nevertheless, important to commence reporting on wetland extent and condition. To assist with that it is recommended using “Report cards” that document the state of the environment, economy and human health (e.g., Dennison et al. 2007; <http://www.ehmp.org>; <http://www.watercentre.org/portfolio/rhef/project-resources/report-cards/reportcards>). These can be used as a basis of public outreach through local media, stakeholder websites and formal channels developed with local and regional authorities.

6.3 Monitoring and Evaluation Framework

The Mara Wetlands is an important component of the Mara River watershed and provides many valuable ecological, economic and social services to the communities that surround it and depend on its resources. Wetlands are usually shaped by the climate in which they exist, and shaped by the topography of the landscape, physical and

chemical characteristics, underlying geology and how they interact to support animal and plant life in that location. The monitoring and evaluation framework presented in below summarises how the management actions will be monitored to ascertain the health of the wetland over time, based on the indicators.

Figure 11: Monitoring and evaluation framework

Management actions	Indicators	Means of verification	By who	Frequency
A. Land Use and Wetland Management Programme				
1.1. Promote agroforestry to address soil erosion and land degradation	- Area under tree cover within the Mara Wetlands	GIS maps of the Mara Wetlands, district reports, WUA records, student research and theses, NGO survey reports	WUAs, District Environmental Officers (Butiama, Rorya and Tarime), RAS Mara, NGOs	Annually
1.2. Promote sustainable production and management of livestock	- Livestock carrying capacity of the wetland - Livestock stocking rates of the wetland - Number of improved livestock breeds at household level - Percentage of households that have adopted sustainable livestock production - Percentage of livestock farmers able to access livestock product market	District reports, national livestock census reports, village government reports, WUA reports, socioeconomic reports, research and theses	WUAs, village governments, DAS, RAS, NGOs, research organisations and universities	Annually
1.3. Develop land use plans	- Number of villages with land use plans - Number of land use plans implemented - Area of papyrus affected by burning over a set period	Land use planning commission reports, district reports, regional reports, NGO reports	NLUPC, village councils, WUAs, local community organisations, districts and RAS	Annually

Management actions	Indicators	Means of verification	By who	Frequency
1.4. Promote conservation of biodiversity and ecosystem services	<ul style="list-style-type: none"> - A comprehensive species list of animals, plants, fish, birds, etc. of the Mara Wetlands - A total ecosystem services assessment and economic evaluation report of the wetlands - Reduction in area of wetland covered with hyacinth; amounts and time of regrowth - Eflows assessment report; water supply; water demand 	Biodiversity study reports, university research theses, GIS spatial analysis reports, village government reports, Eflows assessment report, LVBC reports, NGO reports	DAS, WUAs, NGOs, RAS, ward and village councils and LVBC	Annually
1.5. Building community resilience to climate change	<ul style="list-style-type: none"> - Climate change studies undertaken - Amalgamated amount of rainfall water harvested - Number of households implementing climate change adaptation strategies - Number of policies supporting cross-sectoral coordination on climate change 	District reports, project reports (NGOs), WUA reports and records; district reports	WUA representatives, RAS, DAS and NGOs	Annually
1.6. Control of soil erosion, rehabilitation of soils and terracin	<ul style="list-style-type: none"> - Area of land under sustainable soil conservation practice (e.g., terraces, improved agriculture) - Number of extension workers trained on soil conservation technologies 	District reports, WUA report and records, policy analysis	District Agricultural Extension Officers, RAS (Mara)	Annually

Management actions	Indicators	Means of verification	By who	Frequency
1.7. Regulate water abstraction	<ul style="list-style-type: none"> - Eflows study report of the lower MRB including the Mara Wetlands - Percentage of stakeholders with a good understanding of integrated water resource management - Number of laws supporting PES approaches 	NGO reports, village governments meeting minutes, district government plans and reports, RAS reports, national policies on water with framework on water use and abstraction, policy analysis	NGOs, RAS, DAS, WUAs, village councils, research organisation, Ministry of Water and Irrigation, LVBWB, universities	Annually
1.8. Support sustainable fishing methods	<ul style="list-style-type: none"> - Fisheries report for the Mara Wetlands covering key parameters on fish stock and fish catch - Percentage of fishing households who have adopted sustainable fishing technologies 	Regional fisheries report, district reports, village council reports	Village governments, DAS, RAS, WUAs, fisheries department	Annually
B. Awareness Raising and Capacity Building Programme				
2.1. Enhance communication among the MRB stakeholders to support proper conservation and management of the wetland as a transboundary resource	<ul style="list-style-type: none"> - Number of awareness meetings engaging stakeholders on conservation and management of the Mara Wetlands - Percentage of households with increased awareness on the biodiversity and ecosystem services values of the Mara Wetlands - Number of exchange visits focusing on enhancing capacity on wetlands management - Number of schools with conservation awareness programmes - Number of district offices established for information sharing and awareness creation in the wetland 	Regional reports, NGO reports, district reports, district education department reports, village councils	NGOs, RAS, research institutes, LVBWB, WUAs, regional education department	Biannually

