



NATIONAL GUIDELINES FOR THE MANAGEMENT AND CONSERVATION OF WETLAND ECOSYSTEMS IN ZIMBABWE



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Foreword

Zimbabwe is a semi-arid country reliant on seasonal summer rainfall and headwater wetlands for the replenishment of underground water reserves, rivers and streams. Zimbabwe is a landlocked mid-altitude country with the central plateau watershed giving rise to major rivers. These rivers and their associated groundwater and wetlands provide an important resource for the current and the future generations. Continuous losses and shrinkage of wetland areas will thus affect all aspects of human and economic development.



Despite being the world's most valuable ecosystems, wetlands are disappearing at a rate that is three times faster than forests and their loss is not receiving the attention it deserves. In Zimbabwe, wetlands and their associated biodiversity are under threat from activities such as infrastructural development and unsustainable agricultural production among others. If the same trajectory is maintained on a business as usual approach, water scarcity, disease outbreaks and vulnerability to complex climatic events will be intensified.

In response to the wetland management challenges currently being experienced, my Ministry has developed these wetland ecosystem management guidelines to guide and provide the information required for the sound management of wetlands throughout the country. Zimbabwe ratified to the Ramsar Convention in 2013 and continues to champion best practice in this regard. Furthermore, the provisions of the Convention have been domesticated in the Environmental Management Act Chapter 20:27.

The Ministry of Environment, Climate, Tourism and Hospitality Industry is promoting front of pipe interventions in order to prevent the continuous loss of wetland ecosystems. The formulation of these "National Guidelines for the Management and Conservation of Wetland Ecosystems in Zimbabwe" is one example of the interventions that are aimed at safeguarding the country's wetland resources. The guidelines follow a sectoral approach outlining what types of development activities are appropriate or not for wetland ecosystems under different forms of land use and tenure. Developing the guidelines involved intensive consultations with multi-stakeholder groups that included all potentially affected parties such as policy makers, relevant Government arms, the private sector, scientific experts, research and academic institutions among others. The process attempts to rationalise and demystify misconceptions around wetland management.

These guidelines should serve as an administrative tool to guide planning authorities and the public on sustainable wetland management. They should be used together with the Environmental Management Act (Cap 20:27) and any other relevant legal instruments.

Hon N Mangaliso Ndlovu
Minister of Environment, Climate Change, Tourism and Hospitality Industry

Preface

Zimbabwe is endowed with a diversity of ecosystems which support a wide variety of flora and fauna. Wetland ecosystems and their associated biodiversity are among the most vital of ecosystems that provide a wide range of ecological goods and services for human wellbeing, yet their management has not received the attention it deserves. A wetland is simply defined as an area of land which is saturated by water either seasonally or perennially. The management of wetlands in Zimbabwe is guided by the Ramsar Convention, to which Zimbabwe is signatory, as well as national statutes and policies. The Constitution of Zimbabwe, in Section 73, provides for the right to a “safe, clean and healthy environment” to all citizens; a right which can to a large extent be fulfilled through the sustainable management of wetlands. Wetland functions include water storage, flood attenuation, ground water recharge, biodiversity support, provision of habitat for fauna and the filtering of nutrients and pollutants.



Despite the critical functions wetland ecosystems perform, they are highly sensitive to human interference in both rural and urban areas of Zimbabwe. According to assessments by the Environmental Management Agency, over 60% of headwater wetlands in the country are degraded while some have been wholly converted to built up areas. This is largely due to unsustainable agricultural activities, infrastructure development, over abstraction of water and pollution of water through poor disposal of solid and liquid wastes.

In line with the provisions of the Ramsar Convention, Zimbabwe in 2017 designated seven wetlands of national and international importance as Ramsar sites. These are Cleveland Dam, Chinhoyi Caves Recreational Park, Driefontein Grasslands, Lakes Chivero and Manyame, Mana Pools National Park, Monavale Wetland and the Victoria Falls National Park. At a local level, local authorities and communities continue to be engaged for wetland planning and management while significant community wetland protection projects have been established in the country. Traditional leaders play a critical role in management of rural wetlands through community engagement, application of indigenous knowledge systems and enforcement of local by-laws. In urban areas, increased rigour is required in application of the Environmental Impact Assessment policy in order to stem the ongoing rapid loss and degradation of headwater wetland ecosystems.

In an effort to enhance wetland benefits while reducing the negative impacts of wetland utilisation, the Environmental Management Agency in consultation with partners has developed these National Guidelines for the Management and Conservation of Wetland Ecosystems in Zimbabwe. These guidelines are hinged on the principle of sustainable development, which is dependent upon healthy wetlands providing water, with a view to instill a shared vision among stakeholders and the general populace on the need for integrated planning and management of wetland ecosystems for the benefit of present and future generations.

Aaron Chigona

Director General: Environmental Management Agency

These Wetland Ecosystems Management Guidelines are available from the following websites:

Ministry of Environment, Climate, Tourism and Hospitality Industry (.gov)

Ministry of Local Government and Public Works (.gov)

Ministry of Information, Publicity and Broadcasting Services (.gov)

Environmental Management Agency (www.ema.co.zw)

Reference hard copies can be accessed from any of the Environmental Management Agency library network throughout the country.

Review framework for the guidelines: - These guidelines will be reviewed following the National Development Plans timeframes.

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LIST OF ACRONYMS

ARDA	Agricultural and Rural Development Authority
AGRITEX	Agricultural Technical and Extension Services
CBO	Community Based Organization
DA	District Administrator
DPP	Department of Physical Planning
EIA	Environmental Impact Assessment
EMA	Environmental Management Agency
FC	Forestry Commission
HWT	Harare Wetlands Trust
LEAP	Local Environment Action Plan
MECTHI	Ministry of Environment, Climate Change, Tourism and Hospitality Industry
MLAWCRR	Ministry of Lands, Water, Climate and Rural Resettlement
MLGPW	Ministry of Local Government and Public Works
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
PWMA	Parks and Wildlife Management Authority
SI	Statutory Instrument
TSP	Transitional Stabilization Programme
ZINWA	Zimbabwe National Water Authority
ZRP	Zimbabwe Republic Police

SUMMARY

Background. This report presents national guidelines for the management of wetland ecosystems. It starts by detailing why such guidelines are required and how these have been developed. It further outlines the aims and envisaged uses of the guidelines. The intention is that the guidelines should prove useful to anyone carrying out any management or development activities that directly or indirectly infringe on any wetland ecosystem in the country. The aim is to increase awareness as to what wetland ecosystems are, and why it is important to protect and conserve them and, in doing so, to support an integrated and coordinated approach to the conservation and sustainable management of wetland ecosystems in Zimbabwe.

Global Overview. Chapter 2 provides a general overview as to what is a wetland, how wetlands can be identified, and why it is important to consider wetlands as ecosystems embedded in a wider surrounding landscape rather than as separate discrete entities. It provides a brief overview of the global occurrence and importance of wetlands, and highlights the fact that wetlands are amongst the most threatened of all ecosystems.

Wetlands in Zimbabwe. Chapter 3 provides an overview of wetlands in Zimbabwe. It details the diversity and general occurrence of wetlands in Zimbabwe and progress to date in terms of developing a national inventory of wetland ecosystems. It considers the various uses of wetlands, in particular the crucial role of headwater dambo wetlands in terms of water provisioning, and the overall economic values of wetlands. Key management issues are identified together with resulting adverse impacts to wetland ecosystems under different forms of use, as is reflected in the current poor status of wetlands in the country. Particular attention is drawn to the rapid loss of urban wetlands in Greater Harare and of the critical significance of this to the city's water supply. On top of this, climate change is expected to lead to a further general drying of wetlands, so representing a critical threat to the future integrity of all wetland ecosystems and associated supply of water across the country.

Policy and Legal Framework. Chapter 4 outlines the policy and legal framework for the management of wetland ecosystems. Management activities are guided by national policies concerning environmental protection and national development, as well as an array of regional and international treaties to which Zimbabwe is a signatory. The Ramsar Convention, in particular, provides for the wise use / preservation of wetlands in support of sustainable development for the benefit of current and future generations, because healthy intact wetlands provide water required for sustainable development. The National Constitution and the Environmental Management Act are the key legal instruments providing for rights to a healthy environment and to a safe water supply; and providing the regulatory framework for sound environmental management, including the protection and sustainable management of wetland ecosystems, in support of these. A brief description is provided of additional legislation relevant to the management of wetland ecosystems.

Governance of Wetlands. The management and conservation of wetlands in Zimbabwe is a complex process involving multiple institutions, often with divergent motives, and frequently characterized by confusion, tensions and conflicts. Chapter 5 identifies and outlines the roles of the principal actors towards the management of wetland ecosystems in general, and more specifically for wetlands within state conservation areas and in rural and urban areas.

Management of Wetlands. Chapter 6 starts by outlining general principles for sound wetland management and broad management objectives for wetlands under different forms of land use. Thereafter, it looks at the management and use of wetland ecosystems with respect to different sectors and land areas, including wetlands in conservation areas, wetlands and forest plantations, use for agriculture in rural and urban areas, and for infrastructure development, mining and dams. Based on consideration of the resulting impacts certain activities are identified as being appropriate or not for wetland ecosystems. Whilst development of infrastructure within wetland ecosystems is incompatible with sustainable use, it is recognised that there will be exceptional cases where development in terms of urgent national interest is unavoidable. Finally, brief consideration is given to mechanisms for managing environmental impacts to wetland ecosystems resulting from development activities.

Restoration of Wetlands. Chapter 7 provides information on activities which may be done by stakeholders in terms of wetland restoration, creation or enhancement, subject to approval by the Environmental Management Agency. It explains what these different terms mean, why there is a need for restoration work, and identifies different approaches and principles to be followed in carrying out restoration activities. Examples of efforts to restore and create wetlands are provided.

Conclusion. Chapter 8 provides some brief concluding remarks. Driven by population growth and climate change, future access to water is anticipated to become increasingly constrained. Given the critical role of wetlands in terms of water provisioning, it is imperative that wetland ecosystems should be managed primarily for this essential purpose, together with compatible objectives of biodiversity conservation and recreational use. At the same time every effort should be made to avoid any further loss of wetlands through development of infrastructure and mining. Successful management will depend on the support of wetland users. Opportunities need to be created for improved participation by civil society in support of strengthened governance and improved management outcomes for wetland ecosystems.

1. BACKGROUND TO GUIDELINES

1.1 The Need for Wetland Management Guidelines

Wetlands are widely recognized as being some of the most useful, productive and valuable ecosystems on the planet. Yet wetlands are also particularly fragile and threatened ecosystems, with high levels of use leading to rapid degradation and loss of wetlands. Water security, in particular, has emerged as a major strategic issue and this has put wetland conservation and sustainable use high on the international agenda, including in Zimbabwe. Against this background many Zimbabweans are not fully aware of the critical importance of wetland ecosystems and the fact that their use of wetlands can result in negative impacts to these landscapes and to water supplies. Furthermore, not everyone understands their role in terms of wetland conservation and management. These guidelines are intended to promote awareness of wetlands and of effective approaches and practices to wetland management and conservation by environmental practitioners, individuals, communities, developers, development consultants, non-governmental organizations and government bodies in their day to day interactions with wetlands.

1.2 Development of the Guidelines

These wetland ecosystem guidelines have been developed in a participatory manner enabling valuable input from a wide variety of wetland stakeholders and experts. The process started with an inception workshop (date). This was followed by a detailed background study on wetlands in Zimbabwe, including field visits to 16 wetlands selected so as to be representative of different wetland types and condition, occurring on sites with different geology and soil types, within different agro-ecological zones, and subject to varying forms of land tenure and land use. Findings were detailed in a baseline report which was subsequently shared and presented to stakeholders (EMA, 2018). This work provided the basis for development of draft guidelines, which again were shared among stakeholders and experts for comment and subsequently presented at a validation workshop (date, not yet held). The final guidelines incorporate important feedback and suggestions received during this review process.

1.3 Aim of the Guidelines

These guidelines have been designed to support an integrated and coordinated approach to the conservation and sustainable management of wetland ecosystems in Zimbabwe. Wetland users, policy makers, regulators, programme and project designers and government departments and non-governmental organizations must be fully aware of the essential value and importance of wetlands. Therefore, these guidelines have been compiled so that all stakeholders share the same understanding of what wetland ecosystems are, why it is important to protect and conserve them, what this means in terms of behavior towards wetland ecosystems and what the roles of different stakeholders are in terms of promoting wetland conservation and sustainable wetland management. Hopefully with this shared understanding, existing problems with wetland management can be rectified, and enhanced success can be achieved in terms of safeguarding and conserving wetlands for the benefit of current and future generations.

1.4 Use of the Guidelines

It is anticipated that these guidelines will be useful to any person or group carrying out any management or development activities that directly or indirectly infringe on any wetland ecosystem in the country. This will include, for example, such diverse groups as farmers, foresters, miners, dam builders, developers, conservation organizations, traditional leaders, local and urban authorities, technical advisers, community based organization and non-governmental organizations. It is intended that these guidelines should provide improved clarity as to the forms of use appropriate or not for wetland ecosystems under different forms of land use and tenure, and offer examples of best management practices for various sectors.

