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Contents

The Housing Provision and Environmental Protection Dilemma: A Cause-Impact Analysis of Urban Housing Development on Harare's Wetlands

TENDAI PEACEBE MUDOMBI AND BENVIOLENT CHIGARA[1]

Abstract

This article discusses the causes and impacts of urban housing development on wetlands in Harare. Being a local authority, the City of Harare has the mandate to provide housing for its inhabitants and at the same time protect the natural environment such as wetlands that are inherent in the city. Recent trends show that there has been a trade-off between housing provision and wetlands protection. A qualitative research design, which entailed the use of interviews with town planners and environmentalists was used to gather data for this study. The data was analysed using content analysis. The study results revealed that fragmented legislation, lack of enforcement, deficient wetlands categorisation criteria, political interference, corruption and low wetlands prioritisation were the contributory factors for housing development on wetlands in Harare. Consequently, water retention capacity, flood attenuation strengths, biodiversity supporting services and spatial extent of the wetlands have been greatly affected. However, if these developments continue unabated, the residents of Harare will be affected by a serious water crisis and environmental problems such as flooding.

Keywords: housing development, legislations, environment, urbanity, special economic zones

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INTRODUCTION

Urbanisation has transformed cities and towns in Africa. City life has been a major pull factor in migration and statistics show an immense evolution in the desire to live in cities. In 1950, only 16.8% of Africa's population inhabited cities (Manirakiza, 2011) and it is projected that the urban population will rise to 68% by 2050. Projections by UN-Habitat (2009) suggest that a continuing population increase in urban areas will add approximately 2.5 billion people to the current urban population by 2050 and this may amplify environmental challenges in the cities. There has been a drastic increase in population from a mere 50 000 inhabitants in 1962 when Kampala (Uganda) was declared a city to 1 208 544 in 2002 and 1.5 million in 2014 (Uganda Bureau of Statistics, 2002, 2016). The planning and development of cities have become complex due to the dynamics of urban space utilisation that has resulted from increased population. Housing demand in Harare and other cities in Zimbabwe has always been on the rise post-independence. The housing waiting list for Harare currently stands above a staggering figure of 500 000 home seekers (Chibamu, 2018). The pressing need to provide housing and related support services has led to the liberalisation of the housing market not just in Harare but countrywide (Kachere, 2014). However, rapid urbanisation in Africa had adverse effects on the environment.

Urban development on wetlands has been a prominent phenomenon in the past two decades (Ramsar Convention on Wetlands, 2018). Cui and Shi (2012) suggest that a general increase in the urban population has resulted in increased demand and pressure for urban housing and other related services. With nearly four billion people now living in urban areas, this growth has a direct detrimental effect on wetlands (United Nations, 2014). Housing development has been the most noticeable urban development activity on wetlands and it has degraded wetlands' functionality in the urban ecosystem (Kadziya and Chikosha, 2013). Nonetheless, studies investigating the factors contributing to developments in wetlands are limited in Zimbabwe. This study sought to investigate (1) the nature of developments on wetlands in Harare (2) the factors contributing to developments on wetlands and (3) the effects of developments on wetlands.

REVIEW OF RELATED LITERATURE

Research has shown that rapid urbanisation stretched the demand for housing development beyond what the city could provide, resulting in invasions of wetland areas. The effects are likely to be high in cities of the developing world where the pace of urban development and population increase is rapid. According to Wear and Greis (2002), urban development is a significant factor affecting forest ecosystems and wetlands in the Southern United States. In North Carolina, the forest cover and wetlands have declined by approximately 1.0 million acres (about 5%) since 1990 and urban development is the predominant cause of the net loss (Brown, 2004). Extensive urban development has also been implicated as the lead cause of habitat loss and species endangerment in the mainland United States (Czech *et al.*, 2000).

However, the rapid growth in world population and the need for more space to accommodate urban development activities posed a huge environmental challenge due to the existence of wetlands in urban areas. This is inconsistent with a global call through Agenda 2030 to make cities and human settlements inclusive, safe, resilient and sustainable (Goal 11) and to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reserve land degradation and halt biodiversity loss (Goal 15) (UNEP, 2017). Given that environmental sustainability and decent human life are at the ccentre of the sustainable development goals (SDGs (UNEP, 2017), the need to balance both targets is key to the achievement of Agenda 2030 at a very local level.

