UNITED REPUBLIC OF TANZANIA

GUIDELINES FOR SUSTAINABLE MANAGEMENT OF WETLANDS

VICE-PRESIDENT'S OFFICE **2014**

PREFACE

The government of Tanzania is highly concerned with management of wetland hence its full commitment to ensure that are effectively conserved. In our country wetlands are known to be nature's water store on land. Almost 95% of all water on land providing vital ecosystems support services for humans, wildlife and livestock is stored in wetlands. Wetlands store the water and maintain perennial stream and river flows. Without wetlands, rivers and streams would drain all run-offs to the sea and dry up rapidly. Without wetlands there would be no water, no wildlife, no irrigation, no tourism, no power, no economy, thus no life.

It is important to note that although wetlands make up less than10% of land area, they are extremely valuable to the society. Wetlands can decrease flooding, remove pollutants from water, recharge groundwater, protect shorelines, provide habitat for wildlife and serve important recreational and cultural functions. Formulation of these Guidelines for Sustainable Management of Wetlands in Tanzania has been motivated by the realization of the importance of wetlands in providing critical life support services as mentioned above. The need for wetland management is absolutely important. However, in spite of the important roles they play they are generally considered as wastelands, unsustainably managed, taken for granted and undervalued, severely encroached and over-abstracted. In addition wetlands are fragile and are among the most vulnerable ecosystems susceptible to climate change. The extent to which wetlands are currently being exploited, it is evident that they are being degraded and disappearing very fast. This is mainly due to inadequate guidelines on how to manage them in a sustainable manner. The challenge, therefore, is to ensure sustainable management of wetlands by striking a balance between utilization and conservation.

To bridge the gap of inadequate guidelines the government has embarked on the preparation of guidelines for Sustainable Management of Wetlands as provided for by the Environmental Management Act (2004) Section 56, Subsection (5) which states that "The Minister in consultation with other sector ministries may make regulations and guidelines on sustainable management of wetlands protected under this Act".

It is, therefore my expectation that, these guidelines will go a long way in outlining and enhancing the appropriate path in managing our wetlands sustainably for the present and future generations of Tanzania.

Hon, Eng. Dr. Binilith S. Mahenge (MP)
Minister of State, Environment - Vice President's Office

DEFINITIONS OF KEY TERMINOLOGIES AND CONCEPTS

Agreement: This is an arrangement that is accepted by all parties to a transaction.

Auditing: This is a formal, systematic and disciplined approach designed to evaluate and improve the effectiveness of processes and related controls. Auditing is governed by professional standards, completed by individuals independent of the process being audited and normally performed by individuals with one of several acknowledged certifications. Objectivity in governance reporting is the benefit of in dependence.

Evaluation: This is a rigorous, scientifically based collection of information about program/intervention activities, characteristics, and outcomes that determine the merit or worth of the program /intervention. Evaluation studies provide credible information for use in improving programs /interventions, identifying lessons learned, and informing decisions about future resource allocation.

***Guideline*:** Aims to streamline particular processes according to a set routine or sound practice.

Indicator: This is a quantitative or qualitative variable that provides a valid and reliable way to measure achievement, assess performance, or reflect changes connected to an intervention.

Integrated management: This is a combination of physical, technical, administrative, and legal practices relating to wetland in a manner designed to increase combined benefits or achieve a more equitable apportionment of benefits from both sources.
Inventory: A complete list of items such as property, goods in stock, or the contents of a wetland.

Wetland Management: Wetland management generally involves activities that can be conducted with, in, and around wetlands, both natural and man-made, to protect, restore, manipulate, or provide for their functions and values.

Monitoring: To observe, supervise, or keep under review; to measure or test at intervals, especially for the purpose of regulation or control, or to check or regulate the technical quality of something.

Ramsar Convention: The Ramsar Convention (formally, the Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilization of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their

economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.

Reconnaissance survey: This is an examination of all or part of an area accomplished in sufficient detail to make generalizations about the types and distributions of resources that may be present" within a given project area. Reconnaissance surveys represent a type of field survey that is often used to gather initial information regarding the presence or absence of resources within an area.

Stakeholder: individual, group or organization that has interest, share or concern in a given wetland. Any decision/action on wetland can affect or be affected by stakeholder.

***Sustainable utilization*:** Sustainable utilization is defined as "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations".

***Trans-boundary wetlands*:** These are wetlands that straddle one or more borders between states, sub-national units such as provinces and regions, autonomous areas of water and/or areas beyond the limit of national sovereignty or jurisdiction, whose constituent parts are especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed cooperatively through legal or other effective means'. Trans-boundary wetlands main elements include: transcending administrative boundaries, and in particular national borders between sovereign states; dedication to the conservation of the natural and cultural heritage; co-operative and effective management.

Wetland Rehabilitation: To improve wetland functions, but not necessarily to pre-disturbance ecological character.

***Wetlands*:** "Areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty, including areas of marine water, the depth of which does not exceed six metres. In addition wetlands may incorporate riparian and coastal zones adjacent to wetlands, and islands or bodies of marine water deeper than six metres" (Ramsar, 1971).

EXECUTIVE SUMMARY

Background information
Tanzania is rich in wetland resources, which include the great lake system, inland drainage systems, major river networks and deltaic mangrove areas. Wetlands have significant economical, social, cultural and biological values. However, given the extent of exploitation of wetlands resources, these important areas are fast degrading and disappearing before much is known about them. Some identified major threats facing wetlands include economically destructive fishing methods, beach erosion and excessive sedimentation caused by deforestation and overgrazing of catchment areas.

Aim of the guideline
These guidelines aim to provide for sustainable management of wetlands that would contribute to: i) Improve livelihoods while maintaining ecosystem functions; ii) Facilitate and provide a framework for sustainable management of wetlands; and iii) Maintain essential ecological and hydrological functions.

Scope of the guidelines
These guidelines are prepared to lead on Sustainable Management of Wetlands in Tanzania.

Rationale of the guidelines
These guidelines have been produced in fulfilment of Section 56, Subsection (5) of the Environmental Management Act (2004).

The methods applied in developing the guidelines
Techniques applied include: mobilization period, desk review and analysis, site visits, expert interviews and stakeholders' workshops.

POLICY AND LEGAL FRAMEWORK

National Responses to Sustainable Management of Wetlands
The vision of the Government of Tanzania is to alleviate widespread poverty by improving socio-economic opportunities, good governance, transparency, and enhancing public sector performance.

Policies for sustainable management of wetlands include:

i) National Agriculture Policy, 2013
ii) National Water policy, 2002
iii) Fisheries Policy, 2005
iv) Forest policy, 1998
v) Land policy, 1997
vi) The National Environmental Policy, 1997
vii) Wildlife policy, 2007
viii) Livestock policy, 2006

Legislative Acts include:

i) The Environmental Management act, 200
ii) Wildlife Act, 2009
iii) Water Resources Management Act, 2009

Strategies include

i. Wetlands strategy
ii. National Water Sector Development Strategy

SITUATION ANALYSIS OF WETLANDS MANAGEMENT INITIATIVES IN TANZANIA

Classification of wetlands in Tanzania

From the existing knowledge, wetlands in Tanzania can be classified into seven categories namely; *Highland headwater wetlands*, *Freshwater estuarine wetlands*, *Internal drainage wetlands*, *Rivers and inland floodplain wetlands, Marine and coastal wetlands, Man-made wetlands and Rift system wetlands*

Implications of sectoral specific activities on Tanzanian wetlands

Agriculture

It has been observed that wetland health is affected by poor agricultural practices which cause a number of negative changes to wetland environments including changes in water regime, reduced flood frequency, duration and volume, increased permanent inundation and changes to water quality.

Livestock

Inappropriate grazing regimes and stocking rates are degrading many wetlands in the country.

Mining

Pollution arising from unsustainable mining and mining based activities is quite marked and is rapidly increasing in various parts of Tanzania.

Forestry

Deforestation rates in Tanzania are quite high; between 1990 and 2005 an estimated 412,000 ha per annum were cleared, equivalent to about 1.1% of the total forest area.

Hydrology

Peoples' relationships with the environment have posed additional challenges to wetlands management plans country wide.

Settlement and Urbanization

Settlements have been established extensively in wetlands both in rural and urban areas thereby interfering with the health of these important ecosystems.

Transport
Any type of unsustainable construction in wetlands is bound to affect the operations especially of natural wetlands like purifying water or interfere with breeding patterns of fish.

Energy
The energy sector is stressing on the minimization of wood fuel consumption through the development of alternative energy sources and wood fuel energy efficiency. However, how much the energy sector is contributing to wetlands degradation is not yet quantified country wide.

Industry
Industrial effluents are the main culprits in polluting wetlands.

Private Sector
The private sector in Tanzania has been in partnership with the government in implementation a comprehensive, integrated approach to wetland protection.

Urgency and Conservation priority for Tanzanian wetlands
The urgency of conserving the individual protected wetlands stems from the fact that currently there is rampant invasion of these habitats for the purpose of carrying out different economic activities to gain livelihoods.

Key Management issues in specific wetlands and their possible solutions
The key management issues with regard to wetlands can be grouped into institutional weaknesses, legislative problems and sectoral management issues as follows:

Institutional weakness
Wetlands being crosscutting in nature, their management responsibility has been left as a responsibility of many institutions in Tanzania. This has lead to a problem of the tragedy of the commons thus resulting in lack of coordination between the institutions and sectors.

Sectoral management
Wetlands are often viewed by each user as a single-product system, precluding other uses and values, which eventually put them under great threat. It is important to understand that wetlands are multifunctional and their management should be integrated and coordinated.

Legislative enforcement weakness

Wetland management needs effective legislation, which takes into account the diverse nature of wetlands and should be supported by effective enforcement and resources. The legislation must take into account the needs of wetlands and the requirement of all the sectors that use them.

WETLAND MANAGEMENT FRAMEWORK

The structure of the framework

This framework has proposed three hierarchical levels. The first is the highest level which is responsible for setting the stage for the next levels. The next level is the management objectives specifically designed to achieve the vision. Finally is the lowest level that contains the specific details and targets.

Identification of key issues and key wetlands

In order to search for key wetlands the process should base on:

- Level Zero, that involves identifying key wetlands based on the knowledge of direct ministries responsible staffs.

- Level one; this involves identifying key wetlands based on a systematic desktop-based description of all known wetlands.

- Level two, involves identifying key wetlands based on a systematic rapid assessment of all wetlands in the field.

Examining and setting management options

In order to translate the objectives into operational goals, different management options should be examine. The selection of management options must be guided by general management guidelines and best management practices.

Setting operational goals and key performance indicators (KPIs)

The operational goals for threatened wetlands would specify which wetland rehabilitation/management methods are to be applied. The KPIs would specify the target levels of threatened wetlands abundance for rehabilitation.

Monitoring and auditing

The overall responsibility for monitoring of component progress and outcome will be vested with the Vice President Office –Division of Environment and supported by Wildlife Division/Wetlands Unit, Ministry of Agriculture-Environment Unit, Ministry of Water, Ministry of Livestock and Fisheries Development and other relevant Ministries.

PROCEDURES FOR SUSTAINABLE MANAGEMENT OF WETLANDS

Wetlands management in Tanzania faces many challenges, the major ones include: increased wetlands degradation, climate change; lack of proper land-use and management plans, absence of restoration plans for degraded wetlands and limited funds for enforcement of the existing guidelines.

Procedures for Identification and establishment of wetlands

In order to identify and establish wetlands, the following procedures must be followed: Status identification, Area specific wetland definition and types, Review national objectives, Inventories and data, Prioritizing and Boundary definition of sites.

Procedures for Preparation of wetland integrated management plan

The integrated management plan, should comply with the following procedures:

1. Identification of the objectives of wetland management
2. Identification of key stakeholders and their needs
3. Identification of the factors that affect, or may affect, the features
4. Defining the monitoring requirements
5. Identification and description of the management required to achieve the objectives
6. Maintaining the continuity of effective management
7. Resources acquisition
8. Communication within and between stakeholders
9. Demonstration that management is effective and efficient
10. Compliance with local, national, and international policies

Criteria for selection of activities to be carried out in the wetland

Selection of activities to be undertaken in a particular wetland must consider the following aspects:

i) the present condition of a wetland;
ii) the healthy of that specific wetland ecosystem;
iii) wetland species composition at a particular time;
iv) key characteristics of specific populations in the wetland ecosystem;
v) the risky levels of the resources in demand;
vi) indigenous knowledge;
vii) change over time of the population (people and livestock) on a particular wetland.

Procedures for acquiring wetlands resource use permits

The following are the guide for a successive sustainable utilization permits:

i) Harvesting controls and monitoring
ii) Consideration of convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).
iii) Trade in wetland-derived products
iv) Regulation of foreign investment to ensure wetland conservation

Procedures for undertaking surveys and/or researches and tourism in the protected and unprotected wetlands:

From the understanding that, wetlands are crosscutting and are affected by a number of sectors, the permits for undertaking the

research, surveys and tourism should vary according to the respective sector's policies and regulations.