2. INTRODUCTION TO WETLANDS

This chapter provides a general overview as to what is a wetland, how wetlands can be identified, and why it is important to consider wetlands as ecosystems embedded in a wider surrounding landscape rather than as separate discrete entities. It provides a brief overview of the global occurrence and importance of wetlands, and highlights the fact that wetlands are amongst the most threatened of all ecosystems.

2.1 What is a Wetland?

Wetlands are areas where water is the primary factor controlling the environment and the associated plant and animal life. They occur where the water table is at or near the surface of the land, or where the land is covered by shallow water. Examples of wetlands include springs, dambos, streams, rivers, lakes, dams, floodplains and estuaries.

2.2 How to Identify a Wetland

Many wetlands, such as rivers and dams, are clearly distinctive from adjacent ecosystems, for others such as dambos the distinction is often less obvious. In general, wetlands can be identified on the basis of a combination of ecological characters including landform (wetlands usually occur in low or base portions of landscapes); hydrology (permanent or seasonal presence of water at or near the soil surface); soils (wetland soils typically exhibit an accumulation of organic matter, plus the presence of gleying (presence of pale grey or bluish soil colouration in the lower, waterlogged soil horizons) and mottling (distinctive discontinuous reddish patches, or mottles, embedded within a lighter coloured soil matrix); and biota (the presence of plant and animal species that are known to be reliant on wetland conditions). In fact wetlands are often as reliant on wetland adapted plants as these plants are on wetlands. For example, in open grassland headwater wetlands which are characteristic of the region, the horizontal clump-type root systems enhance infiltration of water into the soil, the thin leaves of grasses restrict evaporation and the closeness of the plants reduces evaporation.

2.3 Wetlands as Ecosystems

Wetlands provide essential habitat for a vast diversity of plant and animal species that are entirely or partially dependent on wetland conditions for their existence. Wetlands are determined by hydrological conditions which are usually influenced by land use and development activities within the upstream catchment area. Thus wetlands comprise ecosystems that relate to and need to be seen and managed in context with and relation to adjacent ecosystems. Moreover, natural wetlands typically occur and need to be managed as part of larger connected wetland ecosystems rather than as independent discrete wetland bodies.

2.4 Global Occurrence and Types of Wetlands

Wetlands are found throughout the world from the tundra to the tropics and occur in many different forms. Wetlands can be small or large, freshwater or marine, natural or man-made, seasonal or permanent. Examples include springs, dambos, streams, rivers, lakes, floodplains,

deltas, estuaries, plus man-made dams, reservoirs, quarry pits, canals and sewerage ponds. Collectively, wetlands cover about 4 to 6% of the earth's land surface.

2.5 Wetlands Provide Many Valuable Services and Benefits to People

Despite being relatively small in size, wetlands are extremely important to human well-being and comprise some of the world's most important environmental assets. Wetlands provide water and primary productivity upon which countless species of plants and animals depend on for survival. Key services to people include the provision of clean water, food (fish), natural medicines, regulation of local climate, regulation of human diseases, cultural heritage, and recreation and tourism opportunities. In economic terms wetlands comprise some of the most valuable of all ecosystems, both per unit area and in overall terms.

2.6 Wetlands are Among the World's Most Threatened Ecosystems

There has been a long historical association between wetlands and human settlements who have derived water and other important benefits from wetlands. This has led to widespread modification and loss of wetlands and which remains ongoing, with 35% of remaining wetlands having been lost over the last 45 years. Indeed, the rate of loss of wetlands is higher than for any other types of ecosystem, such that wetlands are among the world's most threatened ecosystems. Although more recently there has been some success in reclamation this is not yet on a scale to significantly mitigate ongoing losses.

3. WETLANDS IN ZIMBABWE

This chapter provides an overview of wetlands in Zimbabwe. It details the diversity and general occurrence of wetlands in Zimbabwe and progress to date in terms of developing a national inventory of wetland ecosystems. It considers the various uses of wetlands, in particular the crucial role of headwater dambo wetlands in terms of water provisioning, and the overall economic values of wetlands. Key management issues are identified together with resulting adverse impacts to wetland ecosystems under different forms of use, as is reflected in the current poor status of wetlands in the country. Particular attention is drawn to the rapid loss of urban wetlands in Greater Harare and of the critical significance of this to the city's water supply. On top of this, climate change is expected to lead to a further general drying of wetlands, so representing a critical threat to the future integrity of all wetland ecosystems and associated supply of water across the country.

3.1 Types of Wetlands

Zimbabwe supports a wide variety of natural wetlands such as caves, springs, hot springs, streams, rivers, lakes, dams, pans, dambos, perennial pools and floodplains, plus a large number of human-made wetlands such as fish ponds, farm ponds, irrigation canals and irrigated lands, water storage areas (dams) excavation such as gravel pits, borrow pits and mines, wastewater treatment areas such as sewerage ponds and mine dams, and drainage canals and ditches.

3.2 Occurrence of Wetlands

Zimbabwe is situated within the interior of the continent and as a result is characterized by large numbers of relatively small headwater wetlands in the form of dambos, pans and small dams, with few large signature wetlands. Dambos and small dams are mainly associated with upper drainages on the central plateau region of the country. Floodplains and associated wetlands, that are characteristic of lower reaches of drainages, are relatively uncommon, the main ones being in association with the Mid-Zambezi valley; the lower reaches of the Save River, particularly in the vicinity of the Save-Runde junction; and along the Limpopo River. The largest wetlands are human-made dams such as Lake Kariba, Lake Mutirikwi and Manyuchi Dam, together with the major rivers. Victoria Falls comprises one of the iconic wetlands of the world.

3.3 Inventory of Wetlands

The Environmental Management Agency (EMA) is in the process of developing a national wetland inventory. To date a total of 1,271 wetlands have been recorded (mapped and visited in the field), principally dambos, and which collectively cover about 3% of the area of the country. The full extent of wetlands will be considerably greater as wetlands in urban areas, plus the main rivers, farm dams, many small pans, and other human-made wetlands have yet to be included in the data base.

3.4 Uses of Wetlands

Wetlands provide a wide range of ecosystem services, including water provisioning, support a great diversity of plant and animal species, regulate local climate and ameliorate climate change through capture of carbon. Wetlands in the form of dambos, streams, rivers and dams, are the primary source of water for urban settlements, irrigated agriculture, water for livestock and wildlife, and for mining and industry. Water bodies, such as large rivers and dams, are important sources of fish, particularly Lake Kariba which supports the production of bream and kapenta. Seasonal wetlands serve as important cropping and grazing areas. Wetland areas, such as Victoria Falls and Mana Pools National Parks, comprise prime tourism attractions and make an essential contribution to the national tourism industry.

3.5 Importance of Dambo Headwater Wetlands

Headwater wetlands arising on the central plateau of Zimbabwe mainly take the form of dambos which are dependent on extensive adjacent grassland ecosystems. Although often largely invisible, these play an essential role in terms of regulating the flow of water and providing clean water to and sustaining the functioning of downstream streams, rivers and dams, as well as the communities that depend on them. Dambos also support a great diversity of plant and animals species. These are critical and sensitive ecosystems that need to be conserved. Effective conservation requires the adoption of a landscape approach that addresses the entire catchment area rather than just the central wetland portion in isolation.

3.6 Value of Wetlands

Little data exists concerning the economic value of wetlands in Zimbabwe. This remains an important research gap. One approach would be to concentrate on their value in terms of water provisioning and in which respect Professor Chris Mugadza has provided some preliminary indications. Studies from elsewhere typically show wetlands to be among the most valuable of all ecosystems and in particular to have higher values than for adjacent grassland, savanna woodland and forest ecosystems.

3.7 Wetland Management Issues and Impacts

Rural wetlands have been heavily impacted through intensive use for crop production and grazing of livestock, leading to the drying of wetlands and widespread loss of biodiversity. In urban situations many wetlands have been strongly modified by development of infrastructure, particularly housing, together with widespread cultivation, excessive abstraction of groundwater, the release of polluted effluents such as sewerage and industrial effluent, and the dumping of solid wastes. These problems are particularly acute for the headwater dambo wetlands and their adjacent grasslands found on the gently undulating highveld plateau of the country; these being the areas where the most productive agricultural lands are found and also where the main population centres are located. Other important issues include the deforestation of wetland catchment areas leading to siltation of rivers and dams; release of toxic wastes from mines, in particular acid mine drainage, and the physical destruction of river environments due to gold panning and the associated use of and release of mercury into

downstream aquatic systems. High levels of offtake leading to declines in fish catches have been reported for many water bodies.

3.8 Status of Wetlands

One fifth (21%) of the documented wetlands in Zimbabwe are considered to be severely degraded, and a further 61% are moderately degraded (61%), with only 18% being classified as stable or intact (EMA, 2018). This highlights the critical need for improved management of wetlands.

3.9 The Loss of Urban Wetlands in Greater Harare

The loss of headwater wetlands in the Greater Harare area (and other urban areas such as Marondera, Rusape and Mutare) represents a particular and critical threat to the future sustainable development of these areas. The headwater wetlands form an essential part of the water supply infrastructure for Harare, Chitungwiza, Epworth, Ruwa and Norton. These wetlands control flooding, regulate and ameliorate the seasonal flow of water, enhance ground water recharge, trap silt, purify water and so enhance the delivery of clean water to downstream water supply dams. However, over recent decades these wetlands have suffered a high level of loss and degradation, principally due to expansion of development into wetland areas. Analysis of ten wetlands in Harare indicate an overall loss of 50% of remaining extent over the eleven year period from 2009-2019. This is particularly critical in that it comes at a time when the city is experiencing a protracted water crisis whereby the city authorities are unable to provide adequate supplies of clean water to residents. Future sustainable development of the city will directly depend on the maintenance and wise management of these wetland ecosystems specifically for water provisioning. Wetlands degraded by agricultural activities can be retrieved and restored using the model developed on Monavale Wetland.

3.10 Wetlands and Climate Change

Climate change is expected to result in warmer and drier conditions over the interior of the African continent, including Zimbabwe. This can be expected to result in reduced availability of surface water, which will have a direct negative impact to virtually all wetland ecosystems in the country and thus on downstream water supplies. On the other hand maintaining wetland ecosystems and the associated provisioning of water will provide an important mechanism for mitigating the expected impacts of climate change.

4. POLICY AND LEGAL FRAMEWORK

Chapter 4 outlines the policy and legal framework for the management of wetland ecosystems. Management activities are guided by national policies concerning environmental protection and national development, as well as an array of regional and international treaties to which Zimbabwe is a signatory. The Ramsar Convention, in particular, provides for the wise use of wetlands in support of sustainable development for the benefit of current and future generations. The National Constitution and the Environmental Management Act are the key legal instruments providing for rights to a healthy environment and to a safe water supply; and providing the regulatory framework for sound environmental management, including the protection and sustainable management of wetland ecosystems, in support of these. A brief description is provided of additional legislation relevant to the management of wetland ecosystems.

4.1 National Environment and Development Policies

Zimbabwe does not have a specific wetland policy that would serve to provide clear guidance concerning the management and use of wetlands. The national environmental policy and strategy provide overall guidance on environmental management, together with a number of other policies and strategies concerning specific aspects of the environment, including water, biodiversity, wildlife, forests, agriculture, climate and national response to climate change. These advocate and provide the platform for environmental protection and for the sustainable management and use of natural resources. The key national development policy is the Transitional Stabilization Program (2018-2020) (TSP). The TSP, in support of improved environmental management, specifically seeks to strengthen initiatives to protect wetlands so as to reduce or halt their rate of destruction.

4.2 Regional and International Treaties

Zimbabwe is signatory to a number of regional and international treaties that are relevant to the management of water and wetlands and constituent biological resources. These include SADC protocols on fisheries, forestry, wildlife conservation, tourism, and shared water courses; the Convention on Biological Diversity, which promotes sustainable development based on the conservation and sustainable use of biodiversity resources and, most importantly, the Ramsar Convention, which is specifically concerned with the conservation and wise use of wetlands and wetland resources.

4.3 Ramsar Convention and the Wise Use of Wetlands

The 'wise use' of wetlands, which forms the core of the Ramsar philosophy, is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development. "Ecological character" is the combination of the ecosystem components, processes and benefits/services that characterise a wetland at a given point in time, and "change in ecological character" is defined as any human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service.

The phrase “in the context of sustainable development” is intended to recognize that whilst some wetland development is inevitable and that many developments have important benefits to society, it is not appropriate to imply that ‘development’ should be an objective for every wetland. This is particularly relevant for a country such as Zimbabwe where there are usually alternatives for development of urban structures outside of wetlands, but for which available water resources are often limiting and declining. Wetlands are central to sustainable development as they supply all our fresh water. Wise use can thus be seen as the conservation and sustainable use of wetlands for water provisioning for the benefit of people and nature.

The Ramsar Convention requires participant nations to identify and protect one or more wetlands of international importance. Zimbabwe, to date, has designated seven such wetlands as Ramsar sites, namely Cleveland Dam, Chinhoyi Caves Recreational Park, Driefontein Grasslands, Lakes Chivero and Manyame, Mana Pools National Park, Monavale Wetland and the Victoria Falls National Park. More generally Contracting Parties commit to work towards the wise use of all their wetlands through national plans, policies and legislation, management actions and public education.