WETLANDS

Wetlands are water body systems such as marshes, fens, peat lands, pans, swamps, streams and lakes, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres (Government of Zimbabwe, 2002; The Ramsar Convention on Wetlands of International Importance (Article 1.1)). These are areas where water is the primary factor controlling climate, environment and associated plants and animal life in an area (Harare Wetlands Trust, 2015) and may be waterlogged

perennially or seasonally (Kecha *et al.*, 2007). Globally, wetlands occupy approximately 12.1 million km² of the land surface which is about 9% of the earth's surface (Ramsar Convention on Wetlands, 2018). The largest wetlands are in Asia, occupying 32% of the global area. North America follows with 27% of the global area. Latin America and the Caribbean occupy 16% of the total global wetlands area. Africa and Oceania have 10% and 3%, respectively (Davidson, 2018). Wetlands include permanently or seasonally inundated freshwater habitats ranging from lakes and rivers to marshes, along with coastal and marine areas such as estuaries, lagoons, mangroves and reefs (Millennium Ecosystem Assessment, 2005). Wetlands exist in many kinds of climates, on every continent except Antarctica. Harare is a wetland city. It sits on land that largely was a wetland but has been disturbed by human activities and urban development. In Kampala, 31 km² out of 172 km² of its space are swamps (Pomeroy, 2004). Wetlands vary in size from isolated prairie potholes to huge salt marshes. They are found along coasts and inland. Some wetlands are flooded woodlands, full of trees. Others are more like flat, watery grasslands. Still, others are choked by thick, spongy mosses (Convention on Biological Diversity, 2014). They are transitional zones that are neither dry nor saturated or underwater. They are characterised by having hydric soils, hydrologic periods of being wet for at least 5% of the growing season and hydrophytes which are wetland plants (Bullock and Acreman, 2013). Wetlands vary widely because of locational variances in soils, topography, climate, hydrology, water chemistry, vegetation and other factors such as human interference (Kecha *et al.*, 2007).

As one of the most productive ecosystems in the world, wetlands are a very important resource to humans, flora and fauna in both urban and rural areas (Millennium Ecosystem Assessment, 2005; Ramsar Convention on Wetlands, 2018; Russi *et al.*, 2013). Wetlands and the varied vegetative components that makeup wetlands provide many ecological and socio-economic goods and services to urban residents (Russi, *et al.*, 2013). They act as carbon sinks, sources of food, water, papyrus for craft making and herbs from vegetation. From an environmental point of view, the Millennium Assessment Report of 2005 states that wetlands are very instrumental in offering ecological

services such as water purification and waste treatment; retention, recovery and removal of excess nutrients and other pollutants. They physically, chemically and biologically remove pollutants and sediments from the wastewater disposed of them (Davidson, *et al.*, 2017).

Urban wetlands contribute to watershed functions, most notably in flood attenuation, groundwater recharge and discharge, shoreline protection and wildlife habitat. In addition, they support soil formation, sediment retention and accumulation of organic matter (Ramsar Convention on Wetlands, 2018). The Convention on Biological Diversity (2014) states that wetlands perform three major functions. First, they provide a habitat for plants and animals that live primarily in wetland areas. Migrating birds are a primary user of wetlands. Second, they contribute to flood control. Wetlands can store large amounts of water when heavy rains occur (Convention on Biological Diversity, 2014). Wetlands will store much of the water accumulation and reduce the flooding in surrounding areas. Third, wetlands purify the water of harmful chemicals from human use such as pesticides, herbicides and cleaning solutions; pathogens and particulates (Russi, *et al.,* 2013). This shows that wetlands ecosystems are a life support system for rural and urban residents and adverse effects are seen when they are disturbed. In Zimbabwe, the Ministry responsible for Environment and Climate spearheads wetlands protection through the Environmental Management Agency (EMA). The main statutory tools used are the Environmental Management Act Chapter 20:27 and Statutory Instrument 7 of 2007. Other legal instruments that impinge on developments on wetlands include the Urban Councils Act, the Rural District Councils Act, the Water Act and the Regional, Town and Country Planning Act .

