



UGANDA WETLANDS ATLAS

Volume One

Kampala City, Mukono and Wakiso Districts



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Preface



Kampala City, Wakiso and Mukono districts are located on the northern fringes of Lake Victoria making wetlands a dominant feature in the city and the two districts. Wetlands provide some of the most critical ecosystem services to the majority of people in these areas, and are therefore central to the social and economic stability of this very productive region of the country. They are therefore crucial for the attainment of the Millennium Development Goals (MDGs) and the national Vision 2040 goals. They will also have an important part to play in

placing the country firmly on the path to achieve the Sustainable Development Goals. Despite the critical functions the wetlands provide, they have however been subjected to severe pressure and degradation, with unpleasant consequences.

Volume 1 of Uganda Wetlands Atlas, covering Kampala City, Wakiso and Mukono provides visual evidence of the extent and severity of the changes taking place in the urban and peri-urban wetlands spanning a period of ten years, mostly occasioned by urban expansion and unregulated activities. The Atlas is the first major publication depicting the dynamics in Uganda's wetlands using satellite imagery. The site-specific, side-by-side display of "before and after" satellite images show different kinds of changes in the major wetland systems in the three administrative areas and also show how competing land use interests have contributed to the accelerated degradation being witnessed in the City and the two districts. Dramatic results such as disappearance of major wetland systems, diverted drainage, algal bloom in Lake Victoria and the impacts of climate change are some of the noticeable impacts. The satellite images and the story lines are supported by graphs, maps, and photographs to provide complete and compelling scientific evidence. It is important to note that the different sites highlighted by the change pairs in this volume focuses on the major hotspots and serve to illustrate the huge problem facing the management of urban and peri-urban wetlands, and the urgency with which this problem has to be handled with full cooperation of the general public for the national good.

The visual story told by these images should spur action among all decision makers in the country and trigger concerted remedial action at all governance levels to protect this national treasures. The Atlas, among others;

- provides scientific evidence of environmental change in the wetlands of Kampala City, Wakiso and Mukono districts and raises decision-makers' awareness about its causes and effects;
- depicts the links between wetland ecosystems integrity and policy implementation by showing where and when problems in compliance enforcement resulted in accelerated degradation;
- provides resource materials for educational purposes and points to critical areas for research focus.

Volume 1 of Uganda Wetlands Atlas is therefore a very valuable resource for all who have an interest in the sustainable management and conservation of wetlands in the City and the two districts to enhance economic development and human well-being.

The production of Volume 1 of Uganda Wetlands Atlas is the result of collaboration among many partners with the Government of Uganda. I would like to express the gratitude of the Government of Uganda to our partners in this process, especially the United Nations System in Uganda, including United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP).

Support from the United States Government through its technical agencies, particularly United States Geological Surveys/Earth Resources Observation and Science (USGS/EROS), not only made the availability and analysis of satellite data possible but also made capacity building of our national experts possible. I am confident that this Volume will provide a solid foundation for government to take decisive action to secure critical wetlands in Kampala City and the surrounding districts of Wakiso and Mukono.

A handwritten signature in black ink, appearing to read 'David O. O. Obong'.

Mr. David O. O. Obong

Permanent Secretary, Ministry of
Water and Environment

Foreword

Government is required by the Constitution of the Republic of Uganda to take all possible measures to protect and preserve the environment from abuse, pollution and degradation for the needs of the present and future generations.

In this regard, Government has embarked on a long term strategy to recover and protect critical wetlands across the country starting with Kampala City and the districts of Wakiso and Mukono.

Wetlands located in Kampala City and the districts of Wakiso and Mukono are very important ecosystems which provide the much needed services that are vital to the well-being of communities living in these areas. For hundreds of years they have played a major role of controlling floods, biodiversity conservation and removing pollutants from runoff from exposed and other surfaces through filtration before the water enters Lake Victoria. The integrity of the lake's water and health of people living in Kampala City and along the lake are to a large extent sustained by the wetlands. During the dry seasons, wetlands in Mukono and Wakiso support production of vegetables and other quick maturing crops at their edges for household consumption and to supplement household incomes. Despite their importance, these wetlands have been subjected to severe pressure and rapid degradation occasioned by the urban nature that characterises the three districts. The result has been detrimental and even catastrophic, with many areas of Kampala City experiencing severe flooding causing untold damage to property and infrastructure.

The water quality of the Lake Victoria in the Inner Murchison Bay has also been severely compromised, with some sections of the bay, particularly behind the Uganda Prisons Facility at Luzira, becoming a "dead zone" emitting a foul smell from an accumulated sludge in the water. This sludge also upwells during the dry season and releases methane gas. This phenomenon, if not checked, will be compounded by climate change and the increasing frequency of extreme weather events. The city's water supply is also under serious jeopardy, with treatment costs escalating every wet season and algal blooms forcing frequent shut downs to clean up the water filters. This has now become a frequent event and the resulting shock has implications to the country's national economy as it is increasingly becoming a destabilizing factor to sustained economic growth.

It is therefore apparent that the attainment of the Uganda Vision 2040 goals in part hinges on how well the country manages these urban and peri-urban wetlands. Government is mindful of the opportunities lost through wetland degradation and has embarked on a long term strategy to recover and protect critical wetlands in the three districts. This strategy will, however, only be effective if all Ugandans appreciate the government's efforts through valuing the services rendered by wetlands. In this regard it is imperative that the public has access to

reliable and up to date information on the dynamics playing out in wetland ecosystems, their value to the economic development of the country, and their importance in sustaining livelihoods in the urban and peri-urban districts where few individuals are selfishly undermining the common good of these ecosystems through illegal reclamation. This information is best appreciated when presented in a manner that is clear, visual and easily understood by those who depend on wetlands for their livelihoods in a variety of ways.



The Ministry of Water and Environment is therefore very pleased to release Volume I of Uganda Wetlands Atlas which highlights the challenges and opportunities of wetlands management in Kampala City, Mukono and Wakiso districts. This publication provides decision makers, and the general public with invaluable visual information about the state of wetlands resources in these areas using satellite images, maps, graphics, ground photographs, and scientifically evidence-based story lines to provide a succinct account of what is happening to various wetlands in these areas. It also identifies a number of actions that need to be immediately taken to secure the critical wetland systems.

The Ministry is grateful for the generous support the UN System in Uganda has continued to extend to the environment sector in Uganda. I would like to recognize all the national and international experts, national institutions and development partners whose contribution has made this important publication possible. It is my sincere hope that this publication will inspire every one into action to restore and conserve the wetlands of Kampala, Mukono and Wakiso for the continued and sustained prosperity of the city and the neighbouring districts.

A handwritten signature in black ink, appearing to read 'Ephraim Kamuntu'. The signature is fluid and cursive, written on a light-colored background.

Prof. Ephraim Kamuntu
Minister of Water and Environment



OVERVIEW OF WETLANDS

INTRODUCTION

Defining wetlands

Wetlands can be defined as the transitional ecosystem that exist between terrestrial and aquatic systems (Figure 1:1). They form the interlinkages between the land and water ecosystems, which are so typically different and yet so highly dependent on each other (Mitsch and Gosselink 1986).

The definition of wetlands found in the Ramsar Convention underpins most descriptions of wetlands. This Convention defines wetlands as “*areas of marsh, fen, peatland or water, 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*” (Ramsar 1971). Uganda ratified the Ramsar Convention in 1988 and it has since been localised and integrated into national laws such as the National Environment Act which was enacted in 1995.

Uganda’s definition of wetlands is provided by the National Environment Act Cap 153 which classifies a wetland as an area that contains water either permanently or seasonally and which are able to support living organisms used to living in such flood-prone conditions (GOU 1995).

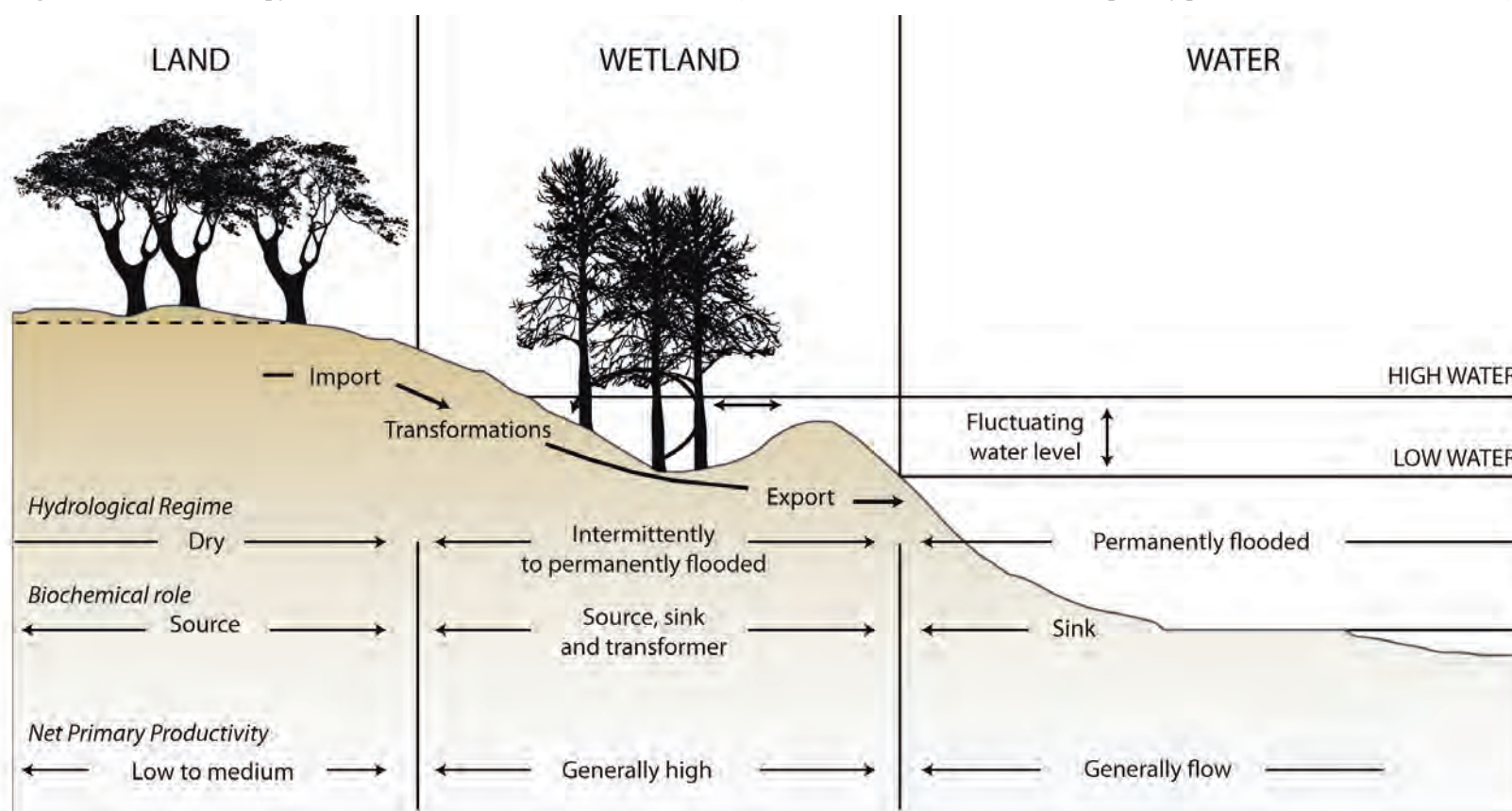
Key messages

The coverage of wetlands in Uganda is in decline. In 2008 wetlands covered approximately 10.9% (26,308 km²) of the country’s land surface area compared to 15.6% (37,575 km²) in 1994.

Wetlands provide a variety of goods, services and attributes at different levels contributing to the national economy and to local needs. These benefits constitute considerable ecological, social and economic value, which may be lost when wetlands are degraded.

Wetlands can only fulfil their ecological, social and economic contributions 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.

Figure 1.1: Wetlands occupy the transitional zone between land and water (after Mitsch and Gosselink, 1986; adapted by permission of John Wiley & Sons).





Green Backed Heron

Chris E Moore / Flickr / CC BY-NC 2.0

CHARACTERISTICS OF WETLANDS

Wetlands are dynamic ecosystems continually changing over space and time and this is borne out by the diverse array of definitions that exist. However, to qualify as wetlands, three things must be present: hydric soils, hydrophytic or flood-adapted vegetation and these must both exist in an environment that is sufficiently wet. These are described in the sections that follow.

Wetlands soils

Hydric soils are defined as soils formed under water logged conditions that are able to support the growth and regeneration of hydrophytic vegetation. During the vegetative season, the soil must remain waterlogged long enough to allow for anaerobic conditions to develop in the upper part of the soil (NRCS 2012).

The shoreline of the study area is fringed with reddish brown sandy loams. Kampala is almost entirely covered with black red sandy clay loams with small tendrils of grey humose clays in the western and northern parts. Wakiso and Mukono have more varied soil types scattered throughout the districts as shown in Figure 1.2. The sands and clays are popular with the brick making and sand mining industries. Wetland soils have unique biological, chemical and physical properties; and vegetation cover has been known to impact the soils

types. Many of Uganda's wetlands have originally been covered by papyrus and are known to have peaty soils. An example is Nakivubo wetland whose soils are described in Box 1.1.

Hydrology

The main hydrological feature of wetlands is the presence of flooding; and this is driven mainly by precipitation. In permanent wetlands water remains above the land surface throughout the year; whereas in seasonal wetlands water covers the soil surface for only parts of the year and usually in the wet season. During the dry season, the water remains below the surface creating waterlogged conditions beneath the soil surface (NWP 2001).

Aquatic or hydrophytic plants

Wetland vegetation or hydrophytes are specially adapted to this type of environment. These include morphological adaptations (for example the presence of aerial root tips), physiological adaptations (such as anaerobic respiration to enable the plants withstand the absence of atmospheric oxygen) and reproductive adaptations (for instance viviparous seeds which germinate within the fruit) to specifically tolerate partial or complete inundations for short or prolonged periods of time (Tiner 2012).

Although many of the wetlands in Kampala and Wakiso have been converted by human activity, the unclaimed wetlands are covered by both wetland grasses and sedges. Common species include *Miscanthidium violaceum*, *Phragmites mauritianus* (Reeds), *Cyperus latifolius* (Papyrus) and *Typha australis* (Bulrushes). The wetlands with swamp forest are seasonal and contain mainly relics of *Phoenix* palms and other trees. The seasonal wetlands mostly have mixed wetland vegetation types that include sedges such as *Cyperus* sp. and wetland grasses such as *Echinochloa* sp (Barnyard grass), *Loudetia* sp (Russet grass), *Leersia* sp (Cut grass) and *Cynodon* sp (Couch grass) (WID 2000a, WID 2000b).

In Mukono, emergent reeds in the wetlands include Papyrus, *Miscanthus* (Elephant grass), *Cladium* (Saw sedge) and *Typha*. In the swamp forests *Phoenix* palms and *Marantachloa* are dominant, with scatterings of the palm species *Calamus* and *Raphia*. Dominant grasses include *Cyperus*, *Cynodon* and *Setaria*; while floating vegetation is characterised by *Nymphaea* (Water lilies) and *Pistia* species (Water cabbage) (WID 2000c).

Wetlands fauna

Apart from the wetlands flora, there is also a wide selection of fauna ranging from protozoa, invertebrates to small and large vertebrates. Together with the plants they combine to form an elaborate food web which ensures a thriving habitat. There is a high level of endemism in wetlands because the aquatic factor acts as a physical impediment to some species. For instance there are around 300 cichlid species thought to be endemic to the wetlands around Lake Victoria (WRI 2005). Sitatunga, Otter, Bushbuck and Wild pigs are common in Kampala's wetlands. Birds present include Cranes and Ducks. Catfish and Lung fish are common. In Mukono, common wetlands fauna include the Marsh mongoose, Sitatunga, Monitor lizards, Foxes, Monkey's, Antelopes, Lions, Rats and Snakes. Birds include Weaver birds, Herons, Hammerkops, Open bill stork, Sacred Ibis, Egrets and Crowned cranes; while fish include Nile perch, Tilapia, *Protopterus*, *Labeo* and *Bagrus* species.

