

CHAPTER 12

Status of Wetlands in Kenya and Implications for Sustainable Development

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12.1 Introduction

Wetlands are defined under the Ramsar Convention as “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 at low tide does not exceed six metres” (Ramsar, 1971; Howard, 1992). A wetland is also loosely defined as a vegetation area, which is flooded either permanently or seasonally (Denny, 1985). In Kenya, wetlands are defined as “Areas of land that are permanently or occasionally waterlogged with fresh, saline, brackish or marine waters at a depth not exceeding six meters, including both natural and man-made areas that support characteristic biota” (NWSC, 1995). These definitions thus include swamps, marshes, bogs, shallow lakes, ox-bow lakes, river meanders and floodplains, as well as riverbanks, lakeshores and seashore where wetland plants grow. It also includes marine and intertidal wetlands such as deltas, estuaries, mud flats, mangroves, salt marshes, sea grass beds and shallow reefs. The definition has been adapted from the Convention on Wetlands (Ramsar, 1971) to which Kenya is a contracting party.

Globally, wetlands occupy about 6% of the earth’s surface. Wetlands in Kenya cover about 3% to 4%, of the land surface, which is approximately 14,000 km² in area and fluctuates up to 6% in the rainy seasons (Figure 1). The distribution of Kenya’s wetlands depends largely on the amount of rainfall and to some extent on the landform. The wetlands provide many ecological and socio-economic goods and services. Despite their valuable functions, wetlands are often regarded as “wastelands” and are continually being degraded and lost through conversion for agricultural uses, settlement and industrial development. Wetlands have suffered degradation caused by among others pollution, overexploitation and catchment destruction. In addition, lack of awareness and appreciation of the values of wetlands has contributed to their loss and mismanagement.

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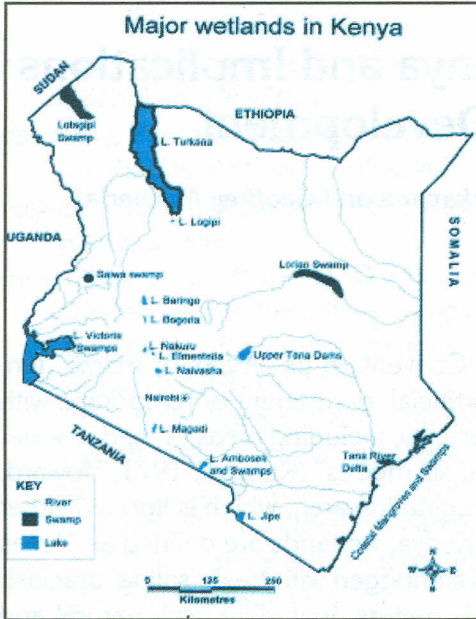


Figure 1. Major wetlands in Kenya
(Source: Owiti, 2006)

Coverage:

- * 14,000 km² ~ 3-4% of total area
- * 80% of wetlands are outside protected areas

Major categories:

- * Saltwater (marine, estuarine salt lake)
- * Freshwater (riverine and lacustrine)
- * Artificial or Man-made Socio-economic uses:
 - Grazing
 - Source of food
 - Medicinal plants
 - Building materials
 - Tourism
 - Domestic water supplies
 - Cultural sites & shrines

Many different groups of stakeholders have influence on the way wetlands are managed. These range from local fishermen and farmers to private businesses and government agencies with diverse mandates including fisheries, agriculture, tourism, the environment, rural development, and public works, along with a host of domestic and international development organizations. Rarely, however, does such a range of actors see themselves as linked together, let alone as sharing responsibility for stewardship of a vital national resource. Progress towards the sustainable management of wetlands demands a systematic, holistic perspective, precisely because wetlands defy boundaries. They do not lie within the domain of any one agency's management authority; they are both publicly and privately owned; and their extent fluctuates seasonally. Moreover, resource use decisions in one part of the system directly impact upon other parts, sometimes in complex ways.

As unique ecosystems, wetlands are highly valued for the services and functions they provide to human beings and other fauna and flora. Although they are among the most biologically productive ecosystems in the world, wetlands are often regarded as a nuisance, as wastelands, habitats for pests and threats to public health. As such wetlands continue to be threatened by anthropogenic forces mainly as a result of lack of knowledge and understanding on their importance and also survival pressure like increasing demand for food commensurate with the growing population (Howard, 1992). For instance, between 1970 and 2003 the area under swamps declined by about 40 percent; the flow rates (discharge) in most rivers

reduced by over 30 percent, and lakes have experienced dramatic fluctuations in water levels, with frequent dry-outs, as has been the case for most of the Rift Valley Lakes.