URBAN DEVELOPMENT AND THE ASSOCIATED IMPACTS ON WETLANDS

Projections by UN-Habitat suggest that 50% of Africa's population will be living in cities by 2030 (UN-Habitat, 2009). Rapid urbanisation is being experienced in Africa and African cities are currently confronted with the formidable challenge of responding to the rapidly growing urban population, whilst ensuring that cities remain socially inclusive, environmentally sustainable and economically viable. This has then

translated to most cities failing to balance the three pillars of sustainability in their growth and hence the prospering of economic and social pillars has taken place at the expense of the environmental pillar (Martines and Alves, 2015). Population increases in most cities lead to the straining of urban infrastructure and services which has resulted in some urban dwellers failing to access the services (Cui and Shi, 2012). Such a situation has resulted in increased urban poverty levels and such a social problem has spatial implications. This has led to increased urban agriculture in environmentally sensitive areas such as wetlands, informal settlements, slums, sand abstraction and other illegal or environment-degrading practices in cities (Jamal and Mortez, 2014).

A concrete jungle has been created in Kampala on land that used to be wetlands and the city is now experiencing constant flooding, increased runoff and siltation of Lake Victoria (Byaruhanga and Ssozi, 2012).

The major impact of rapid urbanisation in Africa as a region is the stunted attainment of development goals. Premature urbanisation and urban developments are challenges affecting all types of urban areas from new towns such as Abuja (Nigeria) and Lilongwe (Malawi) to cities in rapidly growing economies such as Addis Ababa (Ethiopia), Cairo (Egypt), Luanda (Angola) and Beira and Maputo (Mozambique) (UN-Habitat, 2017). Environmental degradation, which compounds environmental injustices and threatens the sustainability of development, has been one major cost that has emerged due to urbanisation. Interestingly, environmental degradation is preventable with the right planning and management. Most African cities have been facing challenges in ensuring quality urban development that is both sustainable and equitable (UN-Habitat, 2008). This has seen the destruction and disturbance of most urban wetlands in cities in the developing world.

This saw the engagement of housing cooperatives and private land developers in the housing market. This policy position did not go well in terms of the preservation of wetlands. Several home-seekers managed to develop residential properties with some on wetlands, which are ecologically sensitive areas. Having achieved success in one

area of housing provision, it was derogatory to the goal of protecting ecologically sensitive areas. This is evidenced by Nyavaya's (2018) assertion that only a fifth of the wetlands in Zimbabwe's urban areas are reported to be in a healthy functioning state. The sustainability of urban wetlands is compromised as urban development activities continue to happen in such sensitive areas.

The protection and management of wetlands in Africa depend highly on the context of individual countries' legal systems, their economies and their political systems. Unfortunately, the proclivity of African governments and local authorities to prioritise economic benefits over ecological benefits has always led to a situation where construction projects are favoured at the expense of nature. Bad corporate governance and corruption have also resulted in land designated and gazetted by law as wetlands to be used for other uses that are detrimental to the wetland.

HOUSING PROVISION, WETLANDS AND ENVIRONMENTAL PROTECTION: THE NEXUS

Housing provision and environmental protection are some of the major mandates of urban local authorities as stated in the Urban Councils Act (Chapter 29:15) Section 96 subsections 2 and 4 (Government of Zimbabwe, 2005). These two are also at the centre of global plans such as the Millennium Development Goals (MDGs) and the Sustainable Development Goals. Millennium Development (SDGs) Goal 7 which was to ensure Environmental Sustainability targeted the provision of proper housing to slum dwellers and the protection of the natural environment where wetlands are included (United Nations, 2014). This was further prospered by SDG 11 whose aim was to ensure access for all to adequate, safe and affordable housing and basic services. SDG 15 (Life on Land) was aimed at protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably managing the forest, combating desertification; halt and reversing land degradation and biodiversity loss (UNEP, 2017). Sustainability in housing provision and environmental protection has become the ccentre for MDGs and SDGs considering that their global goals are

directly focusing on environmental issues and addressing human housing needs (UNEP, 2017). The continuum from the MDG to the SDGs positions environmental sustainability and sustainable housing provision as the centre of the 21st century's goals and targets.