4.4 National Constitution

The constitution is the supreme law in Zimbabwe. According to Section 73, every person has the right to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting economic and social development. The constitution also provides every person with the right to safe, clean and potable water (Section 77). The protection and wise use of wetland ecosystems is fundamental to the realisation of both these rights.

4.5 Environmental Management Act and Regulations

The Environmental Management Act provides for general protection of the environment for the benefit of present and future generations. It aims to secure ecologically sustainable management and use of natural resources while promoting justifiable economic and social development.

The Environmental Management Act, together with the Ecosystem Management Act (Environmental Impact Assessment and Ecosystem Protection) Regulations (SI 7/2007), provide specific protection for wetlands whereby it is an offence to impact on any wetland by:

- Reclaiming or draining it;
- Adversely affecting any animal or plant life on it;
- Introducing any exotic animals or plant species to it;
- Disturbing it by drilling or tunnelling in a manner that will have any adverse impact;
- Cultivating or destroying any natural vegetation on it; and
- Digging up, breaking up, removing, or altering in any way, its soil or surface;

without a licence (wetlands utilisation certificate or EIA certificate) or express written authorisation of EMA, given in consultation with the Environmental Management Board and the Minister of Environment, Climate Change, Tourism and Hospitality Industry. Thus, in practice virtually any development activity on a wetland requires a licence issued by EMA in the form of either an EIA Certificate or Wetlands utilization certificate. Despite this protection there has been a massive loss of wetlands in Harare over the last ten years.

EIA Process. The primary protective mechanism provided by the Environmental Management Act is the requirement that a wide range of development projects should be subject to an Environmental Impact Assessment process (Table 1) and cannot be implemented unless in possession of a valid EIA Certificate issued by the Director General of EMA for the project. The list of prescribed projects for which an EIA Certificate is required, in addition to drainage of wetlands, includes:

- Dams and man-made lakes
- Irrigation schemes
- Forestry – conversion of forest land or natural woodland to other purposes
- Housing developments
- Industrial developments
- Infrastructure
- Mining and quarrying
- Petroleum production, storage and distribution
- Power generation and transmission
- Tourist resorts and recreational developments
- Waste treatment and disposal (hazardous waste, solid waste and sewerage)
- Water supply (groundwater development, withdrawals from rivers or dams, canals and pipelines).

Table 1. Outline of the EIA Process.

Step	Notes
1. Prospectus	The developer is required to prepare a Prospectus, comprising a brief description of the proposed project, and which he submits to the DG of EMA. Prepared by developer. Brief description of project, which DG reviews and approves/ rejects.
2. EIA report	EIA report prepared by EMA-registered consultants instructed by developer. Includes description of impact on the environment and measures to address negative impact. Also wide consultations with stakeholders (fee for viewing documents).
3. DG reviews report	DG reviews report, verifying stakeholder participation. Approves/ rejects within 60 days. If not, it is granted by default.
4. EIA Certificate	EIA certificate issued, if approved, may be with conditions
5. Periodic audits	Periodic environmental audits of project by DG. Certificate may be cancelled if evidence of harm to the environment emerges

Development Permits. Different types of development activities typically require some form of a permit. For example, for any urban development, a developer is required to obtain a building permit from the relevant local authority. Regarding wetlands in particular, under the ZINWA Act, for any operation that interferes with the banks, bed or course of a public stream, marsh, spring, swamp or vlei, it is necessary to first obtain a permit from the relevant Catchment or Subcatchment Council. Under the Environmental Management Act it is stipulated that, for listed projects, no licensing authority, such as a local authority, may issue a development permit for listed projects without an EIA Certificate.

In practice, the EIA process has a number of serious flaws. These are frequently exploited by developers and provide a means to enable development to go ahead in wetland environments and other sensitive ecosystems.

Ministerial Powers. The Environmental Management Act provides wide ranging executive powers to the Minister of Environment to issue orders for protection of the environment on any land owner, occupier or user, to issue regulations providing for the conservation and protection of wetlands, and of bed, banks or course of any river or stream and any source of water; and to declare any wetland to be an ecologically sensitive area and to impose limitations on development in or surrounding such areas.

Environmental Planning. The Environmental Management Act further provides for environmental planning at different levels which should provide a powerful tool for environmental protection, including of sensitive ecosystems such as wetlands. The Act requires the preparation of a National Environmental Action Plan (NEAP) to be reviewed and updated on a ten year basis. This should promote an integrated approach to the maintenance and improvement of the environment so as to afford an acceptable quality of life, based on strategies and measures for the protection of ecological processes and natural systems and for protecting the environment against disturbances and destruction due to human activities. All other environmental plans should be consistent with the NEAP and any development activities should comply with the NEAP. The EMA additionally requires all local authorities to prepare a Local Environmental Action Plan (LEAP) for the area under their jurisdiction, and which should be consistent with the NEAP. However, in practice these requirements have yet to be implemented. The NEAP has never been formulated and those local plans that do exist are often outdated.

4.6 Supporting Legislation

Other legislation relevant to the sustainable management of wetlands under different sectors or jurisdictions includes the Water Act, the Zimbabwe National Water Authority Act, the Urban Councils Act, Rural District Councils Act, the Regional Town and Country Planning Act, the Traditional Leaders Act, the Mines and Minerals Act, the Parks and Wildlife Act, the Forest Act and the Communal Lands Forest Produce Act (Table 2).

Table 2. Additional legislation relevant to the sustainable management of wetlands.

Law	Notes
Water Act (Chapter 20:24)	<p>The Water Act provides for the planning, development and utilisation of the water resources of Zimbabwe. It provides for establishment of catchment councils and subcatchment councils and defines their powers and procedures concerning the planning and management of corresponding water resources. The Act confers wide responsibilities on the Minister of Lands, Agriculture, Water, Climate and Rural Resettlement to: (a) to provide overall policy guidelines on the optimum development, utilization and protection of water resources, ensuring that all components of the water cycle such as ground water surface water, evaporation, clouds and rainfall are recognized as being interdependent and forming part of a single water cycle, and that management is carried out in a manner that is consistent with national environmental approaches provided for in any enactment; (b) to ensure the availability of water to all citizens for primary purposes and to meet the needs of aquatic and associated ecosystems particularly when there are competing demands for water; and (c) to ensure the equitable and efficient allocation of the available water resources in the national interest for the development of the rural, urban, industrial, mining and agricultural sectors.</p> <p>All water is vested in the Water vested in President. Any use of water (stored, abstracted, apportioned, controlled, diverted or used in any way), other than for primary use, requires a permit issued in terms of the Act and which confers upon the holder a right to the use of water in accordance with the permit.</p> <p>Though the Act makes no specific mention of wetlands, it does provide a solid basis for sound management of wetlands, particularly given that these are an important source of water.</p>
ZINWA Act (Chapter 20:25)	<p>The ZINWA Act serves to establish the Zimbabwe National Water Authority and to provide for its functions. Subject to the Water Act, the ZINWA Act confers wide ranging responsibilities to the National Water Authority regarding the planning, management and development of water resources in the country. In particular, ZINWA superintends over the catchment and subcatchment councils established under the Water Act, and is responsible for the issuing of permits as required for any use of water other than for primary purposes.</p>
Urban Councils Act (Chapter 29:15)	<p>The Urban Councils Act provides for the establishment and administration of urban areas. It provides for the establishment of local authorities and provides such authorities with various powers to administer the urban areas under their control. Such powers include the provision of services relating to water supply and to implementation of sewerage and drainage systems, as well as for the establishment of by-laws. The Act confers considerable powers of oversight</p>

Law	Notes
	<p>to the Minister of Local Government, Public Works and National Housing to whom administration of the Act is assigned.</p> <p>Regarding wetlands, while the Urban Councils Act includes provisions that local authorities can use to support protection of the environment in general, there is little that compels them to do so. In practice urban authorities tend to be more concerned with facilitating development of infrastructure, often regardless of the impacts to and thus at the expense of wetland ecosystems.</p>
Rural District Councils Act (Chapter 29:13)	<p>The Rural District Councils Act provides for the establishment and administration of Districts, for the establishment of corresponding rural district councils and confers powers to such councils for purposes of administration of district areas. It provides for the division of districts into wards, for the formation of district development committees and for environmental committees and subcommittees. It also provides for the establishment of by-laws to regulate land use and development activities within the district.</p> <p>Regarding wetlands, while the Rural District Councils Act includes provisions that local authorities can use to support protection of the environment although this tends to be low down on their long lists of competing priorities.</p>
Regional Town and Country Planning Act (Chapter 29:12)	<p>The RTCP Act provides for and guides the making of regional plans, master plans and local plans in both urban and rural areas. Such plans are prepared by relevant local authorities and submitted to the Minister of Local Government, Public Works and National Housing for approval. The Act also provides for control over development, whereby no development should go ahead without a permit or development order issued by the relevant local authority. Owners of adjacent properties must be informed of any application for a permit and afforded opportunity to lodge objections. In assessing the application, the local authority should ensure that it conforms with any existing Master Plan, Local Area Plan and any environmental plans. The decision whether to grant a development permit should be made by the full council.</p> <p>Regarding wetlands, the Environmental Management Act stipulates that no development should take place on wetlands without written consent from the Minister of Environment (in the form of an EIA Certificate or wetland utilization certificate), and that no other authority should issue a development permit unless accompanied by an EIA Certificate.</p>
Traditional Leaders Act (Chapter 29:17)	<p>The Traditional Leaders Act provides for the appointment of village heads, headmen and chiefs and defines their functions. Formerly restricted to communal lands, the Act includes provision for the appointment of traditional leaders for resettlement lands. The Act provides for the establishment of village and ward (and provincial) assemblies and village and ward</p>

Law	Notes
	<p>development committees and defines their roles. In terms of the Act the Traditional Leaders have a strong role to play in terms of the allocation of land (but requiring approval by the relevant rural district council) and management of natural resources. The Act tasks chiefs with ensuring that the land and its natural resources are used and exploited in terms of the law and, in particular, to control against over-cultivation, over-grazing, the indiscriminate destruction of flora and fauna, and illegal settlements; and generally to prevent the degradation, abuse or misuse of land and natural resources in his area.</p> <p>For wetlands, the Act confers responsibility to traditional leaders to ensure sound environmental management within the areas under their control, including of wetland areas.</p>
Mines and Minerals Act (Chapter 21:05)	<p>The Mines and Minerals Act regulates mining activities. All rights concerning the exploration, mining and disposal of minerals, oil and natural gas are vested in the President. The Mining Affairs Board, established by the Act, plays a strong supervisory role over all mining activities. The Act provides for access to water resources for mining activities.</p> <p>Regarding wetlands, the Act regulates mining of alluvial and eluvial deposits of designated minerals, for which purposes it is necessary to first apply for and obtain an order (permit) from the Mining Affairs Board. Applicants are required to send a copy of their application to the Environmental Management Agency and to the relevant local authority. Regarding the exploitation of (a) any deposit of any mineral the working of which interferes with or is likely to interfere with the bed, banks or course of a public stream or any swamps or marshes forming the source of a public stream or found along its course; and (b) any alluvial or eluvial deposit or rubble or placer deposit of a mineral other than a designated mineral; written application may be made to the Mining Affairs Board by the Environmental Management Agency and/or relevant local authority for an order prescribing the manner of and conditions governing the working of the deposit or reef concerned.</p>
Parks and Wildlife Act (Chapter 20:14)	<p>The Parks and Wildlife Act provides for the establishment of national parks, botanical reserves, botanical gardens, sanctuaries, safari areas and recreational park, for the protection of the natural landscape and scenery and conservation of wildlife, fish and plants; and provides for establishment of the Parks and Wildlife Management Authority for administration and management of these areas.</p> <p>Regarding wetlands, the Parks and Wildlife Act establishes the PWMA as the management authority for wetlands within wildlife conservation areas; it regulates the use of fish within water bodies and provides for the declaration</p>

Law	Notes
	of specially protected plant and animal species and their protection, a number of which are obligate wetland species.
Forest Act (Chapter 19:05)	The Forest Act provides for the setting aside of State forests, establishes the Forestry Commission for the administration, control and management of State forests, provides for the protection of private forests, trees and forest produce including timber resources. Regarding wetlands, the Forest Act establishes the Forestry Commission as the management authority for wetlands within State forest areas.
Communal Lands Forest Produce Act (Chapter 19:04)	The purpose of the Communal Lands Forest Produce Act is to regulate the exploitation of and to protect forest produce within Communal Land; and to regulate and encourage the establishment of plantations within Communal Land. Regarding wetlands, no forest produce may be harvested from within 100m from the bank of a public stream without written permission from the Minister.

5. GOVERNANCE OF WETLANDS

The management and conservation of wetlands in Zimbabwe is a complex process involving multiple institutions, often with divergent motives, and frequently characterized by confusion, tensions and conflicts. Chapter 5 identifies and outlines the roles of the principal actors towards the management of wetland ecosystems in general, and more specifically for wetlands within state conservation areas and in rural and urban areas.

5.1 Ministry of Environment and EMA

The MECTHI has overall responsibility for environmental management throughout the country, including all wetlands. The Minister formulates policies and national and local plans for environmental management; administers the Environmental Management Act; and has executive powers to declare specific wetlands as ecologically sensitive areas and to impose penalties on people who cause harm to the environment.