Procedures for rehabilitation of wetlands

The process of rehabilitation should consider the following:

i) Historical background of an area
ii) Current ecological status of the wetland
iii) The economic value of the species to be restored
iv) The existing land use status of an area
v) Environmental benefits of the process
vi) The cost effectiveness of the process depending on the extent of degradation, and whether the situation is reversible
vii) Understanding of stakeholders' need and levels of dependence on the wetland
viii) the priorities of key stakeholders
ix) strategies to win political will
x) technical constraints associated to the process
xi) Understanding the legislative context within which wetland rehabilitation takes place

Procedures for effective and efficient institutional and legal framework for integrated management and wise use of wetlands:

In sustainable management and utilization of wetland resources, there is the need of using legal and institutional framework effectively and efficiently. The following are the guidelines to adhere when formulating framework:

i) Establish a knowledge base of relevant legal and institutional measures.
ii) Identify wetland-related legal and institutional measures
iii) Identify sectoral legal and institutional measures which directly or indirectly affect wetlands

Communication, education and public awareness strategies among stakeholders:

In sustainability use and limiting impacts of wetlands in Tanzania, stakeholders should adhere the strategies for communication, education and public awareness. This is outlined as follows:-

i) Communication, education, participation and awareness should be used effectively at all levels in the country to promote the value of wetlands.
ii) There must be support and tools provided for the effective implementation of national and local wetland-related activities.
iii) People must be motivated and enabled to act for the wise use of wetlands.

Partnership and cooperation at district/region, national, regional and international levels for the management of trans-boundary wetlands and migratory species:
The concept of shared wetlands now referred to as international wetlands (those wetlands which cross international boundaries). The basic guidelines for partnership and cooperation for management of trans-boundary wetlands and migratory species are as follows:

i) Managing shared wetlands and river basins
ii) Trans-boundary wetlands
iii) Trans-boundary (international) river basins
iv) Managing shared wetland-dependent species
v) Migratory water birds
vi) Other migratory species

MONITORING AND QUALITY ASSURANCE PROCEDURES

Monitoring Procedures
The ecological character of a monitoring programme should consider the following: hydrological factors, elements of biodiversity, as well as the socio-economic aspects.

Setting wetlands monitoring objectives
A well organised set of monitoring program objectives, the process would be guided by a checklist that would address the following issues:

1. Wetland degradation problem clearly identified;
2. Ascertain knowledgeable sources of information;
3. Identify all the relevant stakeholders involved and their needs;
4. Collect all available relevant information and put in a common form;
5. Identify the knowledge gaps, limitations and restrictions;
6. Collect the necessary additional information to fill up the gaps identified;
7. Develop a relevant conceptual model with underlying assumptions;

Also the following generalised issues can be useful in formulating monitoring program objective:

Inventory issues
In order to formulate the objective related to the natural resource present in a particular wetland the following issues should be considered:

i) the present condition of the wetland;
ii) The healthy of that specific ecosystem;
iii) Wetland species composition at a particular time;
iv) Key characteristics of specific populations in the wetland ecosystem;

v) Existing similarities and differences between biological communities in a particular wetland.
vi) Existing conflicts among resource users

Assessment issues
Objective related assessment of the wetlands ecosystem and processes should consider the following aspects:

i) the relationship between ecosystem components and ecosystem processes;
ii) parameters to be used to measure the effects of altered environmental conditions;
iii) existing threatening processes;
iv) the existing risk levels;
v) responses of ecosystem components and processes that have to be proposed for the management action;
vi) responses that signify damage.

Monitoring issues
The following issues should be considered in developing wetlands monitoring program objective:
i) observed difference between control and impact sites over time;
ii) conformity of water quality to statutory standards;
iii) successfulness of restoration activities;
iv) recovery status of a particular wetland;
v) short and long term changes occurring in wetland ecosystems

Adaptive Management issues
The guiding aspects for issues in this section shall include:
i) predictability of long-term effects that facilitate adaptive management
ii) protect and enhance a particular wetland

Quality Assurance Procedures
The key elements of a quality assurance/evaluation program include: management process, data acquisition, auditing processes as well as evolution programme.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

APE	Area of Potential Effects
ASDP	Agriculture Sector Development Programme
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Parties
COSTECH	Tanzania Commission for Science and Technology
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
HEP	Hydro-electric Power
IBA	Important Birding Area
IRA	Institute of Resource Assessment
IUCN	The International Union for Conservation of Nature
KPI	Key performance indicators
LME	Large Marine Ecosystem
MKUKUTA	Kiswahili acronym for NSGPR - Mkakati wa Kukuza Uchumi na Kuondoa Umaskini Tanzania
MNRT	Ministry of Natural Resources and Tourism
NEMC	National Environmental Management Council
NCA	Ngorongoro Conservation Area
NIP	National Irrigation Policy
NSGRP	National Strategy for Growth and Reduction of Poverty
NWWG	National Wetlands Working Group
PFM	Participatory Forest Management
SAGCOT	Southern Agriculture Growth Corridor of Tanzania
SEA	Strategic Environment Assessment
SMUWC	Sustainable Management of the Usangu Wetlands and its Catchments
SUA	Sokoine University of Agriculture
TANESCO	Tanzania Electric Supply Company Limited
WTO	World Trade Organization
WWF	World Wide Fund for Nature

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background information

Tanzania is rich in wetland resources, which include the great lake system, inland drainage systems, major river networks and deltaic mangrove areas. About 10% of the country's land is covered by wetlands. Wetlands have significant economical, social, cultural and biological values. They are among the most productive ecosystems (Fig. 1), they are vital for production of electricity, groundwater recharge, control of floods, retention, prevention of eutrophication of rivers and lakes, supporting specific bio-data and traditional uses. Through tourism wetlands contribute a significant amount to country's GDP. They are also particularly important in semi-arid areas where they play a significant role in providing water and water related resources for various purposes especially during the dry season.

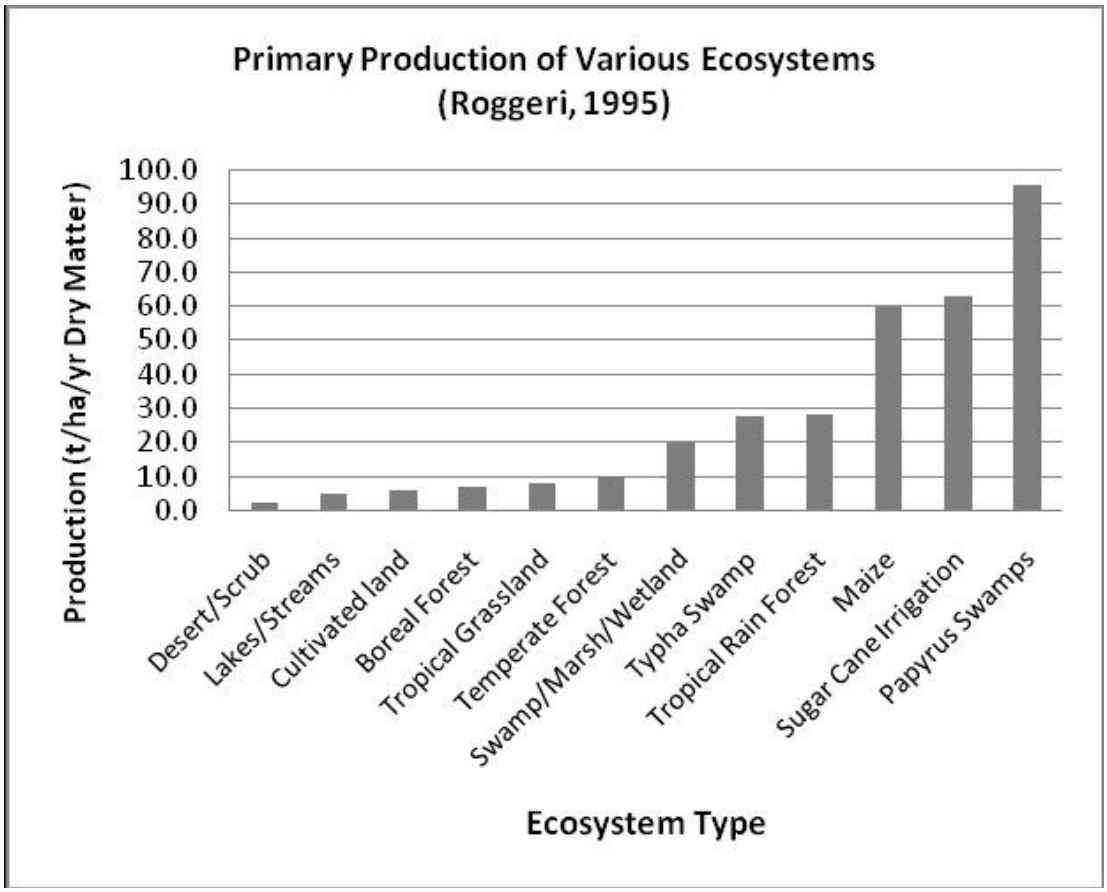

Figure 1: Wetlands are some of the Most Productive Ecosystems on the Planet *Source*: Roggeri, (1995)

Wetlands constitute a wide range of inland, coastal and marine habitats that share a number of common features. Although there are as many definitions for wetlands as there are types, the Ramsar Convention provides the most comprehensive definition. They are highly dynamic and vary a lot in size and nature depending on the season. A huge flooded river can shrink to a small silent stream in the dry season, or at times it may even simply disappear. A lake basin can be flooded and full of breeding birds in the wet season. But in the dry season it will become dry like a desert with a few tolerant grasses to survive with prolonged droughts.

As indicated above wetlands tend to contribute substantially to livelihoods and socio-economy of the country. However, given the extent of exploitation of these wetlands resources there are many reasons to believe that these important areas are fast degrading and disappearing before much is known about them. Some identified major threats facing marine and coastal wetlands include economically destructive fishing methods and beach erosion. Worth noting, beach erosions is increasingly becoming a threat to beach front investment including tourist facilities, while sea grass and mangrove forest ecosystems are wantonly harvested (Mwalyosi, 1999). Threats to inland drainage wetlands especially those within the Great East African Rift Valley system as well as highlands headwater wetlands include excessive sedimentation caused by deforestation and overgrazing of catchments. According to IRA (2002) most of the wetlands are either unprotected or partially protected (the lowest status of conservation).

Unprotected wetlands face the problem of *tragedy of commons* thus causing most of the floodplain wetlands to be invaded by influx of livestock from degraded rangelands in the country. Examples include Kilombero and Usangu plains (the famous Ihefu wetlands), as well as the Malagarasi-Muyowosi wetlands. Such encroachment is attributed to lack of comprehensive measures to deal with mobile pastoralists, poor farming systems as well as degrading fishing gears. Furthermore, some studies show a decline of water inflows during the rainy season, siltation and pollution problems (Mwalyosi & Yanda, 1999; IRA, 2002). In Lake Babati for example, identified threats are related to soil erosion and overgrazing. Similar problem have been reported in Lake Burungi wetlands. On the other hand a study on Sustainable Management of the Usangu Wetlands and its Catchments (SMUWC) 2001 show that in 1993 Ruaha River dried up in the dry season in the Ruaha national Park and has have been drying up every year since. This has been linked to human activities taking place in the Usangu Catchment.

1.2 Aim of the guidelines

The aim of these guidelines has been indicated in **Box One** below:

Box One

These guidelines provide for sustainable management wetlands that contribute to: i) improve livelihoods in line with the ability to maintain ecosystem functions; ii) Facilitate and provide a framework for sustainable management of wetlands; and iii) Maintain essential ecological and hydrological functions which ultimately provide its products, functions and attributes.

1.3 Scope of the guidelines

These guidelines are prepared to lead on Sustainable Management of Wetlands. It covers procedures for: identification and establishment of wetlands, wetland integrated management plan, activities to be carried out and in the wetland, assessment of the inventory and state of natural resources provided by wetlands as well as procedures for carrying out comprehensive assessments. It also covers procedures for: wetland resources use, monitoring programmes, surveys, researches, controlled tourism, restoration or enhancement programmes in the protected wetlands, rehabilitation as a management response, management issues in a specific wetlands, urgency and conservation priority, establishment of an effective and efficient institutional and legal framework for integrated management and wise use of wetlands, communication, education and public awareness among stakeholders and promotion of partnership and cooperation.

1.4 Rationale of the guidelines

These Guidelines have been produced in fulfilment of Section 56, Subsection (5) of the Environmental Management Act (2004), which requires that "The Minister in consultation with other sector ministries may make regulations and guidelines on the sustainable management of wetlands protected under this Act". So far in Tanzania, the policies and legislations related to wetlands and environmental degradation and management are in place. However, wetlands management guideline is important in helping to develop new and innovative approaches towards integration of land-use planning, water resource management and natural resource management. This integration does not only consider the geographical characteristics and needs of the wetland area, but also include the entire catchment area of the wetland. Furthermore, from the understanding that wetlands are currently facing a lot of human interferences resulting from unsustainable uses, the development of a guideline that will consider human needs and contribution is inevitable. It is important to note that, despite the existing list of wetlands already recognized in Tanzania, quite many are yet to be

discovered while a good number have already disappeared thus the importance of this guideline.

1.5 The methods applied in developing the guidelines

These guidelines for sustainable wetlands management in Tanzania have been developed through a series of techniques as follows:

1.5.1 Mobilization Period

This stage entailed mobilizing the consultancy team, and orienting them to the task at hand. It also entailed a quick overview of the available materials, charting out a clear plan of action and compiling the required materials for the guidelines.