Despite all these efforts to balance housing provision and environmental sustainability, the fulfilment of the former has compromised the protection of the latter, causing devastating effects on wetlands. The control of housing development on wetlands is one of the critical issues challenging urban planners, development practitioners, environmentalists and city fathers in most cities in the developing world. African cities are confronted with the formidable challenge of providing housing to the ever-increasing urban population while at the same time ensuring that cities remain, socially inclusive, environmentally sustainable and economically viable. Martines and Alves (2015) precisely opine that the prospering of economic and social pillars of sustainability has taken place at the expense of the environmental pillar which promotes wetlands protection. An untamed quest to provide adequate housing for all urban dwellers has caused the invasion of ecologically sensitive areas, leading to the disappearance of urban wetlands, meadows, streams and hinterlands (Centre for Watershed Protection, 2006). Wetlands are slowly vanishing and are being replaced by pavements, buildings and sterile landscaping that make the few remaining wetlands unable to perform their natural functions as natural green infrastructure. Brugnmann and Robert (2005) believe that environmental problems such as flooding and reduced underground water recharge are resulting from wetlands invasions.

SOME INTERNATIONAL CASE STUDIES

GRANADA, SPAIN

By the end of the 1980s, the proclivity to develop coastal wetlands was driven by a limited appreciation of the ecological value of such spaces by local authorities. As a result, they were classified as developable

and buildings were erected along the coast. This led to the wetlands shrinking and a substantive loss in biodiversity in all its forms. The realisation of the impact of development that ignored the wetland led to a change towards municipal housing and tourism models that were more sustainable in their approach. However, there was a dilemma between promoting tourism along the coastal wetlands by constructing tourist hotels and luxurious conference centres and protecting the wetland for ecological purposes. The implementation of the Coastal Preservation Model, which protected the coastal wetlands was seen as being counterproductive for tourism development. Even so, being the only one in the province, it was highly important to protect the coastal area for the preservation of biodiversity. The sustainable approach to land use planning and environmental protection made it possible for it to accommodate more than half of the endangered bird species in the region. The Granada experience prompted the idea of public participation in land use planning and the preservation of nature. The UN-Habitat (2008) suggested that the sustainability of environmental preservation initiatives by government or local authorities is highly dependent on the support that the public is giving to such initiatives. It also showed that the idea of protecting wetlands requires an intentional policy shift towards strengthening laws and regulations that encourage the preservation of biodiversity.

NAIROBI, KENYA

The Nairobi case involves the increase in population in the city which has led to pressure for resources from the shelter, infrastructure and food. Human settlements to shelter the city's inhabitants and stream bank cultivation to provide food for city dwellers have led to land fragmentation and wetlands invasion. The Nairobi River Basin and its several tributaries, such as Mathare and Ngong Rivers, have not been spared by the impacts of increasing human settlements and activities in the City of Nairobi. Because they flow through the City of Nairobi, the rivers have been contaminated by waste from settlements. In addition to that, most of the Nairobi River basin and its associated wetlands have been lost to infrastructure and property. Construction

is also rampant around the Nairobi dam along the Motoine River where extensive sewage treatment work is being done (UNEP, 2009).

Wetlands in Nairobi support a wealth of biodiversity both flora and fauna. The Nairobi River Basin hosts both natural and agroforestry trees such as Cyprus, Croton, Eucalyptus and the Bamboo tree. It is also home to floral species native to Nairobi. The wetlands and associated forest harbour many fauna and avifauna species which include the African hare, bushbucks and mongoose. A variety of primates also reside in the wetland and these include, among others, the black and white colobus monkey, sykes monkey and vervet monkey. The wetlands lie within the route of migratory birds moving from Europe to Africa to breed. Having this richness in biodiversity composition, the ecological integrity of the Nairobi River Basin and its associated wetlands has been greatly compromised by the invasion of such spaces by urban agriculture and human settlements (Ye *et al.*, 2009).

Several lessons were also learned in the Nairobi instance. The improvement of the already converted land to become more productive reduces the need for locals to colonise more lands (*ibid*.). This lesson hinged on the understanding that if the colonised land is not used efficiently, more land may be required and more wetlands will be disturbed. The establishment of stricter environment protection rules was also seen as a pivotal measure in the protection of wetlands which are ecologically sensitive areas. Educating residents on the more important roles played by wetlands that do not necessarily benefit them economically was also cited as a measure to convince locals to take part in conservation efforts (UNEP, 2009).

MATERIALS AND METHODS

The study employed a case study research design and the focus was on Harare. Four (4) wetland areas, namely Monavale, Northwood, Budiriro and Dzivarasekwa, were sampled out of 29 gazetted wetlands in Harare. Table 1 provides a brief background of the selected wetlands.

