

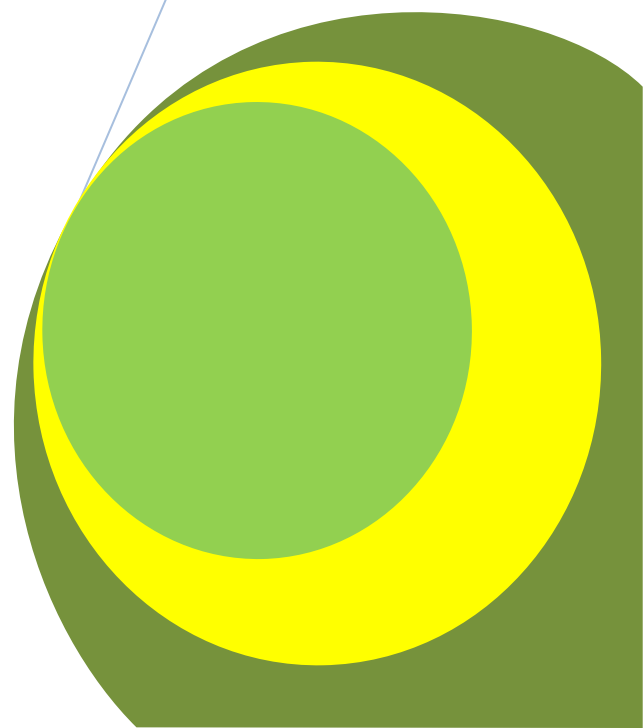
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Wetlands and Urban Growth in Bindura, Zimbabwe

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Research Article

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ABSTRACT

Widespread destruction of the country's wetlands, especially in urban centres, has continued unchecked despite a raft of legal instruments that criminalizes such activities. Mineral panning, housing developments, agricultural and industrial activities are among the leading causes of wetland degradation. This research found out that the demand for housing in Bindura has seen the town authorities parcelling out land in areas that had been preserved as wetlands, most of the areas are not fit for construction. The research sought to find out what the Environmental Management Agency (EMA) had done to raise awareness in the town. Data was collected through the use of a self-administered questionnaire with EMA officials being the survey respondents. Four wetlands sites were visited where there is ongoing construction of houses. The major findings were that housing construction depletes the water table and give rise to pollution of underground water. Other findings include habitat loss, water diversion structures, impairment of wetlands among others. It is therefore recommended that wetlands could be utilized in a way that it would not affect the ecological functions, such as creation of parks and golf courses. EMA should be given more authority to stop local authorities from allocating stands on wetlands and there should be local environmental activities to raise awareness.

Keywords: Wetlands and urban growth.

INTRODUCTION AND BACKGROUND TO THE STUDY

Bindura is a provincial capital for Mashonaland Central in Zimbabwe. The demand for housing has seen Bindura Town authorities parcelling out land in areas that had been preserved as wetlands, some of which are not fit for construction of houses.

There is therefore need for wetlands to be utilized in a way that it would not affect the ecological functions, such as creation of parks and golf courses because improper wetlands use has extensive negative consequences. Some of the consequences are pollution of underground water. Housing developments result in the construction of septic tanks that drain into soak-aways, which in most cases are not connected to main sewer channels. With these negative consequences in mind, it is hoped that the Environmental Management Agency (EMA) and Bindura Municipality will find common ground to limit the damage caused.

Key Terms

Wetlands – are lands where saturation with water is the dominant factor determining the nature of soil development and the types of soil development and the types of plant and animal communities living in the soil and on its surface. Wetlands generally include swamps, marshes, bogs and similar areas.

Urban Growth – refers to growth that makes intensive use of land for the location of buildings, structures and impermeable surfaces to such a degree as to be incompatible with the primary use of such land for the production of food and other agricultural products.

LITERATURE REVIEW

Characteristics of Wetlands

Darl (1990) says wetlands have soils that become saturated from precipitation bodies of water such as rivers and oceans or from ground water. The saturation must be predictable to some extent. It may become saturated seasonally for extended periods by rain or snow raising the water table.

This saturation impacts the soil and what lives in it. Dry soil has pockets of air in it providing oxygen to plants and animals for respiration. When air in the soil is replaced by water, it changes the types of bacteria that live in the soil.

Any mix of interdependent plants and animals are shaped by their physical environment of air, land and water.

Major causes of wetlands loss and degradation

Darl (2011) gives activities resulting in wetlands loss and degradation which include: agriculture, commercial and residential development, road construction, resource extraction, industrial siting, process and waste, dredge disposal. The primary pollutants causing degradation are sediment, pesticides, heavy metals and weeds. Many wetlands have suffered functional degradation. Wetlands are threatened by air and water pollutants.