The quality and functions of wetlands have declined drastically due to reduction of vegetation cover, especially within the main water catchment basins of the Mau complex, Mount Elgon, the Aberdare range, and Mount Kenya ecosystems. This has affected the hydrological cycles and reduced wetland capacity to supply water. The introduction of alien species has affected the ecological balance of many wetlands. Increased human population, poverty prevalence, inadequate management capacity, unfavourable climate, inadequate awareness on sustainable use of biodiversity, inappropriate land uses, inappropriate conversion of wetland, and land fragmentation are key driving forces on the status of wetland ecosystems and biodiversity. Sustainable development requires an approach that promotes greater connectivity between ecosystems and societal actions. This should include formulation of policies, enforcement of legislation, establishment of wetland-protected areas, development of management plans, stakeholders' participation, research, monitoring and restoration, education, and awareness. Additional responses include funding of micro-finance projects around wetlands to enhance sustainable socio-economic development of the local communities living around wetlands, promoting regional collaboration, and political good will.

12.2 Wetland Functions and Importance

The rationale for wetland conservation and sustainable utilisation is based on the following unique services and benefits to humans and other life forms associated with them:

Improvement of water quality

Wetlands can help improve water quality by removing, nutrients, organic matter, and sediment carried by runoff and breaking down organic waste. Wetland vegetation absorbs nutrients and toxic substances from inflowing water thereby improving the quality of water downstream. Plants and the biological processes present in a wetland breakdown and convert these pollutants into less harmful substances. Many chemicals fertilisers, human and household wastes, and toxic compounds are tied to sediment and trapped in wetlands. Further runoff from catchment areas is filtered by the wetland vegetation resulting in water purification.

Increased groundwater availability

Wetlands discharge and recharge both surface and ground water resources respectively. The impeded drainage allows the water to stay in one place long enough to maximize infiltration, enhancing recharge of groundwater and aquifers. Excess water in wetlands and aquifers discharges into springs, rivers and other water bodies. Aquifers also play a complementary role by recharging wetlands during dry spells.

Flood Control and Soil Erosion Prevention

Wetlands act as storage (reservoirs) for excess amounts of water during heavy rainfall, thereby ensuring flood control and prevention of soil erosion. They reduce severity of floods downstream by retaining water and releasing it during drier periods. In addition, wetland vegetation slows down the flow of floodwater resulting in silt and sediment retention and riverbank protection. Besides reduction of flooding events downstream, this process also ensures river flows are maintained for longer periods. Furthermore, the vegetation shields the soil from damage by strong waves and wind. This feature can help slow floodwaters, lower flood heights and reduce shoreline and stream bank erosion.

Carbon Storage

Wetlands are among the most effective ecosystems for carbon storage. The wetland vegetation takes up carbon from the atmosphere and converts it into plant biomass during the process of photosynthesis. In many wetlands, waterlogged soil conditions prevent decomposition of the plant material thereby retaining carbon in the form of un-decomposed organic matter. The long retention of carbon in wetlands prevents excessive amounts of atmospheric carbon, thereby contributing to reduced global warming.

Natural habitat / Centres of Biodiversity

Wetlands are natural habitats for a variety of fauna and flora some of which are of conservation significance including endemic, endangered and migratory species bird species like the waterfowl. This makes wetlands important tourist areas. Wetlands are also in-situ banks for genetic resources. They also provide fish and wildlife including numerous rare and endangered species with food, breeding grounds, and resting areas

Prevention of Saline water Intrusion

Wetlands are essential for maintaining a buffer zone between freshwater and saline water. The destruction of wetlands due to over-extraction or drainage reduces the influx of freshwater and hence increases the intrusion of saline water. Intrusion of saline water deprives people, agriculture, industry, and ecological communities of valuable freshwater.

Wetland Soil and Mineral Products:

Wetlands are major sources of clay products such as bricks and ceramics. They are also essential sources of minerals such as sand and salt.

Wildlife products

Wetlands provide a number of wildlife resources and products. These include reptile skins and ornamental (aquarium) fish. Many communities are increasingly harvesting these resources to enhance and improve their livelihoods.