Table 1: Background information on the selected wetlands

Name of Wetland	Location of the Wetland
Monavale	Monavale wetland is one of the seven Ramsar Sites in Zimbabwe. It is located to the north of Harare's city centre. It's surrounded by middle- to upper-income residential suburbs such as Monavale, Meyrick Park and Milton Park. Monavale wetlands are one successful community-led wetland restoration project that has ever happened in Zimbabwe.
Northwood	Northwood is located on the North East side of Harare's city centre.
Budiriro	Budiriro wetland is located in a high-density zone west of the city centre.
Dzivarasekwa	Dzivarasekwa wetland is located to the west of the city centre and is abutted by residential suburbs.

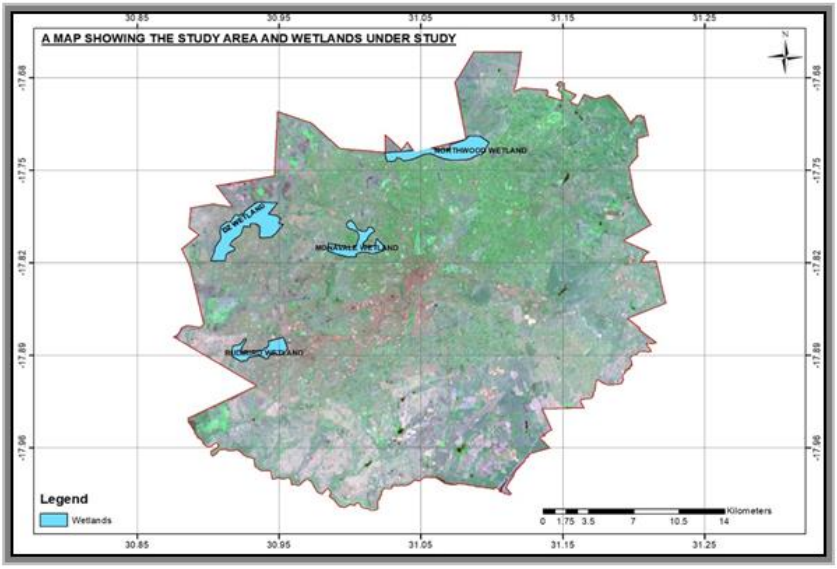

Figure 1.1: Showing the 4 wetlands selected from the 29 wetlands in Harare

Data was collected through conducting key informant interviews with officials from the Environmental Management Agency (EMA), the City of Harare, the Conservations Society of Monavale and the Harare Wetlands Trust. In addition, transect/nature walks were conducted on

the wetlands to observe how humans interact with the wetlands and the visible impacts resulting from such interactions. Documents such as local authority plans, publications and statutory documents were also extensively reviewed.

A quantitative approach was adopted for data analysis and important categories or themes were identified in the data and patterns and relationships (Flick, 2013). To support this, thematic analysis was also used to categorise data meaning through the creation of themes that guided the presentation (Denzin, 2011).

RESULTS AND DISCUSSION

DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Table 1 shows the nature of respondents who participated in the survey. Notably, respondents were selected from town planning, environment and community members to ensure a balanced assessment of the issues under consideration.

Table 1: Profile of respondents

Participant No.	Respondents	Nature of Organisation	No of Interviews
1	Town Planners	Harare City Council/Local authority	1
2	Environmentalist		1
3	Environmentalist	Environmental Management Agency	1
4	Wetland Protection Manager	Wetlands Trust Organisation	1
5	Wetland Superintendent	COSMO	1
6 & 7	Residents / Households	Monavale	2
8		Northwood	1
9 & 10		Budiriro	2
11 & 12		Dzivarasekwa	2
TOTAL			**12**

THE NATURE OF DEVELOPMENTS ON WETLANDS IN HARARE

There is a consensus among the respondents that wetlands have been invaded by various forms of urban development activities. Despite this, there is a lack of consensus among the respondents relative to the

actual hectares of wetlands occupied by urban development activities. Interviewees from the City of Harare suggested that approximately 10% of the total wetlands in Harare have been occupied by urban development and human activities. However, an approximation generated by the EMA suggests that 12 977.7 hectares (55.2%) of wetlands have been built up out of the total of 23 504.9 hectares. The approximation potentially explains the water supply challenges experienced in Harare.

