UGANDA

WETLANDS ATLAS

Volume One: Kampala City, Mukono and Wakiso Districts

POPULAR VERSION

UGANDA

WETLANDS ATLAS

Volume One: Kampala City, Mukono and Wakiso Districts

POPULAR VERSION

UNITED NATIONS

CONTENTS

A typical permanent wetland in Ugandan dominated by *Cyperus papyrus*

Chapter 1

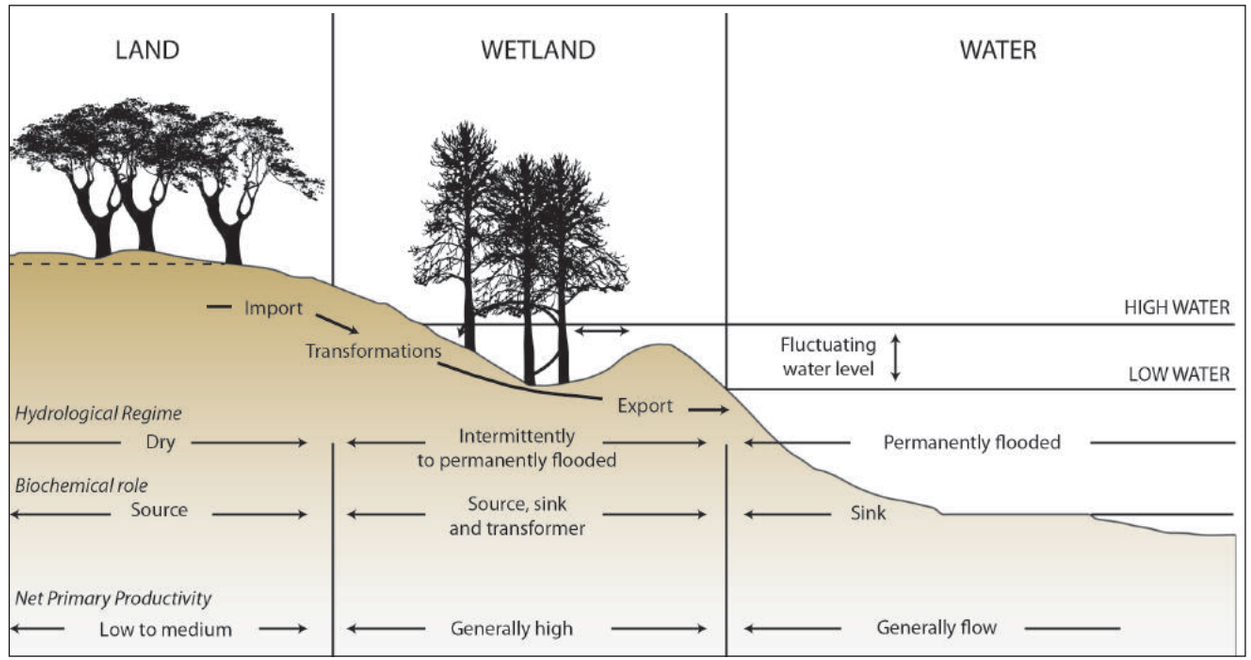
WETLANDS OVERVIEW

Between 1995 and 2010, the area of wetlands in Kampala, Mukono and Wakiso reduced by 9,661 ha – a decline of 14 percent. This translates into a conversion rate of 600 ha per annum and at this rate, all wetlands in the country will be gone in a 100 years' time.

Existing legislation and governance systems have to date not managed to curb wetlands degradation and lately there has been an escalation of encroachment into the wetlands. This has created a multitude of management challenges in the three districts related to the consequences of flooding, agriculture and settlements. For instance, in Kampala the impacts of flooding seem to be getting worse despite numerous government interventions. This has been linked to increased settlement in the catchment areas of Bukoto, Naguru, Mulago and Kyebando. In Wakiso encroachment from dairy, food crop farming and floriculture is contaminating the soil and water with agricultural chemicals; while in Mukono brick making leaves behind huge pits that seriously damage the landscape and provide breeding grounds for disease vectors.

The impacts of wetlands degradation is evident in damage to infrastructure, increase in deaths and communicable diseases and other impacts on businesses and economic development. Wetlands degradation costs the country about Ug.Shs 2 billion per annum.

Wetlands occupy the transitional zone between land and water (after Mitsch & Gosselink, 1983; adapted by permission of John Wilev & Sons).



The importance of wetlands

Wetlands can only fulfil their ecological, social and economic functions if they are healthy. A moderately degraded wetland is only partly able to meet its potential for flood control, water table maintenance or stabilization of shorelines. Whereas a degraded one may lose its ability to purify water affecting human and livestock health and ultimately destroying habitat for aquatic biodiversity.

Drivers of wetlands degradation

Population and socio-economic factors are the two main forces driving wetlands change in Kampala City, Mukono and Wakiso Districts. Agriculture (in the rural areas), settlement establishment and industrial development (in urban areas) are some of the human activities that lead to wetlands change or degradation. These factors are also complicated by the current complex land ownership patterns that exist in the country today.

Population

High population growth creates high demand for land and enormous pressure on natural resources especially wetlands. The urban character of the three districts means that land is at a premium. So poor people get displaced and end up settling in wetlands as dry upland areas are snapped up for up-market developments. Wetlands located close to roads are also under threat as the proximity to the transport network means that wetland products can easily be traded.

Settlements in Kasokoso in Kira Municipality

Agriculture

Floriculture affects wetlands through their proximity to the lakeshores, the extensive usage of chemicals and water, filling in or draining of wetlands, waste management and cutting off access to the lake shore. For instance, when the flower farms are fenced off the local communities are denied access to their traditional domestic water supply and fishing grounds.

Flower farming in Lutembe wetland

Map of wetlands in Uganda

Industrial development

Wetlands have been the victim of historical policy decisions. The 1972 Kampala Urban Development Plan clearly allocates wetland areas to industrial land use (Nyakaana, Undated). Wetlands can only be effective bio-filters under conditions of low nutrient loading and abundant swamp. In Kampala for instance, the number of industries has increased exponentially infilling the wetlands with murram, reducing the vegetation and increasing the pollution load from industrial sewerage discharge. Consequently, the wetlands are now unable to undertake their regulating and ecological functions. This is the case with the wetlands between Nakawa and Kireka and part of Nalukolongo no longer able to purify wastewater of hazardous chemicals. Studies indicate that the contamination of water resources which is partly caused by reduced buffering capacity of wetlands near open water bodies costs the country nearly Ug.Shs 38 billion per annum (ARCOS, Undated).