Management actions	Indicators	Means of verification	By who	Frequency
2.2. Review existing policy and institutional arrangements and legal frameworks	<ul style="list-style-type: none"> - Policies analysis on wetlands management with emphasis on Mara Wetlands undertaken - Number of joint sectoral meetings held to institute a legal framework for management with the MRB 	Regional and national meeting agendas, minutes and reports focusing on the Mara Wetlands, LVBWB meeting reports, RAS reports, DAS reports, regional wetlands and natural resources policy analysis report	LVBWB/ EAC, RAS, WUAs, district administration, policy analysts, universities, NGOs	Biannually
2.3. Establish clear institutional arrangements for the management and governance of wetland resources	<ul style="list-style-type: none"> - Institutional capacity assessment outlining the strengths and gaps to effective management of the MRB resources that have been conducted - Number of joint stakeholder meetings held to discuss the coordination of the Mara Wetlands resources 	Regional reports, NGO reports, regional Institution reports (LVBC, EAC, NELSAP), student theses	LVBC/EAC, RAS, WUAs, NGOs	Annually
2.4. Enhance government accountability on climate mitigation measures	<ul style="list-style-type: none"> - Number of stakeholder meetings focusing on enhancing governance structures accountability on climate adaptation and mitigation - Number of joint sectoral meetings held to integrate wetland management and conservation planning in response to climate change 	Regional reports, RAS and DAS meeting minutes and reports, NGO reports	RAS, WUAs, village government, NGOs LVBWB, national government focal ministry on climate change	Annually

Management actions	Indicators	Means of verification	By who	Frequency
2.5. Promote the best climate change adaptation technologies in Mara Wetlands	<ul style="list-style-type: none"> - Number of people trained on climate change issues and adaptation - Percentage of households aware of climate change and the prerequisite adaptation strategies - Percentage of households in the Mara that have adopted climate change adaptation technologies and innovations 	Regional reports, district reports, NGO reports, national climate change reports	WUAs, NGOs, DAS, RAS, village councils, national climate change focal ministry	Annually
2.6. Integrate and improve coordination of transboundary conservation and management of Mara Wetlands resources	<ul style="list-style-type: none"> - Number of meetings convened by the transboundary management committee of the MRB - Number of stakeholders trained on transboundary natural resource management 	Transboundary management meeting minutes, NGO reports, regional reports, district report, LVBC and EAC reports and meeting minutes	RAS, DAS, LVBWB, LVBC/EAC, governments of Kenya and Tanzania	Biannually
2.7. Creation of awareness on natural resources and biodiversity conservation and management	<ul style="list-style-type: none"> - Number of stakeholders sensitised to natural resources management ecosystem services and biodiversity conservation - Institutional capacity assessments carried out - Number of wetlands encroachment incidences recorded annually 	Regional reports, district training reports, NGO reports, RAS reports, WUA reports and assessment reports	RAS, DAS, village governments, WUAs, NGOs	Biannually
2.8. Rehabilitate community information infrastructure including community centres in villages where information is shared	<ul style="list-style-type: none"> - Number of villages with refurbished information infrastructure 	District reports, village council reports, NGOs, RAS report and WUA reports, NGO reports	RAS, DAS, village governments, WUAs, NGOs	Annually