Natural Plant Products

Wetland plants are harvested to provide materials for construction and thatching, the cottage industry, canoes, fishing baskets and traps. Wetland plants are also used for medicinal purposes and as a food source.

Grazing

Wetlands are important sources of water and pasture for livestock and wildlife particularly during the dry season. Some wetland soils contain essential minerals necessary for animal health and are natural salt licks.

Religious and Cultural Significance

Wetlands are important historical sites that comprise important components of Kenya's cultural heritage. Local communities have strong attachments to the sites because of their social, cultural and spiritual importance. The communities also promote indigenous knowledge and practices on environmental functions and values that are essential for their survival. Some communities in Kenya use wetlands for cultural ceremonies like circumcision. Some of these communities like the Bukusu, Poker, and the Tiriki choose wetlands, which are permanently wet as sites for their initiation ceremonies. In addition to this some wetlands plants have to be present for the wetland to act as a suitable site for the ceremonies

12.3 Threats to Wetlands

The main driver of wetland changes whether positive or negative are human activities, particularly land use changes occasioned by the survival instinct. A summary of threats and effects at national levels is provided in table 1. Other factors contributing to wetland degradation include:

- ⊙ Naturally occurring event such as droughts, erosion, drops in groundwater levels
- ⊙ Pollution from industrial and domestic wastes especially Lake Nakuru, agrochemicals from horticultural enterprises in Lake Naivasha. Agrochemicals and urban wastes are key pollutants of the Tana River, while sugar and paper industries, agrochemicals, and domestic wastes affect Lake Victoria and associated wetlands. Most wetlands are increasingly showing symptoms of nutrient enrichment such as algal blooms, fish kills, prolific growth of macrophytes, and murky foul water. A survey by the National Museums of Kenya (NMK) in parts of the Rift Valley, Central and Eastern provinces showed that most of the farmers used chemicals like acaricides and fertilizers in their farms, and had no quantity standards for the same thus leading to over utilisation and increasing possibilities of water pollution.

- ⊙ Over-exploitation of wetland resources through water abstraction, fisheries, timber and plant products utilization is having its effect. These are common features in nearly all the wetlands in the Rift Valley as exemplified by the declining fisheries in Lake Naivasha, reduced papyrus cover in the Loboi swamp, serious water level fluctuations in Lake Naivasha and frequent drying of many swamps in the region.

Table 1: Summary of wetland threats and effects at National Level

Threats	Effects	Areas Affected
Deforestation and Catchment destruction	Habitat degradation, loss of biodiversity, alteration of hydrological regime	Mau catchment, L. Ol Bolossat(Satima escarpment), Mount Kenya, Aberdares, Upper L. Victoria Basin(Nandi, Uasin Gishu, Tinderet, Trans Nzoia, Mau, Mt Elgon)
Livestock Overgrazing	Habitat destruction	L. Ol Bolossat, L. Victoria Basin swamps (Yala, Nyando ect), Tana River Basin, Most seasonal wetlands
Water abstraction	Changed hydrological regime, depletion of aquifers/ reduction of water table, salinization	Lakes Naivasha, L. Ol Bolossat
Inter basin transfer	Changed hydrological regime, water quality changes, extinction of vulnerable species, ecological changes	L. Naivasha (Turasha) to Nakuru
Human settlement and encroachment	Loss of spawning/breeding grounds and biodiversity, loss of groundwater recharge, extinction of vulnerable species	Uasin Gishu Swamps, Saiwa Swamp, L. Kamnarok, L. Bogoria, L. Naivasha, L. Victoria Basin swamps, Nairobi River,