Owning land in wetlands

Land in Uganda can be owned under one of four land tenure systems: Mailo, Freehold, Leasehold and Customary tenure; and land titles may be issued to formalise ownership under some of these systems. However, the Environment law of 1995 is clear on the fact that wetlands cannot be legally owned by individuals. Despite this, many people claim ownership of wetlands with titles; and this brings them into conflict with the wetlands.

Excarvation of sand in Mabamba wetland

Factors allowing ownership of land in wetlands

There are a number of factors that have allowed ownership of land in wetlands to grow. These are the manual cadastral system of land administration, decentralisation of land management to the districts, weak local and central government institutions and corruption.

The Ministry of Lands, Housing and Urban Development uses a system of cadastral mapping to define land boundaries to document ownership and establish land rights. To date only 15 percent of the country (mostly in Kampala) is under the cadastral register; and the fact that it is a manual one, means that checking and updating is a slow, laborious process leaving opportunity for misuse of the system.

Land administration is now a decentralised function handled by District Land Boards. However, there is an increasing trend in fake surveys leading to errors in acreage, preparation of titles, dimensions or even the total absence of the plot on the ground. This has grossly complicated matters on the ground as many people have been issued titles on land that is actually wetlands. Consequently, when the cadastral maps from the MLHUD are superimposed on the landuse maps, many of the existing titles fall in wetland areas.

Kinawataka wetland 2010

Map of location of Kampala, Mukono and Wakiso

Chapter 2

WETLANDS IN KAMPALA, MUKONO AND WAKISO

The Inner Murchison Bay wetlands

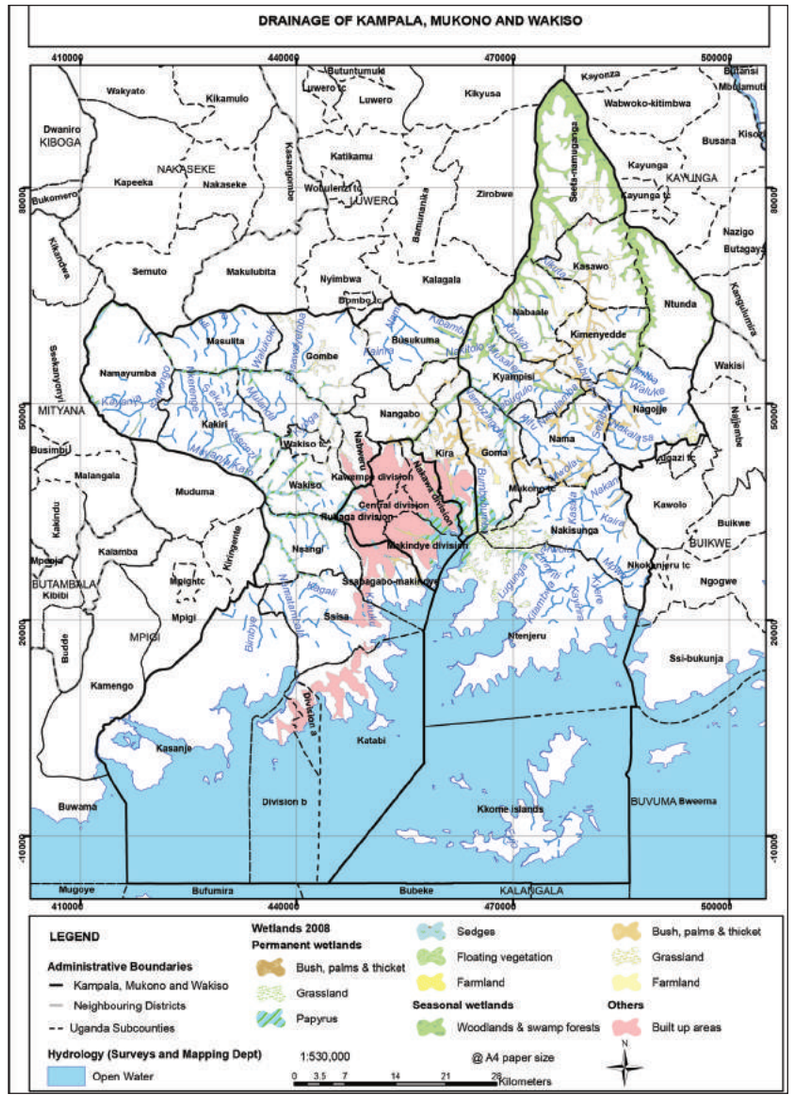
The wetlands surrounding the Inner Murchison Bay (IMB) are shared by Kampala, Mukono and Wakiso and exhibit many of the challenges enumerated above.

The problem

The problem facing the IMB wetlands are twofold. First the IMB is the sole recipient (through the Nakivubo channel) of all the storm water from Kampala that drains into the lake. The water in the channel is highly polluted due to the discharge of untreated and partially treated waste water and solid waste (74 percent of which is biodegradable). Recently sections of the Nakivubo wetland was channelized as part of a strategy to improve storm water drainage and reduce flooding in the city. However, it has altered the rate of water flow and degraded the function of the wetland (World Bank, 2015). Storm water and pre-treated waste water from the catchment moves very fast into the wetland and the reduced time it spends in the wetland means that it does not benefit from the wetland purification function. Secondly the removal of wetland vegetation as part of the channelization process destroyed habitats and contributed to soil erosion and siltation.

The shoreline of the Bay is dotted with numerous industries that discharge their waste water into the environment. Most are located in Nakawa and

Map of drainage in Kampala, Mukono and Wakiso



Central divisions of Kampala city. Some of the discharge points are at Mukwano Industries, City Abattoir, Peacock Paints and Phoenix Logistics. The factories include industrial metalwork, chemicals and pharmaceutical, meat, dairy and beverages processing, leather tanning, textiles, oil and gas manufacture among others.