Management actions	Indicators	Means of verification	By who	Frequency
C. Sustainable Alternative Livelihood Programme				
3.1. Promote ecosystem restoration and sustainable land management through tree-based business	<ul style="list-style-type: none"> - Number of households sensitised to and trained on agroforestry - Number of tree nurseries established in the three districts - Number of households who have adopted agroforestry practices - Area under tree cover within the Mara Wetlands - Percentage of household income generated from tree-based business 	WUA reports, village government reports, regional reports, district reports, NGO reports	RAS, DAS, WUA, village governments	Annually
3.2. Improved sustainable fishing methods and fish farming	<ul style="list-style-type: none"> - Number of households that have fish ponds - Number of households using fish caging technology - Number of households with knowledge and capacity for fish farming options - Percentage of household income generated from fish farming 	Regional fisheries report, District reports, regional reports, village reports, NGO reports	Village governments, VIFAFIO, DAS, RAS, WUAs	Annually
3.3. Promote the use of improved cooking stoves and energy saving equipment at household level	<ul style="list-style-type: none"> - Number of households who have received training on production and use of alternative energy sources - Number of households who have adopted improved cooking stoves and renewable sources of energy - Number of trainers trained on production and marketing of energy saving stoves - Number of households who have adopted solar power technology 	WUA reports, village government reports, district reports, NGO reports	RAS, DAS, WUA, village councils	Annually

Management actions	Indicators	Means of verification	By who	Frequency
3.4. Enhance bee-keeping and honey production	<ul style="list-style-type: none"> - Number of households trained on bee-keeping production technology - Number of households who have adopted bee-keeping technology - Percentage of household income from bee-keeping 	Regional reports, district reports, NGO reports, WUA reports, village council reports	RAS, DAS, WUA, NGOs, LVBWB	Annually
3.5. Enhance production and sales of papyrus-based products	<ul style="list-style-type: none"> - Number of households trained on improved papyrus product production - Number of households making improved products from papyrus - Number of households with access to capital to enhance papyrus product business - Number of people who have participated in exchange visits to learn about papyrus product production 	WUA reports, village government reports, district reports	RAS, DAS, WUA, village governments	Annually
3.6. Promote ecotourism in the Mara Wetlands	<ul style="list-style-type: none"> - Number of assessments conducted - Number of tourism strategies and plans developed - Ecotourism strategy for Mara Wetlands - Number of households trained on ecotourism enterprises development and management - Percentage of household income generated from ecotourism - Number of visitors visiting the wetland area annually - Existence of an ecotourism portal for the Mara Wetlands 	Tourism reports, strategies and plans; village committee reports; NGO reports; district reports; research and survey reports; national statistics on tourism	RAS, DAS, WUA, village government, NGOs	Annually

Management actions	Indicators	Means of verification	By who	Frequency
D. Water Sanitation and Hygiene Programme				
4.1. Promote construction and use of toilets for the communities surrounding the Mara Wetlands	<ul style="list-style-type: none"> - Number of households aware of how to construct and use toilets for human waste disposal - Percentage of households who have constructed and use toilets for human waste disposal - Number of demonstration toilets in villages 	Training reports, regional reports, WUA reports, village council reports, district reports, NGO reports	RAS, DAS, WUAs, village governments, NGOs	Annually
4.2. Establish sanitation and hygiene clubs within the community	<ul style="list-style-type: none"> - Number of schools with active sanitation and hygiene clubs 	School activity reports, district reports, village government reports, NGO reports	RAS, DAS, WUA, NGOs, village governments, LVBC reports, school heads	Biannually
4.3. Establish domestic water supply schemes	<ul style="list-style-type: none"> - Number of households with access to clean potable water 	District reports; village government reports and meetings minutes; NGO reports	RAS, DAS, WUA, NGOs, village governments, LVBC reports	Biannually
4.4. Build the capacity of community health workers	<ul style="list-style-type: none"> - Number of village workers with the capacity to train and build community capacity on WASH 	Training reports, district reports, NGO reports, regional meeting reports, Community Health Workers extension reports	RAS, DAS, WUAs, village governments, NGOs	Biannually
4.5. Develop solid waste management infrastructure	<ul style="list-style-type: none"> - Solid waste management strategy - Number of solid waste management sites development - Number of households who are aware of and are using of solid waste management infrastructure 	District reports, village government reports and meetings minutes, NGO reports, regional reports	RAS, DAS, WUA, NGOs, village governments, LVBC reports	Biannually