1.5.2 Desk Review and Analysis

This was a very important stage of the guideline development. It involved a systematic review and analysis of the available documentation and case studies on guidelines for sustainable wetland management. The guideline was developed in accordance with the frameworks for managing wetlands of international importance and other wetland sites provided by the Annex to Resolution VII.11 (cf. "Strategic framework and guidelines for future development of the list of wetlands of international importance") adopted by Ramsar COP 5, 6, 7, 8 and 9 (see also the Ramsar Handbooks 3 and 12. It also considered among other documents the existing wetlands guidelines in Tanzania (**See Box Two below**). The review further included various policies and sectoral strategies where wetland issues seen as important or are controversial. The existing data on ecological features and/or trends, functions and values of wetlands, including socio-economic, cultural and educational values of our wetlands were as well be reviewed and analysed. These all provided for a roadmap toward formulation of these guidelines that appears useful for the Tanzanian existing wetland management challenges and/or issues.

1.5.3 Site visits

This involved a quick site surveys to the Tanzanian wetlands especially those with ongoing conflicts/challenges in the Rufiji (Kilombero floodplains, Ihefu wetlands, and Ruaha National Park) and Pangani (Kitangiri, Boloti wetlands) water basins. The purpose was to have direct field observations as well as some stakeholders' consultations from the local levels. This was done using a checklist of questions and also through visitation to the wetlands areas where farmers and livestock keepers were observed directly. Most consultations at local levels were through relevant authorities in the areas thus to maximize on the existing knowledge and challenges facing Tanzanian wetlands.

Box Two

The preparations of the guidelines have emerged as tailor made for Tanzania from the following Ramsar documents (among others):

***Ramsar Handbook 3**, (2010): Laws and institutions Reviewing laws and institutions to promote the conservation and wise use of wetlands.*

***Ramsar Handbook 12**, (2010): A Ramsar Framework for Wetland inventory*

In addition, the guidelines recognizes and draws from the following existing guides:

i) *URT-MNRT (2013a): A guide to wetland friendly investments: Sustainable wildlife management in Wetlands*
ii) *URT-MNRT (2013b): User's guide to sustainable wetland management*
iii) *URT-MNRT (2013c): A guide to Wetland Friendly Investments: Strategic Economic Assessment of Wetlands*
iv) *URT-MNRT (2013d): A guide to Wetland Friendly Investments: Sustainable Irrigation management in Wetlands*
v) *URT-MNRT (2013e): A guide to Wetland Friendly Investments: WMA training manual and user's guide part one*
vi) *URT-MNRT (2013f): District Wetlands Inventory and Resource Assessment Guide*
vii) *URT-MNRT (2013g): A guide to Wetland Friendly Investments: WMA training manual and user's guide part two*
viii) *URT-MNRT (2013h): A guide to Wetland Friendly Investments: Sustainable management in wetlands*
ix) *URT-MNRT (2012a): Administration and Financial Management Manual for Participatory Forest Management and sustainable wetlands Management*
x) *URT-MNRT (2012b): User's Guide to the AFM Tools*

1.5.4 Expert Interviews

The consultants prepared a list of experts from relevant sectors (including the Ministry of Water, Ministry of Natural Resources and Tourism, Ministry of Agriculture, Food security and Cooperatives and Ministry of energy) which were all visited considering their contribution to wetlands status in Tanzania. Some expert interviews also involved relevant stakeholders from the academia and international experts working in the wetlands area. The consultations were guided by a semi-structured checklist of issues.

1.5.5 Stakeholders' workshop (s)

After the preparation of the first draft of the guidelines on sustainable management of wetlands, there was a stakeholders' workshop aiming at guidelines review, comments, additional inputs and way forward on how the implementation process of the guidelines should proceed afterwards. It is during this workshop when the consultancy team managed to tease out the unforeseen challenges and/or issues of the guidelines as well as proposing possible pilot wetland areas to try out the guidelines.

CHAPTER TWO

2.0 POLICY AND LEGAL FRAMEWORK

2.1 National Responses to Sustainable Management of Wetlands

The vision of the Government of Tanzania is to alleviate widespread poverty by improving socio-economic opportunities, good governance, transparency, and enhancing public sector performance. The National Environmental Policy (1997) emphasizes the clear cause-and-effect relationship between poverty and environmental degradation, and stresses the need for sectoral policies to address poverty issues by taking into account the need for sustainable resource utilization. Wetland management is, by nature, complex and will inevitably involve many different sectors in identifying key problems and possible solutions.

2.2 Policies for sustainable management of wetlands

In order to achieve sustainable management of wetlands, environmental goals, objectives and actions have to be mainstreamed in sectoral policies and programmes. Recognizing such need, some Tanzanian laws, policies, strategies and plans have incorporated some directives regarding wetlands utilization and management issues. The following paragraphs are discussing about how these laws, policies, strategies and plans incorporate wetland resources.

2.2.1 National Agriculture Policy, 2013

The policy promotes integrated, sustainable use and management of natural resources such as land, soil, water sources and vegetation in order to conserve the environment. Irrigation is considered to be essential for increased productivity and production as it mitigates vagaries of weather, which are becoming more frequent and intensive because of global climate change. The policy states clearly that efforts to develop an effective irrigation system in the country are constrained by inadequate private sector capacity and funding for irrigation development; inadequate sector co-ordination and lack of holistic integrated planning in water resource utilization; weak irrigators' organizations to undertake overall irrigation water management and infrastructure maintenance; and low production and productivity in constructed irrigation schemes. Although the policy does not say specifically on sustainable management of wetlands an insistence on strengthening effective management of irrigation schemes and full participation in Integrated Water Resources Management as well as promotion of enhanced water productivity will have a direct role to play in management of wetlands.

2.2.2 National Water policy, 2002

The National Water Policy reflects the shift in approach towards comprehensiveness, subsidiary and economics. The policy

states that a holistic water (river) basin approach, integrating multi-sector and multi-objective planning and management, should be taken in order to ensure sustainability and protection of the resource. It advocates decentralised decision-making and a participatory planning approach; that the use of water should reflect its scarcity, as should its price, thus recognising water as an economic good; it further promotes cost sharing and other incentives for enhancing efficiency in the use of water. The policy also emphasises the ecological aspects of water management and the need to ensure water allocation to maintain ecosystem health. With these basic shifts in approach and the attempt to coordinate and harmonise the sectoral policies, it is in line with the guidance from the Convention on Wetlands and the vision of the National Wetlands Working Group (NWWG).

2.2.3 The National Environmental Policy, 1997

It is focused on directing the overall sectoral and cross-sectoral environmental management activities in various government departments. The policy makes specific reference to the need to improve the management and conservation of wetlands and identifies the problems related to wetland management as land degradation, lack of accessible water of adequate quality and deterioration of aquatic resources.

2.2.4 Wildlife policy, 2007

Wildlife Policy addresses issues related to protection, conservation management and sustainable utilization of wildlife and wetlands resources. In this policy the issues to do with wetlands management and conservation are being addressed under four objectives, whereby in each objective there are various issues and their policy statements. Comparatively, the Wildlife Policy has been the most successful in providing for and addressing the wetlands issues in relation to conservation and a management for sustainable development.

2.2.5 Land policy, 1997

The overall aim of a National Land Policy (Paragraph 2.0) is to promote and ensure a secure land tenure system, to encourage the optimal use of land resources, and to facilitate broad-based social and economic development without upsetting or endangering the ecological balance of the environment. Protection of land resources from degradation for sustainable development (in paragraph 2.8) is among the specific objectives. In this policy section 7.6.0 states that, the wetlands are considered as wastelands and are thought as being not useful for social economic development. However, the policy Statement (Section 7.6.1) directs wetlands to be properly studied for proper land uses initiatives hence to be allocated to appropriate users.

2.2.6 Forest policy, 1998

The policy emphasizes ecosystem conservation and management that ensures ecosystem stability through conservation of forest biodiversity, water catchments and soil fertility. However, the policy stresses that new reserves for biodiversity conservation will be established in areas of high biodiversity value. Also biodiversity conservation and management to be included in the management plans for all protected forests. Involvement of local communities and other stakeholders in conservation and management will be encouraged through joint management agreements. This policy is relevant because of the coverage of mangroves and swamp forests and because forests have important functions in water catchment areas. The Policy sets out general guidelines for managing forest resources, aimed at ensuring a sustainable supply of forest products and services, and generally acknowledges the need for cross-sectoral regulation.

2.2.7 Fisheries Policy, 2005

The overall goal of the National Fisheries Policy is to promote conservation, development and sustainable management of fisheries resources for present and future generations. The Policy promotes sustainable exploitation, utilization and marketing of fisheries resources to provide food, income, employment, foreign exchange earnings, and effective protection of the aquatic environment to sustain development. The policy provides for aquatic ecosystem productivity and biological diversity protection through prevention of habitat destruction, pollution, and over exploitation. Sound utilization of water is also promoted in generating income and meeting dietary needs. The policy specifies protection of fragile aquatic ecosystems and collaboration with the water sector in developing a water quality monitoring system. Procedures and guidelines are established for aquaculture development including: utilization of small water bodies, dams, and reservoirs for aquaculture activities; and environmental assessment and monitoring to prevent water source pollution.

2.2.8 Livestock policy, 2006

Over 70 percent of livestock populations are kept in semi-arid areas in northern, central and western parts of Tanzania. These areas experience severe water shortage during the dry season, forcing livestock farmers and their livestock to migrate to other areas with wetlands in particular. This movement often results into overgrazing, degradation of environment particularly destruction and pollution of water sources due to limited watering points. The issues here are that water for livestock in the pastoral and agro-pastoral areas is constrained by inadequate water harvesting expertise, wetland management as well as uneven distribution of water sources and distribution.

2.3 Strategies

2.3.1 Wetlands strategy

The Tanzanian wetland conservation and management programme was developed in 1990s. Many wetlands are conserved in the game reserves, national parks, and the controlled areas, while others have no conservation status. Wetlands need to be conserved because of their fragility, endemic nature, historical importance, functions, Products and attributes.

2.3.2 National Water Sector Development Strategy

For the purpose of managing wetlands sustainably the National Water Sector Development Strategy recommends the preparation of national inventories on the condition and extent of wetlands, floodplains and riparian ecosystems, as a basis for ensuring their long term protection. In addition, it is recommended that steps should be taken to identify and legally establish reserve areas for water sources to ensure resources conservation and protection.

2. 4 Legislative Acts

In order to achieve sustainable management of wetlands, in addition to policies, Tanzania government has enacted laws which have incorporated some directives regarding wetlands utilization and management issues.

2.4.1 The Environmental Management Act, 2004

This is an Act to provide legal and institutional framework for sustainable management of environment; to outline principles for management, impact and risk assessments, prevention and control of pollution, waste management, environmental quality standards, public participation, compliance and enforcement; to provide basis for implementation of international instruments on environment; to provide basis for implementation of the National Environment Policy; to repeal the National Environment Management Act, 1983 and provide for continued existence of the National Environment Management Council (NEMC); to provide for establishment of the National Environmental Trust Fund and to provide for other related matters, (URT, 2004). The Act in part V states declaration on protection and management of protected river, river bank, lake or lakeshore and shorelines (Section 54 and 55) while in section 56 (1-6), the Act states declaration of protected wetlands. In sub-section 2, it states that, “For purposes of management declared in subsection (1), sector Ministries under whose jurisdiction any area of wetland falls, shall be responsible for the management of wetlands falling under their respective jurisdiction.

2.4.2 Wildlife Conservation Act, 2009

One of the objectives of this Act and to which all persons exercising powers, applying or interpreting this Act is to protect and conserve

and administer areas with great biological diversity. This includes wetlands which are representative of the major wildlife habitats. The Act also gives special conservation status to endemic, rare or endangered wildlife species and aims at enabling Tanzania to effectively contribute and benefit from international efforts and measures to protect and enhance global bio-diversity.

2.4.3 Water Resources Management Act, 2009

Among other things Part IV of this act addresses the issues of protection of water resources against all sources of damage. It classifies water resources and elaborates on water resource quality objectives. In order to achieve the objective of protecting water resources the Act goes further by prohibiting human activities near water sources and in areas that are declared to be protected zones. The Act contains a list of areas that can be declared protected zones of which swamps, reservoirs, wetlands and other water carrying aquifers are specifically mentioned.

CHAPTER THREE

3.0 SITUATION ANALYSIS OF WETLANDS MANAGEMENT INITIATIVES IN TANZANIA

Wetlands in Tanzania (Fig. 2) cover about 10% of the total land area, of which 5.5% is presently Ramsar sites. Among them include Malagarasi/Muyovosi (32,500 Km^2), Lake Natron Basin (2250 Km^2), Kilombero valley floodplain (7,950 Km^2) and Rufiji-Mafia-Kilwa (5,969.7 Km^2) (Mwalyosi, 1990; Semesi, 1990). As the information on Tanzanian wetlands remaining scattered and sometimes lacking, the last decade or so have witnessed rapid destruction and conversion of wetlands in the country largely resulting from increasing human population and their associated socio-economic developments. It is only recently when Tanzanian wetlands have been recognized as productive lands contrary to the previous recognition as wastelands. This is evidenced by how the riches of these habitats have been exploited by various sectors. This exploitation of wetlands resources is threatening not only the sustainable use of these habitats but also their existence. In this chapter an attempt have been made to show the classification of wetlands in Tanzania and how various activities of the different sectors are impacting on the sustainability of country's wetlands systems. Towards the end of the chapter we indicate the key management issues arising as far as sustainable management of wetlands is concerned while providing for the status of our known wetlands for conservation priorities.