Wetlands form as a result of certain hydrologic conditions which cause the water table to saturate the soil for a certain amount of time each year. The frequent or prolonged presence of such condition near the soil (hydrology) is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Wetland loss and degradation through hydrologic alteration by man had occurred historically through such actions as; drainage, dredging, stream channelization, ditching, deposition of fill material, stream diversion, ground water withdrawal and impoundment.

Implication of hydrological alterations of wetlands

Habitat loss and fragmentation

Coastal water subsidizes as a result of redirection of sediment by rivers, subsurface withdrawal of water and salt from under wetlands and drainage of wetlands for development, (Carney and Watson, 1991).

Habitat fragmentation, as wetlands are drained or hydrologically altered, may result in changes in species composition as wetlands species are replaced by upland species, loss of large wide ranging species, loss of genetic integrity when isolated habitat are too small to support viable population.

Water diversion structures

Water diversion structures, such as canals, ditches and levees have been used to modify wetlands to achieve flood control, drainage, mosquito control, irrigation, transportation and industrial activity (Kirsten, 2005). Canals and channelization change the hydrology of wetlands and increase the speed with which water moves into and through wetlands. As a result, patterns of sedimentation are altered and wetland functions and values that depend on the normal slow flow of water through a wetland can be affected. Channelization and channel modification alter in-stream water temperature and diminish habitat suitable for fish and wildlife. Normal sheet flow that flows through wetlands is inhibited by the soil banks that line a canal and by road embankments.

Impoundments

Impoundments of natural wetlands for wildlife and habitat management may exploit one function of wetlands at the expense of others (USEPA, 1993). Impoundment alters the natural wetlands hydrology and decreases water circulation. Decreased water circulation causes increased water temperature, lower dissolved oxygen levels and changes in salinity, prevents nutrient outflow and increases sedimentation. Sedimentation reduces the water storage capacity, smothers vegetation, reduces light penetration, reduces oxygen content and affects the entire ecosystem richness, diversity and productivity. Toxic substances, adhering to sediments, may accumulate in impoundments as a result of decreased water circulation.

Urbanization

Urbanization is a major cause of impairment of wetlands (USEPA, 1994b). Urbanization has resulted in direct loss of wetland acreage as well as degradation of wetlands. Degradation is due to changes in water quality, quantity, and flow rates, increases in pollutant inputs, and changes in species composition as a result of introduction of non-native species and disturbance. The major pollutants associated with urbanization are sediment, nutrients, oxygen demanding substances, road salts, heavy metals, hydrocarbons, bacteria and viruses (USEPA, 1994b). These pollutants may enter wetlands from point sources or from non-point sources. Construction activities are a major source of suspended sediments that enter wetlands through urban runoff.

Impervious surfaces

As roads, buildings and parking lots are constructed, the amount of impervious surface increases. Impervious surfaces prevent rainfall from percolating into the soil. Rainfall carry sediments organic matter, pet waste, pesticides and fertilizers from lawns, gardens and golf courses into urban streams and wetlands (USEPA, 1993a, 1993b). Increased salinity, turbidity and toxicity and decreased dissolved oxygen all affect aquatic life and therefore the food web (Crance, 1988). Excessive inputs of nutrients can lead to release of pollutants from a wetland into adjacent water resources. Increased water temperature as well as the lower dissolved oxygen levels, can cause stress or mortality of aquatic organisms.

Waste-water treatment plant effluent and urban storm water are a source of pollutants that continue to degrade wetlands (USEPA, 1994b).The aging of wetlands can occur when wetlands filter organic matter.

Heavy metals may bio accumulate in wetlands causing deformities, cancers and death in aquatic animals and their predators. Roads and bridges are frequently constructed across wetlands since wetlands have low land value. It is often considered to be more cost effective to build roads and bridges across wetlands than around them (Winter, 1988). Roads can impound a wetland even if culverts are used. That can change the function of the wetland. Roads can also disrupt habitat continuity, driving out more sensitive, interior species and providing habitat for hardier opportunistic edge and non-native species. Roads can impede movement of certain species or result in increased mortality for animals crossing them.

The maintenance and use of roads contribute many chemicals into the surrounding wetlands. Rock salt used for de-icing roads can damage or kill vegetation and aquatic life (Zetner, 1994). Herbicides, soil stabilizers and dust palliatives used along roadways can damage wetland plants and the chemicals may concentrate in aquatic life or cause mortality (USEPA, 1993a).Runoff from bridges can increase loadings of hydrocarbons, toxic substances and de-icing chemicals directly into wetlands.

Sanitary landfills

Landfills can pose an ecological risk to wetlands. Landfills construction may alter the hydrology of nearby wetlands. Landfills may receive household hazardous waste from small quantity operators, as well as sewage sludge and industrial waste. These facilities may not always be properly located, designed or managed in which case some surface water contamination may occur.

