Eco Logging Management of Lake Nakuru Catchment Area

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ABSTRACT

Lake Nakuru National Park is located between 36° 05’ E and 0° 24’ S. It is located within Nakuru municipality, about 3Km south of Nakuru town, in Nakuru district of Rift valley province of Kenya. The lake is alkaline as the catchment rocks contain a high proportion of alkaline minerals that are leached into the lake. The lake and the catchment area is rich in a variety of habitats. The Upland forest is the main water catchment area; it is rich in forest products, and biodiversity. The catchment has multiple land use types i.e from pastoralism to large-scale commercial farms and ranches in the last 100yrs. The changes are associated with increasing human population, which has led to increased pressure on resources. Developments in Nakuru town and other urban centres have affected negatively on the catchment area and more so Lake Nakuru ecosystem. These impacts are manifested through erosion, high silt loads, and pollution from industrial and domestic wastes, agro-chemicals, urbanization and degradation, deforestation, encroachment into sensitive habitats. There is the need for all stakeholders to work together and come up with policies and strategies to ensure sound environmental management of the catchment area. The polluter pays principle should be used to charge all organizations that contribute to environmental pollution. The government has introduced stringent measures on water and waste management targeting polluters in private and public institutions. This is according to the legal notice number 121, on water quality and the fees charged will have to be paid annually depending on the activities one engages in. At the same time the precautionary principle can be practiced through cleaner production process to curb the disposal of pollutants. The 3R’s i.e. Reduce, Reuse and Recycle should be practiced in all the production processes.

Keywords: Ecosystem; Catchment, Pollution; Impacts; Cleaner production; Precautionary principle; Polluter pays principle; Reduce; Reuse; Recycle.

INTRODUCTION

Definition

A watershed is synonymous with ‘drainage basin’ or ‘catchment’ and can be defined as a land area through which precipitation is distributed into component of hydrologic cycle. An Ecological System or ‘Ecosystem’ refers to the interrelationship of physical, chemical and biological processes within an ecosystem.

Introduction

The physical characteristics of lakes and streams combined with the chemical composition of the water create conditions for life to exist and help to determine which organization live in a particular lake or stream. Wetlands, riparian buffers and groundwater recharge areas are critical to maintain the water quality necessary to promote the good health of aquatic ecosystems. Wetlands serve filters for pollutants that are carried by runoff into a body of water. Riparian buffers control and reduce the amount of non-point source pollution entering a water body. They consist of strips of trees, shrubs, and other vegetation lining a body of water that trap sediment and remove nutrients and pollutants before they reach the water. Groundwater recharge areas allow rainwater is stored. They are usually forested upland areas with steep slopes that are highly susceptible to erosion.

L. Nakuru catchment area is a unique ecosystem containing a variety of habitats that include an alkaline lake and which are home to millions of flamingoes. It is also the largest Euphorbia forest stand in E.A and a wildlife rich savannah and highland moist forest. The area is a rich agricultural region with a diversity of agricultural activities. Other land use systems include urban and industrial centers, ranching, forestry and wildlife conservation. The catchment is a closed basin whose physical and ecological processes are interlinked and interdependent.

OBJECTIVES

• To assess ecological linkages between human activities i.e farming, livestock keeping, sand harvesting, tourism and the park.
• To analyze the socio-economic benefits that may accrue from sustainable management resources
DESCRIPTION AND LOCATION

The L. Nakuru catchment is situated in the Gregorian portion of Eastern Rift Valley in Kenya at Lat. 0° 7’ – 0.44, and Long 35° 7’ – 36° 51’ E (Refer to fig. 1). It is bordered to the north by Menengai Crater, South by Eburru mountain ridges, East by Dundori and Bahati Uplands and to the West by Mau Escarpment. It is out of this area that the following rivers namely Makalia, Endeit, Njoro, Naishi, Larmudiac and Ngosur discharge into the lake.

Figure 1. Location of Lake Nakuru Catchment

The lake is highly alkaline as the catchment rocks contain high proportion of alkaline minerals that are leached into the lake. At the same time high evaporation and low precipitation has turned the lake alkaline and naturally hyper eutrophic.

Soils – There are a variety of soils in the catchment area ranging from volcanic soils, lacustrine deposits, loams, sandy and clay soils, all supporting different types of vegetation. The lake bottom has been filled with weathered material from the catchment area.

HYDROLOGY

L. Nakuru lies at 1,759 m above sea level and it is one of the highest points in Central Kenya dome of the Rift Valley. As a result underground inflows into Lake Nakuru through the fault line system are minimal. The hydrological conditions in L. Nakuru dictate that water levels are dependent on catchment supply through rivers and also waste water from Nakuru Municipality.

VEGETATION

There are grasslands and scrublands at the lower parts of the basin with yellow acacia (Acacia Xanthophleia) along the lakeshore and flood plains. Riverine vegetation along the river courses gives way to dry upland forests in the slopes of the highlands and moist upland forests cover the upper reaches of the highlands.

METHODOLOGY

The Qualitative and Quantitative method of data collection that is primary and secondary data was used. This was analyzed using advanced statistical analysis. Remote Sensed data, Geographical Information Systems and Global Positioning Systems was used to assess the impacts in the catchment area.

CLIMATE

Climate ranges from cold, hot and humid to arid and semi-arid. The mean annual rainfall averages 750 mm, falling within the periods of November to December and April to May. The total annual rainfall increases and becomes more certain and dependable with increasing altitude.