		Aberdare ranges, Mount Kenya, L. Ol Bolossat.
Human-Animal Conflict	Loss of keystone species eg. Hippos, general biodiversity loss	L. Ol Bolossat, Yala Swamp, Nyando wetland, Tana River Basin, Coastal wetlands
Siltation and sedimentation	Smothering of aquatic organisms and critical life stages, ecological changes, biodiversity loss, reduction in habitat size	Ewaso Ngiro catchment, Tana River Dams, L. Ol Bolossat, L. Naivasha, Nakuru, L. Victoria Basin, L. Baringo L. Turkana
Over-harvesting of macrophytes/ trees	Habitat modification, loss of biodiversity	L. Naivasha; Lobo Swamp, L. Victoria Basin Swamps, Tana River Basin, coastal & marine wetlands
Drainage for Agriculture	Reduced ecological functioning of wetlands, habitat & biodiversity loss to monoculture.	Widespread all over the country in palustrine. Yala swamp is a recent example
Over-fishing and unsustainable fishing methods	Biodiversity loss, changes in species diversity & depletion of wetland resources	L. Naivasha, L. Victoria, L. Kanyaboli, Coastal wetlands
Stream Channelization	Loss of habitat heterogeneity & biodiversity loss	Tana River Basin, some L. Victoria Basin swamps
Pesticides and herbicides	Bioaccumulation in fish dangerous to human health, fish kills, extinction of vulnerable species	L. Naivasha, L. Victoria Basin, and L. Nakuru
Introduction of invasive species	Loss of biodiversity, ecological changes, extinction of endemic species	L. Victoria, L. Naivasha, manmade wetlands,
Damming and Irrigation Schemes	Loss of riverine wetlands, modification of habitats & loss of biodiversity	Tana River Basin

Source: National State of Wetland Ecosystem Report (2005)

12.4 Sustainable Wetland Utilisation

The Ramsar Convention, which dates from 1971, was established to deal with the conservation and sustainable use of wetlands. It is the only environmental convention established to address one particular ecosystem. Each Contracting Party must designate at least one Wetland of International Importance (Ramsar site). There are currently 1387 Wetlands of International Importance in the list, which represents the largest global protected areas network totalling 122.7 million hectares. The convention is based on three pillars: the list of Wetlands of International Importance, international co-operation and the wise (sustainable) use of all wetlands. The Ramsar Convention has identified three objectives in order to implement good global governance of wetlands

- ⊙ Clarifying common areas of interest/overlap
- ⊙ Simplifying and harmonizing approaches and guidance to Parties
- ⊙ Enhancing collaboration on implementation at national and global levels

The aim of sustainable wetland utilisation is to contribute towards environmentally sound development decisions that sustain and improve the livelihoods of those who depend upon wetland resource, for their unique, economic, environmental, and social values.

Sustainable wetlands use depends on.

- ⊙ Understanding how the parts integrate into the whole system.
- ⊙ Treating the root of existing problems, not just manifestations.
- ⊙ Understanding nature's boundaries.
- ⊙ Learning to live in balance with natural systems.

Some principles of sustainable wetland utilization include:

- ⊙ Wise use: Wetlands contribute significantly to the health and well being of people and are an important element of Kenya's natural biodiversity; as such they should be integrated into national economic planning for sustainable development, wealth creation and environmental management
- ⊙ Precautionary principle: Where information is inadequate for decision-making, the precautionary principle will apply. Lack of full scientific certainty should not prevent implementation of measures to minimize/ manage wetland degradation
- ⊙ Collaborative and participatory approach: An integrated approach to wetland conservation and management should involve stakeholders at all levels including; government, local community, civil society and the private sector.
- ⊙ The global dimension: the global dimension of environmental impacts of actions and policies should be recognized and considered.

12.5 Challenges to Sustainable Wetland Utilisation

Limited Inventorizing, Monitoring and Information Systems

Currently a comprehensive monitoring system for wetlands is virtually non-existent and as a result decisions affecting wetlands are based on inadequate information. Existing data has shortcomings in satisfactorily measuring the productivity of wetland ecosystems and their importance to food security and the national economy. Data on many other wetland products essential to rural livelihoods such as shrimps, crabs and fish caught for household consumption have long been neglected. Lack of proper documentation of these values has led to long-term neglect of these values because they are seen to have little commercial importance. It is very important to know the actual value of a wetland because this is the only way people can appreciate and therefore conserve it and help in coming up with measures aimed at improving these values and also health and living standards of the people depending on wetland products.

Limited direct benefits derived from wetlands by the local communities

The perceptions of different people regarding the importance of a resource vary depending on the use and benefits enjoyed by the communities that depend on the resources. Most local people may regard wetlands as wastelands because they do not see or understand the benefits of these wetlands, which in turn prevents them from conserving them. A survey done by the National Museums of Kenya in Transzoia District, Central and parts of Eastern provinces on the local communities priorities on wetlands use showed that little effort is devoted to wetland conservation even as people seek to benefit from them in various ways such as agriculture, fishing, hunting, forestry, and grazing.