The EMA, which falls under the MECTHI, is the statutory body responsible for sustainable management of natural resources and protection of the environment in Zimbabwe. In relation to wetland governance EMA provides environmental awareness campaigns, education and training concerning the conservation of wetlands, implements environmental policies and, through the EIA process regulates the process of development and its impact to the environment, particularly as concerns ecologically fragile ecosystems such as wetlands.

5.2 Ministry of Lands and Water and ZINWA

ZINWA is a technical agency which falls under the Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement. Whilst the Minister is responsible for providing overall policy

and guidelines for management and use of water resources, implementation is achieved through ZINWA which oversees the management and use of water resources throughout the country, administration of water catchment areas through Catchment and Subcatchment Councils and regulates and supervises the allocation of permits for the use of surface and groundwater resources. ZINWA staff members are normally engineers rather than conservation practitioners.

More specifically, it is useful to consider governance in relation to different categories of land.

5.3 State Conservation Areas

State conservation areas are administered by either the PWMA (national parks, safari areas, recreational parks, sanctuaries, botanical reserves and botanical gardens) or the Forestry Commission (state forest lands), both of which fall under the MECTHI. Development activities, particularly in the tourism sector are frequently carried out in conjunction with or by private sector participants as governed by concession lease agreements. Conservation activities are often supported by international and local conservation organizations which represent another strong interest group within conservation areas. Development within individual conservation areas is supposed to be controlled by a management plan, although in practice these are sometimes dated or nonexistent. Moreover, under the EMA regulations, an EIA certificate is required for implementation of any tourism developments in general, and within protected areas for any development activities at all.

5.4 Rural Areas

Rural lands principally include communal lands, resettlement areas, A1 and A2 farms and commercial farms, but also large estates such as ADA and private plantations. Participants in wetland management include local residents (farmers and livestock owners), local wetland committees (elected by wetland beneficiaries – for some wetlands), traditional leaders (village heads, headmen and chief), district authorities (elected councilors, rural district council, district environmental committee) plus the DA (under the MLGH), as well as government technical officers (principally EMA, AGRITEX and FC). In the case of large estates, the estate owner has a primary role in all development activities on the estate.

The presence, significance and roles of institutions operating at each wetland site are not consistent. Some agencies are more concerned with conservation of wetlands and others more with food security and livelihoods and thus the use of wetlands for agricultural production. Moreover local and central government agencies are frequently handicapped by inadequate human and financial resources, such that their presence on the ground is limited, and also by politics which sometimes makes it difficult for them to carry out their mandated roles.

5.5 Urban Areas

The situation of capacity constraints and divergent motivations similarly plays out in urban wetlands. Here key wetland stakeholders are wetland users, private owners, developers, development consultants, community organizations, conservation NGOs, urban authorities

(elected councilors, city council, environmental committee, development permits), MLGH (Department of Physical Planning) plus EMA and ZINWA. In this case EMA, ZINWA, CBOs and conservation NGOs tend to emphasize the conservation of wetlands whereas the MLGH, urban authorities, private owners, developers and development consultants are primarily interested in the development of infrastructure including within wetlands.

Previously most urban wetlands remained under ownership of urban authorities and were retained as open public spaces. In recent years there has been widespread privatization of urban wetlands, in support of the development of wetlands. This has led to numerous conflicts, particularly in Harare and Chitungwiza, with numerous disputes currently active within the courts. Despite intended safeguards, including developers having to comply with the EIA process, many developments have gone ahead on wetlands resulting in a rapid loss of urban wetlands. Political interference has been one of the strong drivers in enabling wetland developments to go ahead, leading to the rapid and ongoing loss of wetlands and associated wetland services.

6. MANAGEMENT OF WETLANDS

This chapter starts by outlining general principles for sound wetland management and broad management objectives for wetlands under different forms of land use. Thereafter, it looks at the management and use of wetland ecosystems with respect to different sectors and land areas, including wetlands in conservation areas, wetlands and forest plantations, use for agriculture in rural and urban areas, and for infrastructure development, mining and dams. Based on consideration of the resulting impacts certain activities are identified as being appropriate or not for wetland ecosystems. Whilst development of infrastructure within wetland ecosystems is incompatible with sustainable use, it is recognised that there will be exceptional cases where development in terms of urgent national interest is unavoidable. Finally, brief consideration is given to mechanisms for managing environmental impacts to wetland ecosystems resulting from development activities.

6.1 Principles of Wetland Management

The following general principles should apply to the management and use of any wetland ecosystems, in order to ensure their conservation and sustainable use for the benefit of current and future generations, as required in terms of the National Constitution and the Environmental Management Act.

Ecosystem Approach. Wetlands need to be considered in a holistic manner as comprising part of a wider overall landscape or catchment area. Typically, wetlands occupy the lowest portions of the landscape such that any activities in the upper catchment area will have a direct bearing on downstream wetland ecosystems. As such it is necessary to adopt a catchment management approach rather than seeking to focus more narrowly on just the wetland ecosystem. Furthermore, ecological processes are shaped by multiple processes that operate at different spatial and temporal scales. Awareness of such higher and lower level processes will help inform management activities within wetland ecosystems.

Maintaining Ecological Integrity. Many wetlands occur as linear ecosystems in association with drainage lines, dambos, streams and rivers. In thinking about the management of wetland ecosystems it is important to recognize this and to ensure the maintenance of ecological connectivity along the whole ecosystem. For example, this means consideration of wetland management in relation to upstream and downstream areas, developments and users of water.

Wetlands and Water. Wetland ecosystems are a key element of the supply of freshwater for primary purposes as well as for the development of settlements, agriculture, mining, industry, tourism etc. Wetlands need to be recognised and understood as comprising an essential part of the water supply infrastructure, and managed in the context of being a scarce and valuable resources and one which will become increasingly so in the future.

Multiple Functions of Wetlands. Whilst wetland ecosystems are essential to the delivery of water, they are complex ecosystems that serve a wide range of uses and purposes, each of which is valued in different ways by different stakeholders. It will likely be necessary to make tradeoffs among differing landscape uses and for these to be reconciled.

Wise Use of Wetlands. Wetlands are some of the most important and valuable ecosystems; they are limited in extent, are highly threatened and are rapidly being degraded and destroyed. A primary objective of wetland management should be to confine activities to sustainable uses that will not result in further loss of wetlands, such as water provisioning, such that these valuable assets will be able to continue providing benefits to not just the present but also future generations.

Consistency with Policies and Legislation. Management and use of wetland ecosystems should be consistent with existing policy and legislation, specifically that relating to sustainable management of the environment and to the planning, development and use of water resources.

Consistency with Planning Processes. Management of wetland ecosystems should be consistent with existing planning processes, including environmental planning processes, such as the NEAP and LEAP, and developmental and management planning processes such as master plans, local development plans, management plans etc.

Stakeholder Involvement. Management of wetlands needs to involve, accommodate and attempt to balance in an equitable manner, the views and needs of a wide range of stakeholders, representative of different interest groups. Stakeholders need to be engaged in a transparent and equitable manner in pursuit of negotiated solutions that encompass a fair distribution of benefits and incentives. The rights and responsibilities of different actors need to be clear to, and accepted by, all stakeholders. Similarly, rules on resource access and land use which shape social and conservation outcomes need to be equally clear, as a basis for

good management; and there needs to be access to a fair justice system that allows for conflict resolution and recourse.

Strengthened Stakeholder Capacity. Effective participation makes considerable demands of stakeholders and presupposes certain skills and abilities for representatives to be able to participate effectively and to accept various roles and responsibilities. There may be need to support and strengthen the capacity of certain stakeholders and institutions to enable them to fully participate in the elaboration of management processes.

Precautionary Principle. There is much that is not known yet fully understood about wetland ecosystems. In the absence of conclusive data, embarking on physical development projects that will necessarily degrade wetland ecosystems is unwise. The precautionary principle suggests that alternative uses should be considered, and that potential wetland users should bear the onus of demonstrating that planned activities will not result in any significant degradation or loss of wetland ecosystems.

Adaptive Management. Landscape processes are dynamic. It is necessary to make management decisions regardless of underlying uncertainties in causes and effects regarding changes in important attributes of wetland ecosystems. As new knowledge becomes available it is likely to be necessary to adjust and adopt new management measures, in other words to follow what has come to be known as an adaptive management approach.

Collectively, these above principles combine to form what can be termed a landscape approach to wetland management; one which attempts to balance growing pressures and losses of scarce natural resources and to accommodate the needs of present and future generations. Such an approach attempts to balance conservation and development goals and to steer the evolution of landscapes towards desirable futures. The landscape approach comprises an iterative, flexible, and ongoing process of negotiation, decision-making, and reevaluation, informed by science but shaped by human values and aspirations. This implies a process with people at the centre, with extensive engagement and consultation, in a transparent and equitable manner. It is an approach founded on devolution, democratic participation, increased transparency and improved access to information.

6.2 Management Objectives

Drawing on the above principles it is possible to identify general management objectives for wetland ecosystems under varying broad forms of land use. Specifically it is suggested that for wetlands within:

- Conservation areas, the primary management objective should be for purposes of biodiversity conservation.
- Rural areas, management of wetlands should seek to provide a balance between use for water production and food production, through the growing of crops and grazing of livestock, and biodiversity conservation (recognizing that agricultural activities will directly

impair the capacity of headwater wetlands to produce groundwater and surface water for downstream streams and rivers).

- For urban areas, management of wetland ecosystems should give priority to their essential role in terms of water production, particularly for the many urban centres which lie upstream of their water supplies, together with linked uses for biodiversity conservation and recreational purposes.

In all cases a primary objective should be to prevent any further loss and degradation of wetland ecosystems through harmful activities such as the development of infrastructure and mining activities.

6.3 Wetlands and Biodiversity Conservation

Wetlands ecosystems are rich in biodiversity, particularly of herbaceous plant species (aquatic and terrestrial) and aquatic wildlife including birds. Many of these are obligate wetland species, meaning that they are restricted to wetland ecosystems and are not found elsewhere. Wetlands are essential to the conservation of these species. Similarly, these constituent species are essential to the ecological functioning of wetland ecosystems and provide a wide range of biodiversity related benefits to wetland users. Though not well studied in Zimbabwe, it is apparent that wetland plants play an important role in water infiltration and thus the overall hydrological cycle. Wetland species can be an important source of food, particularly fish, but also fruits and plant tubers. Palm tree species are used for the manufacture of "wine" and a variety of craft items. Other species, such as reeds, sedges are also important for the manufacture of mats and baskets and other items. Biodiversity is an important component of wetland landscapes, contributing to the aesthetic and spiritual appeal and recreational value of such ecosystems.

Protection of biodiversity should be a key management objective for all wetland ecosystems, but particularly so for wetlands occurring within protected areas that have specifically been set aside for purposes of biodiversity conservation. Zimbabwe has a well-developed and extensive network of conservation areas including national parks, safari areas, sanctuaries, state forests, protected forests, recreation and recreational parks, nature reserves, botanical gardens, botanical reserves and national monuments, collectively covering about 15% of the country. Additional areas, often overlapping with the previous, have been declared as Ramsar Sites, Important Bird Areas, World Heritage Sites and Biosphere Reserves. Many of these areas include important wetland ecosystems, though it is only recreational parks, Ramsar Sites and a few of the important bird areas that were specifically designated to protect wetland areas and associated aquatic life, primarily in the form of lakes and dams, but also Chibwatata and Kavira hot springs in Binga District, Monavale Wetland, Driefontein Grasslands, Chinhoyi Caves, Batoka Gorge, the Save Runde junction and Limpopo-Mwenezi floodplain and pans.

Management of protected areas is primarily for purposes of conservation of landscapes, scenery and biodiversity and for recreational/tourism use. Development of management and tourism infrastructure within protected areas, such as access roads and lodges, can result in detrimental environmental impacts including to wetland areas. Any developments within

protected areas are regulated by means of the EIA process. Despite this, in recent years there has been a worrying upsurge in mining activities within protected areas. Additional concerns relate to the establishment and management of artificial water sources and associated localized overstocking of wildlife.

The emphasis of wetland management in conservation areas should be on maintaining wetland ecosystems in as natural a state as possible, and avoiding potential impacts arising from tourism development and use and through management activities. Mining should be strictly avoided unless in exceptional cases of national interest. Any alien plant species should be removed.

6.4 Wetlands and Forestry

Forestry involves the planting and production of trees primarily for timber but also for agricultural or recreational purposes. The main timber species planted in Zimbabwe are pine (*Pinus* species) and *Eucalyptus* species, with pine plantations mainly being confined to the higher rainfall areas to the east of the country, whilst *Eucalyptus* plantations are more widespread.

Historically, some wetland areas have been targeted for the planting of trees, particularly *Eucalyptus* trees as can commonly be observed in Harare and other urban centres. Wetlands are also prone to invasion by exotic tree species such as *Bauhinia variegata* (Bauhinia), *Eucalyptus* sp. (Gum tree), *Fraxinus* sp. (American ash), *Jacaranda mimosifolia* (Jacaranda), *Melia azedarach* (Syringa) and *Toona ciliata* (Cedrela), again as is commonly observed in many urban centres.

Establishment of plantations within wetlands is likely to result in a loss of biodiversity and increased loss of water through evapotranspiration. As such, this cannot be considered to be compatible with the sustainable use of wetlands and should be avoided. Wetland portions within larger forest plantation areas should be maintained in a natural state, with these portions being managed as conservation corridors. Every effort should be made to clear any alien plant species.