3.1 Classification of wetlands in Tanzania

The Ramsar Convention requires each contracting party to develop their own wetlands classification system relevant to the country's environment. From the existing knowledge, wetlands in Tanzania can be classified into seven categories (Mwanukuzi 1991; IRA, 2002) namely:

- *Highland headwater wetlands:* These are usually located in head waters of rivers in mountainous ecoregions. Such wetlands are located at spring sources of river systems and are usually associated with rainforests and/or high annual rainfall. The waters of such wetlands are characterized by low temperatures, clear water with little dissolved oxygen. Although the waters of these wetlands are mostly clear with clear and minimum sediments/pollution; the water quality largely depends on the geology of rock underlying the area.

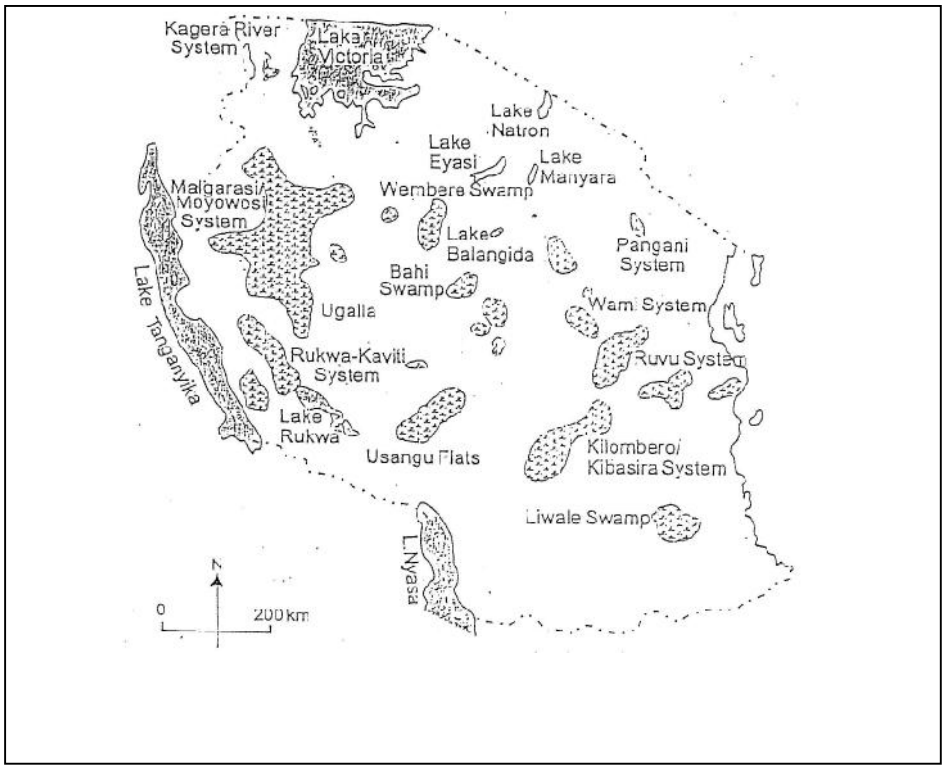

Figure 2: Map of Tanzania indicating the various wetlands. *Source*: Mwanukuzi (1991)

Freshwater estuarine wetlands: These are wetlands formed along the lake shores up to six metres deep. Such wetlands are associated with meandering of rivers (due to low gradients) depositing sediments as they enter the lakes. Such rivers bring with them nutrients from distant areas thus providing food to the fish and other organisms in the lake.

Internal drainage wetlands: These are inland semi-arid wetlands. They are found in the dry lands where annual rainfall is very low ranging from 400 mm to 600 mm. During rain seasons, runoffs collect within catchment and water is retained in low depressions. This water then evaporates very fast on sun/dry times leaving behind very little water which in most cases has high concentrations of caustic soda. When the caustic soda becomes excessive, becomes useful for salt making.

Rivers and inland floodplain wetlands: These are comprised of plains usually formed in low altitudes whereby rivers floods seasonally during the rain seasons. These are areas where takes place and layers of soils profiles are formed in various seasons and years. Given the layering, the soils here are very fertile with adequate moisture thus areas reliable for agriculture.

Marine and coastal wetlands: These comprise of areas where the river enters the ocean thus forming deltas. This is a point where there is a gradient or salt intrusion as fresh water bodies meet the saline ocean water. These wetlands are important habitats for fish, shrimps, lobster and sea shells.

Man-made wetlands: There are very few wetlands of this category in the country. The largest of these reservoirs are Mtera (610 sq. Km) and Nyumba ya Mungu (180 sq. Km). The medium-large reservoirs include Holombo (15.37 sq. Km, Kidatu (10 sq. Km) and Pangani. Like others, these wetlands are also habitats for vario*us wildlife while a*lso playing a unique role of hydropow*er production. Despite such importance, except* for the Nyumba ya Mungu wetland which is a Game Controlled Area (GCA), almost all the wetlands in this category are not protected.

Rift system wetlands: They are found in the rift depressions and are characterized by salt lakes, playas, swamps and short streams with inland drainage. These are characterized with soils that are heavy and are affected by salinity.

3.2 Implications of sectoral specific activities on Tanzanian wetlands

3.2.1 Agriculture

Agricultural sector has continued to be the centre for economic growth in Tanzania, contributing up to 45% of the country's GDP and about 30% of the country's export earnings, while employing over 80% of the nation's workforce. Annually some 5.1 million hectares are cultivated, of which 85% is under rain-fed dependent agricultural food crops. So far, Tanzania has sufficient water sources and their associated resources with three major lakes, river basins and groundwater. However, there is currently very little irrigation (official estimates show less than 300,000 ha are being irrigated) and unsustainable use of natural resources including wetlands.

It has been observed that wetland health is affected by poor agricultural practices which cause a number of negative changes to wetland environments. Negative impacts include changes in water regime, reduced flood frequency, duration and volume, increased permanent inundation, changes to water quality, reduced groundwater recharge, the loss and decline of riparian and wetland vegetation, the loss of habitat and other, biodiversity values and the introduction of exotic animal and plant species.

The Government of Tanzania has formulated a number of strategies and policies to guide interventions in the agricultural and water sectors, and in rural development and poverty alleviation. However implementation of these policies and strategies if not carefully looked at may have some negative impacts on the sustainability of

wetlands in the country.

The two most recent strategies developed in 2009 that support the sector are "Kilimo Kwanza," the Presidential initiative seen as a green revolution to transform Tanzania's agriculture into a modern and commercial sector; and the National Irrigation Policy (NIP) which guides growth in the sector. These support more established policies and plans such as the National Environmental Policy (1997); the 2001 Agricultural Sector development Strategy (ASDS), which built on the Agriculture and Livestock Policy (1997); the 2001 Agricultural Sector Development Programme (ASDP) which is revised annually; the National Water Sector Development Strategy. However, an apparent important but assumed threat to the Tanzanian wetlands is the currently implemented Southern Agricultural Growth Corridor of Tanzania (SAGCOT) program.

As it appears, the SAGCOT largely intends to advocate the large scale investment in the agriculture sector. Despite the very clear objectives of the program and the existing lines of command that the agriculture must be sustainable and environmentally friendly, no statement in the strategy indicates the limits for water off-takes and the need for implementing environmental impact assessments to ensure sustainable utilization of water from the wetlands and other sources. Furthermore, SAGCOT is targeting the largest water basin (Rufiji) in the country thus increasing the chance of losing the largest wetlands biodiversity in case of un-expected environmental destruction resulting from water over-use and natural habitat change for the desired crops. Good examples so far are the sugar cane companies in Kilombero (Kilombero Sugar Company) and Kilimanjaro (TPC Limited) that are highly abstracting water from the catchment areas around these areas. However there are no existing records on maximum water off-take and monitoring measures for both investments.

3.2.2 Livestock

Inappropriate grazing regimes and stocking rates are degrading many wetlands in the country. So far, livestock have unrestricted access to wetlands (and riparian zones) thus increasing the risk of spreading or introducing weeds and contribute to poor water quality by degrading bank stability. So far, many wetlands are being converted to grasslands and other landforms through the high stocking rates by a majority of the pastoral communities (largely the Maasai and Sukuma communities). Famers-livestock conflicts are now very common in the country especially in areas around soil and biodiversity rich areas of the country such as the Usangu basin (the famous Ihefu wetlands conflicts and politics) as well as in the areas with highest population and development increasing areas such as within the Pangani. Various communities (the local farmers as well as the immigrant livestock keepers) are encroaching the wetlands

areas. The government of Tanzania has continued to emphasize on improvement and conservation of grazing lands for preservation of feed resources; promotion of mechanisms for resolving conflicts among different land use interests (wildlife protection, forestry, pastoralism and agriculture); and Management and control of the migration of livestock.

3.2.3 Mining

Pollution arising from mining and mining based activities is quite marked and is rapidly increasing in various parts of Tanzania. With liberalization of trade, Tanzania has witnessed a drastic increase in small scale mining activities over the past few years. Pollution is becoming an increasingly serious problem in the major mining areas. Such areas include the gold mining zone around Lake Victoria; Mpanda; Chunya; coal mining in Kiwira, Tukuyu District; tin mining in Korogwe; ruby mining near Morogoro; tanzanite and phosphate mines in Arusha Region; limestone mines in Dar es Salaam, Tanga and Mbeya Regions; and salt mining along the coastal belt. With the advent of drilling for natural gas and possibly oil in the coastal zone, there may be profound negative impacts on the fragile marine and coastal wetlands.

Solids and colloidal materials from overburden are often responsible for increased sedimentation in the adjacent water bodies. Due to erosion of tailings dumps, the ground and surface water is contaminated with toxic substances. At low pH values, heavy metals (iron, manganese, cadmium, zinc, aluminium) can create serious water pollution problems. In most cases, Tanzanian small scale miners extract gold from soil using mercury, a toxic substance which contaminates soil, water and affecting quality of wetlands.

3.2.4 Forestry

Most of forests in Tanzania are found in wetlands and are the most important water catchment areas. About 35, 257,000 ha (39.9%) of land is forested (URT, 2012a). About 18 million hectares of this total forest area have been gazetted as forest reserves and 4.1 million hectares of this are managed under Participatory Forest Management (PFM) (URT, 2012a). Over 17, 3 million hectares, a third of total forested land, are on village and general land with no properly defined management regime; and this is where deforestation and degradation is the most severe (URT, 2012a).

Deforestation rates in Tanzania are quite high; between 1990 and 2005 an estimated 412,000 ha per annum were cleared, equivalent to about 1.1% of the total forest area. The main direct causes of deforestation are clearing for agriculture, overgrazing, wildfires, charcoal making, persistent reliance on wood fuel for energy, over-exploitation of wood resources and lack of land use planning (Blomley et. al., 2008). Reliance on wood fuel and charcoal for energy supply

have been identified as a key driver behind national rates of deforestation and degradation, and it presents a real challenge, as almost all domestic (rural and urban) energy consumption are derived from these sources. All these illegal forest harvesting activities have continued threatening wetlands in the country.

3.2.5 Hydrology

Water access in many Tanzanian basins is currently threatened by climate change, forest degradation, inefficient land management practices and pollution. The high rates of population growth in the vicinity of rivers are putting increasing pressure on the water supply. Meanwhile, growing demand for water has led to increasing conflict between water users upstream and their counterparts downstream. Un-controlled water abstraction for large scale agriculture and electric power plants down-stream has so much contributed to increased siltation and biological loss downstream. River flows are being reduced while the intended hydropower production is not being achieved. A good example here is the Ihefu wetlands which is been over-exploited thus contributing to less waters flowing into the Mtera dam. The reduced water flow has also led to increasing environmental degradation, with the water shortage disrupting ecological processes and sustainable livelihood practices. The multiple uses of the rivers and insufficient human and financial resources for proper water resources management threaten efforts to conserve the natural resource, and the diversity of users. Furthermore, peoples' relationships with the environment have as well posed additional challenges to wetlands management plans country wide.

3.2.6 Settlement and Urbanization

The overall goals of the National Human Settlements Policy are to promote development of human settlements that are sustainable and to facilitate the provisions of adequate and affordable shelter to all income groups in Tanzania. The main objectives of the policy are many. However one of the objectives is stated as to protect the environment of human settlements and of ecosystems from pollution, degradation and destruction in order to attain sustainable development. The objectives and goals of human settlements as laid out in the documents are noble. However the activities taking place are in contradiction to the policy. Settlements have been established extensively in wetlands both in rural and urban areas thereby interfering with the health of these important ecosystems.

3.2.7 Transport

The government emphasizes on improvement in mass transport systems to reduce fuel consumption, traffic congestion and pollution; control and minimization of transport emission gases, noise, dust and particulates; and disaster/spill prevention and response plans and standards shall be formulated for transportation of

hazardous/dangerous materials. The major obstacle the transport sector faces with regard to protecting wetlands is when transportation infrastructure has to cross wetlands. Transportation infrastructures are, at times, forced to drain or landfills wetlands. Any type of construction in wetlands is bound to affect the operations especially of natural wetlands like purifying water or interfere with breeding patterns of fish.

3.2.8 Tourism

Tourism has developed rapidly since the mid-eighties. It is now an economically significant sector (12 percent GDP) that has grown at an average of 6.7 percent over the last four years. Tanzania is ranked as among the five top tourism income earners in Africa with annual receipts of US$739 million (WTO, 2001). However, apart from the indirect impact of increased revenue to the government, growth in tourism has not led to direct reduction of income poverty. Barriers to communities gaining increased benefits from natural resources (e.g. wildlife) are yet to be removed (MKUKUTA 1, 2005). It has been reported that tourism development in Tanzania is based on careful assessment of the carrying capacity and prior Environmental Impact Assessment application. Again, environmentally friendly tourism (ecotourism) and diversification of tourism activities is more promoted in the country. The financial benefits from tourism activities accrue in part to the local community to motivate them in conservation of tourism resources including wetland resources.