Poverty

As a result of poverty and poor land use practices, some riparian communities engage in activities such as destructive farming practices, draining of wetlands, and cutting of trees to make charcoal, among others. The immediate survival needs of the population conflict with the long-term conservation and management of wetlands. These communities also lack knowledge on various wetland conservation methods and on alternative use of the wetlands in non-consumptive manner such as ecotourism and recreation. Very few wetlands communities have access to education, clean water, health services, and electricity. Most wetland communities have low per capita income, are poor and remain generally ignorant. This leads to over use, misuse and degradation of wetland resources through a vicious cycle.

Alien Invasive species

Wetlands are highly vulnerable to invasive species. Many wetlands have in the past been affected by the introduction of alien invasive species that have altered the biodiversity characteristic and diminished the services provided by wetlands. For example the introduction of Nile perch nearly eliminated the indigenous fish species of Lake Victoria while water hyacinth and *Salvinia* species have affected numerous wetlands. Introduced species easily occupy new niches due to lack of competition and predators. Water hyacinth has led to disruption of water transport, higher cost of water treatment and loss of aesthetic value of major water bodies.

Acculturation

Wetlands management traditionally included a conservation component, reinforced by custom, religious taboos, and totem systems. During sacred days or periods, fishing was prohibited in streams and lagoons. Certain plants and animals were protected. Despite the effectiveness of these traditional conservation practices, modern wetlands conservation has not been based on them. Western culture has quickly replaced the traditional methods of wetland management, which were very effective in controlling the use of wetland resources so as to ensure sustainability. In addition to these, the rapid population increase and bad weather conditions have reduced the capacity of these traditional checks to ensure proper wetland utilisation.

Pollution, Eutrophication and Salinisation

Effluents from agricultural, industrial and domestic effluents have affected water quality and biodiversity in most of the wetlands, thereby reducing their values. Eutrophication of lakes like Naivasha, Baringo and Kamnarok has led to proliferation of invader plant species like *Pistia* and *Salvinia molesta*, leading to loss of biological and ecological values of wetlands as well as the social, cultural and economic values. In Lake Nakuru frequent occurrence of microcystin is as a result of nutrient loading into the lake. In certain areas excessive abstraction of fresh waters, diversions and catchment degradation have led to increased salinity.

Lack of Education and Public Awareness on wetland values

Wetlands are often degraded because the public is either not fully aware or does not appreciate the diversity of their functions and values. The National Museums of Kenya has been duly engaged in creation of awareness and public education on importance of wetland conservation among local communities, by using a wetland bird locally known as the grey crested crane (i.e. *Balearica spp*) as an indicator of the health of wetlands and hence as a key entrance point for wetland monitoring. Being the habitat of this bird, wetland degradation is associated with decline in the population of the bird. As such by monitoring the population trends of these birds, the local communities would simultaneously be monitoring the status of their wetlands.

Policy and Legislative Dimension

Policy documents and their implementation are critical in harmonizing the various aspects relating to wetland use and development. In Kenya several sectors have policies and legislation dealing with wetlands (Box 1).

In all about 77 sector-related acts are relevant to wetlands conservation and management. This has resulted into duplications of effort and conflicts of interest. The absence of a national integrated wetland management strategy has led to inter-sectoral policy contradictions resulting in unsustainable management of wetland resources. The agricultural policy on food production, which has led to conversion of wetlands to farmlands, is an example of the contradictions. It would be important for all these sector Acts to be harmonized under the relevant section 42 of EMCA, 1999

Box 1: Policies, legislations, and conventions related to wetlands in Kenya

- The Wildlife Conservation and Management Act
- The Fisheries Development and Management Act
- The Forests Conservation and Management Act
- The Water Conservation and Development Act
- The Agriculture Act
- Physical Planning Act
- Land Control Act CAP 406
- The Land Planning Act
- The Local Government Act CAP 265
- Environmental Management and Coordination Act, 1999

Poor Resources Mobilization

National budgetary resources have traditionally failed to adequately provide for wetland conservation and management. As a result, the country has been unable to effectively respond to challenges of wetland conservation and management.

Over-Exploitation of Wetland Resources

Increasing human populations and change from subsistence to commercial exploitation of wetland resources continue to exert increasing pressures on limited wetland resources, resulting in a decline of services and biodiversity. Rapid population increase, urbanisation and growth of cities mainly lead to human encroachment into wetland areas for agriculture, settlements and infrastructural development. This has led to over exploitation of wetland resources leading to wetland degradation.