Management actions	Indicators	Means of verification	By who	Frequency
4.6. Promote hand-washing programme within the community	<ul style="list-style-type: none"> - Number of people aware of and actively participating in hand-washing programme - Number of trainings provided on hand-washing within the community - Number of hand-washing facilities available and accessible 	Training reports, sanitation project implemented, WUA reports, village government reports, District reports, NGO reports	RAS, DAS, WUAs, village governments, NGOs, Ministry of Health	Biannually
E. Research Information and Data Needs Programme				
5.1. Collate data on climate, social, hydrology and environmental aspects on the Mara Wetlands and adjacent areas	<ul style="list-style-type: none"> - Eflows report of the Mara basin including the Mara Wetlands - Baseline reports completed on river and wetlands studies, including hydrology 	Regional reports, district reports, student thesis, scientific publications, research projects reports, publications, socioeconomic survey reports	RAS, DAS, universities, LVBWB, NGOs	Annually
5.2. Undertake specific and well-defined research studies to enhance knowledge on the functioning of the Mara Wetlands	<ul style="list-style-type: none"> - Number of studies and assessments (hydrogeomorphology, ecosystem and biodiversity) conducted 	Regional reports, district reports, student theses, scientific publications, research projects reports, publications	RAS, DAS, universities, LVBWB, NGOs	Annually

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ANNEX 1: List of Participants at the Workshops that Agreed on the Outline and Validation of the Lower Mara Integrated Management Plan

Interagency Technical Committee held on the 28th February 2017 at Afrilux Hotel Musoma

No.	Name	Title	Institution
1	Ngoda Ahmad	Project Officer	Nile Basin Initiative–NELSAP
2	Jamal Baruti	Zonal Coordinator-Lake Zone	National Environmental Management Council
3	Edgar Rwezaura	District Natural Resources Officer	Rorya District Council
4	Ken Mwathe	Policy and Advocacy Coordinator	Birdlife International
5	Kedmon Chipanyanga	District Land and Natural Resources Officer	Butiama District Council
6	Adah Waigama	Intern	World Wildlife Fund for Nature (WWF)–Musoma
7	Siproza Charles	Chairperson	North Mara Water Users Association
8	Nindi Stephen	Director General	National Land Use Planning Commission
9	Ogoma Mangasa	Ag. Basin Water Officer	Lake Victoria Basin Water Board
10	Nawabu Stanley	Regional Natural Resources Officer	Mara Regional Administrative Secretary
11	Ken Irvine	Professor	UNESCO–IHE
12	Emmanuel Mgimwa	Project Officer	Birdlife International
13	Ademola Adjagbe	Head of Conservation and Policy Team	Birdlife International
14	Chris Magero	Project Manager	Birdlife International
15	Joseph Ouko	Office Resource Centre Officer	Birdlife International
16	Chelsea Keyser	Deputy Chief of Party	PREPARED USAID Project (Observers)

Absent with Apologies: Tarime District Council

First IMP Drafting Meeting held on 1st March 2017 at Afrilux Hotel Musoma

No.	Name	Title	Institution
1	Jamal Baruti	Zonal Coordinator	National Environment Management Council
2	Edgar Rwezaura	District Natural Resources Officer	Rorya District Council
3	Kedmon Chipanyanga	District Land & Natural Resources Officer	Butiama
4	Mwita M. Mtongori	Councillor – Tarime District	Kisumwa Ward
5	Siproza Charles	Local Community Representative	Mara Wetlands
6	Nindi Stephen	Director General	National Land Use Planning Commission
7	Ogoma Mangasa	Acting Basin Water Officer	Lake Victoria Basin Water Board
8	Nawabu Stanley	Regional Natural Resources Officer	Mara Regional Administrative Secretary
9	Kawaki Marwa	Councillor	Buswahili Ward
10	Jonas M. Mwita	Councillor	Bukabwa Ward
11	Martha Mahule	District Environment Management Officer	Tarime District Council
12	Leonce Bartazari	Councillor	Tarime District Council
13	Steven Gibai	Councillor	Tarime District Council
15	Cornel Missana	Laboratory Manager	Water Quality Laboratory-Musoma
16	Mathew Gamble	Volunteer	Project Concern International–Tanzania
17	Geoffrey Magomere	Hydrogeological Officer (HGO)	Lake Victoria Basin Water Board–Musoma
18	Kenneth Irvine	Chair of Aquatic Ecosystems	UNESCO–IHE
19	Edwin Hes	Lecturer	UNESCO–IHE
20	Chris Magero	Important Bird Area Programme Manager	Birdlife International
21	Ademola Ajagbe	Head of Conservation and Policy Team	Birdlife International
22	Emmanuel Mgimwa	Project Officer	Birdlife International
	Ken Mwathe	Policy and Advocacy Coordinator	Birdlife International
23	Joseph Ouko	Office Resource Officer	Birdlife International
25	Alloyce Hepelwa	Consultant	University of Dar es Salaam
26	Chelsea Keyser	Deputy Chief of Party	PREPARED Project (Observers)
27	Frednand Ngekela	Secretary	–