Importantly, Tanzania Development Vision 2025, has envisaged that fast growth will be pursued while effectively reversing current adverse trends in the loss and degradation of environmental resources (such as forests, fisheries, freshwater, climate, soils, biodiversity) and accumulation of hazardous substances. Thus tourism, as other economic activities, can affect natural resources such as wetlands if is performed unsustainably. The Ngorongoro Conservation area (NCA) crater remains the most visited with highest populations of people at the same time, thus threatening the biodiversity of the wetland area.

3.2.9 Wildlife

The wildlife of Tanzania remains state owned thus the government has kept emphasizing that the resources should be protected and utilized in a sustainable manner on the basis of careful assessment of natural heritage in flora and fauna fragile ecosystems, sites under pressure and endangered species, with participation of, and benefits to, the local communities. The importance of wetlands as among important wildlife areas has been recognized in the country and since 2000; Tanzania has been a signatory to Ramsar Convention. However, environmentally adverse impacts of development projects in wildlife conservation areas (e.g. tourist hotels, rail construction) have been caused by unreliable EIA studies.

3.2.10 Land

Tanzania has a total population of 44,928,923 and a surface area of 94.3 million hectares of which 10% of total land is covered by wetlands. The gross area cultivated/planted annually is only about 5.1 million hectares which is only about five percent of the surface area of Tanzania. The other arable land which is not cultivated but much of it being there is an additional four million hectares suitable for cultivation. Agriculture in Tanzania is dominated by small holder farmers (peasants) cultivating average farm sizes of between 0.9 ha and 3.0 ha each. The increasing demand for more land has been largely contributed by the high rates of population growth and high demand for agricultural land thus placing most of our wetland areas under great threats. Such areas include the rich Kilombero, Lake Babati, Usangu, Pangani River Basins as well as the Lake Victoria wetlands. There has been increasing destruction of Tanzanian wetlands through the unplanned agriculture and livestock overstocking thus increasing poverty among rural livelihoods where most of the existing wetlands are being found.

Lack of coordination between different sectors especially the water sector and Land sector creates a big problem in achieving sustainable wetlands. It is not uncommon to find the land department offering wetlands to people for various development activities in disregard to the well known functions of wetlands such as acting as breeding grounds for fish and birds or as a source of water, groundwater recharge, sediment trap, and water purification to mention but a few functions of wetlands.

3.2.11 Energy

The energy sector is stressing on the minimization of wood fuel consumption through the development of alternative energy sources and wood fuel energy efficiency; Promotion of sustainable renewable energy resources; and Energy efficiency and conservation. Achievement of this objective has been observed in the following:

Utilization of natural gas for thermal applications: Following the discovery of natural gas in the country about twenty industries have switched from using oil, coal or wood fuel to natural gas. Natural gas is a clean fossil fuel, emitting less CO2 per unit of energy provided than oil or coal. Natural gas is harvested at SongoSongo Island offshore on the Indian Ocean where the gas reserve is estimated to be 726 billion cubic feet. There is also a significant gas field at Mnazi Bay near Mtwara .

Energy co-generation: Currently there are a number of initiatives in place of generating electricity using biomass (in particular agricultural waste). Sugar industries are among the leading sector in biomass co-generation. In total sugar mills generate 38 MW of electricity. Sugar industries utilize the biogases by-product for generating electricity.

Other Industries which have made progress in this initiative include TANWAT-2.5 MW, Saohill-1.0 MW, Mufindi Paper Mills-15.0MW and Hale Sisal Estate (150kW). The biomass energy resource, which comprises fuel-wood and charcoal from both natural forest and plantations, accounts for 93 per cent of total energy consumption (CPCT, 2007).

Dissemination programmes of efficient cook stoves: Various programmes are ongoing in this area. The targeted groups are low-income rural and urban households as well as small businesses and institutions using biomass energy for cooking, baking, heating and other food processing applications.

However, how much the energy sector is contributing to wetlands degradation is not yet quantified country wide. Tanzania has recently initiated efforts towards a liquid bioenergy policy, regulatory framework and guidelines for sustainable liquid biofuels development through a National Biofuels Task Force. The National Biofuels Task Force was established in 2006 to prepare an enabling policy and regulatory environment for sustainable development (production and utilization) of biofuels in Tanzania. Thus the Government recognizes the importance and need to develop alternative and strategic fuels such as biofuels, which is an initiative in the right direction towards sustainable environmental management. However, careful assessments need to be undertaken considering multiple uses of the available land and specifically our wetlands resources. In an environmental perspective the efficiency of biofuels is questionable based on the possible destruction of native ecosystems in the initial phase of production. Thus when evaluating different biofuels, there is a great need to consider other associated environmental costs.

3.2.12 Industry

The government stresses that industries have to be planned in a manner that minimizes adverse effects on the environment at all stages (i.e. location, effluent discharge, waste disposal, use and disposal of products); control of industrial emissions and application of environmental impact assessment (EIA) as an essential element in industrial planning and development for taking account of potentially harmful activities on the environment.

The challenge with many industries with regard to wetlands is its objectives of making profits which overshadow wetlands management initiatives. Industrial effluents are the main culprits in polluting wetlands. Very often an accusing finger is pointed to untreated effluents from industries which are poured indiscriminately in water bodies causing harm to the quality of receiving water bodies and lowering the ability of receiving water bodies to sustain aquatic life.

3.2.13 Private Sector

In Tanzania some of the private sector have been active in natural resources conservation including wetland management. Non-governmental and not profit organizations such World Wildlife Fund (WWF) and The International Union for Conservation of Nature (IUCN) have carried out a lot of work on wetland management in collaboration with local communities. They have been in partnership with the government in implementation a comprehensive, integrated approach to wetland protection and pollution control.

On the other hand private investors especially in mining, agriculture and industry sectors have been threatening the sustainability of wetlands of Tanzania through pesticide application in farms as well as discharging oil into wetlands.

3.3 Urgency and Conservation Priority for Wetlands

Except for the four recognized wetlands of international importance under Ramsar sites and those in the Game controlled area (GCA) category, most (60%) wetlands in Tanzania have remained unprotected. Thus, the unprotected wetlands face the problem of the *tragedy of the commons*. The rapid increase of human population in Tanzania has even more devastating impacts on the wetlands and the resources therein. This is because a great proportion of Tanzania population depends on agricultural activities for their livelihood. With the advent of climate change with its impacts on rainfall availability and temperatures a large population that depends on agriculture looks at wetlands as the immediate refuge for the expansion of agricultural and pastoral activities. In the expansion of agricultural and pastoral activities individual protected wetlands become the first target for invasion since the resources of these wetlands are regarded by the invaders as lying idle.

The urgency of conserving the individual protected wetlands stems from the fact that currently there is rampant invasion of these habitats for the purpose of carrying out different economic activities to gain livelihoods. At the current rate of wetlands invasion it is important and urgent that conservation steps are taken immediately before these wetlands are totally destroyed beyond repair. Importantly, there is an urgent need for reconciling the interests of various users of wetlands resources thus to help in the process of changing individual activities undertaken in various wetlands for sustainable management.

Given the current status of our wetlands, most of them need to be studied (through detailed inventories) while others need strict conservation regulations so as to rescue the existing biodiversities there in. The following is a list of wetlands with an urgent need for attention:

i) *Kilombero floodplain wetland:* Although it is already a Ramsar site while part of it being within the Udzungwa National Park, it is highly threatened by major development projects (including hydropower, sugar cane and rice plantations) upstream and around the wetland. Despite the fact that only a few studies have been undertaken, there is high chance of more destruction especially that the SACGOT initiative is targeting the Kilombero valley among other valleys within the Rufiji basin. The Ramsar site in itself do not have an integrated management plan thus risking further destruction of the wetland despite it being partly protected.

ii) *Lake Natron wetland:* It is also designated as a Ramsar site. However, it is a trans-boundary wetland (at the border of Tanzania and Kenya) thus facing threats from hydropower development on the Kenyan side. Soda mining is another serious problem in East Africa. Again there is lack of detailed integrated management plan, while little is known about the area.

iii) *Lake Jipe wetlands:* Again, this is another trans-boundary wetland. The lake is highly important to the local community around. It provides for refugees for wildlife from the Mkomazi Game reserve as well as feeding and breeding grounds for local and migratory birds. The Lake and its surrounding wetlands also are grazing areas for wildlife and domestic livestock. The biggest challenge of Lake Jipe wetlands is the increasing siltation resulting from run-offs from upstream especially from the Tanzanian side. Therefore there is an urgent need to limit activities upstream for protecting and regulating resource off-take from the lake.

iv) *Usangu floodplain:* This has remained among the most important floodplains within the Great Ruaha River system. So far an initiative has been made to include part of the wetland into Ruaha National Park. However, due to the importance of the wetlands to the community around, there have been a lot of conflicts arising from the community. Politicians have as well contributed to such conflicts thus leaving the area in many unresolved resource use problems. What makes the area even more threatened is the fact that, a large part of the wetland catchment has remained unprotected while there has been increasing number of pastoralists' activities around. Thanks to the government initiative to vacate the pastoralists. However, there is still a need to develop an integrated management plan that would involve the locals (especially the original community) while trying to include most of the catchment wetlands under protection.

v) *Sao Hill wetlands:* This has remained unstudied wetlands within Mufindi District. They are situated in a landscape which has remained stable for many geological years despite the ongoing activities such as the livestock grazing. There is a need for the wetlands to be studied thus allowing for a decision on whether or not the wetland qualifies for any special conservation priority.

vi) *Wembere-Kitangiri_Lake Eyasi system of wetlands*: These remain poorly studied while leaving the special biodiversity they harbour under great threat. Again, there is a need for detailed studies for decisions on their planned protection.

vii) *Singidani and Kindai wetlands*: These have remained unprotected while they remain the largest source of livelihood in the region. There is a need for a regulated fishing while controlling the levels of human activities in the area.

viii) *Burigi Lake:* This is a small lake situated in the northern western Tanzania between Lake Victoria and Rwanda in the north-west of Tanzania.Part of Lake Burigi is located in the Burigi Game Reserve. Burigi Lake is a permanent water source in the area and characterised by swampy papyrus beds and riverine forest surrounded by wooded hills, valleys and rocky outcrops. There is an Important Birding Area (IBA) which was last assessed in 2001. Not much of this lake is known so far. In recent years there has been an increase of immigrants from the central part of the country for agricultural and pastoralist activities around the lake which have threatened the sustainability of this lake. There is a need for controlling the levels of human activities in the area.

ix) *Bahi Swamp*: This is regarded as an oasis in the desert as it is situated in the middle of a semi-arid environment in Dodoma region. It is an important land for agriculture and livestock activities while serving for a majority of the community livelihood through fish availability. Again, little is known about the maximum take-off by the locals thus jeopardizing the long term existence of natural resources and biodiversity of these wetlands.

x) *Katavi floodplain wetlands*: These represent the western Rift Valley system. Part of the wetland lies within Katavi National park. The remaining parts of the wetlands (which are the largest part) are under devastating human threats resulting from the intrusion of large groups of livestock from various parts of the country as well as from the neighbouring countries. It is therefore urgent that the system is under some form of conservation which should be preceded by detailed inventories to record the existing

wealthy and the possible threats to be known to the local communities.

3.4 Key Management issues in specific wetlands and their possible solutions

The key management issues with regard to wetlands can be grouped into institutional weaknesses, legislative problems and sectoral management issues as follows:

3.4.1 Institutional weakness

Wetlands being crosscutting in nature, their management responsibility has been left as a responsibility of many institutions in Tanzania. This has lead to a problem of the tragedy of the commons thus resulting in lack of coordination between the institutions and sectors. This has further resulted into limited accountability, inability to respond to changes in wetlands, and failure to partition responsibilities between institutions. Addressing wetland degradation should be undertaken with a long term perspective. This will enable the country to build and achieve sustainable wetland management. The challenge is that there is an inadequate institutional arrangement to effectively address wetland degradation. As a result there is a need to strengthen the existing national institutional frameworks to enhance conducive environment for building and achieving sustainable wetland management.

3.4.2 Sectoral management

There is a growing demand for wetlands as their usefulness are varying between sectors. For example, agriculturalists find wetlands as most fertile soils with vast potential for growing rice, maize, sorghum and cotton; fishery managers find a potential for fish production; hydrologists calculate water supply and demand for various projects; foresters are interested in the mangroves and riverine forests; game wardens view wetlands as sanctuaries for wildlife; ecologists are interested in the intricacies of the ecosystems; health specialists look at wetlands as regulators of water quality or sources of diseases; and TANESCO engineers see them as cheap sources of electricity. Thus, wetlands are often viewed by each user as a single-product system, precluding other uses and values, which eventually put them under great threat. Given this, it is therefore important to understand that wetlands are multifunctional and their management should be integrated and coordinated, Planning at sectoral level should be harmonised

3.4.3 Legislative Enforcement Challenges

Wetland management needs effective legislation, which takes into account the diverse nature of wetlands and should be supported by effective enforcement and resources. The legislation must take into account the needs of wetlands and the requirement of all the sectors

that use them. As the population increases, and thus more demands are made on resources, wetlands maybe further destroyed in the name of development. Despite of having good environment related policies the main weakness and challenges have remained on the enforcement of these policies. Putting in place policies which are not enforced have resulted into environmental and wetland degradation.