Box 1.1: Clay soils characteristic of many wetlands in the country

Source: Kansime et al 1999, Nerima and Orikiran 2013

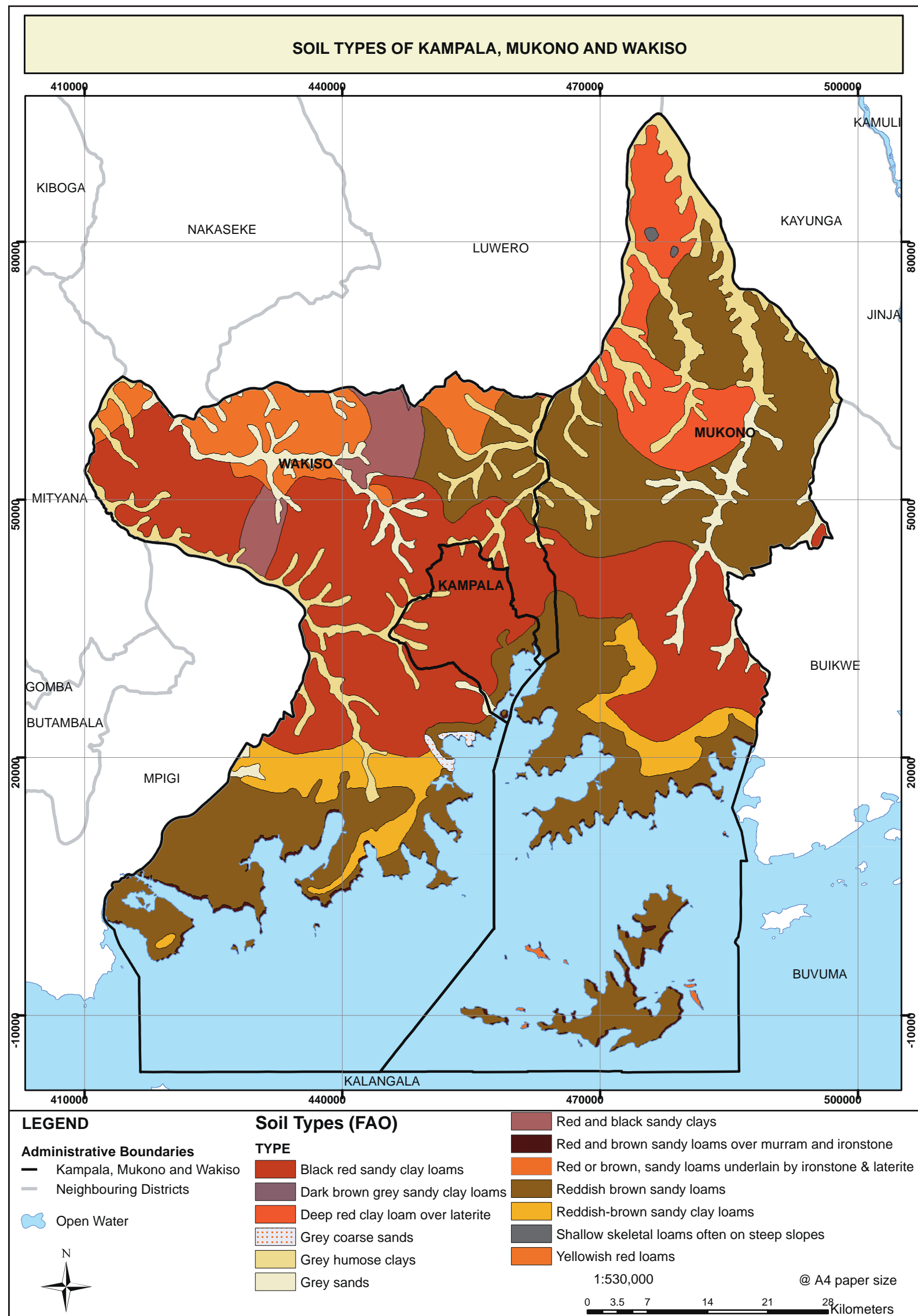
The soils of Nakivubo wetland are alluvial and lacustrine sands, silt and clays overlying granite gneisses. Resistivity studies indicate that the underlying soils consist of upto 30 m thick of impervious clays, implying the existence of a thick barrier that prevents the free mixing of ground and swamp water. In Nakivubo wetland, peat formation is very poor, possibly because of the effects of the flood regimes where by the materials are exported from the swamp into the lake.



Wetland soil

MWE

Figure 1.2: Soil types of Kampala, Mukono and Wakiso



WETLANDS IN UGANDA

Distribution and coverage

Wetlands are spread throughout Uganda as shown in Figure 1.3 and according to an assessment undertaken in 2008 they covered approximately 10.9% (26,308 km²) of the country's land surface area, down from 15.6% (37,575 km²) in 1994 (MWE 2012). There is urgent need, however for more up to date statistics on wetlands coverage.

Uganda's wetlands are defined by two hydro-periods or water regimes, namely seasonal and permanent. The hydro-period influences formation of different wetland types and diversity. The changes in wetlands area coverage for 1994 and 2008 are given in Table 1.1 while Table 1.2 shows the changes in wetland landcover classes between 1994 and 2008.

Table 1.1: Wetlands coverage by water regime in Uganda

Class	1994 Area (Sq Km)	2008 Area (Sq Km)	% of Surface area 1994	% of Surface area 2008	Loss (Sq Km)
Permanent	10390.9	5867.1	4.3	2.4	4523.8
Seasonal	27184.5	20440.7	11.3	8.5	6743.9
Total	37575.4	26307.7	15.6	10.9	11267.7

WMD 2008

Wetlands in Kampala, Mukono and Wakiso

The area of focus for this Atlas are the wetlands in the two districts of Wakiso and Mukono and those in Kampala City. Wakiso and Mukono districts and Kampala City are located along the shores of Lake Victoria in Central Uganda. As a unit, the area of focus is bordered by the districts of Mpigi to the west, Mityana to the northwest, Nakaseke and Luwero to the north, Buikwe to the east, Kayunga to the northeast and Kalangala district (Ssesse Islands) to the south as shown in Figure 1.4. Their climate is influenced by the moisture that rises from Lake Victoria; hence receiving high rainfall in excess of 1,200 mm annually. Although Wakiso and Mukono Districts and Kampala City neighbour Lake Victoria, most of their drainage flows northwards to River Kafu and Lake Kyoga. Only a few river systems drain into Lake Victoria such as Nakivubo, Kinawataka, Lufuka-Kaliddubi and Kyetinda. The remaining wetlands in the City are formed along these river systems.

Table 1.2: Wetlands coverage by landcover class

Class	Area 1994 (Sq Km)	Area 2008 (Sq Km)	Loss (Sq Km)	% loss
Woodland	5932.3	4598.1	1334.2	22.5
Palms and thickets	1149.1	609.6	539.5	47.0
Grassland	20793.3	15745.3	5048.0	24.3
Sedges	232.8	7.7	225.1	96.7
Papyrus	6403.8	3607.7	2796.1	43.7
Floating vegetation	309.6	1.2	308.4	99.6
Farmland (converted)	2754.4	1738.2	1016.2	36.9
Totals	37575.4	26307.7	11267.7	30.0

WMD 2008

Missud / Flickr / CC BY-NC-ND 2.0



The Sitatunga or Marshbuck is one of the rare animals found in wetlands

Figure 1.3: Wetlands of Uganda - 2008 Mapping





Figure 1.4: Location of Kampala, Mukono and Wakiso in Uganda

Wetland benefits

Wetlands provide a variety of goods, services and attributes at different levels contributing to the national economy and to local needs. These benefits constitute considerable ecological, social and economic value, which may be lost when wetlands are degraded (Figure 1.5).

The array of ecological functions performed by wetlands is quite extensive. They include water purification services, maintenance of the water table, flood control, shoreline stabilisation and habitat for plants and animals among others. Kakuru and others (2013) estimate that the flood control function provided by Uganda's wetlands is valued at about US\$ 1.7 billion per ha per year while water regulation and recharge is estimated at US\$ 7 million per ha per year.

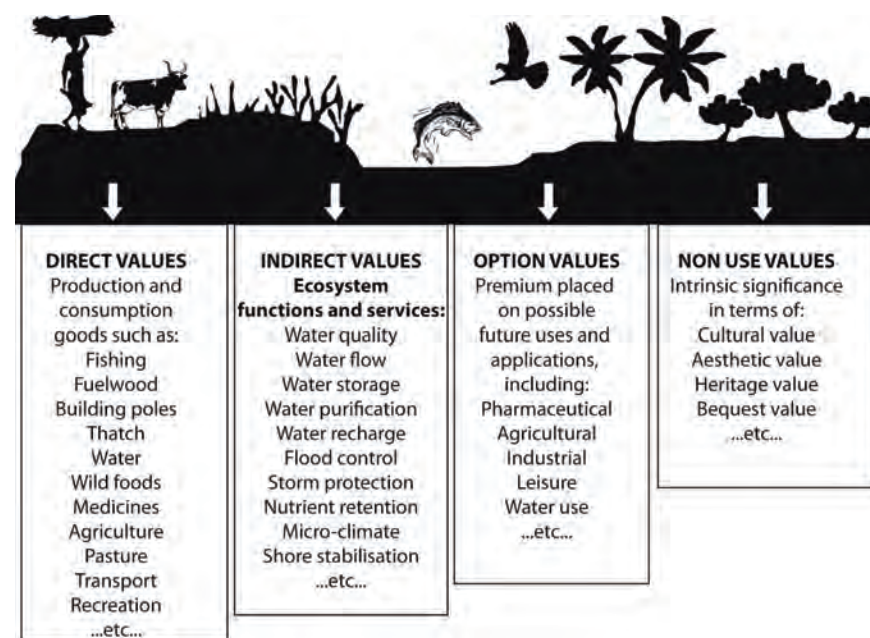
The socio-economic benefits of wetland are quite well documented as they translate into a wide range of tangible products, which are used locally or traded throughout the country. Ugandans interface with wetlands on a regular basis and the resources in the natural wetlands contribute directly and significantly to their wellbeing. Some of these include dry season pasture and agriculture, raw materials for handicrafts, medicinal plants, water for domestic and livestock uses among others. In economic terms, the value of Uganda's wetlands for livestock pastures is about US\$ 4.24 million and for domestic water use estimated at US\$ 34 million year (Kakuru and others 2013). Access to safe drinking water coverage in rural areas in Uganda is estimated at 69.5% consequently wetlands are crucial in the provision of water to the riparian communities especially during the dry season (UBOS 2014).

Threats to wetlands

The rise in human population and the subsequent demand for more resources to sustain incomes means that wetlands are now under pressure both in rural and urban areas. In the urban areas, such as Kampala, despite designation as green corridors, wetlands are increasingly being used for infrastructure development. In the rural areas, small but continuous 'nibbling' at wetland edges has reduced the wetland area somewhat, although this is mainly restricted to the seasonal wetlands. The damage to permanent wetlands in the rural areas is probably still limited. Here the inaccessibility and the lack of drainage technology have protected these systems from encroachment and wholesale drainage.

Encroachment onto wetlands has many effects. Changes to the water regime, water quality and the micro-climate can occur with ensuing impacts on the availability of wetlands resources, crop production and public health. For example, in areas where widespread conversion of wetlands to agriculture has

Figure 1.5: Wetlands benefits



Source: Adapted from Emerton 2001

taken place, the yields are not usually sustained as originally thought and may thus have impacts on food security. In other instances, traditional dry-season grazing has been affected in the long term. In urban and peri-urban areas, it is not uncommon for extensive flooding to occur due to indirectly tampering with the hydrological functions of the wetlands.

Wetlands can only fulfill their ecological, social and economic contributions if they are healthy. For example, 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.

The activities that threaten the viability of the wetlands in the study area are taking place within a weak law enforcement environment. The situation is further compounded by a limited understanding of how wetlands work, what the immediate and long term impacts of wetlands modifications may be and the potential loss in economic value of wetlands as compared to the economic benefits of major developments. Wetlands do have the capacity to regenerate, however they are not indestructible. We still have to do our part to protect them. The subsequent chapters will highlight in greater detail some of the threats that are facing wetlands.

Photo: MWE



Urban encroachment into wetlands



Crested cranes

MWE

WETLANDS MANAGEMENT IN UGANDA

Guiding principles

Mission and vision for wetlands management

The mission of wetlands management in Uganda is “**to ensure the conservation, wise use and protection of wetlands in the country through increased appreciation and effective management, as a means to achieving sustainable development**”. The vision is to “**provide sustainable benefits to the population of Uganda and mankind in general and contribute to environment protection**”.

The vision and mission emphasise the parallel and complementary concepts of conservation and use. Wetlands must be conserved if they are to continue to provide goods and services of value to the riparian communities and the wider world. They can be used, and must of course be used if their value is to be fully realized. But, they should be used wisely. This fundamentally means sustainable use in line with conservation ideals.

The urgent need to alleviate the poverty of so many of its populace makes economic development a prime objective of the government. Every asset must be exploited to that end; and wetlands are no exception. If used wisely, wetlands will make a continued and sustainable contribution to economic development. To achieve wise use, balancing conservation and use so that a continued future stream of benefits is assured, four guiding principles need to be followed as indicated in Table 1.3 below.

Table 1.3: Guiding principles for the wise use of Uganda’s wetlands

Guiding principles	Implications for wetlands management
1. The hydrological and ecological integrity of the wetland ecosystem must be maintained	The Wetlands Policy advocates for sustainable use of wetlands implying that the wetlands can be used, but in such a way that the resources will be available for others to use in the short term or even after decades. This ‘wise use’ is possible as long as the main hydrological and other ecological processes that make it a wetland are not interfered with. Many of Uganda’s wetlands are resilient and can be utilized in this manner. There are a few, however where their unique or more fragile nature implies that either minimal or no modifications at all should occur if the wetlands ecological integrity is to be preserved.
2. Management must comply with larger ecosystem management objectives	Wetlands are not isolated ecological units. They are flowing systems interlinked to ecosystems within the country and in the region. For example research by Bugenyi and Balirwa (1998) indicates that the wetlands system in Uganda plays a significant role in the recharge of the River Nile and more broadly in the eco-hydrology of the basin. As such local and national utilization of wetlands must be sensitive to the wider conservation ideals and standards. So the scope of strategic management should encompass functionally defined hydrological units like catchments or river and lake basins.
3. Wetland management options must be supportive of the socio-economic objectives and aspirations of the people of Uganda.	The National Development Plan recognises that wetlands and their resources are central to national development supporting industrial development such as agriculture, tourism and associated cottage industries. Despite these assets, poverty is still widespread in the wetland adjacent communities thus poor people are often forced to overexploit the wetlands. So to address the issue of reducing poverty while allowing for sustainable livelihoods, the management options proposed by WMD are to improve on the range, quality and quantity of products derived from the wetlands; to add value to the wetlands goods and services; to ensure equitable distribution of wetlands resources to those with a valid claim to them and to avoid monopolies (and monoculture) by maintaining a diversity of uses and users. This will enhance the value and appreciation of wetland products and services, while increasing the competitiveness of wetland-derived goods on the market. In the long term, the conservation and management of wetlands will be effective only if rural communities appreciate the values of wetlands and have a stake in the utilisation of these resources. This way, they will have the incentive to protect and conserve the wetlands.
4. The precautionary principle should be applied whenever the impacts of management options are uncertain	The precautionary principle simply states that any action or policy that is undertaken should aim to avoid harm or destruction to the wetland ecosystems and to the communities. It basically advocates for prudence when utilizing the wetlands. Since wetlands use is widespread in Uganda, there are a variety of tried and tested methodologies. However as the pressures increase, it will be necessary to investigate different management options to find the best use-balance. Meanwhile, caution should be exercised especially in wetlands that have high value in terms of hydrology, habitat functions and biodiversity.