Industries in Kampala, Mukono and Wakiso

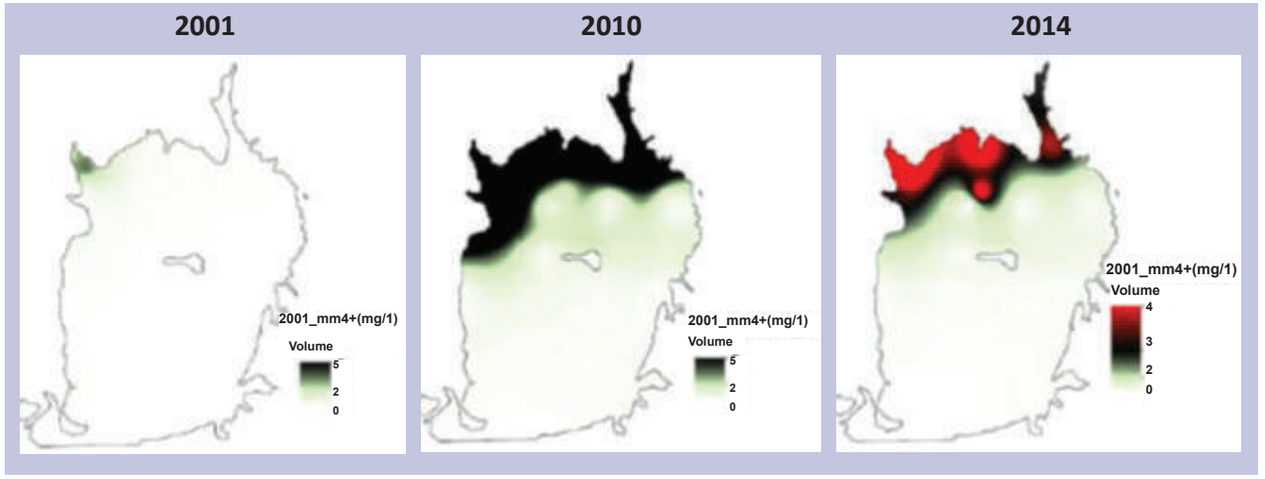
Location	District	Number of industries	%
Nakawa	Kampala	212	41.3
Central	Kampala	244	41.3
Makindye	Kampala	36	41.3
Kira	Wakiso	8	41.3
Mukono	Mukono	13	41.3
Total		**513**	

The production of hydrogen sulphide gas by the anaerobic conditions created leads to a 'rotten eggs' smell which is unattractive for tourists; and there is clear evidence of eutrophication. In fact, studies indicate that concentrations of ammonia and nitrogen have increased 5-fold: from 2mg/l in 2001 to 10 mg/l in 2014 along the northern shores of the IMB (WSS Services, 2015). In addition, low pH values in the water can allow the release of toxic metals allowing them to enter the food chain affecting human health. For example, a study by the Ministry of Water and Environment in 2013 found high levels of heavy metals in fish, a regular component of the diet (MWE, 2013). In 2015 another study found that concentrations of faecal coliforms exceeded maximum acceptable concentrations at several locations along the Nakivubo channel (Fuhrimann, et al., 2015).

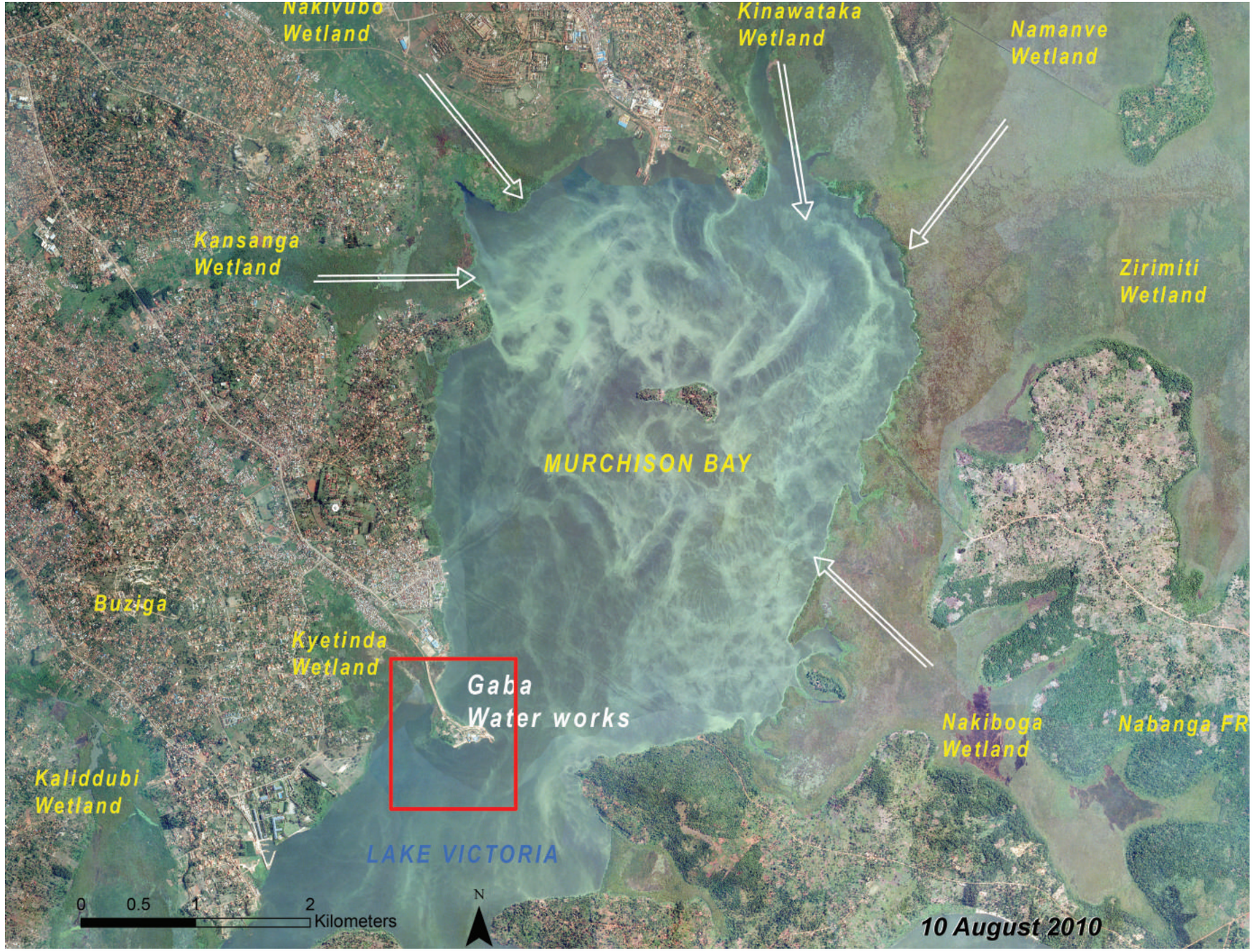
Impacts

As a result, the indicators of pollution – bacterial coliforms, heavy metals, Biological Oxygen Demand, Total Suspended Solids, Total Nitrogen, Nitrates and others are higher than the levels recommended by the National Environment (Wastewater Discharge) Standards of 1999 (MWE, 2013) (Fuhrimann, et al., 2015). A high BOD value implies low dissolved oxygen and this can lead to fish kills.