It should be noted that the "natural state" will vary greatly between different types of wetlands. For example, for headwater dambos this will comprise open grasslands with few if any trees. On the other hand many riparian wetlands are characterized by riparian woodland or forest with distinctive and rich assemblages of tree (and other smaller) species. Elsewhere there are examples of wetlands that support swamp forest communities.

6.5 Wetlands and Agriculture – Rural Areas

Agricultural systems in rural areas (including communal lands, resettlement areas, A1 and A2 farms and commercial farms) are typically dominated by mixed farming systems combining crop and livestock production, particularly cattle. Livestock provide draught power and fertilizer

(manure), serve as a sound investment and provide security during times of crises, while crop residues and fallow fields provide important grazing resources.

Wetlands in farming areas are commonly used and serve as key areas for both crop production and the grazing of livestock. Key features for crop production are the presence of productive clay soils with high moisture levels and the presence of water for irrigation. For livestock, wetlands provide water sources and key grazing resources, particularly during the late dry season (grasses in wetlands shoot earlier than elsewhere due to high soil moisture levels), and also during the rains when animals need to be kept out of fields.

Oral and archaeological evidence shows that there has been a long history of using wetlands for cropping in Zimbabwe, though grazing of livestock on dambos was traditionally forbidden. Crops traditionally grown in wetlands included rice, sugar cane, madumbe (or yams - *Colocasia esculenta*) and tsenza (*Plectranthus esculentus*), but not maize. Following the introduction of the Natural Resources Act in 1952, cultivation in wetlands was outlawed. This was motivated by concerns about degradation caused by cultivation of wetlands, particularly in commercial farming areas. The effect was to increase the use of wetlands for grazing purposes.

Nevertheless, cropping in wetlands did continue, particularly in drier regions of the country, and in recent decades has expanded markedly. This growing pressure on wetlands has been driven partly by population growth and resulting increased demand for land; by increasingly erratic rainfall (together with declining soil fertility) such that upland field production has become increasingly unreliable; by support from donor projects which have encouraged cropping in wetlands as part of efforts to improve food security; by growing urban markets for crop produce and increased access to markets; by a decline in adherence to traditional beliefs that formerly served to protect many wetland areas and, in cases, due to interference by politicians who have promoted the increased allocation of lands within wetlands.

For livestock, particularly in communal lands, grazing areas are generally insufficient to support enough animals to meet draught power requirements, leading to a situation of continued pressure to increase livestock numbers and thus conditions of overstocking.

Although wetlands provide essential livelihood opportunities, their intensive use for crops and grazing results in serious detrimental impacts. Drainage of wetlands, together with increasing use of water for irrigation leads to the drying of wetlands. Clearing for fields and ploughing leads to loss of biodiversity combined with increased soil erosion and downstream siltation. Grazing by livestock leads to changes in vegetation composition, increased bare areas and an increase in erosion. The overall result is that rural wetlands are drying up and being degraded, so resulting in a marked decline in biodiversity related and also cultural values (particularly as younger and better educated people are less inclined to follow traditional beliefs).

Given current conditions of high levels of poverty, combined with continuing population growth and severe macroeconomic challenges, the general outlook is poor. Use of wetlands for crops

and grazing can be expected to continue and in all likelihood to further intensify. Whilst there is urgent need to develop new systems of smallholder farming, for example through providing secure tenure to land, the more immediate objective of these guidelines should be to improve the existing management of wetlands through promoting good agricultural and grazing practices and at the same time sanctioning detrimental practices. Examples include:

- To adopt an ecosystem approach whereby it is important to consider the wider catchment area and to implement sound land management practices in upstream areas. Examples include the use of contours and water harvesting techniques such as “fanya juu”, the reclamation of gullies and the planting of vetiver grass, in order to increase infiltration and reduce runoff and siltation of wetlands.
- To retain part of each wetland under natural conditions (at least 25%); in particular to seek to protect the central wetland area so as to minimize loss of hydrological function.
- To restrict the total area of irrigation to no more than 10% of the wetland area or preferably to irrigate adjacent areas outside of the wetland area.
- To avoid the use of insecticides and pesticides, or limit use to those produced from natural as opposed to synthetic sources, together with the use of alternative biological control or integrated pest management measures, such as the establishment of habitat attractive to natural predators of pests. This will avoid the leaching of any harmful pesticides or residues to downstream surface or groundwater.
- To avoid any fires on wetland areas, for example, annual burning to control tick populations should be avoided.
- To avoid planting any trees in wetland areas.
- To avoid any destructive uses of wetlands, such as the removal of sand or soil for building and making bricks.
- To avoid the development of any roads or drains on wetlands which can be expected to interfere with hydrology and/or lead to the start of erosion.
- Improve management of grazing on wetland areas, for example through the establishment of paddocks and the introduction of rotational grazing, as was trialled in Mwenezi in the early 1980s, so as to avoid overgrazing of wetlands and particularly trampling of the core wetland area by livestock.
- Avoid the introduction and promote the removal of any existing invasive alien species, particularly any tree or shrub species such as *Lantana camara* which might lead to increased rates of evapotranspiration and drying of the wetland.
- Select and promote the growth of crops such as rice, sugarcane, madumbe and tsenza that are suited to wetland conditions, rather than those that require any drainage of wetlands, and promote the use of high value crops that will maximize the return from limited water resources, rather than field crops.
- Promote alternative livelihoods outside of wetlands.

Evidence suggests that wetland users are prepared to invest in the protection and management of wetlands. There is a need to strengthen local governance mechanisms and to empower communities and wetland users to enhance the sustainable management of wetlands.

6.6 Wetlands and Agriculture – Urban Areas

Wetlands in urban areas present a different situation with respect to agriculture as compared to rural areas. In particular, the keeping of livestock in urban areas is largely prohibited such that there is no use of urban wetlands for grazing purposes. Cultivation, however, is widespread, particularly of maize.

Historically, cultivation of urban wetlands was prohibited under bylaws introduced by urban authorities, and this position was reinforced following introduction of the Environmental Management Act. However, whilst regulation has strengthened enforcement efforts have waned, partly in response to political pressures to facilitate rather than prohibit cultivation of wetlands, such that most urban wetlands have now been largely or entirely converted to crop production. Motivations for cultivation are mixed. In addition to food production and cultural norms, some cultivation appears to be carried out on a larger scale for commercial purposes.

Crop production on wetlands results in many detrimental impacts including a loss of biodiversity, drainage of wetlands, changes in hydrology, increased erosion and downstream siltation, and reduced water quality, including elevated levels of nutrients and toxins. Moreover, urban wetlands as compared to rural wetlands, in general, are subject to much higher levels of threat from drainage, development of infrastructure, removal of construction materials, dumping of solid wastes and pollution through release of raw sewerage and other effluents. Collectively, these typically result in high levels of degradation and loss of urban wetlands.

Wetlands in urban areas also provide a different range of services. In a number of cases, such as Harare, Chitungwiza, Epworth, Norton, Ruwa, Marondera, Rusape, Masvingo, Chegutu, Kadoma, Gweru and Karoi, the headwater wetlands within the urban areas form a vital part of the town water supply infrastructure, being of fundamental importance to the delivery of clean water to downstream water supply dams as well as enhancing local groundwater recharge. Wetlands in urban areas also provide essential open spaces within the built environment, which serve to ameliorate local climatic conditions and are important for recreational and spiritual purposes as well as for providing clean air. Intact wetlands are also areas of outstanding natural beauty which is an important concept that is overlooked but enhances the mental health of city populations through linking them to such Nature.

Given the importance of urban wetlands to downstream water supplies, combined with the prevalent high levels of threat, degradation and loss of wetlands, in particular due to development of infrastructure, it seems that to use remaining wetland portions for agriculture, particularly of a relatively low value crop such as maize, represents a very inefficient use of such valuable ecosystems. Opportunities for agriculture do exist elsewhere, but for urban wetlands which are often the primary source of water for many Zimbabwean cities and towns, there are no obvious alternatives. As such existing prohibitions on agriculture in urban wetlands should remain in place and should be enforced, particularly where these are directly linked to downstream urban water supplies.

As for rural wetlands, there is a need to promote local governance mechanisms and to provide greater opportunities for involvement of local community organizations in the management of wetlands in support of overall improved management of urban wetlands.

6.7 Wetlands and Infrastructure Development

The main urban centres are situated on the central plateau of the country from which streams and rivers drain north to the Zambezi or south to the Save-Limpopo Rivers. Most urban areas are built around and include headwater drainages of these rivers or tributaries. Particularly within urban areas, but also in rural situations, wetlands are subject to a wide range of development activities. The situation is particularly severe in the Greater Harare area including Chitungwiza, Epworth, Norton and Ruwa. Examples of development activities include: residential housing, office blocks, shopping complexes, fuel stations, warehouses, factories, hotels, schools and universities, health facilities, council offices, function venues, lawn businesses, sewerage treatment works, golf courses etc. Wetlands are also used for service infrastructure such as roads, pipelines (for water, storm water, sewers, fuel, electric and internet cables), powerlines, fences and walls; extraction of water, both from surface water and through boreholes; extraction of building materials (sand, gravel and clay for making bricks); for dumping of solid wastes and for release of sewerage and industrial effluents.

Development of infrastructure typically results in the loss of biodiversity due to clearing; disruption of soil structure through digging of foundations and development of service infrastructure such as water and sewer pipes and storm water drains; the disruption of hydrological functions through drainage, enhanced runoff/reduced infiltration and excessive abstraction particularly of groundwater; impaired water quality due to the widespread release of sewerage and industrial effluents; and increased soil erosion and downstream siltation.

Collectively, these developments have resulted in significant loss and degradation of wetland ecosystems. In Harare it is estimated that conversion of wetlands to infrastructure has had the result of all wetlands having been reduced in extent by between 30-70%, whilst for ten selected wetlands the loss of remaining extent over the last ten years has been 50%. Remaining wetland areas have been degraded through drainage and clearing (especially for agriculture), pollution due to release of sewerage and industrial effluents, dumping of solid wastes, excessive abstraction of water, and widespread extraction of building materials.

Development of infrastructure cannot be considered compatible with sustainable management or use of wetlands. Under the Environmental Management Act it is prohibited to alter wetlands in any way without written permission from EMA. The act makes clear that all development activities should be subject to an EIA process. Whilst this has been effective in stopping some developments, many developers have been able to exploit the system and go ahead with developments in wetland areas, resulting in a continued high rate of loss and degradation of remaining urban wetlands.

In recent years there has been growing public appreciation of the essential role of wetlands in terms of the delivery of clean freshwater which necessarily underpins future sustainable development of urban areas. However, this understanding of wetlands as an essential component of the urban infrastructure has yet to be fully accepted by the city authorities and the construction industry.

These present guidelines are part of an ongoing attempt to improve regulation and management of wetlands, including in urban areas. For Harare in particular, this is being accompanied by mapping of the remaining extent of wetlands and coupled with the development of new regulations that will effectively prohibit future development within wetland areas. The implementation of restoration activities will also be important.

6.8 Wetlands and Mining

Zimbabwe is blessed with a great variety of mineral resources and mining has long been an important economic activity for Zimbabwe. Mining employs large numbers of people on large mines and in the artisanal and small-scale mining sector and makes a key contribution to national GDP.

Mining methods vary widely depending on the location, type and size of mineral resources. Mining involves a wide range of activities, including prospecting, mine development (access and haul roads, offices, workshops, car parks, warehouses, chemical and fuel storage, mine equipment, power and water supplies, airstrips, railways, housing, etc.), removal of surface material, extraction and stockpiling of ore and tailings, processing of ore, management of waste materials, extraction, refining and beneficiation of minerals, transport to final markets, mine closure and post-operational management of wastes. Mining can be carried out on surface, or shallow or deep deposits, each requiring quite different levels of investment, operations and impacts. The typical lifespan of a mine is in the region of 25 years, although this can vary from less than 1 year to well over 100 years.

Mining can result in severe and long term impacts to the environment and to wetlands in particular. Impacts to wetlands result through direct disturbance, through diversion or release of water into the environment, and through the release of effluent into the environment, both from mines and stores of waste materials. While many mine impacts are essentially localized, the release of contaminated effluent can result in serious impacts to downstream wetland ecosystems and water users.

Acid mine drainage and riverbed mining are issues of particular concern. Acid mine drainage results from the exposure of ore and waste materials to the environment, which results in the oxidation of certain minerals and the formation and release of highly acidic and sulphate rich effluent to the environment. For large mines this can be a long term issue whereby acid mine drainage from waste storages can persist for many decades after closure of mines.

Gold panning and river bed mining are carried out in many of the larger rivers in the country, and result in a range of severe impacts, including direct destruction of river ecosystems and downstream impacts through siltation (resulting in reduced availability of surface water in downstream rivers and dams) and the release of toxic pollutants and contamination of downstream water bodies (particularly cyanide and mercury which are commonly used to enhance the extraction of gold), leading to long term detrimental impacts to aquatic biodiversity and other water users.