Reclamation and Conversion of Wetlands

Drainage and reclamation of wetlands for agricultural development, human settlement and industrial development is one of the biggest threats to wetland conservation and management. In the past, wetlands have been regarded as "wastelands", which harbour disease vectors. This has led to large-scale drainage and conversion for alternative uses without regard to ecological and socio-economic values. For example, reclamation and draining of wetlands for agricultural activities, is going on in Yala Swamp and Tana Delta; Wetlands act as reservoirs for pest and diseases to both the communities living around wetlands and to their livestock. This has led to some negative attitudes as people see the wetlands as wastelands and as threats to them and their livestock and therefore they engage in reclamation. This is a major challenge to sustainable wetland utilisation

Ownership of Wetlands

There are three main land tenure systems in Kenya namely, Government (unalienated hence public land), private (freehold and leasehold land) and trust land (land held by local authorities in trust for the local community). Under freehold, the absolute ownership of that land is vested in the person together with all rights and privileges. Essentially changes in land tenure have resulted in a lack of land use coordination and environmental insecurity. In Transzoia District, up to 91% of wetlands are found in privately owned lands, where perceived free access to land on a "willing buyer willing seller" basis and free choice of land use combined with a single-use philosophy has exacerbated wetland loss and degradation. Due to the different tenure systems, wetlands have been subjected to diverse uses and management regimes some of which have affected them adversely.

Lack of Management plans

The complete lack of wetland specific Management plans has seen wetlands integrity being compromised and misused. In the Rift Valley it is only the wetlands with conservation status or international importance that have management plans. These include wetlands like Nakuru, Naivasha and Saiwa Swamp. Lack of management plans has seen important wetlands like Bogoria and Baringo turned into ecologically mismanaged ecosystems where the wetlands socio-economic potential has been compromised.

Poor participation of all stakeholders in wetland conservation

Wetland resources require a vast group of stakeholders to participate in their conservation. Key stakeholders such as the local communities must participate in all stages of the project, from the identification of problems and their appropriate solutions to implementation and benefit sharing. Rarely, however, does such a range

of actors see themselves as linked together, let alone as sharing responsibility for stewardship of a vital national resource. In order to arrest this situation, there is an urgent need to define wetland systems and identify their management strategies. All stakeholders (government departments, research institutions, NGOs, CBOs and village committees) must be identified and their roles well defined after which they must be involved in the management of wetlands at all levels. The problems associated with wetlands must be properly identified and understood before any possible solutions are found to address them.

12.6 Opportunities for Sustainable Wetland Utilisation

Tourism and Recreation

The naturalness and serenity of wetlands makes them important ecotourism and recreation centres. The presence of a wide range of wildlife species as well as their aesthetic value makes them a unique attraction for tourism, which is an important foreign exchange earner at the national level and source of livelihood for local communities. Development and promotion of tourism builds appreciation of wetlands and generates funds for their protection hence is one approach to tapping the value of wetlands without degrading them. For example Lake Nakuru is an important foreign-exchange earner through tourism. According to KWS, the Park currently receives about 200,000 visitors per year, bringing in over US\$ 24 million per annum. Sustainable ecotourism with adequate benefit sharing would also provide a deterrent to damaging activities and land-use types in the catchment area, particularly by the local community.

Energy Production

Wetlands provide energy in various forms, the most important being hydropower generation and plant biomass. Kenya mainly relies on hydro-electric energy as a major source of energy both for the domestic and industrial sector. The energy is mainly generated from several hydroelectric power plants constructed especially on the upper reaches of the Tana River, Kerio River and Sondu-Miriu River. Wetland plants such as reeds can also be harvested and dried to provide a source of fuel. Wetlands have a great potential for satisfying the ever-growing demand for energy in our country.

Fish Production

Wetlands sustain commercial and subsistence fisheries in many areas. Their importance as fish nursery grounds and for replenishing natural stocks is recognized for over 70% of fish species globally. Fish farming within wetland areas is increasingly becoming an important alternative to natural production. In 2005, fishermen earned Ksh 7 billion from fish sales in lake Victoria, indicating a steady growth in the industry.