Institutional framework for wetlands management

The National Environment Management Authority (NEMA)

In Uganda, the National Environment Management Authority (NEMA) is the principal agency for the management of the environment including wetlands. NEMA is charged with the responsibility to coordinate, supervise and coordinate all aspects of the environment. However, implementation of wetlands activities lies with the Wetlands Management Department and Local Governments.

In fulfilling its mandate, NEMA works with Lead Agencies, Government departments and Local Governments as specified in the National Environment Act Cap 153 and the Local Government Act Cap 243. In addition, NEMA is empowered to gazette qualified and certified government officials as Environmental Inspectors to support implementation including in the areas of wetlands management. For instance a gazetted Environmental Inspector is empowered to stop any infringement on wetlands, issue an Environmental Improvement Notice and cause arrest and prosecution of any person or organization violating a wetland.

Wetlands Management Department

The Wetlands Management Department (WMD) in the Ministry of Water and Environment (MWE) is the core department charged with the responsibility to manage wetlands. In doing so the WMD assists the Local Governments and ministerial departments at the Centre to apply the National Policy for the Conservation and Management of Wetland Resources. In undertaking this mandate, WMD specifically undertakes the following:

- 1) Enhancing the knowledge base and increasing awareness of ecological processes and socio-economic values of wetlands amongst all stakeholders;
- 2) Developing and maintaining an appropriate institutional framework for wetland management at all levels;
- 3) Improving systems at all levels to plan, budget and implement wetlands management activities;
- 4) Developing and formulating appropriate policies, laws and standards to ensure compliance;
- 5) Identifying and protecting critical and vital wetlands to maintain their ecological integrity;
- 6) Mobilising resources for funding wetland management activities.

District Local Governments

The management of wetlands and other natural resources in Uganda is a decentralized function of Local Governments. The District Environment Committee is the sub-committee of the District Council that provides policy guidance on the management of wetlands. In undertaking this mandate, the Local Governments are supported by WMD and NEMA. The Local Governments also liaise with Civil Society Organizations to strengthen and accelerate community outreach. Each District Local Government has a District Environment Officer, who is the key technical person on environment and wetlands-related issues as stipulated in the National Environment Act Cap 153.

Policy mechanisms

The history of conservation through Protected Areas predates Uganda's colonial history. In the period preceding 1900, the country's biodiversity was protected through a system of customary rules and practices in the form of hunting

grounds, cultural and spiritual grounds. With the advent of colonisation, these hitherto community protected areas were transformed into Parks and Reserves and governed under various pieces of legislation. Box 1.2 outlines a historical review of legal, policy and institutional mechanisms for wetlands management.

Box 1.2: Historical review of legal, policy and institutional mechanisms for wetlands management

- 1902 Uganda Order in Council establishes land tenure and ownership
- 1954 Gibb study recommends drainage of wetlands for agriculture
- 1969 Public Lands Act adopted
- 1970s Reclamation and drainage encouraged
- 1975 Land Reform Decree declared all land as public land to be managed by Uganda Land Commission
- 1986 Government (stop gap) policy to stop large scale draining of wetlands
- 1988 Ramsar Convention entered into force in Uganda
- 1989 Establishment of the National Wetlands Conservation and Management Programme
- 1991 National Environment Action Plan Process
- 1994 National Environment Management Policy
- 1995 National Environment Management Act
- 1995 National Policy for the Conservation and Management of Wetlands
- 1995 New Constitution (that provided for protection of wetlands)
- 1997 Local Governments Act that gave districts authority to manage wetlands
- 1998 Wetlands Inspection Division started
- 1998 Wetlands included in Land Act (1998)
- 2000 National Environment (Wetlands, River Banks and Lake Shores Management) Regulations
- 2001 Wetlands Sector Strategic Plan 2001-2010 launched
- 2008 Wetlands Management Department created

Wetlands, at this time, were managed as common property under customary traditions and norms. This method of management was feasible at that time when the population was small and the resources were not under pressure from commercial forces. Later, a study carried out in 1955 recommended the draining of wetlands to allow for agriculture (Gibb 1955). This influenced a policy decision to permit the use of wetlands accordingly and it led to the drastic conversion of wetlands. Farmers acquired leaseholds, drained them and converted them into dairy and crop farms. This encroachment continued and spread throughout the country.

The large scale drainage of wetlands was banned in 1986 and the government set up the National Conservation and Management Programme in the Department of Environment Protection to analyze existing activities and assess the full range of functions and values provided by wetlands. In addition, the programme concurrently carried out a sensitization and awareness campaign and consultations to enlighten the public on the values and functions of wetlands and the need for their conservation and sustainable use. This was a landmark milestone in the conservation of this resource.

In 1995, Uganda became the first African country and only second country in the world (after Canada) to adopt a National Policy for the Conservation and Management of Wetland Resources. The policy has five goals, namely:

- 1) to establish the principles by which wetland resources can be optimally used now and in the future;
- 2) to end practices which reduce wetland productivity;
- 3) to maintain the biological diversity of natural or semi-natural wetlands;
- 4) to maintain wetland functions and values;
- 5) to integrate wetland concerns into the planning and decision making of other sectors.

Three principles apply in pursuit of these goals. The first is that wetland resources form an integral part of the environment and their management must be pursued in the context of sometimes conflicting conservation and national development strategies and activities. Secondly the conservation of wetlands can only be achieved through a coordinated and cooperative approach involving all the concerned stakeholders including local communities and organizations. Lastly, it is of vital importance that the present attitudes and perceptions of Ugandans towards wetlands be changed if wise use is to become a reality.

Despite these interventions, wetlands degradation has continued. Eventually in 2014, the Cabinet decided to implement sweeping interventions including the cancellation of Land Titles issued in the wetlands in an attempt to save them. The cabinet recommendations are highlighted in Box 1.3.

Box 1.3: 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:

- 1) That all titles in wetlands on public land acquired unlawfully (after 1995) should be cancelled;
- 2) Land Titles on critical ecosystems especially those within the 200 m 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;
- 3) 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;
- 4) 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;
- 5) 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.
- 6) 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.



Legal mechanisms

International laws

The Ramsar Convention

The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat is the overarching global environmental treaty guiding the management of wetlands. It was ratified in 1971 in Ramsar, Iran. It originated as a tool intended to protect migratory waterfowl. However over time, the

importance of wetlands ecosystems for ground water protection, regulation of the water cycle, water storage, water purification and habitat for fish and other organisms grew justifying the need for the wider focus for this convention (Matthews 1993).

The Ramsar Convention provides for a network of protected wetlands and encourages the wise use principle for their management. Some of the activities being undertaken in the study area under the Ramsar Convention are highlighted in Box 1.4.

Box 1.4: Ramsar Convention - Protecting wetlands in the study area

The study area hosts two Ramsar sites. These are Mabamba wetlands and Lutembe Bay wetlands, both in Wakiso district. Ramsar sites provide extra protection to the endangered animal and plant species which are important tourist attractions. Some of the conservation measures being undertaken for these two Ramsar sites include:

- development of a management plan for each of the wetland sites by the Wetland Management Department
- development of community action plans which will be used to update the existing management plans
- designation of Mabamba and Lutembe Bay wetlands as Important Bird and Biodiversity Areas
- development of a National Important Bird Area Strategy
- undertaking an assessment to evaluate the effectiveness of Ramsar site management at Mabamba bay
- assessing the Ecosystem Services of Lutembe Wetland Ramsar site through application of The Economics of Ecosystems and Biodiversity (TEEB).

Source: Ramsar Secretariat (2012)

Other international laws pertinent to wetlands management include the:

- 1) Convention on Biological Diversity (CBD)
- 2) Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention)
- 3) Agreement on the Conservation of African-Eurasian Migratory Water birds (also known as AEWA or African-Eurasian Water bird Agreement)
- 4) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- 5) Convention Concerning the Protection of the World Cultural and Natural Heritage
- 6) United Nations Convention to Combat Desertification (UNCCD)
- 7) United Nations Framework Convention on Climate Change (UNFCCC)
- 8) Kyoto Protocol to the United Nations Framework Convention on Climate Change

Regional laws

The African Convention on the Conservation of Nature and Natural Resources is a framework convention that provides a number of avenues for wetlands management. It provides for the management of wetlands through the conservation and integrated management of water catchment areas. It encourages the consultative management of transboundary water resources including wetlands through the setting up of inter-governmental bodies; and calls on countries to adopt science-based and indigenous conservation methodologies for wetlands management. At the same time, the Convention recognizes the need to take social and economic issues into consideration as wetlands must contribute to the wellbeing of the people and the nation at large.

Photo: Sanne Roemen / Flickr / CC BY-SA 2.0

The African Initiative for the Conservation of Migratory Water birds and their Habitats in Africa (the AEWA African Initiative) was established in 2009 and aims to support the implementation of the 1995 Agreement on the Conservation of African-Eurasian Migratory Water birds (AEWA) in Africa. One of its goals is to reverse the decline in populations of migratory water birds. The single species action plans are in place, but mainly covering intra-African migrants. In addition, general surveys such as annual waterfowl counts and wetland inventories are being undertaken. Single species research and monitoring is on-going especially for the Crested Cranes and Blue Swallows. Nature Uganda is working with the communities to involve them in monitoring the birds at Musamba islands Ramsar site.

The Nile Basin Wetlands Management Strategy. Wetlands in Uganda and in the study area in particular, are of paramount importance in the wider Nile River hydrological system and therefore proper management is imperative. For example, releases from Lake Victoria have great implications on the wetlands of the Sudd region in South Sudan and further up in Egypt. The Nile Basin Wetlands Management Strategy is premised on wise use with five strategic objectives. These include improving the knowledge base; increasing awareness on the importance of wetlands; developing a basin-wide approach for wetlands management; strengthening national policies and institutions; and improving financing for wetlands management (NBI 2013).

East African Community (EAC) Strategies for Wetlands Management. A number of tools are available at the East African regional level that present the opportunity for wise use of wetlands. These include the EAC Protocol on Environment and Natural Resources which in article 14 provides for sustainable wetlands management; and the strategic action plan for the Lake Victoria Basin Commission. Two development objectives of the Lake Victoria Basin Commission Strategic Action Plan (2011-2016) are relevant:

- harmonising approaches for sustainable management and development of natural resources in the Lake Victoria Basin
- promoting conservation and management of natural resources and biodiversity in and outside protected areas.

The Strategy for the Lake Victoria Basin aims to invest in the rehabilitation and restoration of degraded wetlands by integrating and harmonizing wetlands management with spatial planning and Integrated Water Resources Management (IWRM) approaches and promoting local methods and practices that reduce pressures on wetlands (LVBC 2007). The development of an integrated management plan for Lake Victoria Basin and the harmonization of supporting laws and regulations amongst the partner states would also ease current management challenges.

The EAC Regional Environment Impact Assessment Guidelines for Shared Ecosystems are an integral part of the EAC Protocol on Environment and Natural Resources and are used to help in the identification and application of environmentally sound approaches to manage and ensure the sustainability and biophysical integrity of the shared ecosystems within the East African region. Such guidelines are crucial for the proper conduct of impact assessment studies on shared ecosystems such as wetlands, fresh water, forests and protected areas.

National laws

The Constitution of Uganda of 1995 in its National Objectives and Directive Principles of State Policy, Objective XIII provides the foundation for the protection of natural resources in the country. It states that “the State shall protect important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda”. Objective XXVII (i) obliges the State to promote sustainable development by enhancing the public’s awareness of the need to manage land, air and water resources. Paragraph (ii) of that objective goes ahead to pronounce that the State shall take all possible measures to prevent or minimize damage and destruction to land, air and water resources resulting from pollution or other causes.

In Articles 39 and 41, every Ugandan citizen is obliged to maintain a clean environment; and to that end can bring action against any pollution or abuse of the environment. Chapter 3 Section 245 further provides that Parliament shall provide measures intended to protect and preserve the environment from abuse, pollution and degradation.

Article 237 (1) allows the citizens to own land according to the four land tenure systems identified in the Constitution, that is, customary, freehold, mailo and leasehold tenures. However, in Section 2, this article goes further to state that in spite of this, the Government (or Local Government) shall hold in trust and protect any rivers, natural lakes, wetlands, forest reserves, game reserves, national parks and any land put aside for ecological or touristic purposes for the good of the people.

Article 245 of the Constitution enables Parliament to make laws to protect and preserve the environment.

The Land Act Cap. 227 of 1998 lays down the control and operational measures for protection of wetlands, rivers, lakes and other fragile ecosystems. Under Section 43, Government or Local Government may acquire land in accordance with the provisions of Article 26 and Article 237 (2) of the Constitution.

MWE



Dense wetland vegetation, Kibale Island



A Shoebill wading in a marsh

sttijtjn / Flickr / CC BY-NC-ND 2.0

Section 44 of the Land Act reiterates Article 237(2) (b) of the Constitution, declaring natural resources as public trust resources. Furthermore, Section 44 (b) states that the Government or a Local Government shall not lease out or otherwise alienate any natural resource referred to in the section. Any issuance of a land title in a wetland or within the regulated lakeshores and river bank protection zones is, thus, illegal. The Commissioner for Land Registration is empowered to cancel any land titles issued in error, illegally or wrongfully under Section 36 of the Land (Amendment) Act No.1 of 2004. However, under Section 44 (5) of the Land Act of 1998, the Government or a Local Government may grant concessions, licenses or permits in respect of a natural resource including wetlands, as long as the law is followed.

The doctrine of public trust is enshrined in the laws to ensure that wetlands and other public resources are sustainably used and that prohibited, indiscriminate and uncontrolled encroachment on these resources is avoided. That is why Section 43 of the Land Act states that a person who owns land shall manage and utilize the land in accordance with the Forest Act; the Mining Act; the National Environment Act Cap 153; the Water Act; the Uganda Wildlife Act and any other relevant laws.

The National Environment Act Cap 153 and associated Regulations.

The National Environment Act Cap 153 of 1995 is the framework law on the environment. Section 3 protects the right to a healthy environment and obliges every person to maintain and enhance the natural environment around them. Although, Section 36 (1) of the Act allows for the controlled use of wetlands, the following activities are forbidden:

- i) the reclamation or drainage of wetlands
- ii) the assembly, construction or placement of any structure in a wetland
- iii) the disturbance of a wetland by drilling or tunnelling in a way that is likely to have unfavourable effects on the wetland
- iv) the dumping in, on or under any wetland of any substance that is likely to have adverse effects on the wetland
- v) the destruction, damage or disturbance of any wetland in such a way that may negatively affect any plants, animals or their habitats

- vi) the introduction of any poisonous or introduced plant or animal in a wetland, unless with the permission of NEMA and the concerned Lead Agency.

Under Section 36 (3) only certain traditional uses of wetlands can be exempted from the application of the prohibitions listed above. For further clarity, Section 37 of the Act requires the formulation of guidelines to help identify wetlands and to encourage their sustainable management.

The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, S.I No. 3/2000 were put in place specifically to protect wetlands from encroachment and to regulate activities in the wetlands and on riverbanks and lakeshores. Under these regulations:

- i) Wetlands resources are to be used sustainably in a way that would ensure the continued presence of the wetlands and their hydrological functions and services;
- ii) Environmental impact assessment as required under the Environment Act is mandatory for all activities in the wetlands, riverbanks and lakeshores;
- iii) Special measures are essential for protection of wetlands, lakeshores and riverbanks of international, national and local importance as ecological systems and habitat for fauna and flora species, and for cultural and aesthetic purposes, as well as for their hydrological functions and values for preventing soil erosion, siltation and water pollution;
- iv) Wise use of wetlands, lakeshore and riverbanks should form an integral part of all National and Local level plans and strategies; and measures put in place to enhance public information and awareness.
- v) Every landowner, occupier or user who is adjacent or contiguous with a lakeshore or wetlands area is responsible for preventing the degradation or destruction of these ecosystems. They also have a constitutional duty to maintain the ecological and other functions of the wetland.

The Second Schedule of these Regulations gives a list of regulated activities that require a permit granted by NEMA in consultation with the Lead Agencies.