Table 2 presents some of the main urban development activities taking place on the identified wetlands.

Table 2: Urban development activities on selected wetlands in Harare

Name of Wetland	Nature of Activities
Monavale	a. Housing b. Institutional developments
Northwood	a. Landowners (30) were issued with EIA certificates and licenses to operate commercial and industrial uses. b. Industrial/manufacturing use (Halsted, Electrosales, Vakani Panner, Seed Companies, Superfit, Maxitiles) c. Petrol filling station (PFS) (Trek PFS) d. Quarrying e. The Pomona Barrack is also located on the Northwood Wetlands
Budiriro	a. Housing development by cooperatives such as Motherland Housing Cooperative, Teurai Ropa Housing Cooperative and Stars Consortium. b. Institutional (Budiriro School)
Dzivarasekwa	a. A layout to facilitate housing development has been approved to provide 130 housing stands. b. Institutional uses (Pinewood High School).

Table 2 shows the various urban development activities on the selected wetlands. Notably, the main urban development activities on the wetlands include housing development, industrial activities and commercial activities. Interestingly, housing is the main urban development activity or land use invading wetlands. This is confirming the extent of the housing problem in Harare where over 500, 000 people are on the housing waiting list. Industrial and commercial activities dominate the wetlands such as Northwood and Monavale, which are located in proximity to high-income areas.

FACTORS CONTRIBUTING TO DEVELOPMENT ACTIVITIES ON WETLANDS IN HARARE

The study sought to identify the factors contributing to urban development activities on wetlands in Harare. The factors will be discussed under the four themes which emerged from the analysis of the data.

FRAGMENTED LEGISLATIVE FRAMEWORKS

The results suggest that lack of consensus concerning the legality of housing development on wetlands is a contributory factor to housing development activities on wetlands. This is amplified by the fragmentation of legislation relating to wetlands protection and urban development. Two main aspects emerged from discussions with research participants. First, EMA perceives that a wetland can be utilised for any use the Minister of Environment, Water and Climate declare when one gets a certificate or license of use from EMA. Second, officials from the City of Harare perceive that wetlands can be used for the provision of critical infrastructure that serves public interest such as base stations, sewer lines, water reticulation systems and power lines. In the latter instance, issuance of a certificate or license of use from EMA is not required but rather justified from a town planning perspective on the grounds of public interest. Nonetheless, a cost-benefit analysis is conducted before the use of a wetland for any use. Impact mitigation measures are required to ensure harmonious co-existence between wetlands and the infrastructure. Accordingly, the City of Harare has approved layouts and building plans that are being erected on wetlands by housing cooperatives and other land developers.

The results suggest that urban development planning and environmental protection planning are not synchronised and this causes chaos in the planning for the development and protection of wetlands. The problem is amplified by the fact that Harare lacks a gazetted wetland map and the administrative overlaps between the Environmental Management (EM) Act and the Regional Town and Country Planning (RTCP) Act relative to wetlands. The lack of explicit provisions in the Layout Design Manual relative to designing in

wetland areas and the long process to stop developments on wetlands further compounds the problem.

LAND TENURE ISSUES

Housing provision has become a prominent business endeavour in Harare due to the increase in the population of all income levels. This is evidenced by the increase in densification initiatives in the high-income residential areas which are coming in the form of cluster housing, second dwellings and high-rise flats. This is coming at a time when cities have become more environmentally conscious and have put measures in place to protect wetlands. The research established that land tenure influences the use of wetlands for urban development and town planning laws. Respondent 1 described how privately owned land is zoned residential by the City of Harare's planning schemes and a wetland by the Harare Wetlands Map. Such discord is likely to contribute to confusion relative to how the land can be utilised. As a planner with the local authority highlights, the City of Harare is bound to follow the provisions of the operative Master Plans, Local Development Plan and Schemes. This suggests that private the land owner can apply and be granted permission to carry out developments on land as long as the development proposal conforms with the operative plan that covers that area. The problem is compounded in areas such as Monavale Vlei where 16 hectares of the land was zoned residential by the Monavale Town Planning Scheme before the promulgation of the Environmental Management Act. The misalignment between town planning and environmental laws contributed to court challenges between owners of the land as they intend to develop and the environmentalists seeking to protect the wetland.