Non Native plants and animals

As a result of disturbance and habitat degradation, wetlands can be invaded by aggressive, highly-tolerant, non-tolerant, non-native vegetation. Particularly in constructed wetlands, non-native and tolerant native species may out-compete other species leading to a reduction in species diversity.

Data Collection Method, Procedure and Presentation

There are several research designs used by researchers but the most extensively used one in social sciences and education is the descriptive survey method (Babbie, 1979); hence it was used in this research. The descriptive survey is a data gathering strategy that can take the form of a self-administered questionnaire or a face to face or telephone interview.

Judgemental sampling, a non probability sampling technique was used to select respondents who were deemed to have intricate knowledge on environmental management issues; a total of six (6) EMA officers out of ten (10) made up the sample that responded to the questionnaires. Three (3) came from the EMA Mashonaland Central Provincial offices and the other three (3) from the EMA Bindura District offices.

The researcher personally completed the questionnaires. The personal interviews were conducted in English. The interview started with a brief explanation of the reason for the meeting. Visits were carried out in wetlands areas where there is construction of houses and a church. These include places around Chipadze Township and Cluster residential area and the area around the railway line immediately after the town to the East. More than 200 houses have been constructed while some are under construction in areas observed.

RESULTS AND DISCUSSION

The purpose of the study was to look at wetland degradation and how it affects ecological functions in Bindura Urban. The study also wanted to find out the Environmental Management Agency's (EMA) views and suggestions for

improvement on wetlands and urban growth. The following is a discussion of and presentation of results from the questionnaire survey with EMA officials.

• Overview on Wetlands and Urban Growth in Bindura

According to EMA officials real estate's developments is encroaching into wetlands threatening their existence. Bindura's main plan on real estate's indicates that there is intention to encroach into these wetlands. Therefore urban growth is negatively impacting on wetlands. Construction that is taking place in and around wetlands results in permanent changes on wetland status.

• Benefits of Wetlands

Table 1: Benefits of Wetlands

Benefits	Responses	
	n	%
They are a food sanctuary to animals	6	100
Water for gardens and orchards	6	100
They offer biodiversity. They are used as habitats by different species	6	100
They offer aesthetic value	5	83
Some plants are used for medicinal purposes	3	50

Table 1 show the major benefits of wetlands with the provision for food, water and habitation cited by 100% of the respondents.

• Effects of Urban Growth on Wetlands

The respondents alluded to the following as the detrimental effects of urban growth on wetlands:

- Reduction of water levels/water table in wetlands.
- Loss of biodiversity
- Reduction of water levels in rivers recharged by wetlands.
- Compression of sponge material underlying wetlands including even displacement of this material. This affects the water affecting hydrology and ecosystems thereon.
- Leads to pollution of underground water.
- Housing development leads to construction of septic tanks that drain into soak-aways, which, in most cases are not connected to the main sewer channel.

• Measures taken by EMA to Counteract Urban Growth on Wetlands

EMA has resorted to the following ways to mitigate the effects of urban growth on wetlands:

- Carrying out awareness campaigns on the need to preserve wetlands
- Demarcate areas preserved as wetlands
- Stop developments in areas considered inappropriate for development
- As a last resort, prosecute offenders who defy directives. Statutory Instrument 7 of 2007 Environmental Management (EIA and Ecosystems Protection) criminalises the abuse of wetlands.

• Major Challenges faced by EMA officials

Table 2: Major Challenges faced by EMA officials

Challenges	Responses	
	n	%
Political Interference	6	100
Negative perception of EMA	6	100
Ignorance of Wetlands Importance	5	83
Legislative Weaknesses	4	66

Table 2 above reveals the major challenges to EMA in curbing urban growth on wetlands. Politicians, specifically councillors and Members of National Assembly are often behind the allocation of developmental projects on wetlands. The general public also has a misconception that EMA is a policing agency bent on making their life difficult. People too do not really understand the importance of preserving wetlands. Lastly EMA does not have the power to stop local authority from allocating stands on wetlands.

CONCLUSIONS

On the basis of the research findings and responses to the research questions the following conclusions were made.

- There is rapid urban population growth in Bindura that has seen the mushrooming of in-fills in wetlands for housing construction to cater for the growth.
- Political interference has influenced the use of wetlands against well laid out statutory instruments.
- EMA has no power to stop the local authority from allocating stands on wetlands.
- The public has not been well educated to appreciate the importance of wetlands and the need to protect them.

RECOMMENDATIONS

In view of the above conclusion, the research makes the following recommendations:-

- There is need for an all stakeholders approach in wetland protection and management involving the local authority, policy makers, local government and the general public.
- Political will and involvement of politicians will assist to stop further developments in wetlands.
- The local authority and EMA should come up with local environmental activities or wetlands watchdogs.
- EMA should be given more power statutorily so that all developments undergo EMA processes before implementation.

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