CHAPTER FOUR

4.0 WETLAND MANAGEMENT FRAMEWORK

4.1 The structure of the framework

Natural resource management is ever challenging in many developing countries and Tanzania in particular. This is because natural systems such as wetlands are often very dynamic, changing from season to season and year to year. Cause and effect are not always clear and may operate over long periods of time and across great distances (Kotze, 2004). Moreover, management often involves different stakeholders, with differing perceptions, values and interests. To cope with this complexity a management framework has been designed around organizational and time scales appropriate for wetland division (Fig. 3).

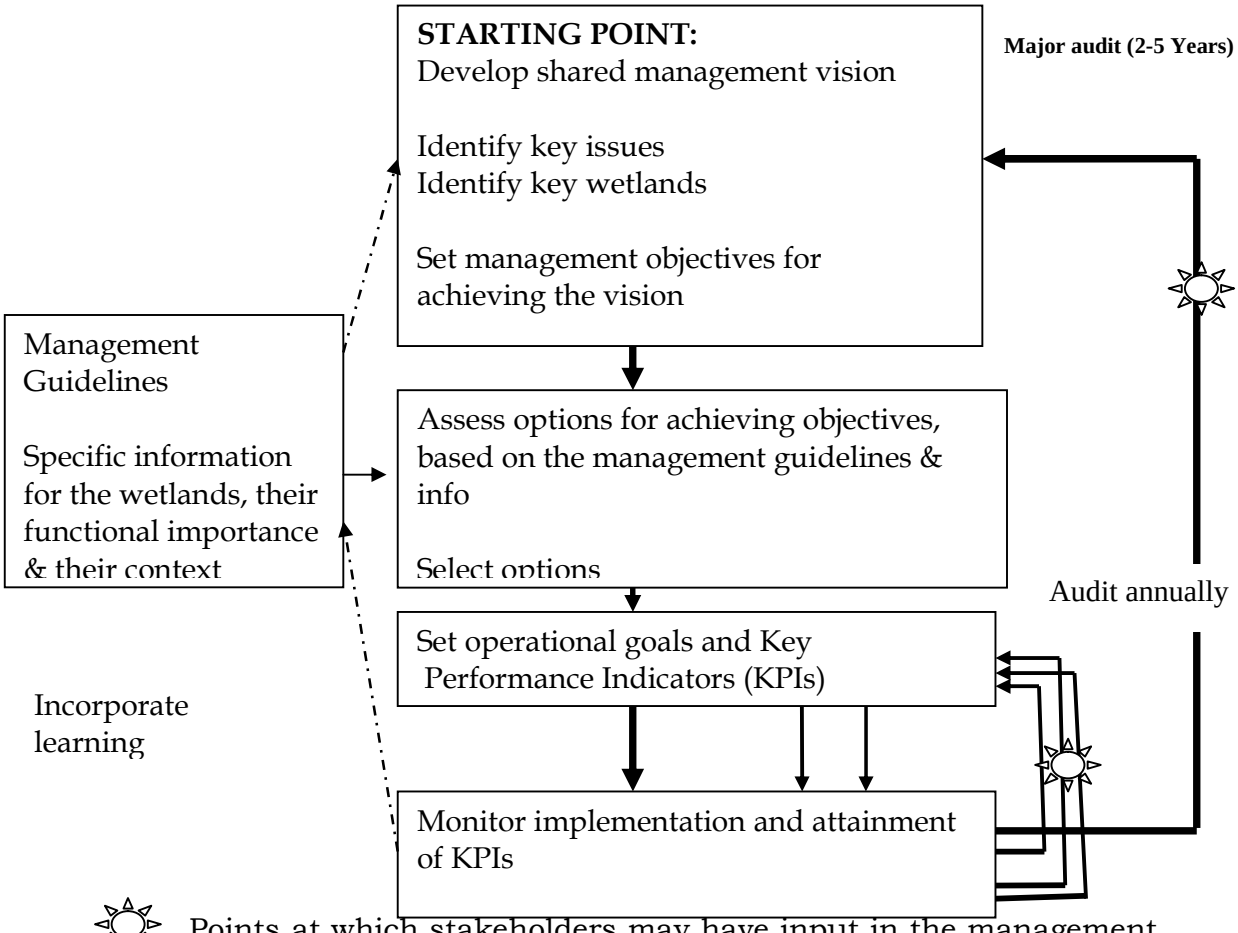

Figure 3: Adaptive management framework for the management of wetlands (**Source**; Modified from Kotze and Breen, 2000; Ramsar Convention Bureau, 1997; 2002)

The framework has proposed three hierarchical levels. The first is the highest level with the overall vision and which is responsible for setting the stage for the next levels. This level of the system is designed to operate over long time periods but to be reviewed every 3 - 5 years at high organizational levels. The next level is the management objectives specifically designed to achieve the vision. Finally is the lowest level that contains the specific details and targets. It includes timeframes and responsibilities required to operationalize each objective. The lowest level is proposed to deal with short term activities undertaken at a more localized scale (i.e. at the scale of an individual wetland). This is a point at which stakeholders may have input in the management process (Kotze and Breen, 20000).

An adaptive management cycle is considered to be central to the system, involving setting management objectives, selecting and implementing actions to achieve the objectives, monitoring the outcomes and returning to the objectives and adjusting where required. The adaptive management structure facilitates learning from action, and allows for the incorporation of new understanding and information over time (Kotze, 2004). Furthermore, the system gives an opportunity for the incorporation of stakeholder input. Stakeholders may raise a concern about a very localized issue requiring swift action. The need for longer term strategic revisions may raise as a result of short term actions that may have been highlighted.

In Tanzania management of wetlands cannot be done in isolation. It should keep in touch with other relevant initiatives and programs that provide the national legal and policy framework. These may include:

- Environment Management Act, 2004,
- The Water Resources Management Act, 2009,
- The National Forest Act, 2002
- The Fisheries Act, 2002
- Wildlife Conservation Act, 2009
- Environmental initiatives involving stakeholders' participation.

4.2 Identification of Key Wetlands

Key wetlands are those wetlands which deliver a high level of goods and services (Kotze, 2004; URT, 2003). Wetlands are also considered key if they are threatened by degradation which is likely to lead to significant environmental impacts, aside from any goods and services that they may be currently delivering.

In order to search for key wetlands the process should base on:

- Level Zero, that involves identifying key wetlands based on the knowledge of direct ministries responsible staffs that are familiar with the different regions. This takes a short time.

- Level one; this involves identifying key wetlands based on a systematic desktop-based description of all known wetlands using interpretation of remotely sensed images, examination of relevant databases and consultation with individuals having good local knowledge.

- Level two, involves identifying key wetlands based on a systematic rapid assessment of all wetlands in the field.

The key wetlands in Tanzania are Malagarasi – Muyovosi wetland, Pangani Basin, Usangu Wetlands, Rufiji Basin Wetlands, Lake Natron, Lake Victoria and Kilombero Plain. These wetlands are of immense socio-economic importance for the local communities and the regions in terms of agriculture, fishing, grazing, wildlife and water resource management.

The identification of key issues should be undertaken based on consultation with those within the Ministries (e.g. Vice President's Office, Division of Environment, Ministry of Water and Ministry of Natural Resources and Tourism) closely involved with natural resources, water and environmental management, relevant government officials and visits to a variety of different relevant stakeholders. Since the issues are likely to change with time this process should be repeated at least every time so that there is a comprehensive review of management.

4.3 Examining and setting management options

In order to translate the objectives into operational goals, different management options should be examined. The selection should consider those which are well-matched with the overall vision and management objectives. The selection of management options must be guided by general management guidelines and best management practices. These need to be applied by building them into the specific operational goals for each wetland, where particular circumstances of the individual wetlands are accounted for. Revisiting periodically the management options is important to accommodate new understanding, knowledge and challenges.

4.4 Setting operational goals and key performance indicators (KPIs)

Management objectives describe "where you intend going". This is where to plan the details of "how to get there" (your operational goals) and how you are going to measure your success along the way (your KPIs).Operational goals should contain milestones and roles and

responsibilities defined. The operational goals for threatened wetlands would specify which wetland rehabilitation/management methods are to be applied. It gives details regarding follow-ups) who is responsible for specific actions and target dates for completion. The KPIs would specify the target levels of threatened wetlands abundance for rehabilitation.

4.5 Monitoring and auditing

The overall responsibility for monitoring of component progress and outcome will be vested with the Vice President Office –Division of Environment and supported by Wildlife Division/Wetlands Unit, Ministry of Agriculture-Environment Unit, Ministry of Water, Ministry of Livestock and Fisheries Development and other relevant Ministries. The monitoring system has two levels:

- Level 1 applies to all wetlands and requires the description of broadly important issues, notably alien plant infestation, encroachment and burning, that can be readily described.
- Level 2 applies only to key wetlands, for which additional features will need to be described.

Some sample key monitoring indicators for both levels are being provided in table 1 below.

Table 1: Monitoring Indicators

Changes	Key Indicator components to consider at Level 1	Key Indicator components to consider at Level 2
Change in hydrological integrity(water level)	man-made structures	• inflows and outflows, • evapotranspiration, • historical information on hydrological regime • climatic condition
	water table depth	
	plant invasion	
Change in physico-chemical parameters	fire damage	• intensity of fire and damage • type of materials eroded and concentration
	degree of sedimentation/erosion	
Change in ecosystem intactness	loss in area of original wetland	• shape and size • corridors and links for all constituent species
	connectivity barriers	
Change in browsing, predation and harvesting regimes	damage by domestic/feral animals	• size and visibility • historical information • frequency, extent and intensity
	introduced predator impacts on wildlife	
	harvesting of biota	
Change in species composition and cover	introduced plant canopy cover	• type of alien species • historical information • frequency, extent and intensity
	introduced plant understory cover	

It is essential that monitoring provides the information to determine whether the KPIs are being met.

The next step in the management cycle is auditing. This is a frequent (i.e. annual) audit to be undertaken for attainment of the operational goals and a long term (i.e. major audit) every 3-5 years conducted to determine attainment of the management objectives. In case the management objectives are not being met then this highlights the need to re-examine and adjust the operational goals and possibly also the objectives. Each successive management cycle yields an improved understanding and information base.

CHAPTER FIVE

5.0 PROCEDURES FOR SUSTAINABLE MANAGEMENT OF WETLANDS

Wetlands management in Tanzania faces many challenges, the major ones include: increased wetlands degradation as a result of various anthropogenic activities, climate change; lack of proper land-use and management plans in many areas of the country, absence of restoration plans for degraded wetlands and poor enforcement of the existing guidelines for maintaining the wetlands and development of alternative wetlands in case of completely degraded wetlands. Thus, in the following sections the procedures for sustainable management of wetlands are being elaborated.

5.1. Procedures for Identification and establishment of wetlands

In order to identify and establish wetlands, the following procedures must be followed:-

5.1.1 Status identification

In identifying the status of the wetland resources, baseline data on the general knowledge of wetland quality and quantity needs to be established through wetland inventory and developing a landscape level assessment of wetland condition. The status identification therefore should be achieved through the established goals as outlined below:

- Identify where the country's wetlands are located;
- Identify the different types of wetlands and their distribution over space and time;
- Determine the overall ambient condition of wetlands country wide and how their condition changes over time;
- Associate changes in wetlands quality and quantity with possible causal factors, such as urban and rural development, agriculture, and conservation programs;
- Identify possible sources of wetlands degradation;
- Assess the impacts of degradation factors on the wetlands;
- Find out whether restoration measures have been undertaken;
- Determine the types of restoration measures which have been undertaken;
- Evaluate the effectiveness the restoration measures undertaken.

5.1.2 Area specific wetland definition and types

The Ramsar definition of "wetlands" is very broad and does reflect the global scale of wetlands thus the best template towards identification and establishment of wetlands. It is therefore proposed that the definition is worthy treated as a first steps towards identification, categorizing and establishing the Tanzanian wetlands, while considering the existing categories so far recognized in the country.

5.1.3 Review national objectives

As a precursor to developing a systematic approach for identifying future wetlands, there must be consideration on the objectives related with national plans on wetland. These objectives should provide a basis for all subsequent considerations in the area.

5.1.4 Inventories and data

Wetland inventory is a basic need for any planner providing information on what exists in an area, levels of pressure as well as the various stakeholders involved in resource uses. A successful inventory is the one which considers an ecosystem approach complimented by a detailed analysis of the livelihoods of the wetland natural resources users (at the household level). The survey should be ideally conducted in a participatory way, in such a way that it: a) includes the local/traditional users in the definition of the objectives from the beginning, being answer-driven, i.e. answer to a specific problem the local communities are facing b) involves the local users in the data collection, with a clear explanation of the expected result (and financial compensation of the work-time of the monitoring is time demanding) c) analyses the results together with the researchers, the managers from the District local users within inclusive and participatory workshops d) involve all the users in a prospective analysis about the future of the wetland.

A structured framework for planning and designing a wetland inventory is summarized in Appendix I. The framework comprises 13 steps that provide the basis for making decisions in relation to the purpose (objectives), and the available resources in a particular wetland. All steps in the Framework are applicable to the planning and implementation of any wetland inventory, and all steps should therefore be followed during the design and planning process.

Wetlands inventories should therefore be undertaken using accepted models and standards as advocated by the Ramsar Convention (Resolutions VII.20 and VIII.6). In the Tanzanian case, the inventory process should include reconnaissance survey. Reconnaissance surveys represent a type of field survey that is often used to gather initial information regarding the presence or absence of resources within an area.