These include brick making; cultivation; drainage; commercial exploitation of wetland resources; sewerage filtration; fishing using fish gear and weirs, fish farming and other aquaculture; construction of transport and communication facilities such as roads, railways, telephone lines; burning; recreation activities such as sport fishing, maintenance of green spaces; and any other exploitative activity which is of a commercial or trade nature, such as harvesting of papyrus for commercial purposes.

The major rivers in the country have been assigned a protection zone of 100 m calculated from the highest water mark. These include the Nile River, Aswa, Katonga, Nkusi, Kafu, Rwizi, Kagera, Mpanga, Manafwa, Mpologoma, Semliki, Kibuku, Mayanja, Sezibwa, Malaba, Sipi, Namatala, Sironko, Muzizi, and Nabuyonga. The highest water mark is the highest point in history towards the dryland where the water-land interface last occurred when there was heavy discharge of water. All other rivers not mentioned above have a protection zone of 30 m calculated from the highest watermark. All major lakes have a protection zone of 200 meters from the lowest water mark. These include Lakes Victoria, Kyoga, Albert, Edward, George, Bisina, Mburo, Bunyonyi, Kijanibarola, Kwania, Wamala, Mutanda, Murehe, Opeta, Nabugabo, Nkugute, Katunga, Nyabihoko, and Nakivale. The lowest water mark is the lowest point in history towards the lake where the water-land interface last occurred when there was drought and water tended to decrease. Any other lakes not listed above have protection zones of about 100 meters from the lowest water mark.

The rationale behind the setting of these regulated zones is based on the critical role they play in protecting the water resources as well as the larger catchment areas. The Environmental Impact Assessment Regulations, S.I No. 13/1998 require EIA to be carried out for any projects that are likely to have an impact on the environment.

CONCLUSION

Wetlands are important because they perform various provisioning, regulatory and cultural services that provide a multitude of benefits to individuals, communities and economies. Many of these services are directly essential for the wellbeing of the local communities adjacent to the wetlands and their rights to access these resources are recognized. However, in making the most of these wetland resources, it is important to exercise prudence.

The management of wetlands is not the endeavour of one institution alone; it can only be successful if undertaken as a concerted effort by all stakeholders. The differing stakeholders may have many conflicting interests, policies and mandates. However to achieve sustainable development the organizations need to think outside the box and mandates. Collaborative planning is required beyond the location level and should involve multiple sectors as wetlands degradation has far reaching implications. For instance wetlands degradation can affect the functions and costs of sectors through impacts on water quality, water treatment and road infrastructure, among others.

Community participation in wetlands management is also vital to reducing wetlands degradation. Information on the values of wetlands, including the economic values would help communities recognise the economic value of wetlands and put their efforts into sustainable management.

Lastly to support joined up policy and decision making it is important that the data foundation for wetlands is maintained, accessible and up-to-date. Wetlands statistics in Uganda need urgent attention.

Photo: MWE



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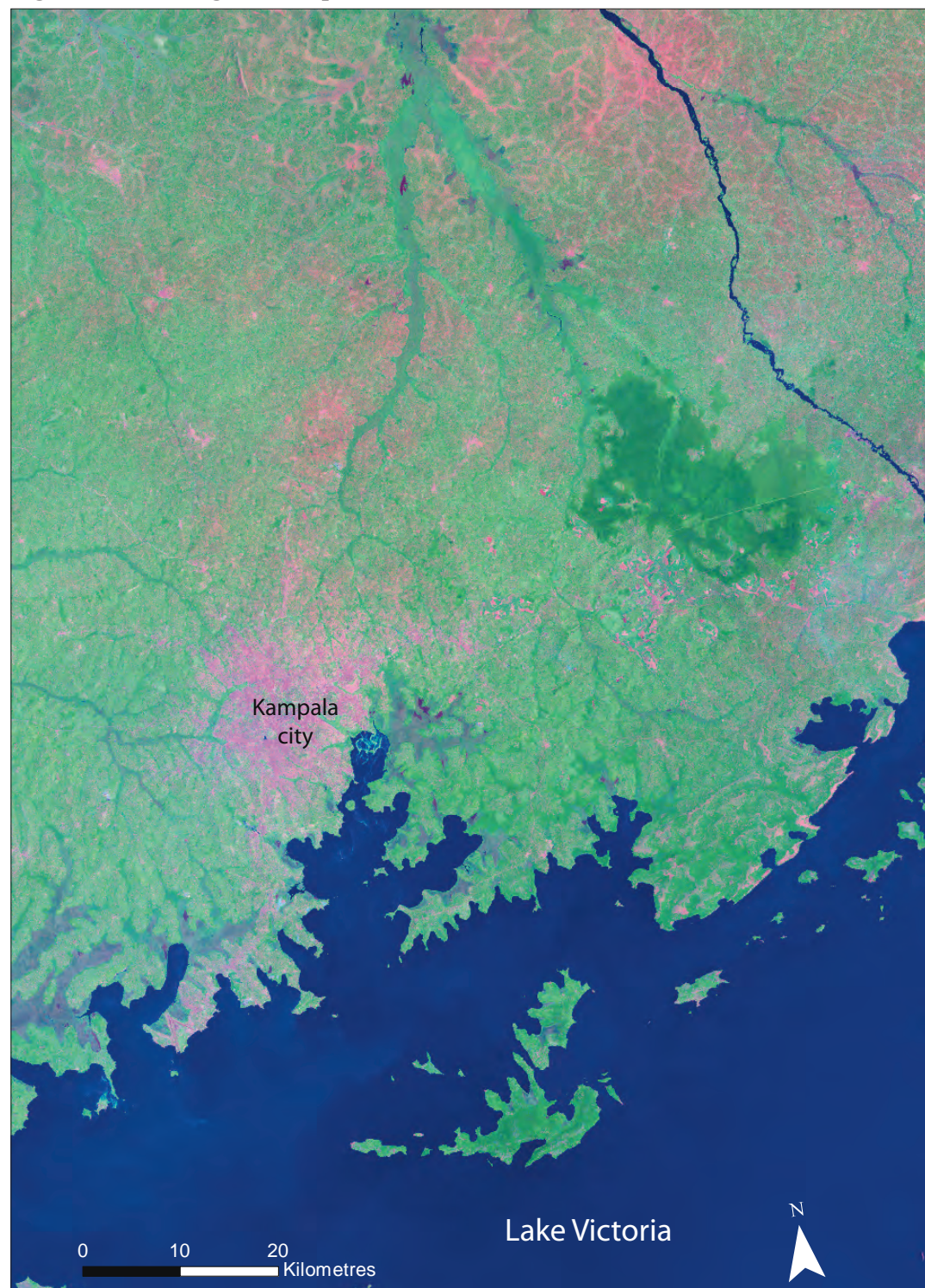


WETLAND SYSTEMS IN KAMPALA, MUKONO AND WAKISO

INTRODUCTION

Wetlands of the study area lie within the Lake Victoria and Victoria Nile Basins (Figure 2.1). In Kampala wetlands cover 8.3% of the total area; while those in Mukono and Wakiso are estimated to cover 2.0 and 8.6% of each district respectively (UBOS 2013). Although the estimated coverage seems small, these wetlands are indispensable to the well-being of people in the neighboring communities, providing critical ecosystem services as well as contributing to district and national

Figure 2.1: Drainage of Kampala, Wakiso and Mukono



Key messages

Wetlands cover 8.3% of Kampala City, 2% of Mukono District and 8.6% of Wakiso District.

Between 1995 and 2010, wetlands in Kampala, Mukono and Wakiso reduced by 14%.

The three largest wetland systems in Kampala are Kinawataka, Nakivubo and Lubigi.

Degradation of Nakivubo wetland has reduced its ability for water purification. This has resulted in algal blooms in the Inner Murchison Bay and a subsequent increase in water treatment costs for the National Water and Sewerage Corporation.

In 1997, part of Namanve Forest Reserve, including the wetland, was degazetted to form the Kampala Industrial Park in Nama subcounty, Mukono district.

Lutembe Bay wetlands and Mabamba Bay wetlands in Wakiso district are Ramsar sites.

Kasa Mabamba Wetland is habitat to more than 300 birds species including the globally threatened Shoebill, many palearctic migrants such as the Blue Swallow, White-winged Tern and the Gull-billed Tern; and it also supports a lucrative fisheries.

development through provisioning, supporting, regulating and cultural services (WRI 2005).

These wetlands are under threat for the very reasons that make them key to people's wellbeing. Their provisioning services have led to their encroachment, over exploitation and degradation. They are used for farming, fishing and livestock grazing, supplying homesteads and industry with basic needs such as water, construction materials and fuel. High demand for clay and sand in the commercial construction industry has led to degradation of these wetland ecosystems. At the local level, the system of interconnected wetlands plays a crucial role at the sub-national and national level by filtering pollutants and regulating water flows (influencing ground water recharge, flood impacts and water availability during the dry season).

Pressures from industry is also on the increase. For example, in recent years there has been a growing trend of zoning industrial parks in fragile areas such as forest and lake shores such as the Kampala Industrial Park in 1997. This is corroborated by the growing number of people undertaking social economic activities and seeking authentication from the law. For instance in 2014, a total of 446 Environment Impact Assessment (EIA) certificates of approval were issued for developers to undertake regulated activities, two of which were in or around wetlands (MWE 2014). Figure 2.2 shows trends in approval of projects requiring EIA's in Uganda.

These pressures are contributing to a decline in wetlands coverage. Wetlands coverage in the study area in 1995 was 68,312 ha shrinking by 14% to 58,650 ha by 2010. This is shown in Figure 2.3 and Table 2.1 respectively.

Figure 2.2: Trends in EIA approval and certificates issued

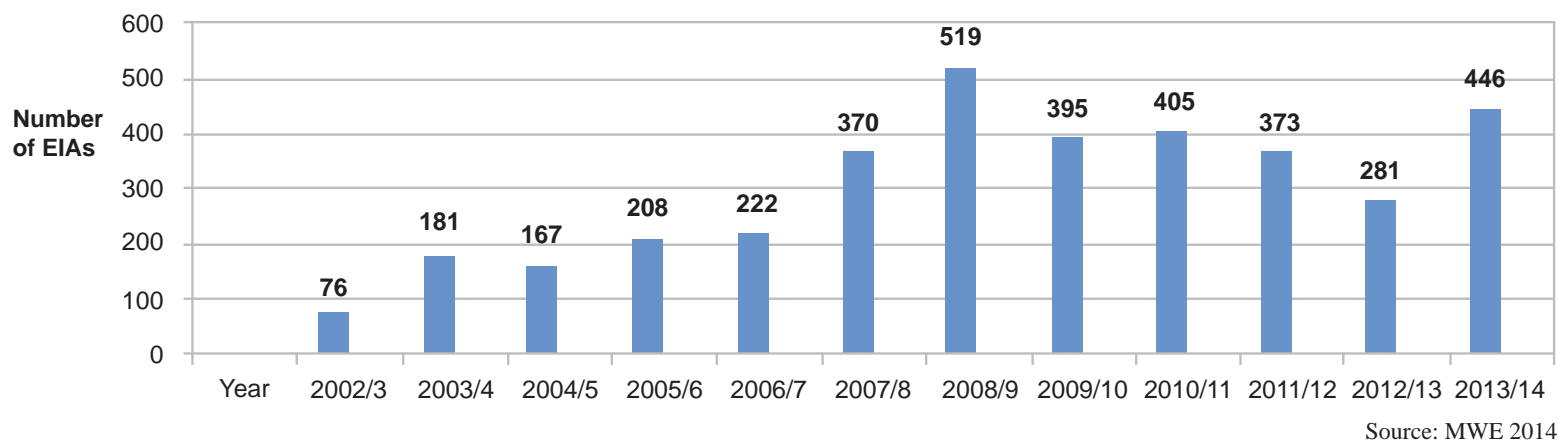
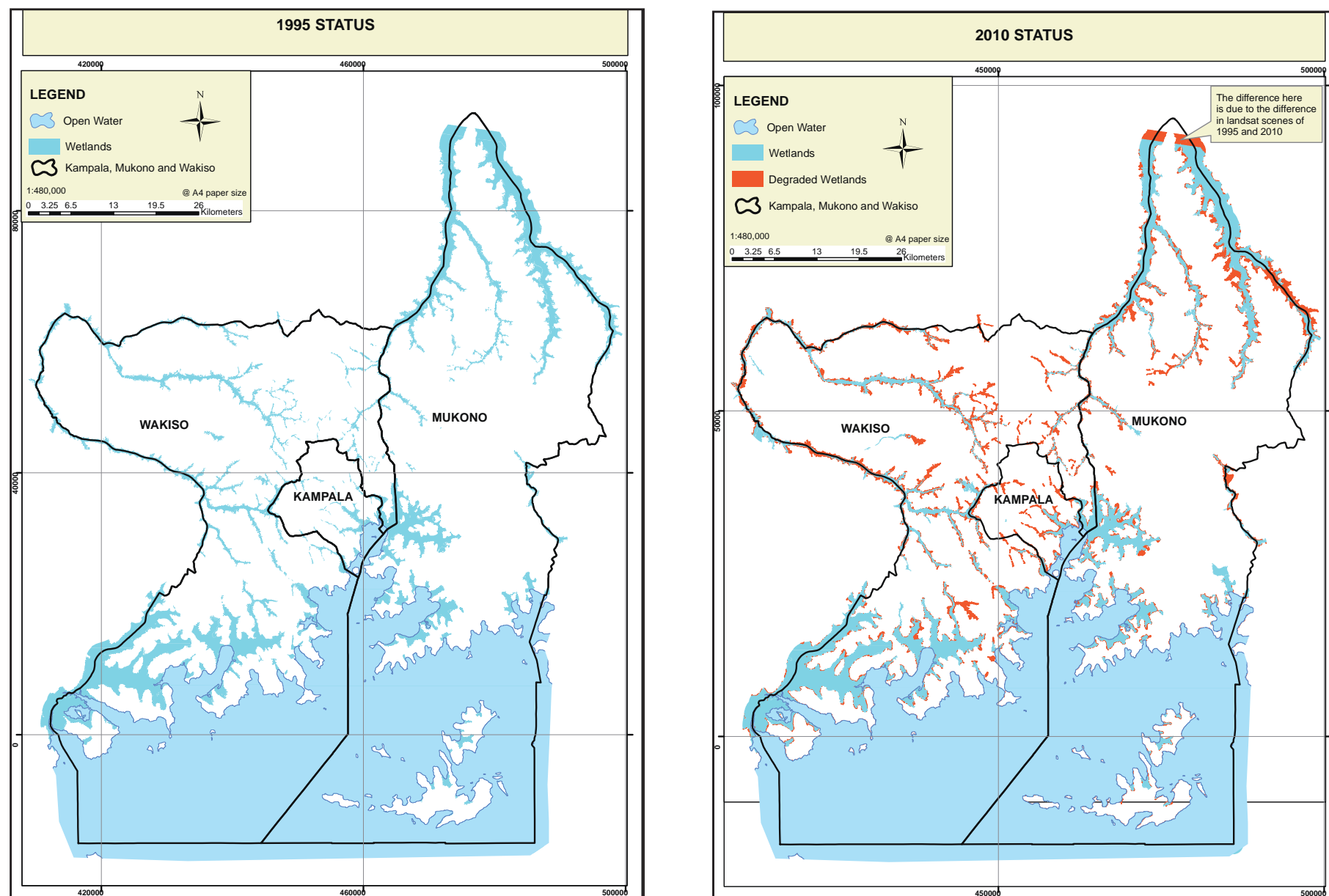


Figure 2.3: Comparison of wetlands coverage in the study area in 1995 and 2010 (NFA 2014)