River-bed mining was effectively outlawed under environmental regulations established in 2014 under the Environmental Management Act. Subsequently, government has sought to circumvent these restrictions, initially through implementing “desilting activities”, and later proposing that riverbed mining should be allowed but restricted to government (and/or joint venture partnerships). The latter was written into the proposed Mines and Minerals Amendment Bill (which is yet to be finalized and gazetted). The Parliamentary Portfolio Committee on Mines and Energy subsequently recommended that this provision should be removed, on the basis that “there is need to balance the interests of all persons that are dependent on the country’s river systems”, but it remains to be seen what the final outcome will be. In effect this means that riverbed mining remains prohibited in terms of SI 92/2014 (regulations to control alluvial mining), but the reality on the ground is that the activity is still widespread.

More recently the emphasis has been on seeking to formalize artisanal and small-scale gold panning activities, including the identification of best practices and encouraging miners to adhere to these. For example, EMA has recently modified requirements for small scale miners in terms of EIA procedures, such that they are now required to fill out a standard environmental management plan form instead of having to submit a full EIA report.

The EIA process remains the principal tool to regulate mining activities and to guard against resulting detrimental environmental impacts. Although mining is of high importance for livelihood issues and national economic development mining should not be done at the expense of water resources, which are equally important to and will in future become an increasing constraint to national development. This is particularly the case for riverbed mining. Although it does make an important contribution to livelihoods this needs to be balanced against long term requirements for water for sustainable development. Given the unacceptably high impacts to wetlands and downstream water resources, particularly the widespread release of mercury, it is clear that river-bed mining should remain illegal and every effort should be made to bring a stop to such activities.

6.9 Wetlands and Dams

Zimbabwe is a relatively dry country with limited water resources. As such a lot of effort has gone into the building of dams for water storage. The country currently has some 8000 dams of which 244 are classified as large dams. Dams play an important role in the economic

development of the country, providing water for settlements, hydropower generation, industry, mines, agriculture, and fisheries and for wildlife and tourism.

Dams are considered separately here because they are a specific type of development with specific impacts on existing wetlands, whilst also resulting in the creation of new wetlands. Direct impacts to existing wetlands will occur within the upstream dam reservoir, whilst modification of the downstream flow regime and hydrological conditions will result in additional impacts to downstream wetlands.

Construction of dams results in immediate impacts during the construction phase as well as long term impacts throughout the operational life of the dam. The capture of water for storage necessarily means reduced flows and often reduced availability of water in downstream areas. Dams are also subject to siltation, which can have a pronounced impact on the newly created wetlands.

The construction of dams is primarily regulated through the EIA process. In assessing the potential impacts of a new dam it is essential to adopt a catchment management approach and to make sure there is adequate consideration of impacts to downstream water users as well as provision for environmental flows and maintenance of downstream wetland conditions. The National Water Policy and Water Act specifically recognize the environment as a legitimate and important user of water and the need to allocate water for the sustenance of wetland ecosystems.

Table 3. Significance of impacts resulting from specific activities under various sectors (rated as low, moderate, high or very high).

Sector	Activities	Impact
Tourism	Watching wetland scenery	Low
	Watching ponds	Low
	Watching Crocodiles	Low
	Watching falls	Low
Cultural activities	Traditional ceremonies and rituals	Low
	Collection of ritual water from springs	Low
	Open air churches	High
Forestry		
Planting	Commercial forest plantations	Very High
	Woodlots	Very High
	Orchards	Very High
	Introduction of alien invasive tree and shrub species	Very High
Harvesting	Roots of grasses, shrubs and trees	High
	Bark	High

Sector	Activities	Impact
	Leaves of grasses, shrubs and trees	Low
	Thatching grass	Low
	Harvesting Fruits	Low
	Fishing	Low
	Fish farming	Low
	Making Fish baskets	Low
	Sand /clay abstraction	Very High
Agriculture		
Cropping	Burning (use fire for land clearing/uncontrolled fires)	Very High
	Clearing of natural vegetation	Very High
	Ploughing	Very High
	Drainage works	Very High
	Use of inorganic fertilizers and pesticides	Very High
	Perennial crops like bananas	Very High
	Sweet, Potatoes, Tsenza	High
	Potatoes, Beans, Cassava	High
	Rice	High
	Yams/Madhumbé, Maize, Sorghum, Millet	High
Irrigation	Irrigation using wetland water	Very High
	Establishment of gardens	High
	Introduction of alien, species	Very High
Livestock	Grazing of large animals in large numbers	Very High
	Grazing of small animals in large numbers	Very High
Infrastructure		
A construction	Surveying-	Low
	Clearance of vegetation	Very high
	Placement of pegs	High
	Soil boring for tests	Low
	Movement of machines over study area	Very high
	Movement of men over the study area	High
	Earthworks	Very high
	Temporary buildings	High
	Drainage structures	Very high
	Power lines	Low
	Fills and channels	Very high
	Bridges	Very high
	Masonry	Very high
	Porous pipes drainage	Very high
	River channel changes	Very high

Sector	Activities	Impact
	Drainage ditches	Very high
	Pipelines	Very high
	Minor roads	Very high
	Minor buildings	Very high
B Line construction	Oil pipelines	Very high
	Gas pipelines	Very high
	Sewer lines	Very high
	Water lines	Very high
	Stormwater	Very high
	Power lines	Low
	Canals	Very high
	Building and electrical lines	Very high
	Irrigation pipelines	High
	Clearance of routes	High
	Excavation of trenches	High
	Delivery of pipes	High
	Laying pipes	Moderate
	Backfilling trenches	High
	Drainage ditch or canal lining	High
	Special foundations/constructions	Very high
	Pole lines and electrical power poles	Moderate
C Buildings	Site clearance	Moderate
	Rock blasting	Very high
	Demolition of existing buildings	Very high
	Basements construction	Very high
	Foundation construction	Very high
	Caissons	Very high
D industry	Site establishment and preparation	Very high
	Foundations	Very high
	Plant construction and access	Very high
	Laboratories	Very high
	Reinforced concrete structures	Very high
	Extensive piping systems (below and above ground)	Very high
	Movement of essential machinery	Moderate
	Electrical wiring	Moderate
	Plant drainage system and reticulation	Very high
	Pipe fitting	Moderate
	Placement of power cables	Moderate
	Structural steel erection	Moderate
	Control and telephone cables	Moderate
	Extensive roads and streets	Very high

Sector	Activities	Impact
	Parking lots	Very high
	Hard standing and open storage areas	Very high
	Fueling and vehicle repair garages	Very high
E drainage works	Small culverts which drain a few acres	Very high
	Large suspension bridges over rivers.	High
	Culverts used to drain dry channels and streams with small flows, total span is less than 15m	Very high
	Bridges cross major waterway areas requiring spans over 15m	High
	Bridge piers: dry construction; bridge piers: wet construction	Very high
	Bridge abutments and bridge superstructure. Supports the exterior bridge span and provides the transition to the approach fill	Very high
	Excavations (materials)	Very high
	Concrete structures	Very high
	Water drainage	Very high
	Reinforcing steel	Moderate
	placement of concrete, and earth backfill for the abutment	Very high
	Strip mining the most common minerals so extracted are coal, rock, sand and gravel.	Very high
	Open pit operations	Very high
	sand and gravel waste	Very high
	Blasting	Very high
	Trenching	Very high
Settlements	Houses (peri-urban and urban)	Very high
	Rural homesteads	Very high
	Roads	Very high
	Schools	Very high
	Playgrounds	Very high
	Blair toilets	Very High
	Graveyards	Very High
Dumping wastes	Dumping of solid wastes	Very High
	Sewerage	Very High
	Industrial effluents	Very High
	Construction waste	Very High
Mining	Hauling the ore to the surface-small cars and conveyor belts	Very high
Need to add	Heavy equipment	Very high
	Blasting and shoring	Very high

Sector	Activities	Impact
Dams	Use of concrete (masonry)	Very high
	Earth fill, or rock fill	High
	Blocking water channels	Very high
	Excavation and replacement by stable fill	Very high
	Use of bulldozers	Very high
	Blasting	Very high
	Drainages	Very high
Water collection	Bottling water	Moderate
	Domestic Water (rural)	Moderate
	Domestic Water (urban)	Very High
	Watering of Livestock	High
	Industrial Water	Very High

6.10 Development in Wetlands in Cases of Urgent National Interest

In some exceptional circumstances it may be decided to go ahead with a development project which will damage or destroy the wetlands in an area, on the basis that the national interest will be better served in implementing the project rather than preserving the wetland intact.

In considering the merits of such cases it must be clear that the proposed development relates to public interest and must be more pressing than private interests. Whilst a private body may promote a public interest, it is inappropriate for that body to demonstrate that their intervention constitutes an overriding public interest. This is for a public authority. Furthermore, the interest of a private body should not constitute a public interest unless it can be demonstrated that it is of overriding interest to the public.

Consideration of whether or not a proposed development comprises an urgent or overriding interest relates to the nature of the public interest and its relationship to the ecological interest. For something to be in the public interest it must provide reasons described as imperative and be sufficiently weighty as to override the ecological objective. Therefore not every kind of public interest would be sufficient to override the interests of the wetland protection.

In considering whether a proposal constitutes an urgent national interest one must consider the consequences of not implementing the proposal at the specified site, and one must demonstrate the absence of any other potential sites for the proposal, and which could feasibly satisfy the broad objective of the proposal. In addition, one should specifically consider:

1. The existing functions and economic, social and ecological values of the site in question. (The more important the site's values and functions, the higher should be the social, economic, or ecological benefits of the proposed project);
2. The particular value of habitats harbouring endemic, threatened, rare, vulnerable or endangered species;

3. The national benefits of maintaining the integrity of the wetlands system and its related benefits;
4. Whether maintaining the status quo threatens a national interest;
5. Whether the proposed change is consistent with national policies;
6. Whether the immediate action is required to avert a significant threat;
7. Whether a national interest is being increasingly threatened;
8. All reasonable alternatives to the proposed action, including the "without project" option, finding an alternative location, introducing buffer zones, etc.;
9. Whether the proposed action provides benefits to a large base of recipients;
10. Whether, over the long term, the proposed action offers greater benefits; and
11. The alternative that will best minimize harm to the site in question.

Such decisions should only be taken after the full implications and long-term costs and benefits have been evaluated, and possible alternatives considered. Protective and mitigating measures should be built into the project and the application of the "No Net Loss" principle and the principle of restoration should also be considered.

6.11 Mitigating the Impacts of Projects on Wetlands

The mitigation hierarchy is regarded internationally as the best practice framework for environmental planning and managing environmental impacts. It is a set of prioritized, sequential steps that are applied to anticipate, avoid and reduce the potential negative impacts of project activities on the natural environment. It involves a sequence of four key components, avoidance, minimisation, remediation and offset, where:

- Avoidance concerns measures taken to avoid impacts during site selection and project design,
- Minimization refers to measures taken to minimise the severity and magnitude of impacts during site selection, project design, construction and operation,
- Remediation involves the restoration and rehabilitation of unavoidable impacts, and
- Offset requires additional measures over and above rehabilitation to compensate for significant residual impacts by making a contribution to wetland management and/or protection elsewhere in the landscape.

Avoidance and minimization are preventive components, whilst remediation and offset are remediative components. Options for the preventive components (avoidance and minimization) occur primarily, but not exclusively, early on in the project planning cycle as part of site selection and project design. Avoidance is often the most effective way of reducing potential negative impacts and its proper implementation requires wetlands to be considered in the pre-planning stages of the project. The remediative components (remediation and offsets) occur later in the project planning process after project design. It is important to note that preventive measures are always preferable to remediation measures, and careful implementation of the early components of the mitigation hierarchy will reduce the project's liability for subsequent rehabilitation and offsets measures.

In terms of the mitigation hierarchy, the role of the project proponent should be to:

- Ensure that all the project alternatives are considered in the design phase and during the EIA process (avoidance and minimization);
- Develop wetland management measures to restore or improve the condition of remaining wetland ecosystems and the associated supply of ecosystem services, following exposure to project impacts that are unavoidable and cannot be adequately minimised (remediation);
- As a last resort option implement offset measures whereby wetland functions can be provided or created elsewhere (offsets). Wetland offsets are permanent and measurable conservation outcomes resulting from actions designed to compensate for anticipated significant residual negative impacts on wetlands. The goals of wetland offsets are to achieve 'no net loss' and preferably a net gain with respect to the full spectrum of functions and values provided by wetlands. Wetland offsets are aimed specifically at compensating for significant residual impacts on wetlands after all appropriate and feasible steps have first been taken to avoid, minimize and remediate impacts as per the mitigation hierarchy. Wetland offsets should only ever be a last resort option and not be applied as the sole or first mitigation option.

7. RESTORATION OF WETLANDS

This chapter provides information on activities which may be done by stakeholders in terms of wetland restoration, creation or enhancement, subject to approval by the Environmental Management Agency. It explains what these different terms mean, why there is a need for restoration work, and identifies different approaches and principles to be followed in carrying out restoration activities. Examples of efforts to restore and create wetlands are provided.

7.1 Definitions

To begin with it is useful to distinguish clearly between the related concepts of restoration, creation and enhancement.

Restoration concerns returning a degraded wetland or former wetland to a pre-existing condition or as close to that condition as is possible. Restoration of an existing wetland is referred to as “rehabilitation”, whereas “reestablishment” concerns restoration of a former wetland area.

Creation involves the conversion of any non-wetland area to a wetland.