Accumulation of Ammonia (NH_4) and Nitrogen (N) on the northern shores of the IMB

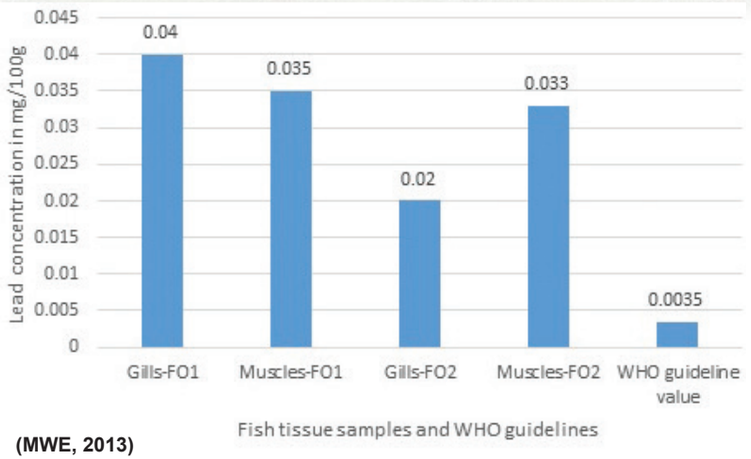


(WSS Services, 2015)



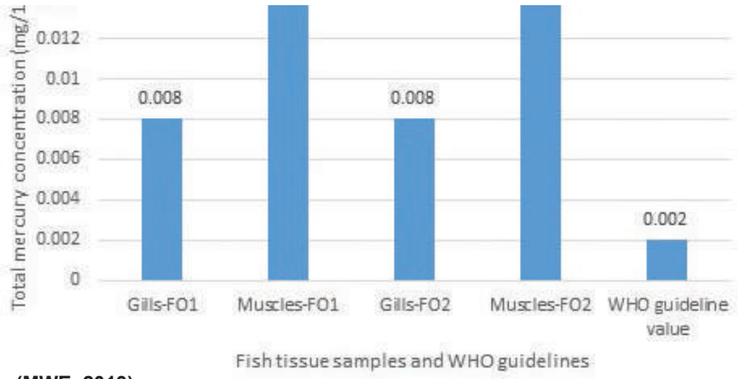
The Inner Murchison Bay

Concentration of lead found in fish tissue samples in the Inner Murchison Bay, 2013



(MWE, 2013)

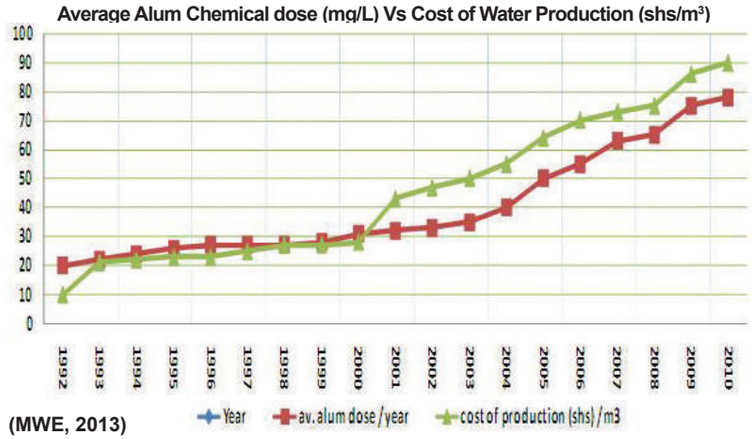
Concentration of mercury found in fish tissue samples in the Inner Murchison Bay, 2013



(MWE, 2013)

The intake point of the drinking water supply system for Kampala is located in Gaba, which is only 4km from where the Nakivubo channel discharges into Lake Victoria. This decline in water quality has implications on human health and on the economy as maintaining the quality of water has required ever increasing chemical inputs into the water treatment plants at Gaba with cost implications.

Incrteased Cost of Production: Water Treatment Chemical (alum) - Gaba Water Works (1992 - 2010)



(MWE, 2013)

Recommendations

Urgently implement the strategy for the protection of the Nakivubo and other wetlands.

Develop and implement a pollution control strategy for the entire Inner Murchison Bay area.

Strictly enforce pollution control activities and monitor conditions of the approved EIAs issued to investors in the area.

Address the negative impacts of large-scale infrastructure projects that have had significant negative impacts on wetland quality and function such as the Nakivubo Channel project which was designed to improve storm water drainage and flood management through channelization, but has instead increased the rate of water flow and disrupted the hydrology of the wetlands (World Bank, 2015).

Implement a comprehensive piped sewerage network and adequate wastewater treatment to reduce the discharge of improperly or untreated effluent into the IMB.

Chapter 3

KAMPALA CITY

For the most part Kampala city is almost completely surrounded by Wakiso district to the west and shares a small border with Mukono district on the west. The city has an area of 197 km^2 and wetlands cover 8.3 percent of this (UBOS, 2013). The area of wetlands has been changing with the fluctuation in the level of the lake (about 2.5 m) over the last century. But it is also changing because it is being reclaimed for agriculture, settlements and industrial developments.

Wetlands in Kampala belong to one of two systems: the River Kafu system or Lake Victoria system. The most critical wetlands are Nakivubo (5.29 km^2), Kansanga (4.54 km^2), Kinawataka (1.5 km^2) and Kyetinda (1.43 km^2). These all drain into Lake Victoria.

A degraded wetland: Kinawataka wetland

This is a very important wetland running along the boundary between Nakawa division and Kira Town Council and is drained by 5 rivers.

The problem

The Kinawataka wetland lies within the Industrial Area gazetted in 1972 by the Kampala City Council and it is a victim of a disastrous government policy that allocated wetlands for industrial development. The entire wetland has been sub-divided into plots and planned with road networks. Developments within the area have increased concretised surfaces reducing the retention capacity and infiltration rates of the wetland affecting the normal flow pattern of the rivers.

In-filling of murram in Nakivubo wetland.

The government has failed to implement appropriate measures to mitigate the situation. For instance, the physical plan of the area hardly provides for drainage. Indeed, there is barely any space left for construction of storm water channels and the removal of vegetation impacts of the storm water run-off characteristics of the area reducing the infiltration and retention capacity to almost nil. Even where government-led development has gone ahead, the infrastructure installed is inappropriate. For instance, the culverts installed at the Ntinda-Kyambogo crossroads are too small to deal

with the volumes of stormwater during the rains. And the damaged wetland can no longer perform their flood-attenuation function leading to excessive flooding in the area.