HOUSING DEMAND IN HARARE

The respondents highlighted that the population increase led to an increase in the demand for housing in Harare and with no corresponding supply of land for housing development, wetlands were invaded. The respondents note that although wetlands protection is a priority even in the face of other pressing needs for urban infrastructure and services in Harare, the increasing demand for housing and other supporting services like schools, hospitals and

commercial shops cannot be ignored. This pressure to supply houses to the city residents is forcing the City of Harare to disregard the protection of wetlands to serve an urgent need for housing. As housing is a basic need, the local authority is compelled to balance the act of environmental protection and the provision of houses. The role of politics in housing is also complicating the problem. For example, co-operatives that are well connected to political power, have targeted wetlands with impunity to provide accommodation to their members. Recognising the role of government and local authorities in housing provision, Respondent 1 indicated: "….. it is government and council's mandate to provide housing to urban residents hence they are usually caught in between protecting the environment and providing a basic need. However, there is a need to balance the two." While the importance of housing could not be over-emphasized, alternative sites could be explored instead of targeting wetlands.

In addition, the results suggest that respondents perceive that housing development is prioritised ahead of wetlands protection. This is confirmed by the fact that the local authority has no gazetted wetlands map. "Council, being in a position to do Local Priority Plans, Local Subject Plans that focus only on the city's wetlands, no efforts have been made to do that," Respondent 4 lamented. Since the enactment of EMA in 2002, 18 years down the line, the city still lacks a gazetted wetlands map which has a strong legal backing that is synchronised with other laws to make it perfect as far as protecting wetlands is concerned.

POLITICAL INTERFERENCE

The respondents highlighted that politics play a major role relative to development activities on wetlands. As noted in Table 3, housing development is the main activity on wetlands. This is consistent with the National Housing Policy, which seeks to ensure an adequate supply of housing for all. The respondents perceive that developments in wetlands conducted by co-operatives are connected to politics as most of the housing co-operatives with activities on wetlands are connected to the ruling party (ZANU-PF). Notably, housing co-operatives in Budiriro exhibit these traits in the names such as Teurai Ropa Housing Cooperative that are highly affiliated to the ZANU PF

party. As highlighted by Respondent 10, "*Vanhu vase vamuri kuona ava, vakaunzwa pano* nemusangano (All these people you see were brought here by the party)" suggests serious political interference in planning and land allocation. In addition to direct political interference, precedence relative to the regularisation of illegal developments on wetlands also made people invade wetlands and speculated that they would be regularised. The results confirm past studies where Machamire (2018) established that corruption and political interference in city planning are major causes of wetlands invasion and ultimate destruction in Harare. In Kampala, despite a very good legislative framework for wetlands protection, their wetlands continue to be disturbed by political interference (Kakuru, 2001; Pomeroy, 2012). However, the study results show that the role of politics in wetlands development is more pronounced in Budiriro and Dzivarasekwa than in Monavale and Northwood where other factors such as tenure and town planning are predominant.

IMPACTS OF HOUSING DEVELOPMENT ON WETLANDS

With regards to the impact of urban development activities on wetlands, three main themes, namely the effect on surface hydrological systems, biotic components of the wetlands and wetland connectivity emerged from the analysis of the data. The development of residential properties in any setting brings the need to provide supporting services such as water and sewer infrastructure, institutional uses like schools and health facilities, commercial shops to support the population and recreational facilities, among others. This means that the provision of housing has far-reaching implications for the sustainability of wetland ecosystems. In Harare, surface hydrological systems have been affected and this has affected biodiversity that thrives in wetland ecosystems. When buildings are constructed on wetland areas, the areas cease to be wetlands which means the majority of wetland space has been made extinct by housing provision.