Absent with Apologies:

Global Resources Alliance-Musoma

First IMP Drafting Meeting held on 2nd March 2017 at Afrilux Hotel Musoma

No.	Name	Title	Institution
1	Jamal Baruti	Zonal Coordinator	National Environment Management Council
2	Edgar Rwezaura	District Natural Resources Officer	Rorya District Council
3	Kedmon Chipanyanga	District Land & Natural Resources Officer	Butiama District
4	Mwita M. Mtongori	Councillor – Tarime District	Kisumwa Ward
5	Siproza Charles	Local Community Representative	Mara Wetlands
6	Nindi Stephen	Director General	National Land Use Planning Commission
7	Ogoma Mangasa	Acting Basin Water Officer	Lake Victoria Basin Water Board
8	Nawabu Stanley	Regional Natural Resources Officer	Mara Regional Administrative Secretary
9	Kawaki Marwa	Councillor	Buswahili Ward
10	Jonas M. Mwita	Councillor	Bukabwa Ward
11	Martha Mahule	District Environment Management Officer	Tarime District Council
12	Leonce Bartazari	Councillor	Tarime District Council
13	Steven Gibai	Councillor	Tarime District Council
14	Cornel Missana	Lab. Manager	Water Quality Laboratory-Musoma
15	Geoffrey Magomere	Hydrogeological Officer (HGO)	Lake Victoria Basin Water Board – Musoma
16	Ken Irvine	Professor	UNESCO-IHE
17	Edwin Hes	Lecturer	UNESCO-IHE
18	Chris Magero	Important Bird Area Programme Manager	Birdlife International
19	Emmanuel Mgimwa	Project Officer	Birdlife International
20	Alloyce Hepelwa	Consultant	University of Dar es Salaam
21	Chelsea Keyser	Deputy Chief of Party	PREPARED Project (Observers)
22	Frednand Ngekela	Secretary	–

Absent with Apologies:

Global Resource Alliance (GRA) – Musoma
Project Concern International – Musoma

**Participants at North Mara Participatory Rural Appraisal Validation Workshop,
held at Komaswa Ward Council Office, Tarime District Mara, 26th April 2017**

	Name	Institution/ organization	Title/ position
1	Neema Ibamba	Mara RAS Office	Regional Community Development Officer (RCDO)
2	Martha Mahule	Tarime District	District Environmental Management Officer (DEMO)
3	Isack James	Rorya District	Ag. District Natural Resource Officer
4	Joseph N. Nyandoro	Rorya District	Ward Executive Officer (WEO)
5	Juma Wambura	Rorya District	Chairperson
6	Divina L. Kaholwe	Rorya District	Village Executive Officer (VEO)
7	Tereza C. Wandwe	Rorya District	Secretary
8	Halima John M.	Nkerege Village	Chairperson
9	Getruda Jemsi	Rorya District	Farmer
10	Paulo Maganga	Rorya District	Chairperson
11	Grace Daniel	Rorya District	Farmer
12	Esther Kachwele	Tarime District	Village Executive Officer (VEO)
13	Samwell Magoma	Rorya District	Village Executive Officer (VEO)
14	James Maseke	Rorya District	Chairperson
15	Ryoba Matiko	Bisarwi Village	Chairperson
16	Chacha Ibrahimu	Tarime District	Chairperson
17	Flora Fabian	Bisarwi Village	Farmer
18	Abel C. Choggo	Bisarwi Village	Village Executive Officer (VEO)
19	Esther Nyaonge	Bisarwi Village	Chairperson
20	Lucas Magige	Nyamrambaro Village	Chairperson
21	Peter Lucas	Surubu Village	Farmer and Livestock Keeper
22	Tabora Machera	Surubu Village	Chairperson
23	James K. Senso	Surubu Village	Village Executive Officer (VEO)
24	Juma L. Mugonya	Kembwi Village	Village Executive Officer (VEO)
25	Chacha Mgerwa	Nkerege Village	Chairperson