Impacts

The impacts have predominantly increased flooding in the area caused by impeded streamflow that has resulted in backflow that has raised the level of the river. Flash floods are common and the situation is getting worse.

Flooding at the Kyambogo-Jinja road junction leads to massive traffic jams and lost income. Pedestrians have to pay to be carried across the roads while drivers experience losses in terms of time and fuel spent idling in traffic.

A section of the flooded Miami Beach at Port Bell, Luzira

If 1 hour is spent in traffic daily, (at an average of 1.2l/hr in fuel spent idling (Quora, 2016)) at current costs each motorist will spend Ug.Shs 3,600 per day. If about 3,000 motorists use this road, this translates into daily losses of at least Ug.Shs 10.8 million.

Recommendations

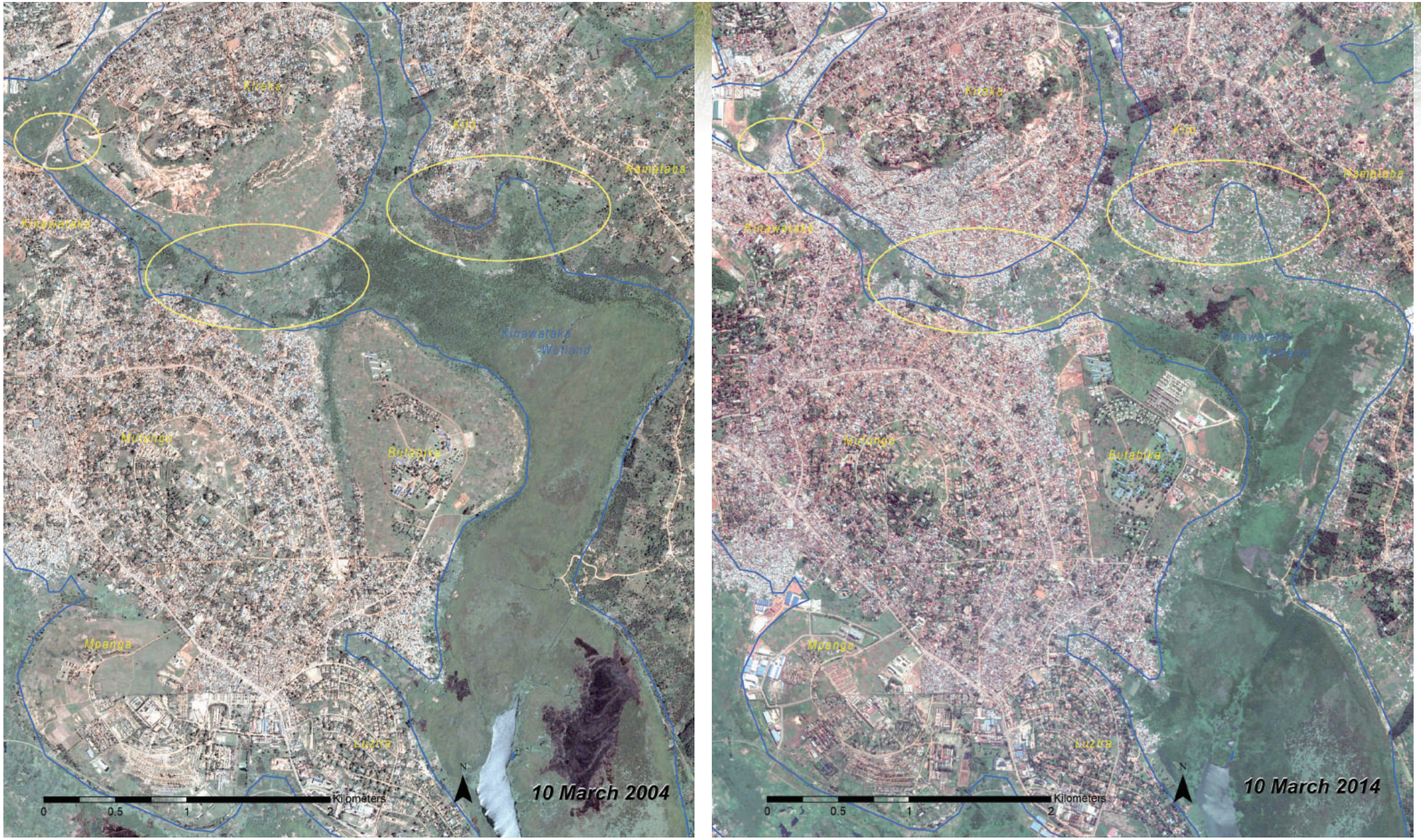
Gazette and restore the critical wetlands that support the drainage system of the city.

Re-plan the Industrial Area and ensure that expanded drainage channels are adequately catered for.

Land parcels in wetlands that are still intact need to be secured especially Kawoya wetland between Kireka and Banda hills, the wetland area below Hill Crescent road and Railway line, the wetland area below the sewerage lagoon at Namboole stadium, and the wetland area between Kasokoso and Butabika hospital in the Inner Murchison Bay.

Develop more green parks integrated with ecotourism, recreation and sustainable urban drainage systems (SUDs) (KCCA, 2015).

Flooding at Kinawataka Washing Bay



Kinawataka wetland 2004 and 2014

Chapter 4 WETLANDS IN MUKONO DISTRICT

Mukono District is a high plain with altitude ranging from 1,099 to 1,300m above sea level. Some areas along the Ssezibwa river and Victoria Nile are as low as 760masl. Wetlands in this district occur around the rivers of Ssezibwa and the Nile and along the shores of Lakes Victoria and Kyoga. About 90 percent of the district drains northwards through the River Ssezibwa into Lake Kyoga. The hilly terrain means that the wetlands become attractive for the flat terrain that they offer.

There are a number of protected areas such as forest reserves in this district and the wetlands that occur therein have largely been protected. These include Mabira, Kifu, Namyoya and Zirimiti.

A threatened wetland: Namanve wetland

Namanve wetland is located in Nama subcounty in Mukono district. The Namanve Forest Reserve used to cover an area of about 2,018 ha and a third of this formed the Namanve wetland stretching all the way from Lake Victoria. In 1928 government established a Eucalyptus plantation with drainage channels and later in 1997 part of the forest reserve was degazetted to provide land for an Industrial Park by the Uganda Investment Authority.

The Kampala Industrial Business Park (KIBP) at Namanve occupies an area of 894ha, 21 percent of which is wetland. It is one of 22 gazetted business parks around the country. It was designed by the Uganda Investment Authority as a central place where investors can locate factories, warehouses, distribution centers and other business offices.