Enhancement refers to increasing one or more of the functions performed by an existing wetland beyond what currently or previously existed in the wetland. There is often an accompanying decrease in other functions.

7.2 Why Restore, Create, or Enhance Wetlands?

Many wetlands have been destroyed or degraded through different forms of use by humans. For example, some have been drained and ploughed for agricultural use, while others have been filled with urban developments. Many have been degraded through the release of pollutants, dumping of solid wastes, extraction of sand and soil and invasion of non-native species. Despite ongoing efforts by government and other stakeholders to protect wetland ecosystems, the overall result is a continuing loss and degradation of wetland ecosystems in both rural and urban settings. Wetland restoration, creation and enhancement works provide options for countering such losses.

7.3 What Is Restoration, Creation, and Enhancement?

There are two broad approaches to restoration work, namely passive and active. Passive approaches apply only to restoration projects whereas active approaches can apply to the full range of restoration, creation and enhancement works.

The passive approach to renewing wetland functions is to remove the factors causing wetland degradation or loss and let nature do the work of re-establishing the wetland. For example, if wetland vegetation and water quality are degraded primarily as a result of cattle grazing, then removing the cows may be the only activity needed to restore the wetland system (although, grazing is not always bad for wetlands). Passive methods allow for natural regeneration of

wetland plant communities, natural re-colonization by animals, and re-establishment of wetland hydrology and soils. Passive approaches are most appropriate when the degraded site still retains basic wetland characteristics and the source of the degradation is an action that can be stopped.

The benefits of passive methods include low costs and a high degree of certainty that the resulting wetland will be compatible with the surrounding landscape.

Active approaches involve physical interventions in which humans directly control site processes to restore, create, or enhance wetland systems. The active approach is most appropriate when a wetland is severely degraded or when goals cannot be achieved in any other way, as is the case with wetland creation and most enhancements. Active methods include re-contouring a site to the desired topography, changing the water flow with water control structures (i.e., weirs or culverts), intensive planting and seeding, intensive non-native species control, and bringing soils to the site to provide the proper substrate for native species. The design, engineering, construction, and costs for such work can be significant.

A primary goal of wetland restoration projects is to re-establish natural ecological processes. Some wetland functions can be mimicked with engineered structures, but such methods typically do not provide the maximum ecological benefit. For example, instead of re-establishing native vegetation to control erosion of a stream bank, a cement wall could be used instead. A cement wall could limit erosion for a time, but it does not provide the other ecosystem benefits of wetlands, such as filtering pollutants and providing habitat for aquatic species.

7.4 Restoration Guiding Principles

The following principles are relevant to the design and implementation of successful restoration projects.

Preserve and protect aquatic resources. Existing, relatively intact ecosystems are the keystone for conserving biodiversity, and provide the biota and other natural materials needed for the recovery of impaired systems. Thus, restoration does not replace the need to protect aquatic resources in the first place. Rather, restoration is a complementary activity that, when combined with protection and preservation, can help achieve overall improvements to wetland ecosystems. The first objective should be to prevent further degradation of wetland ecosystems.

Restore ecological integrity. Restoration should re-establish insofar as possible the ecological integrity of degraded aquatic ecosystems. Ecological integrity refers to the condition of an ecosystem, particularly the structure, composition and natural processes of its biotic communities and physical environment. An ecosystem with sound integrity is a resilient and self-sustaining natural system able to accommodate stress and change, typified by:

- Its key ecosystem processes, such as nutrient cycles, succession, water levels and flow patterns, and the dynamics of sediment erosion and deposition, are functioning properly within the natural range of variability.
- Biologically, its plant and animal communities are good examples of the native communities and diversity characteristic of the particular type of wetland ecosystem.
- Structurally, physical features such as the dimensions of its stream channels are dynamically stable.

Restore natural structure. Many aquatic ecosystems in need of restoration have problems that originated with alteration of channel form or other physical characteristics, which in turn may have led to habitat degradation, changes in flow regimes and siltation. Stream channelization, ditching in wetlands, disconnection from adjacent ecosystems and shoreline modifications are examples of structural alterations that may need to be addressed in a restoration project. In such cases, restoring the original site physical attributes will be essential to the success of other aspects of the project, such as improving water quality and bringing back native biota.

Restore natural function. Structure and function are closely linked in river corridors, lakes, wetlands, estuaries and other aquatic systems. Re-establishing the appropriate natural structure can bring back beneficial functions. For example, restoring the bottom elevation in a wetland can be critical for re-establishing the hydrological regime, natural disturbance cycles and nutrient fluxes. In order to maximize the benefits of a restoration project, it is essential to identify what functions should be present and make missing or impaired functions priorities in the restoration. Verifying whether desired functions have been re-established can be a good way to determine whether the restoration project has succeeded.

Design for self-sustainability. The best way to ensure the long-term viability of a restored area is to minimize the need for continuous maintenance of the site.

Work within the watershed and broader landscape context. Restoration requires a design based on the entire catchment, not just the part of the wetland that may be the most degraded site. Avoid a localized restoration project which may not be able to change what goes on in the whole watershed. New and future urban development may, for example, increase runoff volumes, stream down-cutting and bank erosion, and pollutant loading. By considering the catchment context in this case, restoration planners may be able to design a project for the desired benefits of restoration, while also withstanding or even helping to remediate the effects of adjacent land uses on runoff and nonpoint pollution.

Understand the natural potential of the catchment. Establish knowledge of the historical range of conditions that existed on the site prior to degradation and what future conditions might be. Restoration planning should take into account any irreversible changes in the watershed that may affect the system being restored, and focus on restoring its remaining natural potential.

Address ongoing causes of degradation. Identify the causes of degradation and eliminate or remediate ongoing stresses wherever possible. In identifying the sources of degradation, it is important to look at upstream and up-slope activities as well as at direct impacts on the immediate project site.

Involve the skills and insights of a multi-disciplinary team. It is important that the planning and implementation of a restoration project involve people with experience in the various disciplines needed for the particular project.

Restore native species and avoid non-native species. Wetlands are experiencing significant problems with invasive, non-native species, to the great detriment of our native ecosystems. Many invasive species out compete native species because they are expert colonizers of disturbed areas and lack natural controls. Invasive, non-native species should not be used in a restoration project, and special attention should be given to avoiding the unintentional introduction of such species at the restoration site when the site is most vulnerable to invasion. In some cases, removal of non-native species may be the primary goal of the restoration project.

Adaptive management. Monitor and adapt where changes are necessary. Monitoring before and during the project is crucial for finding out whether goals are being achieved. If they are not, "mid-course" adjustments in the project should be undertaken. Post-project monitoring will help determine whether additional actions or adjustments are needed and can provide useful information for future restoration efforts.

7.5 Examples of Restoration Projects

Monavale Wetland provides a good example of a restoration project in an urban setting, in this case targeting a headwater dambo wetland that has been degraded through activities such as cultivation, the dumping of solid wastes and the establishment of alien invasive tree species. Restoration activities have focused on removing or reversing these aspects. Wetland communities and function has been successfully restored through stopping cultivation, stopping dumping of wastes and through active removal of alien species. Employment of a wetland monitor has been central to these efforts, and to supporting local education and advocacy efforts within surrounding communities.

For rural wetlands, Mwenezi offers a good example of a successful restoration project. This was stimulated by concerns that continuous high intensities of grazing were leading to the degradation of local wetlands, in the form of loss of biodiversity, loss of plant cover, initiation of erosion and drying of wetlands. Local communities used fencing to establish paddocks and then implemented a system of rotational grazing. Several years later there had been a marked recovery in wetland vegetation.

In general, in Zimbabwe relatively little has been carried out as yet in terms of wetland restoration, and little documentation exists for those efforts that have been implemented.

7.6 Creation of Wetlands

Zimbabwe has a great number of created wetlands in the form of dams, irrigation canals, fish ponds, gravel pits, borrow pits and abandoned mines, slime dams and sewerage ponds. Almost all such structures, other than some small ponds and dams, have been created for alternative purposes but in doing so have resulted in the creation of new wetland ecosystems. Specific efforts to create wetlands are much rarer, but there have been efforts to create artificial wetlands for local on-site treatment of waste water and sewerage. In this respect it is useful to distinguish between constructed wetlands which are wetlands intentionally created from non-wetland sites for the sole purpose of wastewater or storm water treatment, and created wetlands which are intentionally created from non-wetland sites to produce or replace natural habitat.

8. CONCLUSION

Though wetland ecosystems occupy only a small part of the country they are extremely important and valuable components of the overall landscape. In particular wetlands play a central role in the delivery of adequate supplies of clean water necessary for development of settlements, agriculture, mining, industry and tourism. Zimbabwe is a relatively dry country with limited water resources. Existing water challenges are set to increase driven by a combination of continued population growth and associated growing demand for water coupled with the adverse effects of climate change which is predicted to increase evaporation, evapotranspiration, water shortages, floods and run-off. Access to adequate water supplies is going to become increasingly challenging. Continuing degradation and loss of wetland ecosystems will serve to further compound this unfortunate situation.

Wetland ecosystems need to be seen and understood as forming a vital part of the water supply infrastructure for the country and they need to be managed primarily for the delivery of water. Uses for agriculture should be of secondary importance, and certainly they should be protected from development of infrastructure and destruction through mining activities. Use for water provisioning dictates the maintenance of natural biodiversity and is thus fully compatible with biodiversity conservation. It is also linked to the storage of water in dams, and accompanying opportunities for use for hydropower, as well as for recreational and tourism purposes.

Although much of the focus of these guidelines is on scientific and technical issues, as in all environmental management activities, the importance of community perspectives and values should not be overlooked. The presence or absence of public support for wetland management activities will often make the difference between positive results and failures. Considering that the environmental services wetlands provide include storing water through the dry season, regulating stream flow, reducing floodwater peaks, improving water quality and sustaining human livelihoods, the international responsibilities relating to the environment must be discharged in the national interest. It is also critical to appreciate that sensitive, vulnerable and highly dynamic or stressed ecosystems, such as wetlands, require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

The nation can take pride in the degree of active citizen involvement in activities to conserve wetland landscapes. Existing efforts to preserve and restore wetlands are impressive but are not sufficient to assure that associated wetland biodiversity will have the environment necessary for survival. Continued urban development and climate change are both a challenge for our wetlands. The impact of recurrent droughts on wetlands is not currently known, but in some areas wetlands within pastures have dried up as they became part of the cropland. Let's all make use of these guidelines to ensure that we maintain or increase the benefits of our national green economy by the year 2030.

9. REFERENCES

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10. APPENDICES

10.1 Definitions

Environmental conservation is an umbrella term that **defines** anything we do to protect our planet and **conserve** its natural resources so that every living thing can have an improved quality of life. **Put simply, it refers to the wise use of a resource.**

Integrated management: This is a combination of physical, technical, administrative, and legal practices relating to wetland management in a manner designed to increase combined benefits or achieve a more equitable apportionment of benefits.

Inventory: A complete list of items such as property, goods in stock, or the contents of a wetland.

Preservation: Preservation refers to the non-use of a resource

Sustainability: The development that meets the needs of the present without compromising the ability of the future generation to meet their own needs

Wetland: "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).

- It is an area of land which is saturated by water either seasonally or perennially.
- Wetlands are places where dryland meets, or is inundated by, water.

Wetland Development" means the carrying out of an activity or operation which includes the construction of ditches, mechanical disturbance of the ground, alteration of normal water level fluctuations, infilling, drainage, dredging, channelization, and removal of vegetation cover and/or organic matter on a wetland for social or economic benefits, or the making of any change in the use or the intensity of use of any wetland which affects its hydrologic characteristics or functions.

Wetland Indicator: This refers to wetland characteristics, for instance grass and/or tree species that provide a valid and reliable way to measure status or health of a wetland.

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

"Wise Use of Wetlands: "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development".

10.2 Types of Wetlands in Zimbabwe

Artificial impoundments (dams): There are over 8 000 man-made impoundments ranging from very small single farm units to very large ones.

Dambos: This is a ChiChewa word that is used to describe a grassland in both Zambia and Malawi. It has now been adopted for use by the scientific community within the SADC region for purposes of uniformity. Locally these ecosystems would be referred to as *doro*, *dekete* 'bani' (Shona), Amaxaphozi (IsiNdebele) or 'vlei' (adapted Afrikaans). Also there are riverine dambos which are found along most of the country's major drainage systems.

Flood Plains: These are associated with the major drainage systems and tend to be well developed in low lying flat areas. These are found in the Zambezi Valley and around the Save-Runde confluence.

Pans: Depressions that collect and retain water from the surrounding uplands. They are generally saline due to the accumulation of salts brought by water that eventually evaporates and are found in hotter areas of the country.

Swamps: Zimbabwe does not possess significant swamp areas. Tsamtsa and Kwaluzi swamps are both notable and located in low rainfall areas of the country.

10.3 Ramsar Convention

In sum, wetlands constitute a resource of great economic, cultural, scientific and recreational value to human life. Yet these functions, values, and attributes – these “ecosystem services” and “components” – can only be maintained if the ecological processes of wetlands are allowed to continue functioning. Unfortunately, in spite of important progress made in recent decades, wetlands continue to be among the world’s most threatened ecosystems, owing mainly to ongoing drainage, conversion, pollution, and over-exploitation of their resources (Ramsar Convention Secretariat, 2013).