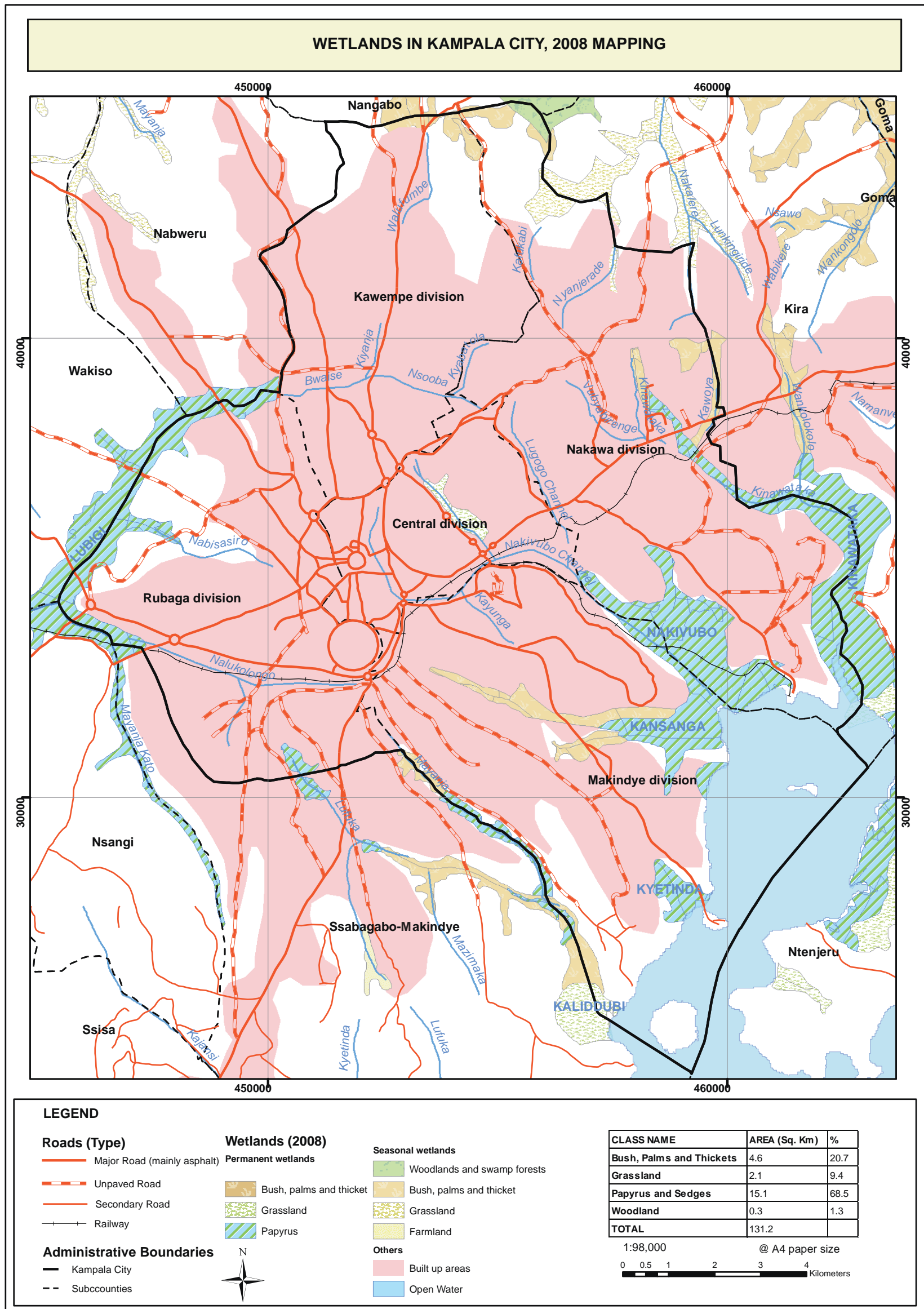
The maps show the extent of wetlands in 1995 (left) and 2010 (right). The red outlines indicate areas that were wetlands in 1995 but have since been converted to other land cover types. The red part in the north of the maps is still under permanent wetlands but the satellite image extent for 2010 does not entirely overlap with that of 1995. There is a small shift in extent to the south but the features on both images are not affected.

Table 2.1: Change in wetlands coverage in the study area between 1995 and 2010

Class name	Area (ha)		Difference
	1995	2010	
Dry land	5,345.19	14,342.49	8,997.30
Wetland	68,312.46	58,650.65	(9,661.81)
Open water	204,514.61	205,179.12	664.51
	278,172.26	278,172.26	

Source: UBOS 2010

Figure 2.4: Wetlands in Kampala City (2008)



WETLANDS IN KAMPALA CITY

Kampala City is made up of five divisions (sub-counties), 79 parishes and 118 villages. According to UBOS (2014), 8.3% of Kampala's 197 km² is covered by seasonal or permanent wetlands as shown in figure 2.4. Wetlands in Kampala cover an area of 31 km² or 16% of the city (NEMA 1997). Their altitude varies from 1,143-1,189 m above mean sea level, with most lying at the same height as Lake Victoria, about 1,143 m (WID 2000a). The lake level has fluctuated by about 2.5 meters over the last hundred years affecting the extent and location of wetlands in the district. Most of the wetlands occupy shallow valleys between the many hills within the city (WID 2000a). They are vital in slowing down and absorbing the runoff from the hills and releasing it slowly into the rivers and Lake Victoria. The wetlands are used to provide water for domestic and industrial purposes; but are also under threat from construction for industrial, commercial and settlement purposes and production of food such as maize, beans, yams and sugarcane among others.



Wetlands next to a treatment plant; Kampala in the background

Sustainable sanitation / Flickr / CC BY 2.0



Flooding at Miami Beach, Port Bell, Luzira

The major wetland systems in the city are the Nsooba-Lubigi, Nakivubo and Kinawataka wetland systems (NEMA 2009a). The other wetlands include Kansanga, Kyetinda, Kaliddubi, Kiwembo, Bulyera, Nalukolongo, Mayanja, Nabisasiro, Walufumba-Nalubega and Kirombe swamp systems (NEMA 1997). The most critical wetland systems in Kampala are Kyetinda, Kinawataka, Nakivubo and Kansanga that drains into Lake Victoria at Gaba, the main source of water for the city. The main threats to the wetlands in Kampala City are pollution, settlements and industrial development (Table 2.2).



Dumping marrum in a wetland at Kawuku Gaba

MWE

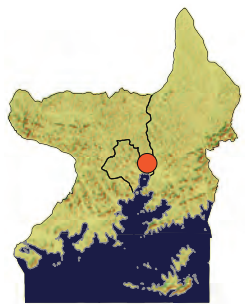
Table 2.2: Major land use and threats facing the wetlands in Kampala

Drainage basins	Wetland name	Main land use	Threats
Lake Victoria	<ul style="list-style-type: none"> • Kansanga • Kinawataka • Kawoya • Kula • Kiwembo-Kawaga • Kyetinda • Mayanja • Nakivubo 	<ul style="list-style-type: none"> • Brick making • Cultivatiom • Settlements • Industrial development 	<ul style="list-style-type: none"> • Pollution • Bush burning • Soil erosion • Agricultural encroachment • Brick burning • Deforestation • Papyrus harvesting • Construction • Murram deposition
River Kafu	<ul style="list-style-type: none"> • Lubigi • Jugula • Nabisasiro • Nalukolongo • Nsooba • Bulyera • Kiyanja • Kyabatola • Wabusanke • Kondi • Nakalere • Nalubaga • Nyanjaerade • Walufumbe • Kalungi 	<ul style="list-style-type: none"> • Settlements • Livestock farms • Woodlots • Industrial development 	<ul style="list-style-type: none"> • Cultivation • Brick making • Water collection • Waste disposal • Pollution from pit latrines • Murram deposition • Construction

Source: WID 2000a



MWE



Kinawataka

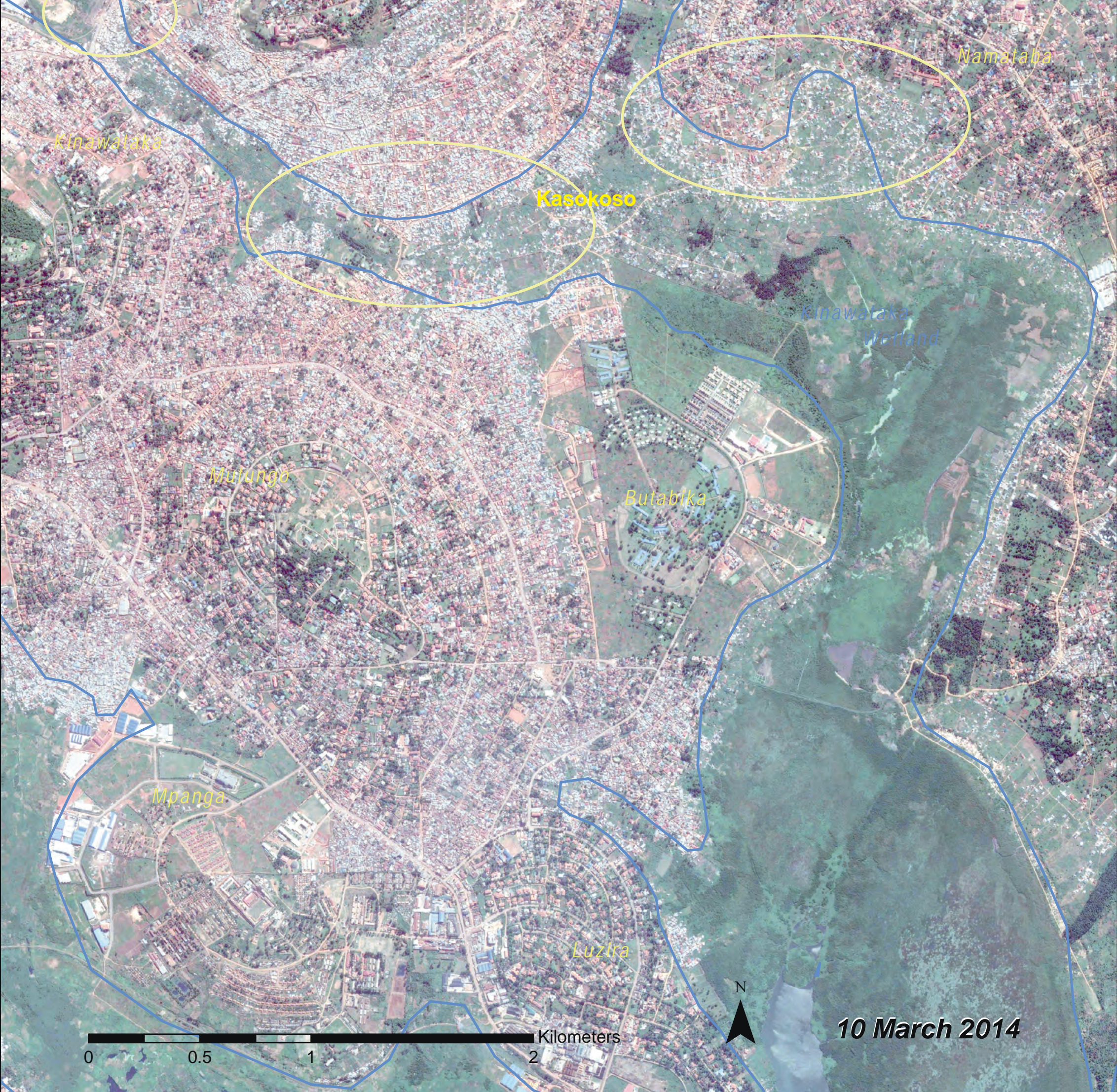
Lake Victoria System

Kinawataka Wetland

Kinawataka wetland, also referred to as Kinawataka-Kawoya, covers an area of 1.5 km² and is located in Nakawa subcounty, 6.5 km east of Kampala city centre. It is located on the eastern part of the district and forms the border of Kampala and Wakiso. It occupies a valley below Ntinda, Banda, Kyambogo, Kireka,

Mbuya and Mutungo hills and drains into Lake Victoria. The wetland provides key ecological functions to the Inner Murchison Bay including slowing down runoff, controlling upstream flooding and removing nutrients thus preventing their rapid accumulation in the water. However, these functions are under threat from human activity in the wetlands.

The main threat to this wetland is pressure from settlement. For example, by 2004 much of the upstream wetland areas of Buye



were converted into high and middle class settlements; and although between 2004 and 2005, the wetlands around Wankolokolo stream were still intact, formal settlements began to emerge in 2008. This portion of the wetland is now all settled with development ranging from schools, a few slums and formal housing. The Kinawataka slum which was just a few houses in 2004, expanded into a major settlement beginning 2008 and is growing rapidly with more settlements coming from Kasokoso. The wetland section in Kasokoso has been channelized and has poorly planned settlements and sanitation. Further down at Kyambogo, construction of industries started before 2004 has since been expanding down

towards Kinawataka. There has also been a lot of infilling of the wetland with murrum since 2013. Satellite images from 2014 show that almost the entire wetland is overrun with settlements. This has severely constricted the storage and holding capacity of the wetlands for storm water leading to the frequent severe flooding around Kyambogo and Kireka whenever it rains. There is also upcoming land pressure from Mutungo Zone 3 squeezing the wetland system from Kirombe village. However, around Ntinda and Banda valley, the wetland remains undisturbed.



Nakivubo

Nakivubo Wetland

This is one of the largest wetlands in Kampala covering an area of 5.29 km² (Gumm 2011). This permanently waterlogged wetland is located in Nakawa subcounty, 5.5 km south east of Kampala city, lying between Bugolobi, Mpanga and Muyenga Hills. Access is through Old Port Bell and Muyenga roads. Nakivubo channel is the main river flowing into it, carrying storm water from the Central Business District and eventually draining into Lake Victoria. Nakivubo wetland hosts a rich biodiversity and is known to be habitat to a colony of cranes. It is also part of the Sewage Works at Bugolobi operated by the National Water and Sewerage Corporation. The ability of the wetland to maintain water quality is highly dependent on its natural integrity.

The land use in 2000 was mainly cultivation, with a few settlements in Wakaliga valley, Namuwongo (Soweto, Kasavu

zones) and on the Kitintale side of Mpanga valley. Over time, the pressure increased and by 2010, settlement structures had edged up Namuwongo side onto the Nakivubo channel; and by 2014, cultivation downstream had spread close to the lakeshore as shown in the satellite image. Settlements also intensified in the wetland in Mpanga valley between Bugolobi and Kitintale with cultivation dominating the downstream area below the railway line. Settlements have continued to increase and are closing in on the wetlands between Bugolobi and Kitintale. Industries have also been established below Luzira Women's Prison and Fifth Street. The Bugolobi side of Wakaliga valley has been spared much encroachment due to strict enforcement by the local leaders.

Encroaching settlements, along with the widening and cementing of the upper section of Nakivubo channel for flood control has drastically reduced wetland vegetation lowering the residence



time flood waters spend in the wetlands. The effects are visible in the Inner Murchison Bay where algal blooms as well as other indicators of declining water quality have been reported. This is of concern as this is where the water intake point for Kampala city is located.

Kitante Wetland

This is a modified wetland that doubles as a ‘green corridor’ designed to improve the natural environment of the city as well as to enhance opportunities for recreation, beauty and ecological quality for the nearby communities. Kitante wetland houses the Kampala Golf Course and borders the Centenary Park on its southern edge. Although this golf course is contributing to the attractiveness of the urban landscape, it may not be without adverse impacts on the wetland. For instance golf courses use large amounts of fertilizers and other chemicals to maintain the lush and attractive greens. This can lead to potential pollution of the wetlands and associated water bodies such as the Kitante Stream that runs through the golf course from Mulago across the city and into Lake Victoria. This is an area that requires urgent monitoring.



MWE



Kyetinda Wetland

Kyetinda wetland covers an area of 1.43 km² and is located in Makindye Division about 9 km southeast of Kampala (WID 2000a). It can be reached using Gaba and Salaama roads. The main threat facing this wetland is that of pressures from encroaching settlement and agriculture caused by the growing

population. Makindye Division is the most populous among the Urban Divisions in the country with 395,276 people (UBOS 2014). In 2004, the upstream area of the wetland had few settlements while the downstream area below the road to Munyonyo, pockets of brick making and cultivation was evident along the wetland edges.



By 2011, these activities had drastically intensified. The downstream wetland area continues to reduce as new settlements are observed on both sides of the wetland from Buziga and Gaba. It is not easy to recognize the upstream area

as a wetland in the 2014 image since the surrounding hills have almost all been occupied by settlements and human pressure extends to the wetlands. This encroachment poses a threat to the buffering function of the wetland.