Sezibwa Falls, a tourism attraction in Mukono District.

The problem

The location of the KIBP (so close to the Namanve wetland) is likely to have several negative impacts on the wetland including pollution from industrial effluent and other waste once the KIBP is fully functional; and encroachment from the increased population attracted to the area. Namanve wetland eventually flows into Lake Victoria which is the source of drinking water for the population. Excessive pollution could also lead to eutrophication and on the plus side, its proximity to Kampala is ideal for trade purposes and to attract skilled and unskilled labour to work.

Impacts

One of the conditions of the NEMA-approved Environment Impact Assessment was that the wetland in the business park be demarcated off and conserved for ecological purposes. An assessment in 2014 determined that most of the critical wetland and drainage areas in the business park had been zoned for development by UIA. This even led to the World Bank withdrawing from the project on environmental concerns.

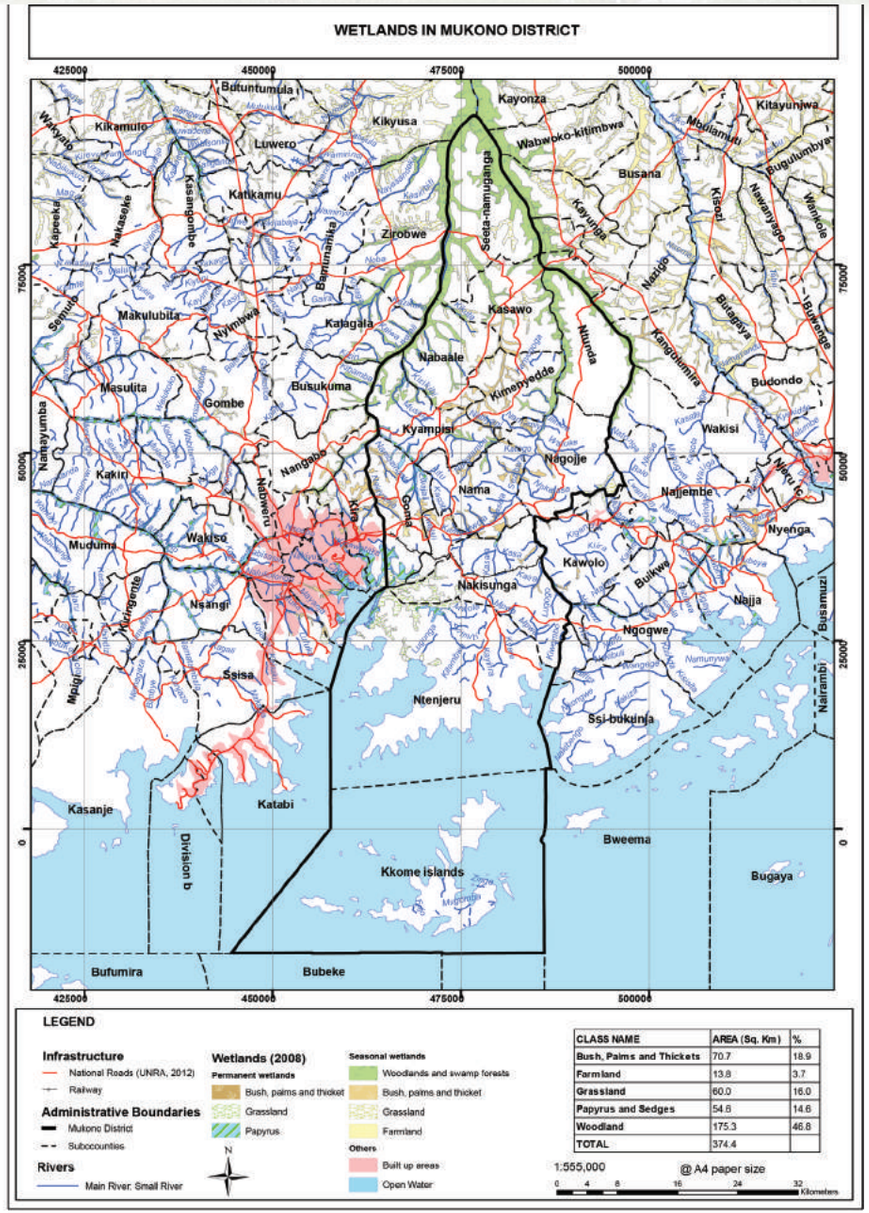
Recommendations

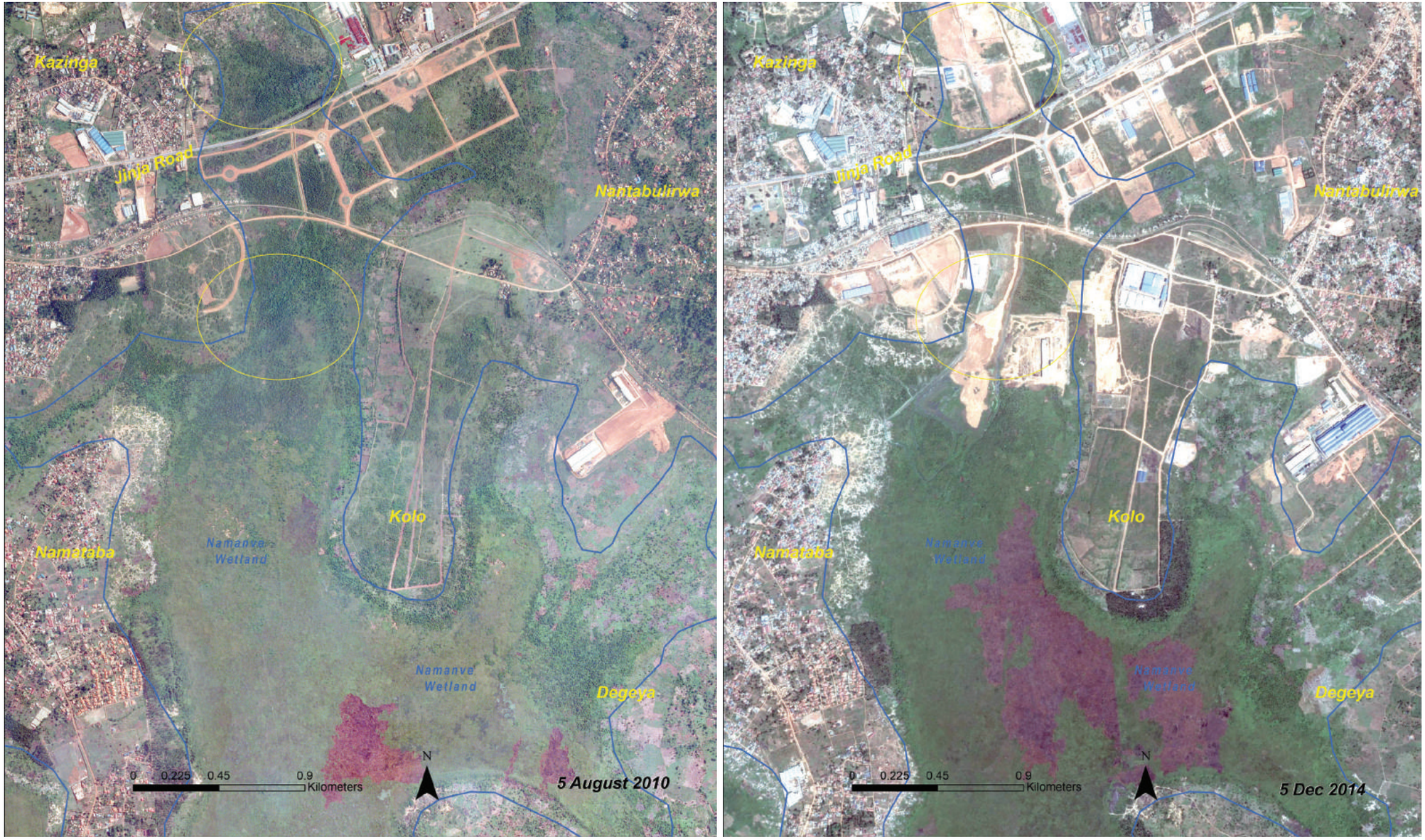
Enforce pollution control measures to cater for effluent, solid waste and any toxic or hazardous wastes that may be outputs from the functions of the KIBP. Water quality analysis should be carried out regularly at the outlet from River Namanve to Lake Victoria.