EFFECT OF HOUSING DEVELOPMENTS ON SURFACE HYDROLOGICAL SYSTEMS

Wetlands in Harare are seasonally inundated. This means that they get flooded only when the water table reaches the surface during the wet seasons. Housing developments have fragmented wetlands to an

extent that the natural hydrological flows have been affected. The water purification strength of wetlands has ceased due to disturbance and this has affected the quality of water. Although underground water proves to be clear, surface water has been greatly affected. The restoration of Monavale Vlei has restored its purification characteristics and hence much of the water that seeps into the Marimba River is clear. Pools of surface water on Monavale also were filled up with clear water showing that the wetland's hydrological services are optimally operational. Dzivarasekwa and Budiriro wetlands painted a heavily disturbed surface hydrological system. Housing developments on the wetlands have also brought with them heavy agricultural activities. The wetlands are now clogged with invasive species as a result of the introduction of foreign characteristics like buildings and crops. Respondent 10 narrates the changes in hydrology by saying

> "When we first came here, wells were only three metres deep because the water was very close to the surface, you didn't need a long rope to lower the tin into the well to fetch water… but now, well are going up to eight metres to 10 metres before you reach water levels."

This is evidence of how housing construction and other human activities that housing provision has brought have affected the wetlands' hydrology. The clearing of wetland vegetation has reduced infiltration and percolation which resulted in more surface runoff. Precisely, underground water recharge has been greatly compromised.

EFFECT OF HOUSING DEVELOPMENT ON BIOTIC COMPONENTS OF WETLAND ECOSYSTEMS

The biotic components of wetland ecosystems are animals, birds and vegetation species. Wetlands are home to multitudes of animals, birds and vegetation species. When best performing, they are one of the most productive ecosystems on earth. They act as breeding sites for migratory birds and also places of hibernation. In terms of the animal and bird species, the most common wetland species are the black-headed heron, the grey dove and the black-winged kite which were observed in three of the four wetlands studied in Harare. Because of its restored state, Monavale wetlands have managed to attract and retain

animal species such as bush pigs and rabbits. Several snake species have also been recorded on the wetland.

Harare's wetlands are treeless and have short grass. Wetland vegetation has been affected on two levels which are vegetation survival and vegetation cover. Grass species and wetland shrubs are slowly being replaced by buildings, roads and other human activities that result from housing construction. Invasive species such as the *phragmites australis* have colonised wetlands due to foreign bodies in the wetlands. The eucalyptus, acacias and syringa trees are invasive species that were also observed at Monavale, Budiriro and the Dzivarasekwa wetlands.

Evidence in Harare is the lowering of the water table from 18 to 30 metres below the earth's surface, flooding and pollution of wetland streams (Kadirire, 2014). Chakanyuka (2019) also states that 13 of the 29 wetlands in Harare have already been taken up for construction projects.

EFFECTS OF HOUSING DEVELOPMENT ON WETLANDS ON PUBLIC HEALTH

Evidence shows that the creation of human settlements on wetlands hurts both humans and the wetland ecosystems. While wetlands are water purifiers, they also provide a conducive environment for water-borne diseases because of their nature. When left undisturbed, they are disease-free ecosystems. They only breed human-harming pathogens which cause diseases such as cholera, typhoid and dysentery when human excreta has been introduced to them due to human occupation.

Wetlands become dysfunctional in terms of providing wetland services when humans construct settlements on them. In their natural state, they act as flood attenuators. However, human settlements create impervious surfaces which increase runoff by reducing the capacity of wetlands to absorb the water. Removal of vegetation during construction also affects the existing hydrological systems of wetlands.

DISCUSSION

Protection of ecologically sensitive ecosystems and provision of decent housing are some of the goals of the Agenda 2030 which sets Sustainable Development Goals for 15 years from 2015. There are conflicting interests in the implementation of these in Harare

A common grass type in the studied wetlands is the *parrhesia* although Budiriro and Dzivarasekwa are only left with a few portions where this grass exists. There is still a very heavy presence of the native wetland grass on Monavale and Northwood Vlei because they have not been affected by the invasions.

An official from one of the companies stated that their use is environmentally friendly because the structures they have built on their site and the material used have been approved by EMA not to affect the wetland's normal and natural operations. A further comment was also added that they have developed an Environmental Management Plan which guides how they operate so that their operations do not affect the natural systems and operations of the Northwood Wetland that they are sitting on. The Pomona Barrack is also located on the Northwood Wetlands.

CONCLUSION AND RECOMMENDATIONS

The pattern of urban housing development on wetlands is well-defined and its impacts are being felt and realised. It is, therefore, crucially important for the City of Harare to fulfil its housing provision mandate with great sensitivity to natural green infrastructure. This is the only way the city can balance housing provision and environmental protection, thereby guaranteeing a complete and healthy urban ecosystem that supports humans and nature with positive coexistence.

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