POPULATION

The demographic trends of the catchment from 1989-1999, shows population density increased by over 60%. The high population in the catchment’s area and the accompanied human activities has affected Lake Nakuru adversely through;
- High pollutants from the municipality.
- Industrial and other commercial activities.

AGRICULTURAL ACTIVITIES

Agricultural activities have contributed to siltation, pollution through agricultural chemicals such as fertilizers, herbicides, and pesticides. The continued abstraction from rivers draining into the lake has drastically affected the level of the lake. Fig-2.

URBANIZATION AND INDUSTRY

Nakuru has grown to a large industrial and commercial center with a growth rate of 10%. It produces human, domestic and industrial waste like any other urban centre. Waste handling and treatment facilities have not kept pace with the rate of production leading to environmental pollution.
The increase in the built environment has reduced infiltration rates leading to higher run-off volumes in the early part of the wet season, making storm water the single most important source of pollution in Lake Nakuru. Refer to map on page 36.

The following are the environmental issues of Nakuru municipality:

- **Sewerage and sanitation** – Nakuru has two sewerage treatment plants with a total design capacity of 16200m³ per day. To curb ground water pollution, it is desirable to expand sewer reticulation especially in the high density residential neighbourhoods and rehabilitate Lanet trunk sewer to accommodate the increase in population.

- **Storm water drainage**—Nakuru has both man-made and natural drains. These drains are inadequate and poorly maintained. Most of the areas outside the old town are not served and drainage is poor. Physical development between Crater and the Lake has strained the storm water drainage by reducing normal ground seepage.

- **Solid waste management**—The capacity of the council is unable to cope with solid waste management. The public, NGO and CBO initiatives have contributed to waste water management in the town. Privatization of these services helps the municipal council to handle solid waste.

- **Recreation facilities**—Nakuru has three recreational parks, namely Nyayo gardens, Lion Park and Shahab square. These parks have lack public facilities like wash rooms and solid waste disposal bins.

Management issues—The following are the management issues of urban development in Nakuru municipality:

- Solid and liquid waste management
- Industrial Pollution
- Domestic wastes
- Urban farming

Other urban centers impacting negatively on the catchment area are: Njoro town, Store Mbili, Kihingo, Mauche, Defo, Rikia, Mau-Narok, Sululu, Mutukiano, Naishi, Vagaria, Naishi game, Elmentaita, Ndivai, Mitu mingi, Kabati, Mariguini and Egerton town.

**LAKE NAKURU NATIONAL PARK**

The park has for long acted as a center of biodiversity conservation initiatives. The expansion of the park boundaries acted as a refuge for wildlife that experienced habitat destruction for example the Rothschild giraffe and the Black Rhino. The park has been recognized internationally as an important conservation area and an important Bird area, a stop over for migratory species and the first Ramsar site in East Africa.

**ENVIRONMENTAL CONCERNS IN THE CATCHMENT**

The impacts arising from human activities such as waste, agro-chemicals, and industrial waste (chemical, solid waste, municipal and domestic wastes, hazardous and toxic wastes), accumulate in the lake. Environmental issues in this catchment emanate from:

- Land use and land ownership.
- Land settlement.
- Livestock and crop farming.
- Forestry.
- Conflicts.
- Urban development.
- Water resources.
- Communication.

These impacts are a clear reflection of the failure to enforce and adhere to environmental standards as stipulated in various Acts, Bye-laws and policies.

Lake Nakuru Catchment Linkages: Lake Nakuru is linked to its catchment through ecological, hydrological and socio-economic linkages fig 3.
Figure 3. Ecological Linkages in Lake Nakuru Catchment

POLICY CONCERNS

Environmental Coordination and Management Act 2000, is a strategy to ensure sound environmental
management. Lake Nakuru catchment’s stake holders should accept each other as partners in the policy making process and through the consensus – building approach. The following institutions should collaborate on issues relating to environmental management and social-economic development i.e.:

- Kenya Wildlife Services
- Municipal Council of Nakuru
- Water Department
- Forest Department
- District Environmental Office
- District Development Office
- Local Authorities/County Council Councils
- Local Provincial Administration
- National Museums of Kenya
- Non-Governmental Organizations
- Community Based Organizations
- Department of Resources
- Agriculture Department
- Institutions of Higher Learning e.g. Egerton University

The conservation and sustainable use of Lake Nakuru catchment area is influenced by social, cultural, economic and political factors which should be addressed from a multidisciplinary approach.

The urban development sector in the catchment area is faced with the following challenges:

- Waste management development
- Demand for infrastructure development
- Urban physical planning
- Inadequate sewer system in Nakuru
- Town storm water
- Management of waste oil spillage
- Lack of awareness and capacity on environmental impacts by stake holders
- Corruption
- Inadequate monitoring and follow-up of mitigation measures
- Lack of information transfer
- Poverty
- Inadequate networking among players and actors involved in urban development

SHORT TERM AND LONG TERM IMPACTS

- Pollution
- Contaminated water courses leading to environmental pollution
- Aquifer and water contamination
- Damming of rivers
- Decrease in water resources
- Wastes i.e. Domestic, Municipal and Industrial wastes.
- Loss of diversity
- Loss of ecological integrity
- Loss of economic base

CONCLUSION

The stakeholders in the Lake Nakuru ecosystem should work together for the conservation and sustainable use of the catchment area. Therefore the need develop strong linkages and partnerships between stakeholders, public sectors, local and international conservation agencies. There is also the need to implement sound pollution control methods especially in urban centres and also to use alternative resources.

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