Kansanga

Kansanga Wetland

Kansanga wetland covers an area of 4.54 km² and is located in Makindye Division, about 5 km south east of Kampala city center (WID 2000a). It is located along the River Kansanga in the valley between Makindye, Nsambya, Bunga and Tank hill. It can be approached from Ggaba road. This wetland borders the Inner Murchison Bay and plays a major role in water purification.

Encroachment for settlement and cultivation in this wetland has been increasing gradually through the years from 2000 with cultivation now very close to the lake shore. Settlements began to appear in 2008 and have expanded constricting the wetland to a narrow



Kyetinda near Gaba Water Works

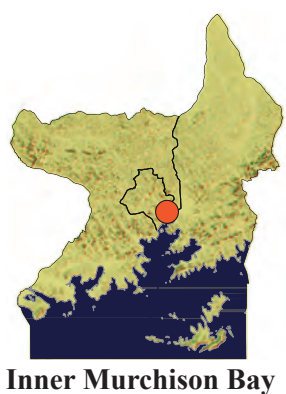
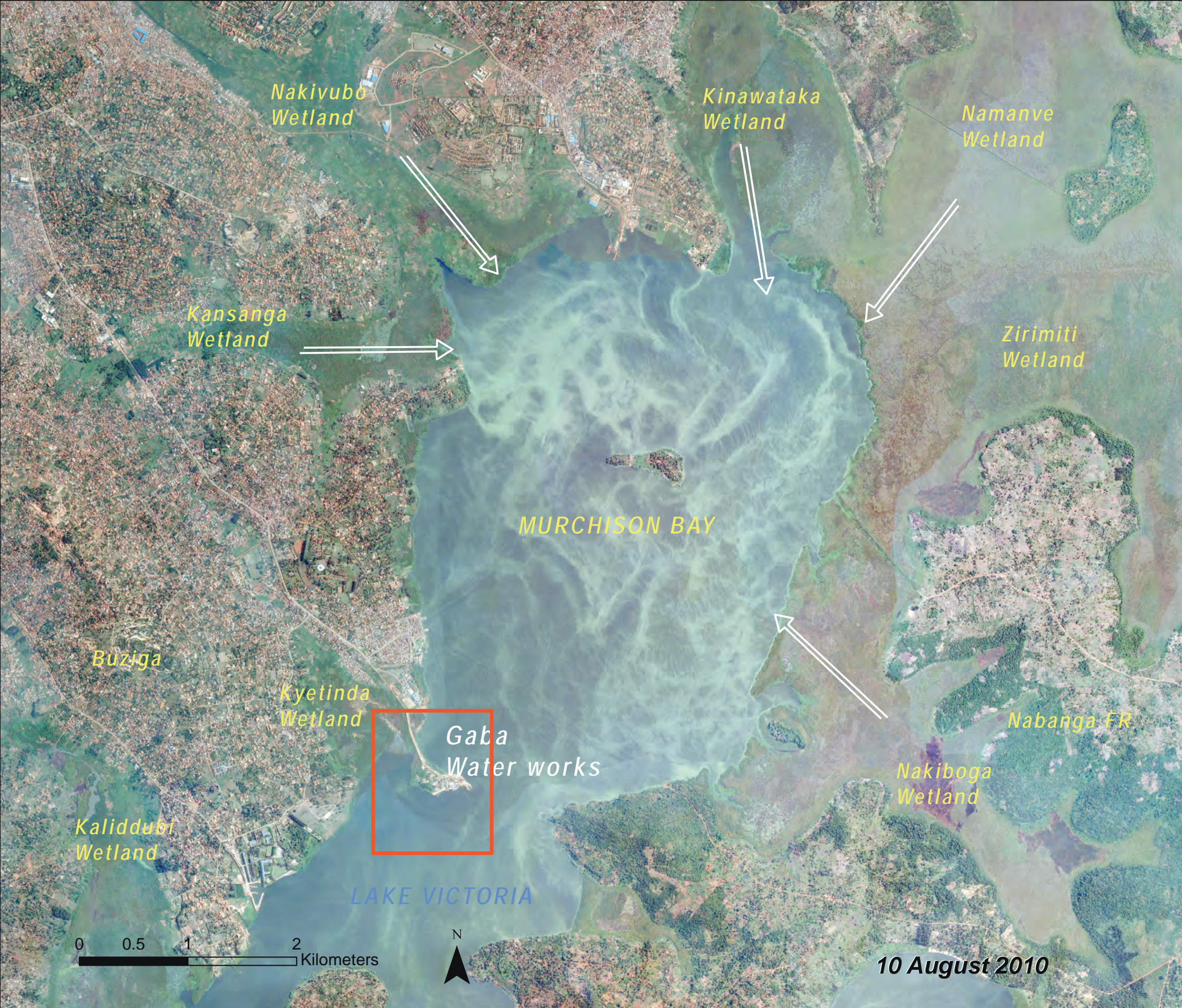
MWE



channel in the upstream area. Infrastructure development has also hastened some of this encroachment, for instance in the area around the new road leading to a new settlement off Soya Factory Road. In 2008, there were increased settlements in the upstream section between Soweto road and Ggaba road; and by 2010, these had covered most of the upstream area leaving very little wetland vegetation visible. There are also noticeable signs of infilling with murrum for construction and tree nurseries. By 2011, settlements had extended to the wetland section along Ggaba road and to the end of Kibaale road and by 2014 the settlements had closed in along Kibaale road from both sides of the hills. Brick making is scattered around in small pockets.



MWE

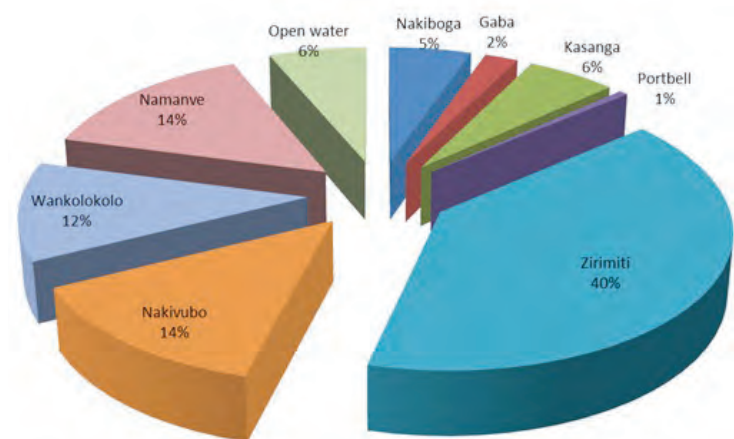


The Inner Murchison Bay Wetlands

The main catchment area of the Inner Murchison Bay (IMB) is shared between the three Local Governments of Kampala (Makindye, Central and Nakawa Divisions); Wakiso (Kira Town Council) and Mukono (Mukono Municipality, Goma, Nakisunga and Ntenjeru Sub counties). The contributing proportions of the differing wetland systems around the bay are shown in Figure 2.5.

The temperatures in the bay range from 23°C to 32°C (Campbell, 2001) and the mean annual rainfall is 1,180 mm with two peaks in March to May and October to November (Matagi 2002). The bay has an intricate shoreline, is relatively shallow deepening towards the pelagic area and narrow at the exit to the outer Murchison Bay after Munyonyo. This has implications on the mixing of the water between the

Figure 2.5: Inner Murchison Bay catchment area



Source: MWE 2013

outer and the inner bay. The bay exhibits unique characteristics compared to the pelagic areas of the open lake (Campbell 2001).

The IMB is the sole recipient (through the Nakivubo channel) of all the storm water from Kampala city that drains into the lake. The water in the Channel is highly polluted due to the discharge of untreated and partially treated wastewater and also solid waste (74% of which is biodegradable) (KCC 2006).

The shoreline of the IMB is dotted with numerous industries that discharge their waste water into the environment as highlighted in Table 2.3 and 2.4. Some discharge points, for instance, include Mukwano industries, City Abattoir, Peacock Paint factory and Phoenix Logistics.

Research shows elevated levels of Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), Total Nitrogen, Nitrates and others as a result of the high organic load, some of which do not comply with the recommended levels stipulated by the National Environment (Wastewater Discharge) Standards of 1999. A high BOD value can result in low dissolved oxygen (DO) levels in the water increasing environmental stresses. If all oxygen is depleted, anaerobic conditions may prevail producing ammonia and hydrogen sulphide which may result in fish kills. The ‘rotten

Table 2.3: Location of industries in the IMB

No	Location	Industry	%
1.	Nakawa	212	41.3%
2.	Central	244	47.6%
3.	Makindye	36	7.0%
4.	Kira	8	1.6%
5.	Mukono	13	2.5%
	Total	513	

Source: MWE 2013

egg’ smell associated with hydrogen sulphide also affects the aesthetic value of the water and prevents its recreational use.

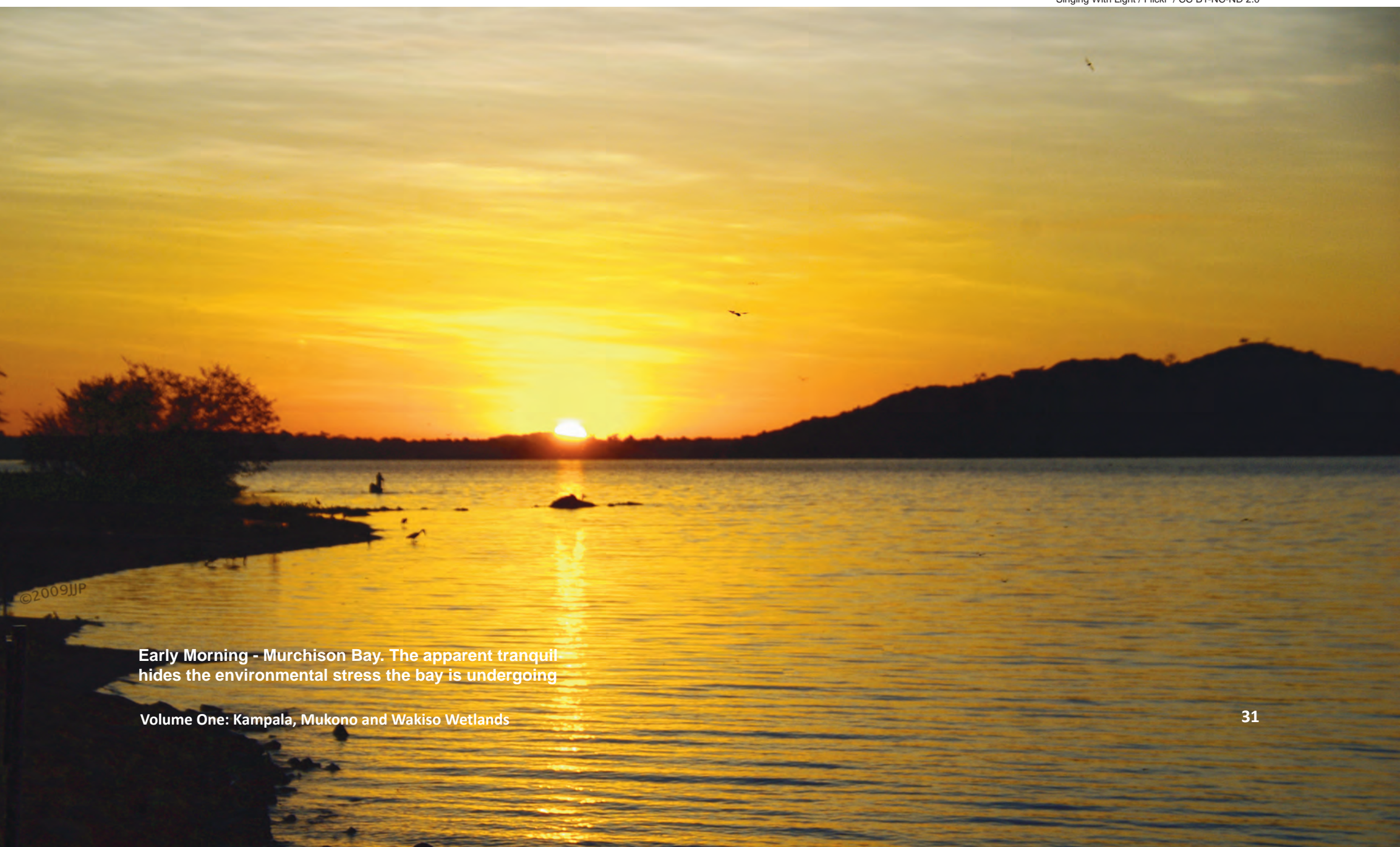
Low pH values in the water may allow the release of toxic metals allowing them to enter the food chain affecting human wellbeing. A study in the IMB area by the Ministry of Water and Environment in 2012, found high levels of heavy metals in fish which is regularly consumed by people in the area (Figure 2.6).

Table 2.4: Categories of industries in the Inner Murchison Bay

No.	Category	No.	Category
1.	Aluminum manufacturing	21.	Mini steel mills
2.	Base metal and iron ore mining	22.	Mixed fertilizer plants
3.	Breweries	23.	Nickel smelting and refining
4.	Cement manufacturing	24.	Nitrogenous fertilizer plants
5.	Chloro-alkali industry	25.	Oil and Gas development (onshore)
6.	Coal mining and production	26.	Pesticides formulation
7.	Coke manufacturing	27.	Pesticides manufacturing
8.	Copper smelting	28.	Petrochemicals manufacturing
9.	Dairy industry	29.	Petroleum refining
10.	Dye manufacturing	30.	Pharmaceutical manufacturing
11.	Electronics manufacturing	31.	Phosphate fertilizer plants
12.	Electroplating industry	32.	Printing industry
13.	Foundries	33.	Pulp and paper mills
14.	Fruit and vegetable processing	34.	Sugar manufacturing
15.	General Manufacturing	35.	Tanning and leather finishing
16.	Glass manufacturing	36.	Textiles industry
17.	Industrial estates	37.	Thermal power
18.	Iron and steel manufacturing	38.	Vegetable oil processing
19.	Lead and zinc smelting	39.	Wood preserving industry
20.	Meat processing and rendering		