Participants at North Mara Participatory Rural Appraisal Validation Workshop,
held at Komasa Ward Council Office, Tarime District Mara, 26th April 2017

26	Marwa J. Rubago	Kiore Ward	Councillor
27	Charles Ernest	Nkerege Village	Secretary
28	Paulo Mnyasa	Nkerege Village	Farmer
29	Godfrey M. Sagwe	Nyanchabakenye Village	Chairperson WUA
30	Paul Zacharia	Nyanchabakenye Village	Livestock Keeper
31	Chacha Mwita	Kwibuse Village	Chairperson
32	Julius K. Maswe	Kwibuse Village	Secretary WUA
33	Samwel J. Ngocho	Kembwi Village	Chairperson WUA
34	Nyakorema Ngocho	Kembwi Village	WUA Member
35	Thomas M. Matiko	Kembwi Village	Secretary
36	Ibrahimu W. Chacha	Kembwi Village	Chairperson (V.C.)
37	Kulugetela N. Mapesa	Nyanchabakenye Village	Village Executive Officer (VEO)
38	George Sorongai	Surubu Village	Chairperson WUA
39	Magoto Msamba	Nyamarambaro Village	Chairperson
40	Chacha Muniko	Kiore Ward	Ward Executive Officer (WEO)
41	Allexm. Chacha	Nkerege Village	Village Executive Officer (VEO)
42	James Okumu Khan	Marasibora Village	Chairperson WUA
43	Ibrahimu Wambura	Nyamarambaro Village	Secretary North Mara WUA
44	Rose L. Leonard	Manga Village	Ward Executive Officer (WEO)
45	Siproza Charles	Marasibora Village	Chairperson North Mara WUA
46	Chacha N. Magonka	Surubu Village	Secretary WUA
47	Ryabala S. Maira	Komaswa Ward	Ward Executive Officer (WEO)
48	Phinias M. Maganya	Nyamarambaro Village	Papyrus Harvester
49	John Ngawambala	Lake Victoria Basin Water Board – Musoma Office	Community Development Officer (CDO)
50	Emmanuel Mгимwa	Birdlife International	Project Officer
51	Enock Kawira	Birdlife International	Project Officer

ANNEX 2: Mammals and Birds Observed or Reported in the Mara Wetlands

Species/common name	Scientific name	Family	Status
Common Quail	<i>Coturnix</i>	Fasiamidae	Rare
Scaly Francolin	<i>Francolinus squamatus</i>	Fasiamidae	Rare
Black faced sandgrouse	<i>Pterocles decoratus</i>	Pterochididae	Rare
Chestnut-bellied sandgrouse	<i>Pterocles exustus</i>	Pterochididae	Rare
Speckled pigeon	<i>Columba guinea</i>	Columbidae	Rare
Namaqua Dove	<i>Oera capensis</i>	Columbidae	Common
Ring-necked dove	<i>Streptopelia semitorquata</i>	Columbidae	Rare
Red-eyed Dove	<i>Streptopelia semitorquata</i>	Columbidae	
Emerald-spotted wood dove	<i>Turtur chalcospilos</i>	Columbidae	Resident
Tamborone dove	<i>Turtur tympanistria</i>	Columbidae	Rare
Fisher's love bird	<i>Agapornis fischeri</i>	Psittacidae	E/ED, P
White-browed Coucal	<i>Centropus superciliosus</i>	Centropidae	B
Little swift	<i>Apus affinis</i>	Apopidae	B
White-rumped swift	<i>Apus caffer</i>	Apopidae	Rare
Speckled mousebird	<i>Colius striatus</i>	Coliidae	BP
Malachite Kingfisher	<i>Alcedo cristata</i>	Alcedinidae Halcyon	Common
Striped Kingfisher	<i>Halcyon chelicuti</i>	Alcedinidae Halcyon	Rare
Chestnut-billed kingfisher	<i>Halcyon leucocephala</i>	Alcedinidae Halcyon	Rare
Mangrove Kingfisher	<i>Halcyon senegaloides</i>	Alcedinidae Halcyon	Rare
White-throated bee-eater	<i>Merops albicollis</i>	Merosidae	AM
Eurasian Bee-eater	<i>Merops apiaster</i>	Merosidae	NM
Little Bee-eater	<i>Merops pussilus</i>	Merosidae	Rare
Fischer's Sparrow Lark	<i>Eremopterix leucopareia</i>	Alaudidae	Common
Flappet Lark	<i>Mirafraga rufocinnamomea</i>	Alaudidae	Common
Mosque Swallow	<i>Hirundo senegalensis</i>	Hirundinidae	Rare
Lesser-striped swallow	<i>H. abyssinica</i>	Hirundinidae	Common
Red-rumped Swallow	<i>H. daurica</i>	Hirundinidae	Resident
Black rough-winged Swallow	<i>Psaldoprocne orientalis</i>	Hirundinidae	Resident
African pipit	<i>Arthus cinnamomeus</i>	Moracilidae	Resident
Yellow-throated Long claw	<i>Macronyx croceus</i>	Moracilidae	Common
African Pied wagtail	<i>Motacilla aguimp</i>	Moracilidae	Resident
Grey wagtail	<i>Motacilla cinerea</i>	Moracilidae	Rare
Yellow wagtail	<i>Motacilla flava</i>	Moracilidae	NM
Golden pipit	<i>Tmetothylacus tenellus</i>	Moracilidae	Resident
Little Green bulbul	<i>Andropadus virens</i>	Pycnonotidae	Rare
Dark-caped bulbul	<i>Pycnonotus tricolor</i>	Pycnonotidae	BP
White-browed scrub robin	<i>Cercotrichas leucophrys</i>	Turdidae	Rare
White-browed Robin Chat	<i>Cossypha heuglini</i>	Turdidae	Rare
Rupells Robin Chat	<i>Cossypha semirufa</i>	Turdidae	Rare