The statistics published in the latest lake Victoria fisheries survey also revealed that fish landing sites in Nyanza and western provinces increased from 304 in 2004 to 316 in 2006. Wetland potential for fish production has not been fully exploited in Kenya. Improvement of infrastructure, storage, and market opportunities for wetland products such as fish will help improve the lives of the communities living near wetlands. Enhancing community participation in management of wetland resources is very critical. Fishermen can be made to manage their fishing grounds and educated on the need to conserve the breeding grounds for the fish. This will ensure sustained fish yields through out the year and in that way help in lifting the living standards of these people.

Food

Wetlands such as swamps are areas where food crops such as rice (*Oryza sativa*) are grown. There is a great potential for rice farming in the Kenyan wetlands like the Yala swamp, which can be fully exploited through use of high quality seeds, which mature faster and have a higher yield. However this form of land use need to integrate conservation values in crop production to ensure the survival of wetlands.

12.7 Conclusion and Recommendations

Wetlands are unique ecosystems rich in bio-resources and are critical in the maintenance of the country's ecological balance and enhanced human well-being. Unfortunately, they are not treated as special areas and development activities are planned and implemented without their special status in mind. As such degradation of wetlands ecosystems in Kenya is still a serious issue requiring urgent attention, more so due to threat from the effects of increasing population and the survival instinct within the Kenyan population.

Formulation of appropriate strategies for their sustainable management (i.e. use, care and improvement) needs proper consideration and re-examination of relevant national policies. Strategy formulation must take into account the present status of the wetlands, the levels of degradation, the needs for conservation, compulsions for resource use under existing socio-economic environment, the problems and realities involved in restoration, factors leading to degradation and to what extent it is feasible with resource, technology and other constraints to rehabilitate them.

Further, the effect of land tenure cannot be ignored since wetland resources may extend beyond private property. Management practices should be participatory in approach involving local residents and occupational groups involved in harvesting wetland resources. In developing participatory management special attention should be given to the social stratification and occupational structure of wetland inhabitants and seemingly the inter-boundary nature of some wetlands

Sound management of the wetlands nationwide can be promoted in either of two ways: by explicitly including wetlands management in existing environmental policies or by creating a separate wetlands-management policy. Developing a sound base for wetlands management involves two key issues: the management strategy that should be embarked on; and essential elements that need to be incorporated into the management plan for the wetlands. As a way forward, the following recommendations are suggested:

- ⊙ Local communities should be involved in all conservation and management activities.
- ⊙ Since most wetlands occur in the rural areas, some form of extension services should be put in place to create awareness in these areas.
- ⊙ Identification of natural, scientific, aesthetic, and educational values and benefits of wetlands should be done.
- ⊙ Wetlands should be managed as multiple use resources
- ⊙ Establish wetland sanctuaries in areas rich in biodiversity, and identify and declare critical areas as protected areas.
- ⊙ Wetland management should take into account the needs of the local communities.
- ⊙ Treat wetlands as unique and nationally important issue requiring high priority in management.
- ⊙ Create integrated management authorities through cooperation among all organizations related to wetlands. This should include interest holders, government and non governmental agencies, conservationists, and ecologists.

To achieve these, there is need to:

- ⊙ Define and establish a database for all wetlands systems and formulate their management approaches.
- ⊙ Set up effective management policies for wetlands, reinforce and review the existing and where wanting, enact by-laws to protect wetlands from, industrial effluents and municipal effluents, commercial and service operations; (Repair, servicing of motor vehicle and disposal of waste oils, solid wastes like garbage and plastics, disposal of industrial chemicals and expired drugs), mining activities, damming and irrigation, power generation, agricultural activities (Pesticides, fertilizers, Livestock grazing and watering).
- ⊙ Identify the resources within the wetland and come up with specific guidelines on sustainable utilization.
- ⊙ Identify ways that the local communities can gain from wetlands and avoiding conflict in harvesting and access to wetland resources.
- ⊙ Oversee all the management aspects of wetlands in the country.
- ⊙ Coordinate the entire players with interests in the wetlands.

- ⊙ Train personnel in wetland management and disseminate information on the importance of wetlands.
- ⊙ Outline guidelines for conservation of fauna and flora within the wetlands.

12. 8 Review Questions

- i. Discuss the rationale for wetland conservation in Kenya?
- ii. Using specific examples, explain the factors behind wetland degradation in Kenya?
- iii. Explain the salient features of a Sustainable Wetland Utilization framework

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