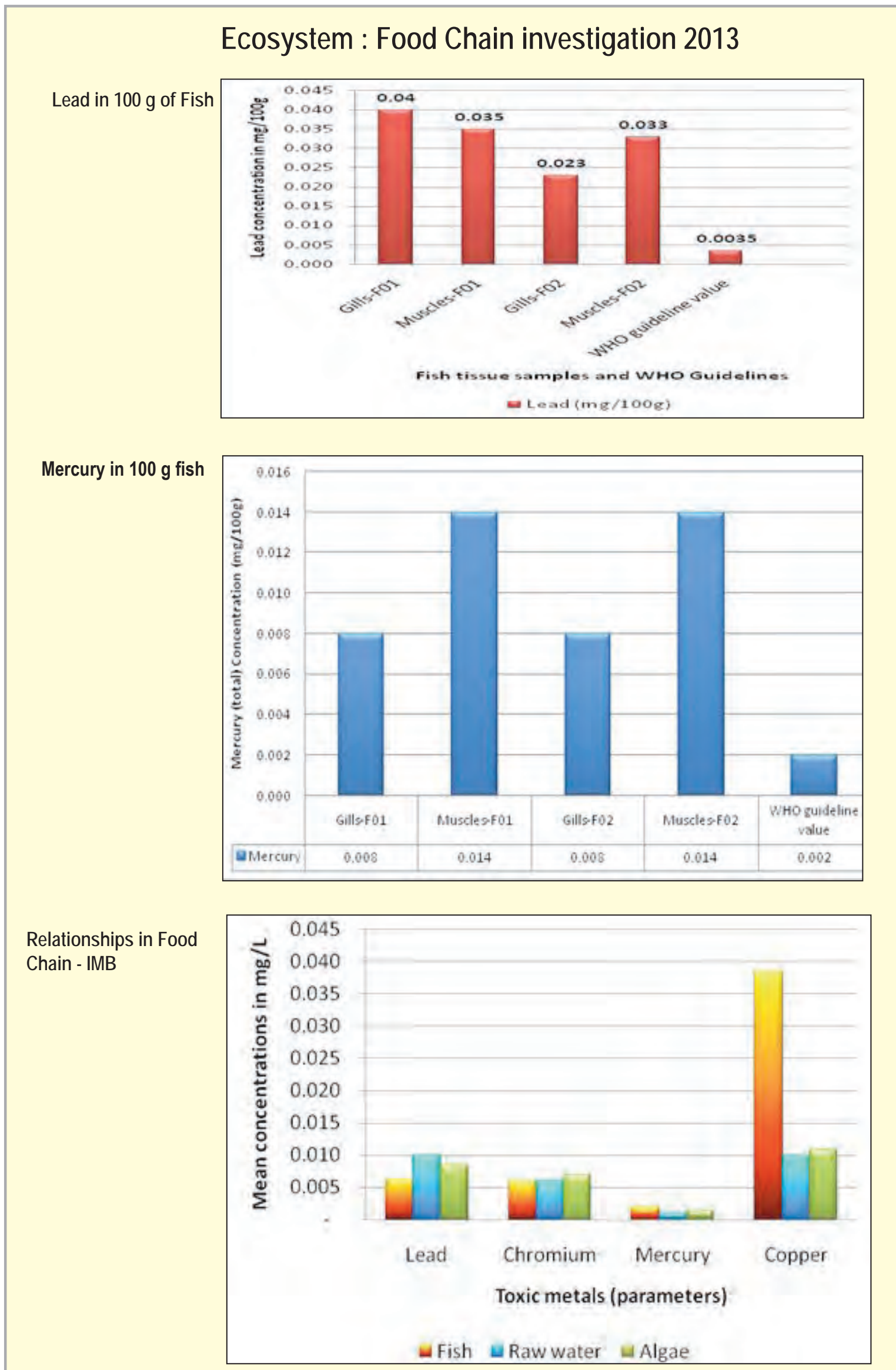
Source: MWE 2013

Singing With Light / Flickr / CC BY-NC-ND 2.0



Early Morning - Murchison Bay. The apparent tranquil hides the environmental stress the bay is undergoing

Figure 2.6: Food chain investigations of the Inner Murchison Bay



Source: MWE 2013

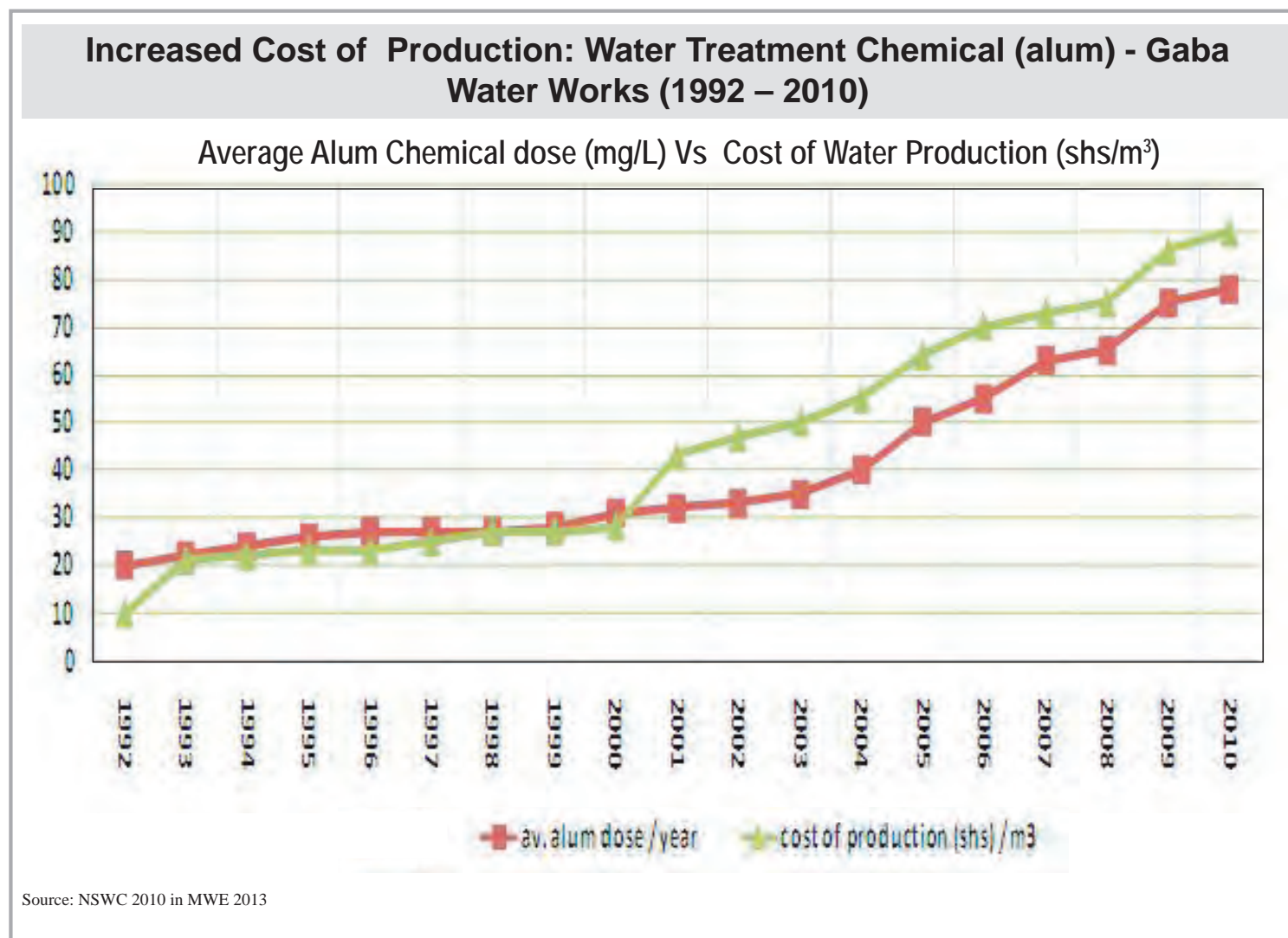


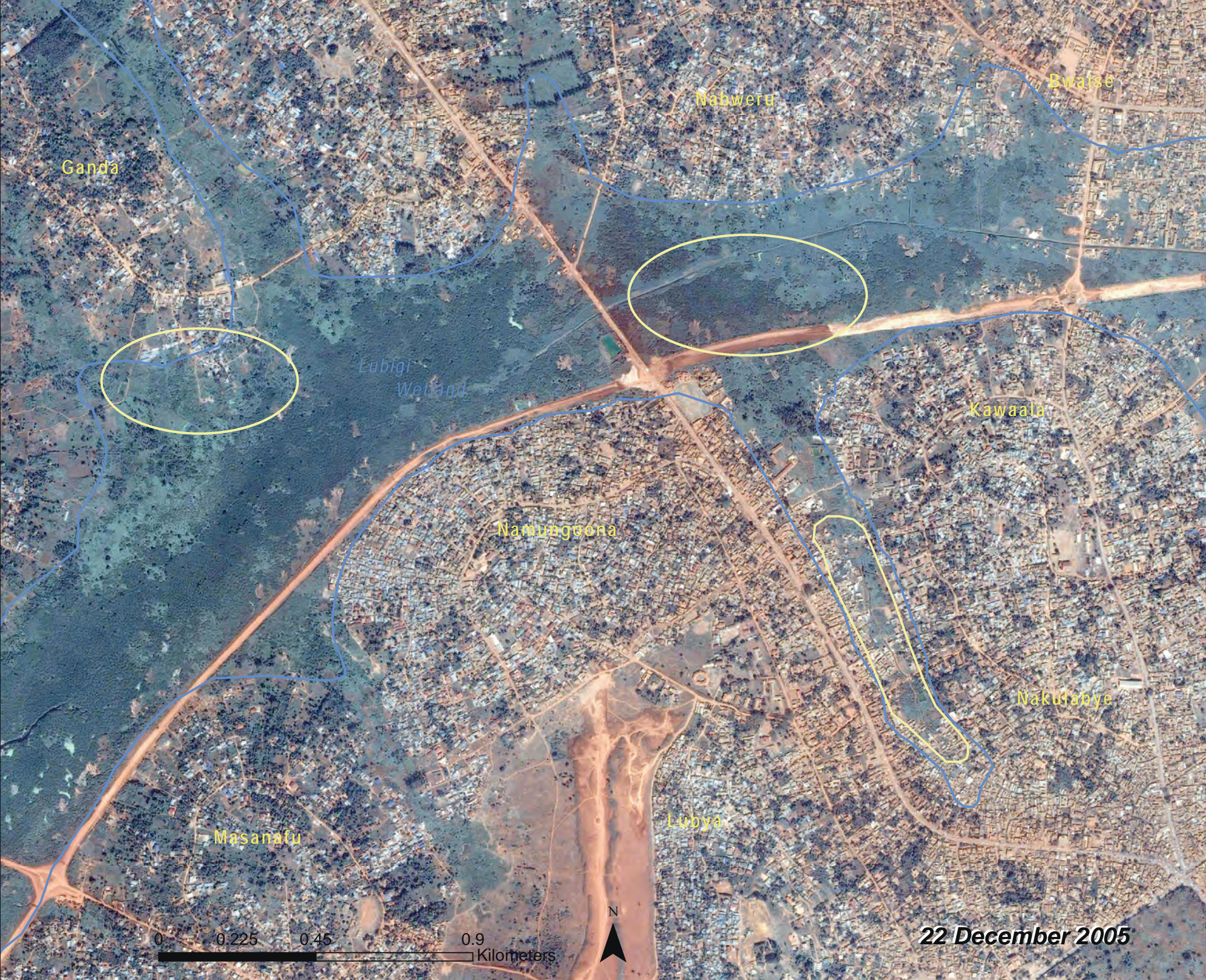
USAID / Flickr / CC BY-NC 2.0

There has been a steady decline in the quality of the water between 2005 and 2014 partly attributed to the channelization of the upper section of the Nakivubo Channel which was done as part of the flood reduction strategy in the city. However increasing the speed at which water traverses the city has meant that the water does not benefit from the purification function of the wetlands. Maintaining

the quality of the water supplied for domestic use has required ever increasing chemical inputs into the water treatment plants at Gaba with cost implications as shown in Figure. 2.7. It is highly recommended that new treatment processes be implemented to cope with the ever fluctuating water quality.

Figure 2.7: Trends in the cost and use of chemicals by the National Water and Sewerage Corporation





22 December 2005



Lubigi

River Kafu Wetland System

Lubigi Wetland (Bwaise)

Lubigi wetland is located on the northwest side of Kampala in Rubaga and Kawempe divisions about 7.5 km from the city centre. It is part of a system in which waters flow north towards Lake Kyoga. It is a tributary to the Mayanja-Kato system in the north and receives water from Nsooba wetland system. This wetland covers an area of 2.98 km² and is permanently water logged (WID 2000a). Lubigi is fed by the rivers Mayanja, Bwaise, Nabisasiro, Nalukolongo and Kiwunya.

In 2004 most parts of the wetland especially in Nabweru and Nansana were intact, except for settlements in Bwaise where population explosion from the catchments had pushed the settlements into the wetland. The construction of the Northern

Bypass which started in 2005 provided access to sections of the wetland that were originally not easily reached. At the beginning of 2010, new roads were also constructed through the wetland at Nansana and Nabweru increasing the pressure on the wetlands for settlements in these towns.

In 2014, the National Water and Sewerage Corporation established a sewage treatment plant in the middle of Lubigi wetland to serve northern Kampala which includes Makerere, Katanga, parts of Mulago, Kalerwe, Bwaise and areas along the Northern Bypass. It is part of the Kampala Sewerage Master Plan. The plant has a combined treatment capacity of 5,400 m³ of wastewater a day and receives and treats wastewater from the piped network as well as faecal sludge that is brought by private cesspool emptier trucks (NWSC 2015). A sewage laboratory monitors and ensures that effluent from this plant meets standards for discharge into water and land.





Nalukolongo

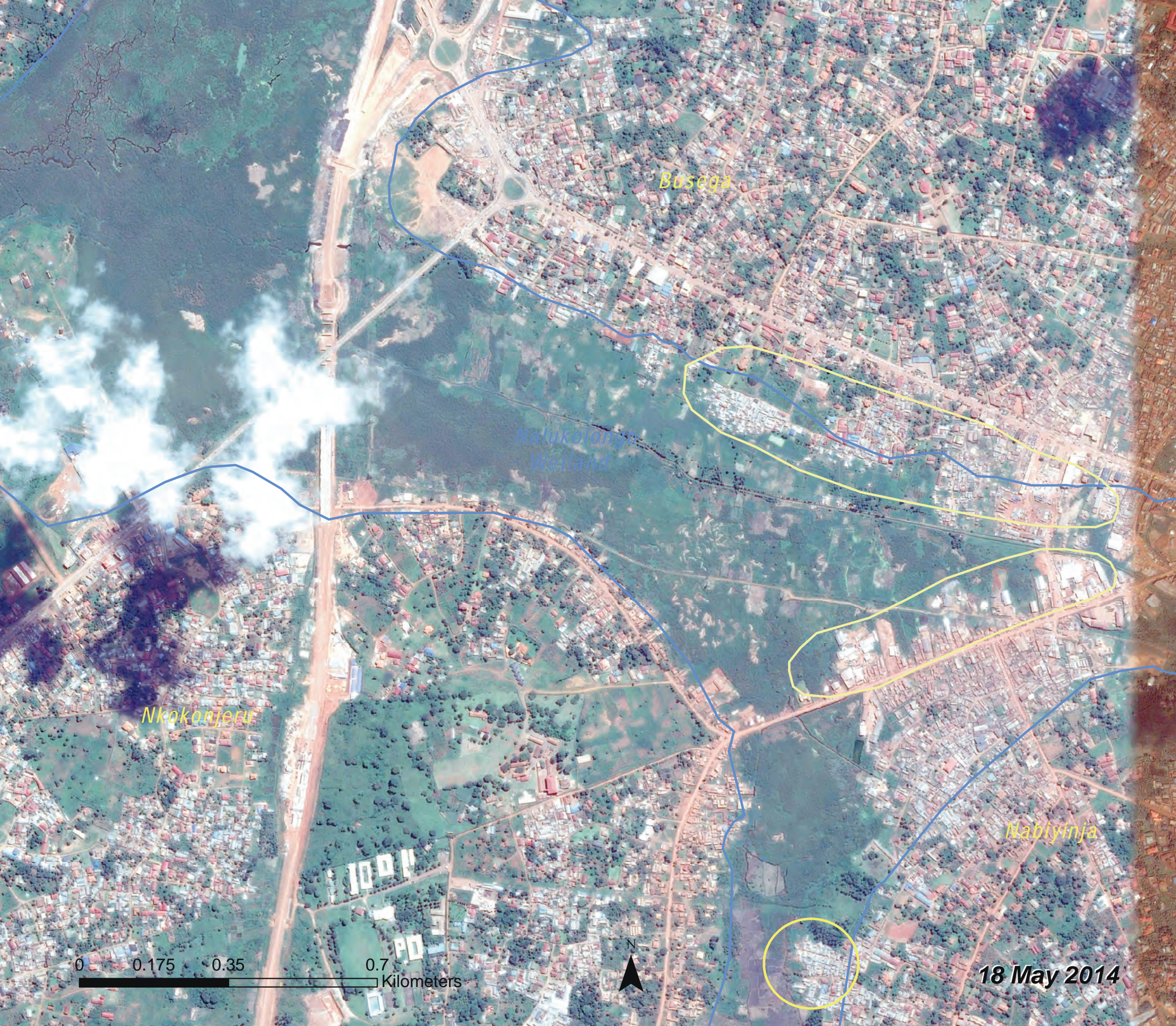
Nalukolongo Wetland

The Nalukolongo wetland covers an area of 0.91 km² and is located in Rubaga subcounty (WID 2000a). It occupies a shallow valley below Mutundwe, Rubaga, Lungujja and Busega hills. This wetland is a permanent and seasonal swamp and it drains into the Mayanja-Kato wetland system. In 2003 this wetland was under pressure from settlements and channels that were created to drain water.