ANNEX 2: Mammals and Birds Observed or Reported in the Mara Wetlands

Species/common name	Scientific name	Family	Status
Capped Wheatear	<i>Oenanthe pileata</i>	Turdidae	Rare
Marsh Warbler	<i>Acrocephalus palustris</i>	Silviidae	Common
Papyrus yellow warbler	<i>Chloropeta gracilirostris</i>	Silviidae	Resident
Singing Cisticola	<i>Cisticola cantans</i>	Silviidae	Resident
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	Silviidae	Common
Silver Bird	<i>Empidonis semipartitus</i>	Muscicapidae	Resident
Dusky Flycatcher	<i>Muscicapa adusta</i>	Muscicapidae	Rare
Beautiful Sunbird	<i>Cinnyris pulchellus</i>	Nectariniidae	Resident
Long-tailed Fiscal Shrike	<i>Lanius cabanisi</i>	Liniidae	Common
Common Fiscal Shrike	<i>Lanius collaris</i>	Liniidae	Resident
Red-backed Shrike	<i>Lanius collurio</i>	Liniidae	NM
Black-headed Gonolek	<i>Laniarius erythrogaster</i>	Malaconotidae	B
Three Streaked Tchagra	<i>Tchagra jamesi</i>	Malaconotidae	B
White-crowned Shrike	<i>Eurocephalus ruppelli</i>	Prionopidae	Rare
Fork tailed Drongo	<i>Dicrurus adsimilis</i>	Discruvidae	Common
Pied Crow	<i>Corvus albus</i>	Corvidae	Common
Wattled Starling	<i>Creatophora cinerea</i>	Sturnidae	Resident
Blue-eared Starling	<i>Lamprotornis chalybaeus</i>	Sturnidae	Resident
Grey-headed Sparrow	<i>Passer griseus</i>	Passevidae	common
Grey-headed Social Weaver	<i>Pseudonigrita arnaudi</i>	Passevidae	Rare
Baglafaecht weaver	<i>Ploceus baglafaecht</i>	Ploceidae	Rare
Village (black faced) weaver	<i>Ploceus cucullatus</i>	Ploceidae	Resident
Yellow Bishop	<i>Euplectes capensis</i>	Ploceidae	B P
Zanzibar Red Bishop	<i>Euplectes nigroventris</i>	Ploceidae	Resident
Parasitic Weaver	<i>Anomalospiza imberbis</i>	Ploceidae	Resident
Straw-tailed Whydah	<i>Vidua fischeri</i>	Viduidae	Common
Pin-tailed Whydah	<i>Vidua macroura</i>	Viduidae	Resident
Broad-tailed Paradise Whydah	<i>Vidua obtusa</i>	Viduidae	Common
African Firefinch	<i>Lagonosticta rubricata</i>	Estrildidae	Rare
Red-cheeked Cordonbleu	<i>Uraeginthus bengalus</i>	Estrildidae	Common
Purple Grenadier	<i>Uraeginthus ianthinogaster</i>	Estrildidae	Common
Bronze Mannikin	<i>Lonchura cucullata</i>	Estrildidae	Common
East African Citril	<i>Serinus hypostictus</i>	Fringillidae	Common
Fischer's Lovebird	<i>Agapornis fischeri</i>		
CORMORANTS & DARTERS			
Long-tailed Cormorant	<i>Phalacrocorax africanus</i>	Phalacrocoracidae	Common
African Darter	<i>Anhinga rufa</i>	Anhingidae	Rare
HERONS & EGRETS			
Grey Heron	<i>Ardea Cinerea</i>	Ardeidae	Resident