Improve management of the wetlands to ensure that UIA and other government institutions respect the fragile ecosystems.

Reinforce road and infrastructure construction within the KIBP to provide long lasting infrastructure that does not impede the flow of the wetland and has minimal impact on the wetlands and its functions.

Map of Wetlands in Mukono District





Namanve wetland 2010 and 2014

Carry out an EIA for each and every industry that is established in the KIBP; and closely monitor approval conditions.

Enforce the Cabinet Directive on Land titles in Wetlands of 2014.

The Cabinet directives on Land titles in wetlands

On 16th April 2014, the Cabinet of the Republic of Uganda under Minute No. 114 (CT 2014) while discussing Cabinet Paper No. CT (2012) 172 on the Cancellation of Land Titles in Wetlands as one of the measures to address the problem of wetlands degradation, directed as follows:

- That all titles in wetlands on public land acquired unlawfully (after 1995) should be cancelled;
- Land titles on critical ecosystems especially those within the 200m lakeshore protection zone should be regulated and that proprietors should be required to apply for and obtain Permits to undertake regulated activities as provided for in the law. In addition, the degraded wetlands whose ecological functions are recoverable, should be restored;
- The portions of wetlands on public land that had been reclaimed and converted for economic activities for public good and with approval from the Regulatory Authorities such as NEMA and KCCA, should be declared vanquished and the land titles issued therein should not be cancelled;
- Clear operational procedures for handling the cancellation of the land titles in wetlands on public land should be developed, and these procedures should be applied without discrimination;
- The Ministry of Land, Housing and Urban Development and NEMA, in consultation with Local Governments and the Police should take immediate steps to ensure that wetlands that are not yet degraded or encroached upon are fully protected and should produce a Wetland Atlas for the whole country; and,
- As soon as the Wetlands Atlas has been published, the Ministry of Land, Housing and Urban Development should commence cancellation of land titles issued after 1995, starting with those within Kampala.

Chapter 5

WETLANDS IN WAKISO DISTRICT

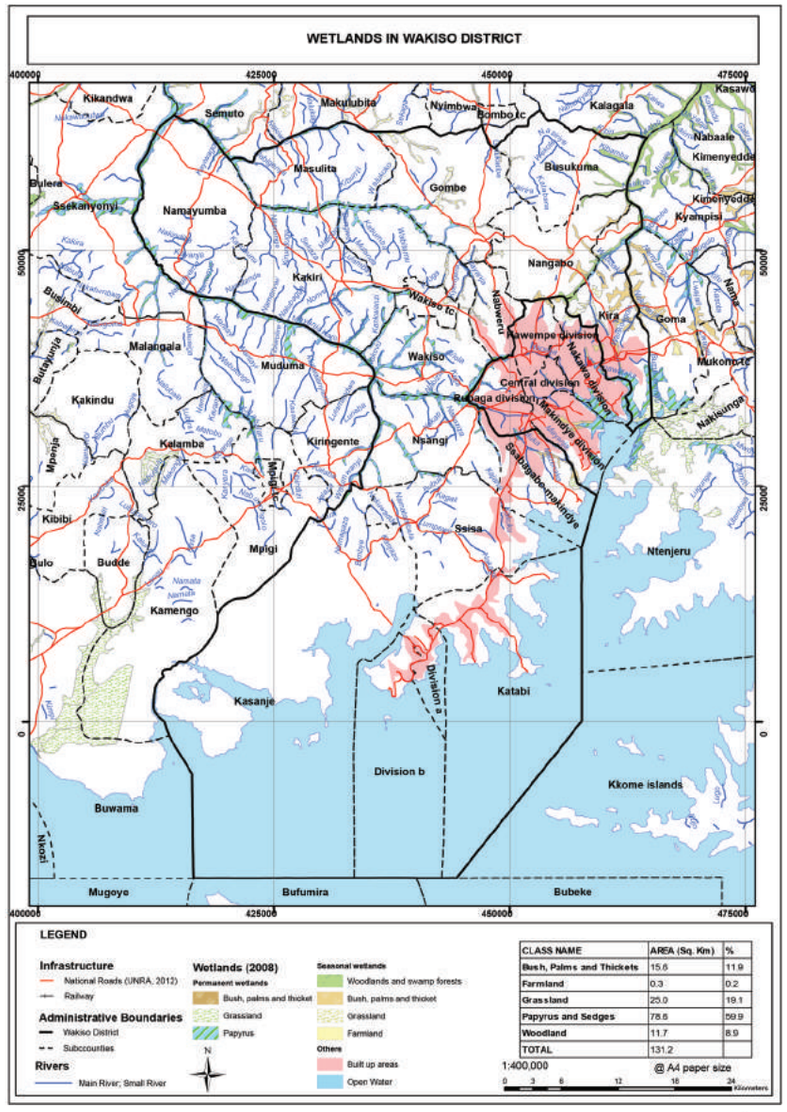
Wakiso is the most populous district in the country (UBOS, 2014) covering an area of 2,807.7 km^2 of which 8.6 percent is wetlands (UBOS, 2013). The district almost completely encircles Kampala city.; and many people from Kampala live in the peri-urban areas in Wakiso district such as Kajjansi, Kansagati, Kawanda, Kira, Kyengera, Maganjo and Nansana among others. Wetlands in this district belong either to the Lake Victoria or River Kafu systems.