The reconnaissance survey should cover the following:-

i) the kinds of wetland resources looked for;
ii) the boundaries of the area surveyed;
iii) the method of survey, including the extent of survey coverage;
iv) the kinds of wetland resources present in the surveyed area;
v) specific wetland resources that were identified, and the categories of information collected; and
vi) places examined that did not contain wetland resources.

The field methods that will be used during survey exercise should include:

a. **Survey Description**: Specific techniques should be described and justified for the project area. Describe locations examined, intervals between transects, depth of artifacts and/or subsoil in shovel tests, variations in vegetation coverage, and surface visibility. Provide justification for areas not surveyed either by pedestrian only or shovel tests and for structure documentation.
b. **Maps**: Cartographic illustrations should depict the Area of Potential Effects (APE), areas where subsurface testing took place, transect or shovel test locations, recorded sites within and near the APE, newly identified structures and sites, surface survey areas and any relevant field description (e.g. vegetative cover). All maps will include a north arrow (magnetic north, true north, or grid north), a map scale (e.g., 1:24,000), and a bar scale. If relevant, also include maps of soil, wetlands, and disturbances.
c. **Photographs**: Include photographs showing the area, areas of disturbance, types of vegetation, and any newly identified archaeological sites and structures within the APE.
d. **Structures**: Newly identified and previously recorded structures should be recorded on a standard form.

The survey results should be summarized and recorded as follows:-

i. List of all previously recorded cultural resources and their National Register eligibility status (if known);
ii. Results of the literature and cartographic search;
iii. Map showing the predictive model or generalized model of high and low probability areas;
iv. Map showing the locations of transects or areas where subsurface testing took place and areas that require further investigation (if any);
v. An estimate of survey coverage for each identified probability area performed during reconnaissance survey;
vi. National Register evaluations for sites tested at the intensive level of investigation;
vii. Recommendations for further investigation and assessment of effects;

5.1.5 Consideration of all Ramsar criteria species

Article 2.2 of the Ramsar Convention indicates that sites should be considered on the basis of their "ecology, botany, zoology, limnology or hydrology, wetland type and conservation of biological diversity". This must be used for all wetland taxa'. However for bird and fish species the following criteria should followed as stipulated in the Ramsar Convention: **Criterion 5**: A wetland should be considered of internationally important if it regularly supports 20,000 or more waterbirds. **Criterion 6**: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbirds. **Criterion 7**: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity. **Criterion 8**: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere.

5.1.6 Prioritising

Particular weight should be given to designating sites to include wetland types, or wetland species that are either unique/endemic to a particular locality or within a significant proportion of Tanzania.

Sites prioritising should therefore pay the consideration for the following:

i. Smaller sites should not be overlooked;
ii. Fragile wetlands
iii. legal status protected area;
iv. Flagship and keystone species;
v. Species presence in perspective;
vi. Non-native species; and
vii. Less visible interests should not be overlooked.

5.1.7 Boundary definition of sites:

When designating wetlands, a management-oriented approach has to be considered to determining boundaries, recognizing that these should allow management of the site to be undertaken at the appropriate scale for maintaining the ecological character of the wetland. For very small and therefore potentially vulnerable sites, the responsible authority and other relevant stakeholders will have to discuss thus to identify and include buffer zones around the wetland.

5.2 Procedures for Preparation of wetland integrated management plan

The integrated management plan, should comply with the following procedures:

5.2.1 Identification of the objectives of wetland management

This is the single most important procedures of the planning process. It is essential that management objectives be defined for each important feature of the ecological character of the wetland and for all other important features related to the functions and values of the site, including socio-economic, cultural and educational values. In other words, those responsible for developing the management plan must be clear about what they are trying to achieve.

5.2.2 Identification of key stakeholders and their needs

On most wetlands there will be many stakeholders with different interests and needs supporting their livelihoods. It is essential that the planning process should be recognized by all stakeholders and act as a forum for harmonizing competing interest and establishing commitments for the future.

5.2.3 Identification of the factors that affect, or may affect, the features

The ability to achieve wise use and conservation objectives for wetlands will always be influenced to some extent by a number of factors, including trends, constraints and obligations, in fact anything that has influenced, is influencing, or may influence the features of the site for which objectives are set. It is essential that all the important factors should be identified, and that their impact on the site, particularly on the features of its ecological character, be considered. For the most significant factors, it may be necessary to undertake Strategic Environmental Assessment (SEA) as part of the planning process.

5.2.4 Defining the monitoring requirements

A function of monitoring, in the context of management planning, is to measure the effectiveness of management. It is essential to know, and to be able to demonstrate to others, that the objectives are being achieved. Thus, monitoring must be recognized as an integral component of management and planning. It should be designed to identify and manage change in ecological character of the wetland.

5.2.5 Identification and description of the management required to achieve the objectives

In most cases where habitats or species require safeguarding, some action, i.e. management, will be necessary. Having established that a plan identifies the objectives of management, must also identify, describe, and estimate the cost of the action required.

5.2.6 Maintaining the continuity of effective management

Continuity of effective management and monitoring is essential. Management processes must be adapted to meet a wide range of varying factors. Although management will change as circumstances require, the purpose of management should remain more or less constant. This is why continuity of effective management must be maintained, and not simply the continuity of any specified process. Continuity of monitoring is as important as is continuity of management.

5.2.7 Resources acquisition

Management planning must identify and quantify the resources required to manage a site, and this should include the preparation of a detailed budget. This information can then be used to support and justify bids for resources. It is often difficult, particularly in Tanzania, to allocate funds for the implementation of management plans, but it is essential that the management plan identify mechanisms for financing management. These mechanisms may include generating income on the site, for example, through tourism, harvesting of reeds, fishing, etc., and/or the establishment of a Trust Fund for the site or other long-term funding mechanism.

5.2.8 Communication within and between stakeholders

Communication is essential within organizations, and also between organizations and individuals. Management plans and the management planning process are a means of presenting information in a structured and accessible format that will inform others about the site, the aims of management, and the management processes. Planning and management for the maintenance of ecological character are largely dependent on the availability of information. It is also important that those responsible for developing the plan should be aware of management techniques and procedures developed or improved elsewhere.

5.2.9 Demonstration that management is effective and efficient

Those responsible for developing the plan must always be in a position to demonstrate that they are making the best use of resources and that management will be effective. In other words, the plan should provide the basis for any cost benefit analysis. It is also important that the need for accountability is recognized.

5.2.10 Compliance with local, national, and international policies

It is essential that the management plan recognizes and is compliant with a wide range of policies, strategies, and legislation. Occasionally policies may be contradictory, and consequently one of the functions of a plan must be to integrate the various policies. Given the process and functions of an integrated wetland management plan, the following items must be considered as necessary components for integrated wetlands management plan in Tanzania:

i) Agreement among stakeholders.

Wetlands are dynamic areas, open to influence from natural and human factors. In order to maintain their biological diversity and productivity and to permit the wise use of their resources by people, an overall agreement is essential between the various managers, owners, occupiers and other stakeholders.

ii) Documentation of the Management planning process

The management plan itself should be a technical document, though it may be appropriate for it to be supported by legislation and in some circumstances to be adopted as a legal document.

iii) The plan review and adjustment must be continuous

The management plan is part of a dynamic and continuing management planning process. The plan should be kept under review and adjusted to take into account the changing circumstances (including factors revelled through monitoring process, changing priorities, and emerging issues).

iv) Appointment of an authority

This is for the purpose of implementing the management planning process, and this authority should be clearly identified to all stakeholders. This is particularly important for the purpose of taking into account the need and interests of all users, and pressures on the wetland.

v) The scope of the management plan should suite the wetland

A management plan, and the management planning process, should be as comprehensive to commensurate with the wetland characteristics, and challenges. However, for large or zoned sites, it may be appropriate to develop specific detailed plans for different sections of the site, within an overall statement of objectives for the whole site.

vi) The Plan should be cross-cutting

Often management planning should not be restricted to the defined wetland boundary, but rather should also take into account the wider context of planning and management, notably in the basin or coastal zone within which the site is located, which can be trans-boundary in nature. It is important to ensure that the site planning takes into account the external natural and human-induced factors and their influence on the site, and also to ensure that the management objectives for a site are taken into account in the wider planning processes.

5.3 Criteria for selection of activities to be carried out in the wetland

Selection of activities to be undertaken in a particular wetland must consider the following aspects:

i) the present condition of a wetland;
ii) the healthy of that specific wetland ecosystem;
iii) wetland species composition at a particular time;
iv) key characteristics of specific populations in the wetland ecosystem;
v) the risky levels of the resources in demand;
vi) indigenous knowledge i.e. the original community to identify the threatened areas;
vii) change over time of the population of people and livestock dependent on a particular wetland.

5.4 Procedures for acquiring wetlands resource use permits

Ideally, resource use permits should vary depending on the type of use and conservation status of an area. For the wetland areas outside Ramsar sites adaptation to water abstraction to the natural wetland hydrogramme is key i.e. users, especially large scale irrigation users, the agribusiness sector should adapt their abstraction to the existing flow of water in the river and/or catchment areas. Ideally they should not be delivered an abstraction permit with the same given volume of water throughout the year. At the local scale, harvesting at Ramsar listed sites should be regulated by a management plan developed in close consultation with the stakeholders. In terms of international cooperation under the convention, trade in plant and animal products derived from wetlands which extend beyond national boundaries should therefore also be regulated to ensure that harvesting is being done in a sustainable way. Both kind of harvesting situation must be done by permits. The following are the guide for a successive sustainable utilization permits:

i) Harvesting controls and monitoring

Through its Wise Use concept the Ramsar Convention recognizes that sustainable harvesting will continue and seeks to ensure that it is done in such a way that the resource can be available to sustain future generations. The case of trade in protected or endangered species must be considered to encourage monitoring the international trade and, where it involves wetland-derived species, to implement the necessary legal, institutional and administrative measures to require that harvesting is biologically sustainable.

ii) Consideration of convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

It is always important to remember that trade in endangered or potentially endangered plant and animal species, and certain

derivatives from them, are regulated and monitored through special permits.

iii) Trade in wetland-derived products

For a successful process, Tanzania should review all its international trade in wetland-derived plant and animal products, both exports and imports, and as appropriate to implement the necessary legal, institutional and administrative measures to require that harvesting is sustainable

iv) Regulation of foreign investment to ensure wetland conservation and wise use

This must be considered to regulate foreign investment in ways that ensure that it contributes in a positive way to the long-term sustainability of the wetland resource being utilized. Any foreign investments permits should be subject to annual/bianual reviews to allow possibility of changes in case of realized threats.

5.5 Procedures for undertaking surveys and/or researches and tourism in the protected and unprotected wetlands:

From the understanding that, wetlands are crosscutting and are affected by a number of sectors, the permits for undertaking the research, surveys and tourism should vary according to the respective sector's policies and regulations. For example, if an individual or group of people wants to undertake research or tour within a wetland that is protected under wildlife division (MNRT), then the wildlife policy and procedure for such activities within those areas should apply. When an area is within the village land, in case of research the responsible person should follow the COSTECH research procedures including gathering all the necessary documents which they will have to share with the district and local authorities. It is always important that there is cross-sectoral communication and information sharing between sectors such that any possible abuse can be prevented. For example, in case the activity emanates from the agriculture sector, then both agriculture and water policies must operate so that there will be no conflicting interests among the users and the authorities

5.6 Procedures for rehabilitation of wetlands

The process of rehabilitation should consider the following:

i) Historical background of an area
ii) Current ecological status of the wetland
iii) The economic value of the species to be restored
iv) The existing land use status of an area
v) Environmental benefits of the process
vi) The cost effectiveness of the process depending on the extent of degradation, and whether the situation is reversible

vii) Understanding of stakeholders' need and levels of dependence on the wetland
viii) the priorities of key stakeholders
ix) strategies to win political will
x) technical constraints associated to the process
xi) Understanding the legislative context within which wetland rehabilitation takes place

5.7 Procedures for effective and efficient institutional and legal framework for integrated management and wise use of wetlands:

In sustainable management and utilization of wetland resources, there is need of using legal and institutional framework effectively and efficiently. The following are the guidelines to adhere when formulating framework:

i) Establish a knowledge base of relevant legal and institutional measures.

A key responsibility of the team formulated is to create a comprehensive collection of knowledge base of the country's law and institutional measures which are relevant to wetlands. The content of the knowledge base will depend on country circumstances.

ii) Identify wetland-related legal and institutional measures

Wetland-related legal and institutional measures are those which directly promote conservation and wise use of wetlands, including those directly supporting the implementation of the Ramsar Convention. Conservation and wise use measures are contained in national laws and regulations on environmental protection, nature conservation, protected areas, environmental impact assessment and audits, land-use planning, coastal management, water resource management or pollution control. At the local level example district, ward or village level, customary laws and community-based institutions may be relevant.

iii) Identify sectoral legal and institutional measures which directly or indirectly affect wetlands

The key step to identifying sectoral legal and institutional measures which directly or indirectly affect wetlands is for the team to determine which processes and categories of activities contribute to the loss of wetland functions, values and benefits within the country. To do this, the team can use existing scientific and policy reports, studies and inventories to determine the main threats to wetlands in the country concerned. Where these are not available the following information may need to be commissioned:

1. Evaluation of the knowledge base

Once the established team has established a knowledge base, it can evaluate the legal and institutional measures identified in its two components. The key steps in the evaluation phase are to:

A. assess the effectiveness of existing wetland-related legal and institutional measures in promoting wetland conservation and wise use; and
B. analyse how sectoral legal and institutional measures directly or indirectly affect wetlands.