The progressive encroachment on and loss of wetlands needs to be stopped, and measures must be taken to conserve and make wise use of wetland resources. To achieve this at a global level requires cooperative, intergovernmental action. This was the rationale for development of the Ramsar Convention on Wetlands in 1971. The Ramsar Convention provides a framework for international, as well as for national and local, action. Governments that join the Convention are expressing their willingness to make a commitment to reversing that history of wetland loss and degradation. As of January 2013, there were 163 Contracting Parties, or member States, in all parts of the world (Ramsar Convention Secretariat, 2013). More than 2,060 wetlands have been designated for inclusion in the List of Wetlands of International Importance, covering 197 million hectares (1.97 million square kilometres).

Because wetlands are important for maintaining key ecological processes, for their rich flora and fauna and for the benefits they provide to local communities and to human society in general, the broad objectives of the Convention are to ensure their conservation and wise use (Ramsar Convention Secretariat, 2013). States that join the Convention accept four main commitments.

a) Listed sites (Article 2 of the Convention)

The first obligation under the Convention is for a Party to designate at least one wetland at the time of accession for inclusion in the **List of Wetlands of International Importance** and to promote its conservation, and in addition to continue to “designate suitable wetlands within its territory”. Selection for the Ramsar List should be based on the wetland’s significance in terms of ecology, botany, zoology, limnology, or hydrology. The Contracting Parties have developed specific criteria and guidelines for identifying sites that qualify for inclusion in the Ramsar List.

The Parties have also committed themselves “to arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to change as the result of technological developments, pollution or other human interference. Information on such changes shall be passed without delay to the Ramsar Secretariat.

b) Wise use (Article 3 of the Convention)

Under the Convention there is a general obligation for the Contracting Parties to include wetland conservation considerations in their national land-use planning. They have committed themselves to formulate and implement this planning so as to promote, as far as possible, **“the wise use of wetlands in their territory”**. The Conference of the Contracting Parties has approved guidelines on how to achieve “wise use”, which has been interpreted as being synonymous with “sustainable use”.

c) Reserves and training (Article 4 of the Convention)

Contracting Parties have also undertaken to establish nature reserves in wetlands, whether or not they are considered to be internationally important and included in the Ramsar List, and they also endeavor to promote training in the fields of wetland research, management and wardening.

d) International cooperation (Article 5 of the Convention)

Contracting Parties have also agreed to consult with other Contracting Parties about implementation of the Convention, especially in regard to transboundary wetlands, shared water systems, and shared species.

Over the years, the Conference of the Contracting Parties has interpreted and elaborated upon these four major obligations included within the text of the treaty, and it has developed guidelines for assisting the Parties in their implementation (Ramsar Convention Secretariat, 2013). These guidelines are published in the Ramsar Handbook series and on the Ramsar website (www.ramsar.org). The Contracting Parties further spelt out their interpretation of their responsibilities as follows:

a) Conservation of wetlands

- to designate wetlands for the List of Wetlands of International Importance;
- to formulate and implement planning so as to promote conservation of listed sites;
- to advise the Secretariat of any change in the ecological character of listed sites;
- to compensate for any loss of wetland resources if a listed wetland is deleted or restricted;
- to use Ramsar criteria for identifying wetlands of international importance;
- to use the Ramsar datasheet and classification system for describing listed sites;
- to consider appropriate management measures after designation and, where appropriate, to use the Montreux Record and [Ramsar Advisory Mission mechanisms];
- to formulate and implement planning so as to promote the wise use of wetlands;
- to adopt and apply the *Guidelines for implementation of the wise use concept*, notably as regards elaboration and implementation of national wetland policies, and the *Additional Guidance on wise use*;
- to make environmental impact assessments before transformations of wetlands;
- to establish nature reserves on wetlands and provide adequately for their wardening;
- to increase waterfowl populations through management of appropriate wetlands;
- to make national wetland inventories which will identify major sites for wetland biodiversity;
- to train personnel competent in wetland research, management, and wardening.

b) Promotion of international cooperation in wetland conservation

- to promote conservation of wetlands by combining far-sighted national policies with coordinated international action;
- to consult with other Contracting Parties about implementing obligations arising from the Convention, especially concerning shared wetlands and water systems and shared species;
- to promote wetland conservation concerns with development aid agencies;
- to establish wetland restoration projects.

c) Fostering communication about wetland conservation

- to encourage research and exchange of data;
- to produce national reports for Conferences of the Parties;
- to increase the number of Contracting Parties.

d) Supporting the work of the Convention

- to convene and attend Conferences of the Parties;
- to adopt the Paris Protocol and Regina Amendments;
- to make financial contributions to the Convention budget and to the Ramsar Small Grants Fund.

Under the third Strategic Plan, Contracting Parties seek to deliver their commitments to wetland conservation and wise use through “three pillars” of action. These are:

a) Working towards the wise use of their wetlands through a wide range of actions and processes contributing to human well-being through sustainable wetlands, water allocation, and river basin management, including, for example, establishing national wetland policies; harmonizing the framework of laws and financial instruments affecting wetlands; undertaking inventory and assessment; ensuring public participation in wetland management and the maintenance of cultural values by local communities and indigenous people; promoting communication, education, participation, and awareness; and increasing private sector involvement;

b) Devoting particular attention to the further identification, designation and management of a comprehensive suite of sites for the List of Wetlands of International Importance (the Ramsar List) as a contribution to the establishment of a global ecological network, and ensuring the effective monitoring and management of those sites included in the List; and

c) Cooperating internationally in the delivery of wetland conservation and wise use, through the management of transboundary water resources and wetlands and shared wetland species, collaboration with other conventions and international organizations, sharing of information and expertise, and increasing the flow of financial resources and relevant technologies to less-developed countries.

In summary, Zimbabwe through signing up to the Ramsar Convention has committed (among other aspects) to:

- Promote the wise use of wetlands throughout the country.
- Designate a number of Ramsar sites (seven to date) and to promote the conservation of such sites.
- To elaborate and implement a national wetlands policy.
- To make a national wetland inventory.
- To identify additional sites in a coordinated and systematic manner.
- To create and effectively manage protected areas in wetlands.
- To make EIA studies prior to the transformation of any wetlands.
- To collaborate with neighbours concerning the management of transboundary wetlands.
- To establish wetlands restoration projects.

10.4 Wise Use of Wetlands in Support of Sustainable Urban Development

The definition of “wetlands”, sustainable development” and “wise use” of wetlands as applied in environmental science, particularly in terms of the Ramsar Convention, with reference to the definitions that have been adopted by the City of Harare, the Environmental Management Agency and the Minister of Environment, Water and Climate in their decisions permitting cluster home development on Monavale wetland.

Wetlands are some of the most diverse and productive ecosystems and deliver a vast range of benefits to human society. Not surprisingly there is long history of association between human settlements and wetlands and which has typically resulted in the progressive degradation and loss of wetlands. This is particularly the case under conditions of rapid population growth and urbanization. It has long been recognized that urbanization can have direct and indirect impacts on the environment, and that wetlands are particularly susceptible to these impacts, such that the rate of loss of wetlands is greater than for any other types of ecosystem (Millenium Ecosystem Assessment, 2005). Through appropriate planning and management the wise use of wetlands in urban environments can contribute to delivering sustainable urbanization for future generations. Indeed for the prosperity of future generations and the conservation of wetland biodiversity it is essential that urban development is planned and managed in ways that are sustainable, recognizing the need to protect the natural resource base that sustains urban areas. This is particularly pertinent in the face of accelerating climate change, according to which some cities can expect to face warmer and drier conditions so putting stress on limited water supplies, whilst others are likely to face increased risks of flooding.

The Convention on Wetlands of International Importance especially as Waterfowl Habitat or ‘Ramsar Convention’ provides the most widely accepted framework for international cooperation and national action for the conservation and wise use of wetlands. It is known as the ‘Ramsar Convention’, after the Iranian city in which it was adopted in 1971. Almost 90% of UN member states are Ramsar “Contracting Parties”, including Zimbabwe.

The Convention’s mission is “the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world” (Ramsar Convention Secretariat, 2013). Under the Convention, the Contracting Parties commit to work towards the wise use of all their wetlands through national plans, policies and legislation, management actions and public education.

The Convention uses a broad definition of wetlands whereby a wetland is defined as “any area of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, and includes riparian land adjacent to the wetland” (Ramsar Convention Secretariat, 2013). This includes all lakes and rivers, underground aquifers, swamps and marshes, wet grasslands, peatlands, oases, estuaries, deltas and tidal flats, mangroves and other coastal areas, coral reefs, and all human-made

sites such as fish ponds, rice paddies, reservoirs and salt pans. It should be noted that EMA has adopted the same broad definition for defining wetland areas in Zimbabwe, as provided in the Environmental Management Act (Chapter 20:27) (Government of Zimbabwe, 2003).

The 'wise use' of wetlands, which is at the centre of the Ramsar philosophy, is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development" (Ramsar Convention Secretariat, 2010). "Ecological character" is the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time, and "change in ecological character" is defined as any human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service (Ramsar Convention Secretariat, 2010). The phrase "in the context of sustainable development" is intended to recognize that whilst some wetland development is inevitable and that many developments have important benefits to society, it is not appropriate to imply that 'development' should be an objective for every wetland. Wetlands are central to sustainable development as they supply all our fresh water. Wise use can thus be seen as the conservation and sustainable use of wetlands and all the services they provide, for the benefit of people and nature (Ramsar Convention Secretariat, 2010).

The principle of wise use is particularly relevant for wetlands located in urban or urbanizing areas and for those wetlands which support essential water and food requirements of urban areas (Emerton et al., 1998). In order to provide clearer guidance on the wise use of urban wetlands, in 2013, the Scientific and Technical Review Panel of the Ramsar Secretariat published a briefing note entitled "Towards the wise-use of urban and peri-urban wetlands" (McInnes, 2013). The purpose of the briefing note was specifically to raise awareness, across all sectors, of the importance of wetlands as vital natural infrastructure within urban and peri-urban environments; to stimulate efforts to stem the loss and degradation of wetlands; and to highlight the important roles wetlands can play in improving human well-being in urban areas.

The Briefing Note sets out principles for the planning and management of urban and peri-urban wetlands agreed by the Contracting Parties to the Ramsar Convention, and aims to help managers and planners of towns and cities to ensure the wise use of wetlands. Key messages include:

- The benefits which wetlands deliver, such as providing drinking water, mitigating flood risk and regulating local climate, underpin human well-being in towns and cities. Therefore, the loss and degradation of urban and peri-urban wetlands diminish human well-being.
- Wetlands should be considered as solution providers within an urban and peri-urban context, which can mitigate risks from a changing climate, support food production for a growing population and generate income through tourism and recreation.

- Ecosystems, and wetlands in particular, are the foundations of sustainable cities which support economic advantages and underpin human well-being. However, unsustainable urbanization all too commonly causes the loss and degradation of wetlands.

The document further spells out five key recommendations which national and local levels of governments need to consider and implement when developing policies that jointly address urban planning and management and the wise use of wetlands. These are:

Policy principle 1: Wetlands and the range of services they provide are essential elements of the supporting infrastructure of urban and peri-urban settlements. Thus wetlands should be treated not merely as areas that are important for nature conservation *per se* but as key elements within urban water management infrastructure and essential components in providing water resources.

Policy principle 2: The wise use of wetlands contributes to socially and environmentally sustainable urban and peri-urban areas.

Policy principle 3: Any further degradation or loss of wetlands as a result of urban development or management should be avoided, and where not possible, any impacts should be mitigated, and any residual effects appropriately compensated for by off sets such as wetland restoration.

Policy principle 4: The full participation of indigenous and local communities, municipalities and government sectors involved in urban and peri-urban spatial planning and wetland management decision-making is vital to creating sustainable urban and peri-urban settlements.

Policy principle 5: The threat of natural calamities and human-made disasters and their impacts on urban populations and wetlands requires government priority and convergent actions to enhance resilience to disasters.

The Resolution goes on to describe practical principles which should define best practice in sustainable urban development and wetland wise use. The first of these is that urban development should avoid, whenever possible, destroying wetlands. Alternative locations need to be identified for planned urban developments (both formal and informal built development) which do not lead to wetlands, or other natural ecosystems, being degraded or lost. Such wise use of wetlands is essential for delivering human well-being in urban and peri-urban environments.

In summary, the core thrust of the policy is that wetlands within urban areas provide a wide variety of services and form a vital component of urban infrastructure, such that degradation and destruction of wetland areas cannot be considered compatible with sustainable development. Or in other words development is not appropriate for some wetlands. These

guidelines are meant to apply to all wetlands and, as a signatory to the Ramsar Convention, the Government of Zimbabwe is obliged to take these guidelines into consideration when making planning and management decisions. A similar recent interpretation is provided by Amerasinghe and Dey (2018) concerning the wise use of urban and peri-urban wetlands in Kolkata, India, while in South Africa, for example, all Ramsar sites have statutory protection on the basis of being proclaimed as protected areas (Dini and Everard, 2016).

Additional input is required to:

Improve Table 1 – on the EIA process

Improve Table 3 – on impacts

Improve Appendix 1 – definitions

Improve Appendix 2 – types of wetlands

To flesh out parts of the earlier sections if required?

To add relevant references throughout

To add graphics/pictures