The construction industry is a major driver of wetlands degradation with demand for sand and clay in the neighbouring urban areas putting pressure on wetlands. Most of these mining activities are not regulated and end up destroying the environment through deforestation and the large open pits in which stagnant water collects becoming a breeding site for mosquitoes and other disease vectors. Other threats come from settlements expansion and agricultural development including floriculture with associated intensive use of agro-chemicals.

A well-kept wetland: Lutembe Bay wetlands

These wetlands located in Busiro South County at the mouth of Murchison Bay on Lake Victoria cover an area of 1,769 ha. They are important for biodiversity conservation and to that end was gazetted as an Important Bird Area and a Ramsar Site. It is home for migrating birds from Europe, spawning ground for fish such as Lungfish and *Clarias,* supports neighbouring communities with water, sand and clay for building and is also important for wetland edge agriculture.

Map of wetlands in Wakiso District



The problem

An assessment in 2012, indicated that more than 90 percent of the wetland is in good condition (World Bank, 2015). However, despite its conservation status, this wetland faces threats especially from large investors (real estate developers, flower farms and industries) encroaching into the wetland. Other threats from mining, quarrying, extraction of water, pollution, commercial and settlement construction.

The danger with degrading these wetlands is the associated loss of important supporting and regulatory functions that they provide including shoreline stabilization, sedimentation and flood control and moderation and nutrient retention. This is especially important since the catchment has been degraded leading to increased run-off and soil erosion. Lutembe Bay wetlands are also important as habitat for migratory birds receiving the biggest share of all Palearctic birds in Africa due to the expansive wetlands.

Impacts

If unabated, the continued encroachment is likely to affect the ecology and hydrology of the wetland with impacts for biodiversity and the communities. Fencing off by developers restricts communities from accessing the wetlands for domestic water, fishing and other raw materials.

Migratory birds at Lutembe Bay

The presence of five large industrial greenhouse flower farms along the western edge of the wetland presents a threat from the agricultural chemicals used, extraction of water for irrigation and discharge of effluents (World Bank, 2015). Infilling with murram to create dry ground for construction of greenhouses has been intensifying. This will change the habitat for the aquatic birds. Tourism is said to contribute Ug.Shs 2,762 billion (4.3 percent of GDP) to the economy in 2014 and forecast to rise by 8.4 percent in 2015 (WTTC, 2015).

Recommendations

Subject all major developments around the Ramsar site to Environment Impact Assessment and Environment Audits.

Monitor all water abstraction permits and ensure adherence to the water abstraction regulations.

Monitor existing activities such as floriculture and estates development and compel industries to build waste water treatment plants to minimize damage from effluent discharge onto the wetlands.

Sand mining within Mabamba Ramsar Site

Bibliography

ARCOS. (Undated). *Wetlands and Agriculture: Partners for Growth*. Kampala: Albertine Rift Conservaton Society (ARCOS).

Fuhrimann, S., Stalder, M., Winkler, M. S., Niwagaba, C. B., Babu, M., Masaba, G., . . . Cissé, C. (2015). Microbial and chemical contamination of water, sediment and soil in the Nakivubo wetland area in Kampala, Uganda. *Environmental Monitoring and AssessmenTt*, 187(7), 475. doi:http://doi.org/10.1007/s10661-015-4689-x

Kakuru, W., Turyahabwe, N., & Mugisha , J. (2013). Total Economic Value of Wetlands Products and Services in Uganda. *The Scientific World Journal, 2013* (Article ID 192656). doi:http://dx.doi.org/10.1155/2013/192656

KCCA. (2015). *Strategic Plan 2014/15-2018/19: Laying the Foundation for Kampala City Transformation.* Kampala: Kampala Capital City Authortiy (KCCA).

Lwasa, S. (2005). Adapting Urban Areas in Africa to Climate change: The Case of Kampala. Current Opinion in Environmental Sustainability. *Science Direct, 2,* 166-171.

MWE. (2011). *Water and Environment Sector Performance Review 2011.* Kampala: Ministry of Water and Environment (MWE).

MWE. (2013). *National Water Resources Assessment 2013.* Kampala: Ministry of Water and Environment (MWE).

MWE. (2013). *Water Quality Assessment Report 2013*. Kampala: Directorate of Water Resources Management, Ministry of Water and Environment (MWE).

MWE. (2014). *Water and Environment Sector Performance Report 2014*. Kampala: Ministry of Water and Environment (MWE).

NFA. (2008). *National Biomass Study.* Kampala: National Forest Authority (NFA).

Nyakaana, J. B. (Undated). *Population, Urban Development and the Environment in Uganda: The Case of Kampala City and its Environs*. Kampala: Geography Department, Makerere University.

Quora. (2016, October 22). Retrieved from Cars and Automobiles: https://www.quora.com/How-much-gas-does-a-car-burn-per-hour-while-idling

UBOS. (2013). *Statistical Abstract 2013*. Kampala: Uganda Bureau of Statistics (UBOS).

This publication has been driven by the need to address the rising concerns about the impact of human activities on wetlands in Uganda, particularly those around the Kampala metropolitan area. The visual portrayal is clustered into five major themes: an introductory overview of wetlands management, institutional, policy and legal framework for general awareness of issue in the wetlands of Uganda and the Kampala metropolitan area; a brief overview of major wetland systems in the study area comprised of Kampala City, Mukono and Wakiso Districts; a general description of the drivers of wetland changes, with detailed analysis for selected hotspots in Kampala, Wakiso and Mukono; wetland pressures, impacts, constraints and opportunities; and strategies for ensuring the wise use of these vital but fragile ecosystems.

With up-to-date maps, recent and historical satellite images, ground photographs, data tables, graphs and compelling storylines, the Wetlands Atlas provides a vivid depiction of the state of Uganda's major urban and peri-urban wetlands. It is envisaged that this Atlas will serve as an important reference tool for policy makers, legislators, corporate bodies, environmentalists, educators, students and the general public.