The evaluation should help the team to determine the legal and institutional constraints on wetland conservation and wise use in the country. This determination is necessary before the team can develop recommendations for necessary legal or institutional changes.

2. Identification of legal and institutional changes necessary to support wetland conservation and wise use

Once the team has identified strengths and weaknesses of the country's legal and institutional framework, it may consider at least three types of recommendation as outputs of the review process. First, and as a priority, the review team should recommend ways in which legal and institutional measures which contribute to the loss of wetlands can be better harmonised with conservation and wise use objectives. Or, if this is not possible, the review team should recommend the removal of these legal and institutional measures. Where this is impracticable in the short term, all possible steps should be taken to reduce progressively the impact of such measures

5.8 Communication, education and public awareness strategies among stakeholders:

In sustainability use and limiting impacts of wetlands in Tanzania, stakeholders should adhere to the strategies for communication, education and public awareness. This is outlined as follows:-

i) Communication, education, participation and awareness should be used effectively at all levels in the country to promote the value of wetlands.
ii) There must be support and tools provided for the effective implementation of national and local wetland-related activities.

This should focus on establishing the enabling environment for the effective implementation of wetland related activities. This includes mechanisms such as frameworks and action plans, the establishment of focal points, including individuals, organizations and centres, and mechanisms such as networks for information exchange and access to resources, experts and training.

iii) People must be motivated and enabled to act for the wise use of wetlands.

For sustainability management of specific individual wetlands the following strategies are important to consider (**Box three**)

Box three

Strategy1: *Motivate and enable new actors to be actively involved for the wise use of wetlands.*

Strategy 2: *Improve the individual and collective capacity and opportunities of people to participate in and contribute to using wetlands wisely.*

Strategy 3: *Support and develop mechanisms to ensure multi-stakeholder participation in wetland management*

Strategy 4: *Formulate local based Community Wetland Resource Management groups. These would help in ensuring the sustainability of the wetlands at local levels. These should be given specific tasks to represent the community.*

5.9 Partnership and cooperation at district/region, national, regional and international levels for the management of trans-boundary wetlands and migratory species:

The concept of shared wetlands now referred to as international wetlands (those wetlands which cross international boundaries). The basic guidelines for partnership and cooperation for management of trans-boundary wetlands and migratory species are as follows:

i) Managing shared wetlands and river basins

In shared river basins the country should seek to harmonise obligations arising from any watercourse agreements to which the country may also be signatory. At regional level, the Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes Helsinki, (1992) sets out important principles and rules which provide a comprehensive basis for the development of new agreements. Another aspect of managing shared wetlands and river basins is that of alien or invasive species.

ii) Trans-boundary wetlands

Under these Guidelines for international cooperation, riparian parties are urged to identify all their shared wetland systems (including those in the coastal zone) and cooperate in the management of these with the adjoining jurisdiction(s). This cooperation may extend to formal joint management arrangements or collaboration in the development and implementation of a management plan for the wetland.

iii) Trans-boundary (international) river basins

Also cooperation will be pursued for shared or international river basins and coastal systems, where the establishment of multistate management commissions is an important concept for the shared river basins to consider and pursue energetically. For shared coastal wetlands, it is urged to develop frameworks of cooperation within existing Regional Seas Programmes and embodying Large Marine Ecosystem (LME) concepts. Regional Seas Programmes provide a legal

framework for cooperation, including a convention and appropriate protocols.

iv) Managing shared wetland-dependent species

International cooperation in the management of so-called shared species has been a priority under the Ramsar Convention since its inception. In fact, countries are in motivation for to develop and put into place a convention like Ramsar is largely provided by a desire to promote international cooperation for migratory waterbird conservation as well as other species.

v) Migratory water birds

The Ramsar Convention has a responsibility as a part of international cooperation to see the important wetland habitats which form flyways recognized and managed appropriately in perpetuity. Contracting Parties should have as a priority the identification and designation of all sites which satisfy the waterbird criteria for identifying wetlands for inclusion in the Ramsar List. With the development and implementation of management plans for these sites, the Convention will make a significant contribution to the global efforts to conserve these species.

vi) Other migratory species

It is recognized that the Ramsar Convention should be taking a more active role in the protection and management of wetland habitats for a wider range of species than simply the waterbirds. The contribution of the Ramsar Convention to this can be through the designation of critical habitats as Wetlands of International Importance and the encouragement of site networks. criteria for identifying Wetlands of International Importance provide one avenue for concerted action by the Contracting Parties to ensure that these critical areas on the migration routes are designated and managed appropriately.(Ramsar Convention on Wetlands, 2010).

CHAPTER SIX

6.0 MONITORING AND QUALITY ASSURANCE PROCEDURES

6.1. Monitoring Procedures

Monitoring and assessment procedures are important to provide managers with the information necessary to report on the condition of the wetlands. That information, in turn, can be used to prioritize wetland management activities such as protection, restoration and compensatory mitigation. The purpose of monitoring is to help one decide whether activities are being implemented as planned. The information is then used to make decisions about improving the management and implementation of the programme. Thus a good monitoring programme has to be focused on either the ecological character or the environmental outcomes of managing a site, (for example, what percentage of a site is occupied by invasive plants); and/or the 'outputs' of the management interventions, (for example, were the specified number of hectares of weed sprayed with herbicide and killed in this year). The ecological character of a monitoring programme should thus consider the following: hydrological factors (targeting the water levels – both surface and ground waters in this context), elements of biodiversity (macro-invertebrates, fish, birds but also plants as well as the socio-economic aspects (economic activities undertaken in an area and food availability over time and space).

6.1.1 Setting wetlands monitoring objectives

As explained above, monitoring is a process that provides information for management purposes (Finlayson and Mitchell, 1999). Essentially, it must provide the basis for management actions and judgements. Monitoring needs to be able to measure changes in reference to a set of objectives. Past experience indicates that, most wetlands rehabilitation projects had not developed clear goals and objectives that could be used to determine project success. This implies that a significant number of monitoring programs do not produce meaningful information that is useful to wetlands managers.

Thus, monitoring activities can effectively be carried out basing on categories of Downes *et al.* (2002) that categorise monitoring projects on the basis of their objectives as follows:

- State-of-environment reporting
- Compliance monitoring
- Impact monitoring
- Long-term and reference site monitoring

In order to come up with a well organised set of monitoring program objectives, the process would be guided by a checklist that would address the following issues:

a) Wetland degradation problem clearly identified;
b) Ascertain knowledgeable sources of information;
c) Identify all the relevant stakeholders involved and their needs;
d) Collect all available relevant information and put in a common form;
e) Identify the knowledge gaps, limitations and restrictions;
f) Collect the necessary additional information to fill up the gaps identified;
g) Develop a relevant conceptual model with underlying assumptions;
h) Ensure that specific objectives are:
i) clear and concisely defined
ii) sufficient to specify what is to be achieved and
iii) specific enough to indicate when each stage is complete.

Also the following generalised issues can be useful in formulating monitoring program objective:

i. Inventory issues

In order to formulate the objective related to the natural resource present in a particular wetland the following issues should be considered:

a) The present condition of the wetland;
b) The health of that specific ecosystem;
c) Wetland species composition at a particular time;
d) Key characteristics of specific populations in the wetland ecosystem;
e) Existing similarities and differences between biological communities in a particular wetland.
f) Existing conflicts among resource users

ii. Assessment issues

Objective related assessment of the wetlands ecosystem and processes should consider the following aspects:

a) the relationship between ecosystem components and ecosystem processes;
b) parameters to be used to measure the effects of altered environmental conditions;
c) existing threatening processes;
d)the existing risk levels;
e) responses of ecosystem components and processes that have to be proposed for the management action;
f) responses that signify damage.

iii. Monitoring issues

The following issues should be considered in developing wetlands monitoring program objective:

a) observed difference between control and impact sites over time;
b) conformity of water quality to statutory standards;

c) successfulness of restoration activities;
d) recovery status of a particular wetland in comparison to its naturally occurring wetlands nearby;
e) short and long term changes occurring in wetland ecosystems in response to management actions.

iv. Adaptive Management issues

The guiding aspects for issues in this section shall include:

a) predictability of long-term effects that facilitate adaptive management
b) management measures required to protect and enhance a particular wetland

6.2 Quality Assurance Procedures

Even the best-designed monitoring program will be of little value if there is no way of ensuring the quality of the data that is collected, stored and processed. Therefore, inherent in the good design and implementation of a monitoring and evaluation program is a well-documented and practical quality assurance program. This section briefly describes the key elements of a quality assurance/evaluation program:

A. Management process

The wetland management component of a quality assurance program should include:

i) a list of the key personnel involved in the monitoring with their specific roles and responsibilities;
ii) a clear statement of the problems being addressed in the monitoring program;
iii) a clear description of the monitoring activities and the tasks to be undertaken; and
iv) a statement on the data quality objectives for measurement (including statements about the precision, accuracy, representativeness, completeness, comparability and measurement range of the data).

B. Data Acquisition

The data acquisition for a wetland quality assurance program should include:

i) an outline of the experimental design including sample types, sampling frequency, sampling locations;
ii) a detailed description of the sampling methods to be used including instrumentation, sample size, preservatives
iii) sample handling procedures;
iv) analytical methods to be used;
v) quality control requirements (example the number of replicate samples and the frequency of cross checks of field data entries);

vi) a detailed instrument and equipment assurance plan including frequency of maintenance;
vii) documented frequency and methods for the calibration of field and laboratory equipment; and
viii) a description of data acquisition and storage requirements.

C. Auditing Processes

A successful wetland quality assurance program needs to be routinely audited, and if necessary modified. The frequency of audits, what they involve and who carries them out needs to be documented and reported in terms of activities that include results of internal assessments, audits and corrective actions that have been undertaken.

6.2.1 Evaluation programme

Any monitoring programme should be evaluated. The process of evaluation starts with the key features central to the ecological character of a wetland. The table below indicates various aspects of wetlands that should be included in an evaluation programme.

Table 2: An example of wetland evaluation form which could be adopted

Summary of wetland values significance and expected impact	Yes	Likely	Possibly	No	Unknown	Critical	Critical only	National	Regional	Local	Negligible	High	Moderate	Low
1. Life support values														
Hydrological values														
Biogeochemical values														
Habitat values														
Ecological values														
2.Social/cultural values														
Aesthetic values														
Recreational values														
Education and Public awareness														
Public Status values														
Cultural attribute values														
3. Production values														
Agricultural values														
Renewable resource values														
Non-renewable resource values														
Tourism and Recreational values														
Urban values Total														

APPENDICES

APPENDIX I: A STRUCTURED FRAMEWORK FOR PLANNING A WETLAND INVENTORY

Step	Guidance
1. State the purpose and objective	State the reason(s) for undertaking the inventory and why the information is required, as the basis for choosing a spatial scale and minimum data set.
2. Stakeholder identification	Identify all relevant stakeholders with their interests on a specific wetland resources
2. Review existing knowledge and information	Review the published and unpublished literature and determine the extent of knowledge and information available for wetlands in the region being considered.
3. Review existing inventory methods	Review available methods and seek expert technical advice to: a) choose the methods that can supply the required information; and b) ensure that suitable data management processes are established.
4. Determine the scale and resolution	Determine the scale and resolution required to achieve the purpose and objective defined in Step 1.
5. Establish a core or minimum data set	Identify the core, or minimum, data set sufficient to describe the location and size of the wetland(s) and any special features. This can be complemented by additional information on factors affecting the ecological character of the wetland(s) and other management issues, if required.
6. Establish a habitat classification	Choose a habitat classification that suits the purpose of the inventory, since there is no single classification that has been globally accepted.
7. Choose an appropriate method	Choose a method that is appropriate for a specific inventory based on an assessment of the advantages and disadvantages, and costs and benefits, of the alternatives.
8. Establish a data management system	Establish clear protocols for collecting, recording and storing data, including archiving in electronic or hardcopy formats. This should enable future users to determine the source of the data, and its accuracy and reliability. At this stage it is also necessary to identify suitable data analysis methods.
9. Establish a time schedule and the level of resources that are	Establish a time schedule for: a) planning the inventory; b) collecting,

required	processing and interpreting the data collected; c) reporting the results; and d) regular review of the program. Establish the extent and reliability of the resources available for the inventory. If necessary make contingency plans to ensure that data is not lost due to insufficiency of resources.
10. Assess the feasibility & cost effectiveness	Assess whether or not the program, including reporting of the results, can be undertaken within under the current institutional, financial and staff situation. Determine whether the costs of data acquisition and analysis are within budget and that a budget is available for the program to be completed.
11. Establish a reporting procedure	Establish a procedure for interpreting and reporting all results in a timely and cost effective manner. The report should be succinct and concise, indicate whether or not the objective has been achieved, and contain recommendations for management action, including whether further data or information is required.
12. Establish a review and evaluation process	Establish a formal and open review process to ensure the effectiveness of all procedures, including reporting and, when required, supply information to adjust or even terminate the program.
13. Plan a pilot study	Test and adjust the method and specialist equipment being used, assess the training needs for staff involved, and confirm the means of collating, collecting, entering, analysing and interpreting the data. In particular, ensure that any remote sensing can be supported by appropriate "ground-truth" survey.

Source: Handbook 12: Wetland inventory; A Ramsar Framework for Wetland inventory, (2010)