ANNEX 2: Mammals and Birds Observed or Reported in the Mara Wetlands

Species/common name	Scientific name	Family	Status
Black-headed Heron	<i>Ardea melanocephala</i>	Ardeidae	Resident
Squacco Heron	<i>Ardeola ralloides</i>	Ardeidae	Resident
Yellow-billed Egret	<i>Egretta intermedia</i>	Ardeidae	Resident
Little Egret	<i>Egretta garzetta</i>	Ardeidae	Resident
Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	Resident
Great White Egret	<i>Egretta alba</i>	Ardeidae	Resident
STORKS			
Yellow-billed Stork	<i>Mycteria ibis</i>	Ciconiidae	Resident
Abdim's Stork	<i>Ciconia abdimii</i>	Ciconiidae	Resident
White Stork	<i>Ciconia</i>	Ciconiidae	NM
Saddle-billed Stork	<i>Ephippiorhynchus senegalensis</i>	Ciconiidae	ENDAN
Marabou Stork	<i>Leptoptilos crumenifer</i>	Ciconiidae	Resident
Black Stork	<i>Ciconia nigra</i>	Ciconiidae	Resident
IBISES, SPOONBILLS & HAMERKOPS			
Sacred Ibis	<i>Threskiornis aethiopicus</i>	Threskiornithidae	AN/NM
Hadada Ibis	<i>Bostrychia hagedash</i>	Threskiornithidae	Resident
Glossy Ibis	<i>Plegadis falcinellus</i>	Threskiornithidae	Resident
African Spoonbill	<i>Platalea alba</i>	Threskiornithidae	Resident
Hamerkop	<i>Scopus umbretta</i>	Threskiornithidae	Resident
CRANES			
Grey-crowned Crane	<i>Balearica regulorum</i>	Gruidae	ENDAN
FITFOOT & JACANAS			
African Jacana	<i>Actophilornis africanus</i>	Jacanidae	Resident
RAILS, GALLINULES & COOTS			
Black Crake	<i>Amaurornis flavirostra</i>	Rallidae	Resident
WADERS (SHORE BIRDS)			
Long-toed Lapwing	<i>Vanellus crassirostris</i>	Charadriidae	Resident
Wattled Plover	<i>Vanellus senegallus</i>	Charadriidae	Resident
Black-smith Lapwing	<i>Vanellus armatus</i>	Charadriidae	Resident
Crowned Lapwing	<i>Vanellus coronatus</i>	Charadriidae	Resident
Common Sandpiper	<i>Actitis hypoleucos</i>	Scolopacidae	Resident
BIRDS OF PREY (RAPTORS)			
Osprey	<i>Pandion haliaetus</i>	Pandionidae	Resident
African Fish Eagle	<i>Haliaeetus vocifer</i>	Accipitridae	Resident
Bateleur	<i>Terathopius ecaudatus</i>	Accipitridae	Resident
Martial Eagle	<i>Polemaetus bellicosus</i>	Accipitridae	Resident
Black (yellow-billed) Kite	<i>Milvus aegyptius</i>	Accipitridae	NM/AM
Black-Headed Gonolek	<i>Laniarius erythrogaster</i>	Malaconotidae	Resident
Papyrus yellow warbler	<i>Chloropeta gracilirostris</i>	Acrocephalidae	Resident