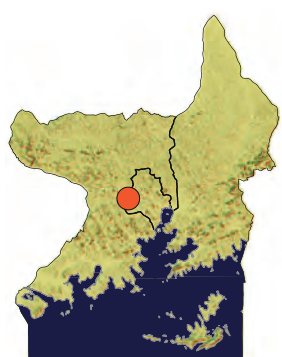
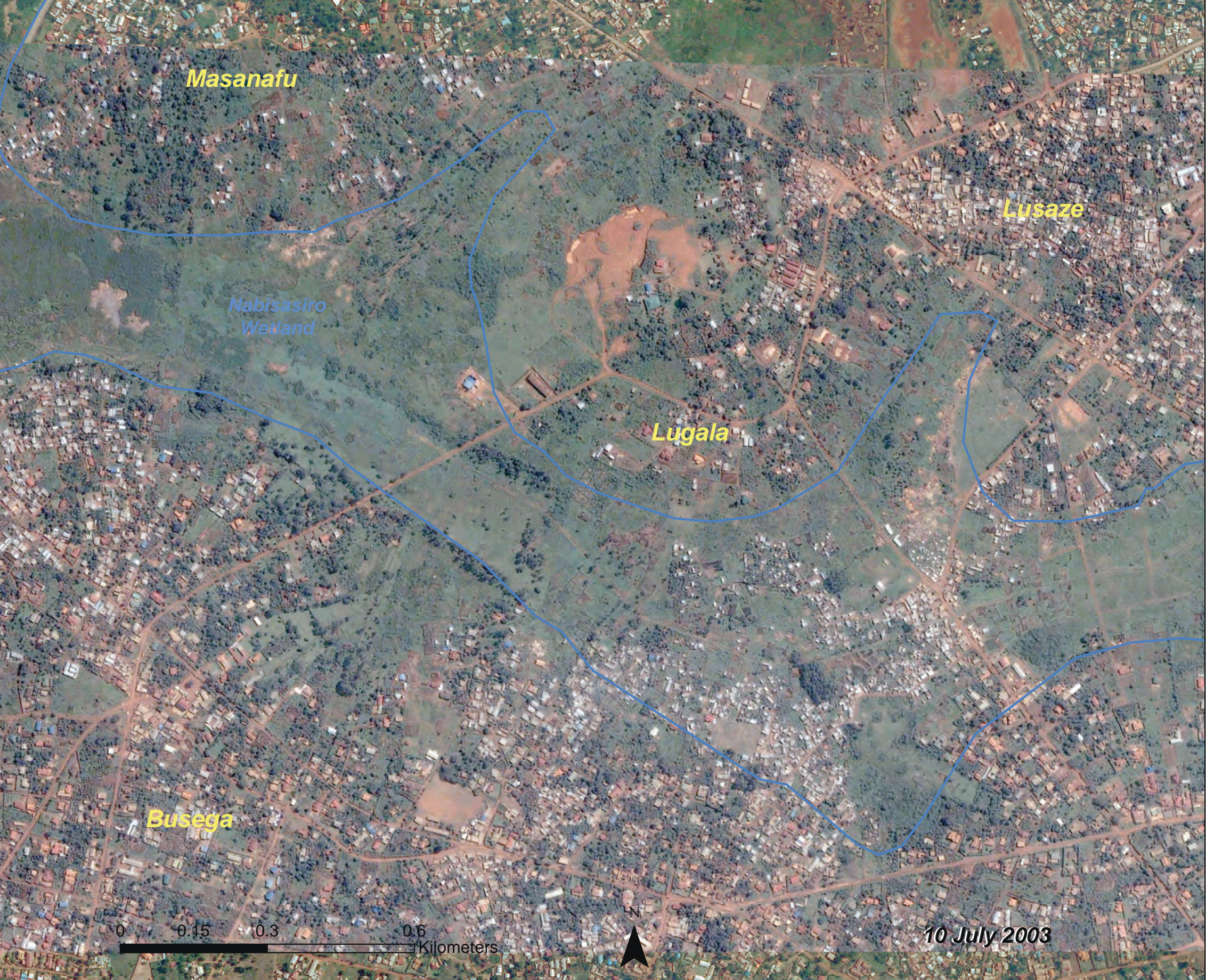
The wetland was gazetted by Kampala City Council in their Urban Planning Structure Plan as an industrial area and much infilling with murram has gone on. Industries started being built in the

upper part of the wetland long before 2003; and this construction is currently extending downwards with much change of land use from settlements into industries.

It floods excessively during the rainy season affecting many homes and industries built in formerly wetland area. The constructed channel does not accommodate the rate of storm water flow from the surrounding hills. And since the water table is very high, during flood times there is mixing of sewage from pit latrines with wetland water. This has implications on the health of the communities since this wetland is a source of water for domestic use.



Infilling a wetland with murrum at Nalukolongo



Nabisasiro

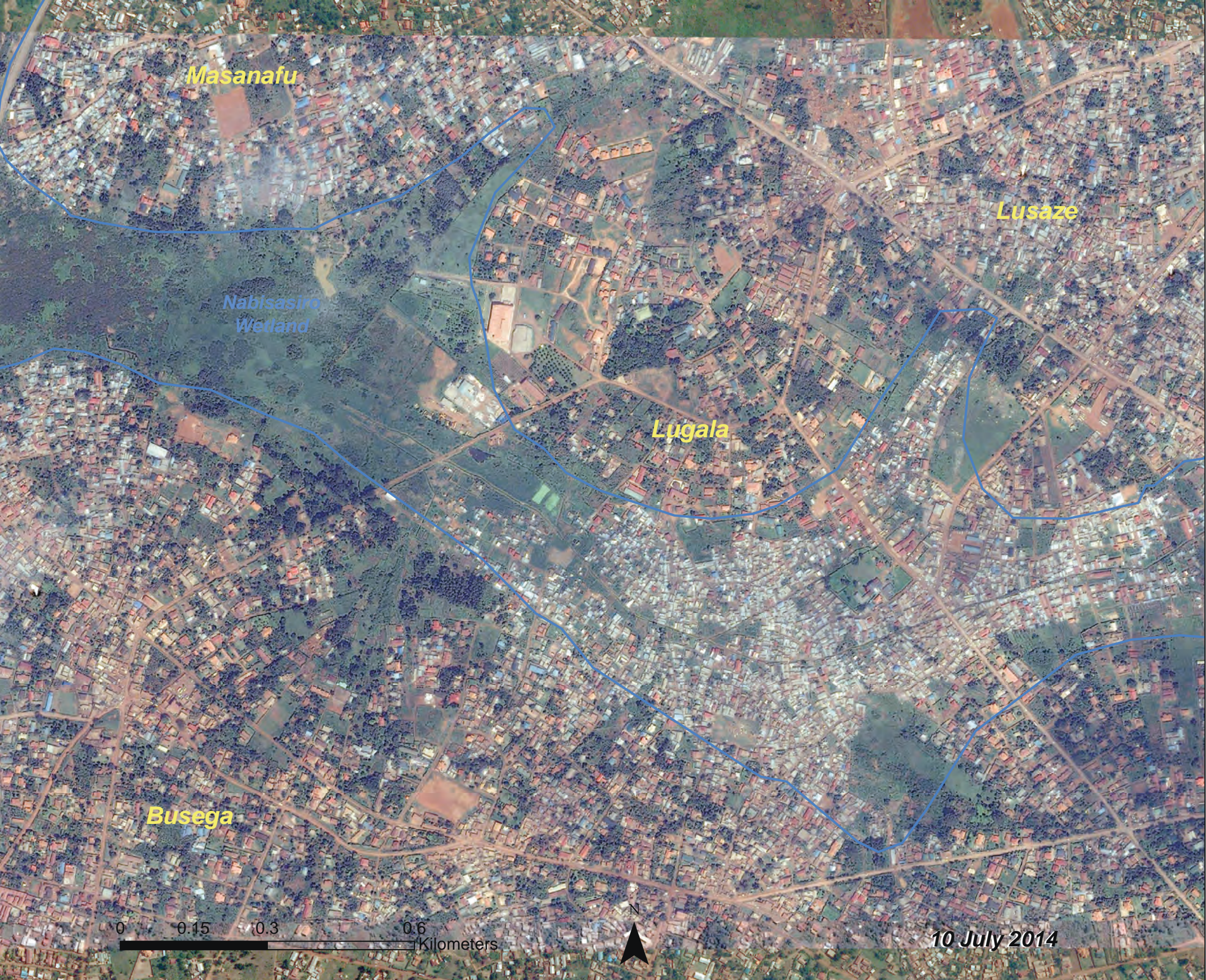
Nabisasiro Wetland

Nabisasiro Wetland is located in Rubaga Division in Kampala City, approximately 3.5 km west of Kampala City centre. The wetland drains the nearby villages of Lugala, Lunguja, Namirembe and Lusaze. The entire wetland measures approximately 1.9 km² and drains into Lubigi wetland and eventually into Mayanja Kato between Bulenga and Masande in Nsangi subcounty in Wakiso district.

Kosovo village is in the middle of this wetland and experiences floods after every downpour of rain. The sanitary facilities (mainly pit latrines) are flooded most of the time and waterborne disease epidemics are frequent during the wet season. The upper reaches of this wetland just above Kosovo are seasonal; and were intact until December 2005 when the registered land owners sub-divided the wetland into plots for sale. Between 2006 and 2009, construction

of houses went ahead despite numerous attempts to halt them. The land use on the remaining sections of the wetland that has not been built up is subsistence agriculture, brick making and livestock production (mainly piggery and poultry). The entire wetland is under private land ownership. Below Kosovo village the wetland is under severe encroachment mainly for settlement. In 2010 NEMA received several proposed for the establishment of fish farms in this lower section for which permission was granted. However the fish farmers soon changed the landuse into settlements without notice. To-date, many other people contingent with the wetland continues to seek permission to establish fish farm in this wetland but this has been denied.

Waste dumping and construction of houses remain the main challenges in this wetland. However the section of wetland below the Lugala-Busega road (not Northern Bypass) is still intact and can be salvaged.



Nabisasiro wetland



Cultivation in the vicinity of the lake less than 200 meters away, contrary to the Law

Jacqui1948 / Flickr / CC BY-SA 2.0

WETLANDS IN MUKONO DISTRICT

Mukono District has 13 Sub counties, 84 Parishes and 94 Villages. UBOS (2013) indicates that seasonal and permanent wetlands cover 2% of Mukono's 12,655.7 km². The wetlands of Mukono District fall into two broad categories: *natural lake lacustrine swamp wetlands* (around Lakes Victoria and Kyoga) and *riverine swamps and flood plains wetlands* which are located along Mukono's major river valleys of Sezibwa and the Nile River (WID 2000b). Mukono has a number of wetlands that occur in protected areas such as forest reserves. These include Mabira, Kifu, Namyoya and Zirimiti and they have largely been protected (NEMA 1997c).

Most of Mukono District is a high plain composed of remnants of lowland. The altitude ranges from 1,099 to 1,300 m above sea level with some area along Ssezibwa River and Victoria Nile below 760 m above sea level. This forms a basin covered by swamps along the shores of Lake Kyoga. About 90% of the district drains northwards through the River Sezibwa system into Lake Kyoga

while the remainder drains southwards through small valleys and streams into Lake Victoria (WID 2000b).

There are two wetland systems of interest in Mukono district. One is on the eastern side of Mukono Municipality and the other is on the western side, as shown in Figure 2.8. Both flow northwards. The one on the western side at one point runs along the boundary between Makukuba and Nakanyonyi parishes in Nabaale subcounty. In 1995 there was a forest between the two parishes. By 2010, this forest had been cleared and in its stead there was wetland. Since the original land cover type is gone and the ground is wet, the new class for the area is a wetland.

The wetland on the eastern side of Mukono town has arms that extend into Bukasa and Kawongo parishes in Kimenyedde subcounty. By 2010, these wetlands were no longer natural wetlands but degraded by agriculture. Mukono town is rapidly expanding, absorbing spill over population from Kampala (Figure 2.9 and 2.10). There is also pressure from industrial developments which have an affinity for wetlands because they offer flat areas amid hilly terrain.

Figure 2.8: Wetland in Mukono District

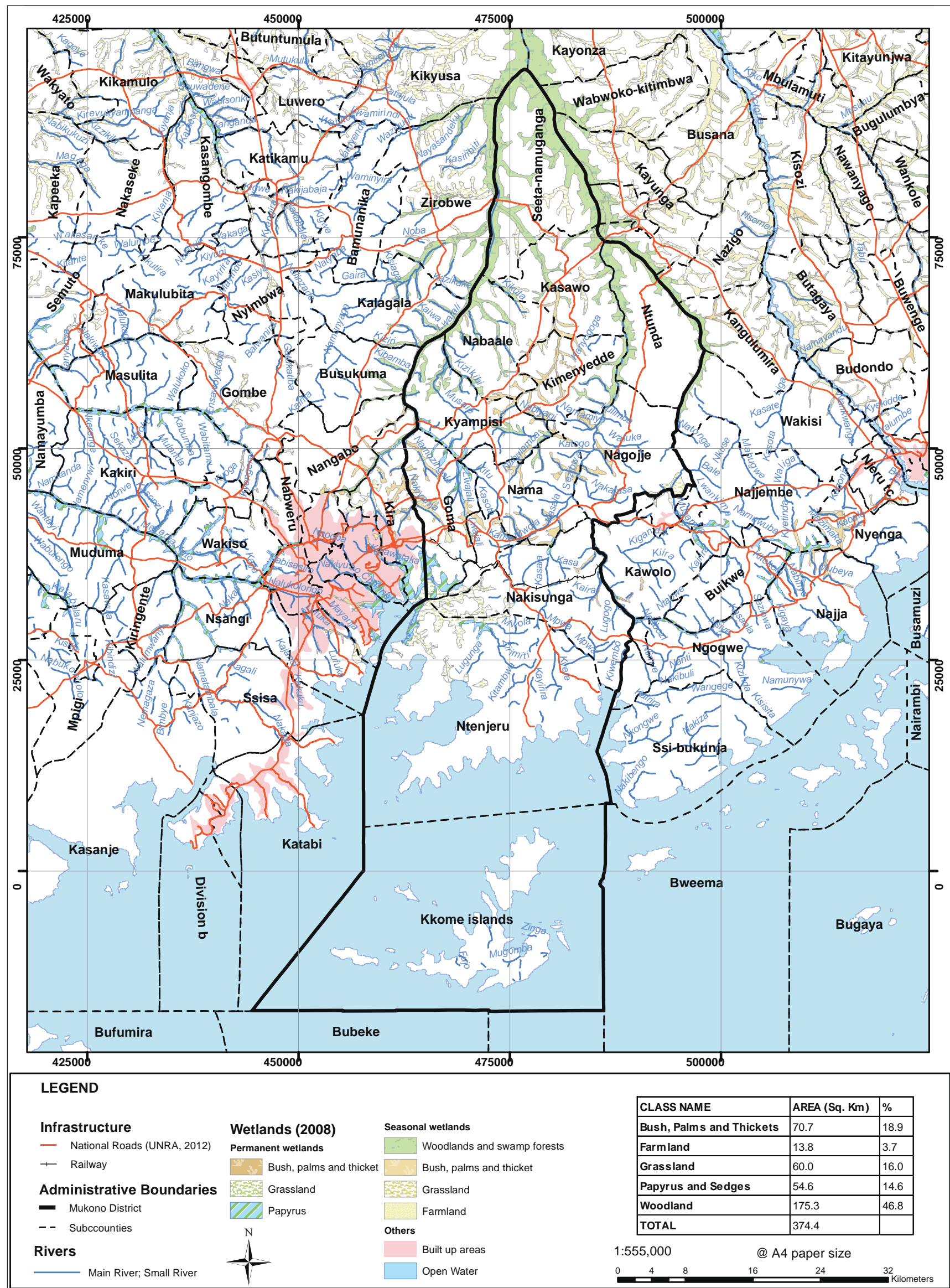
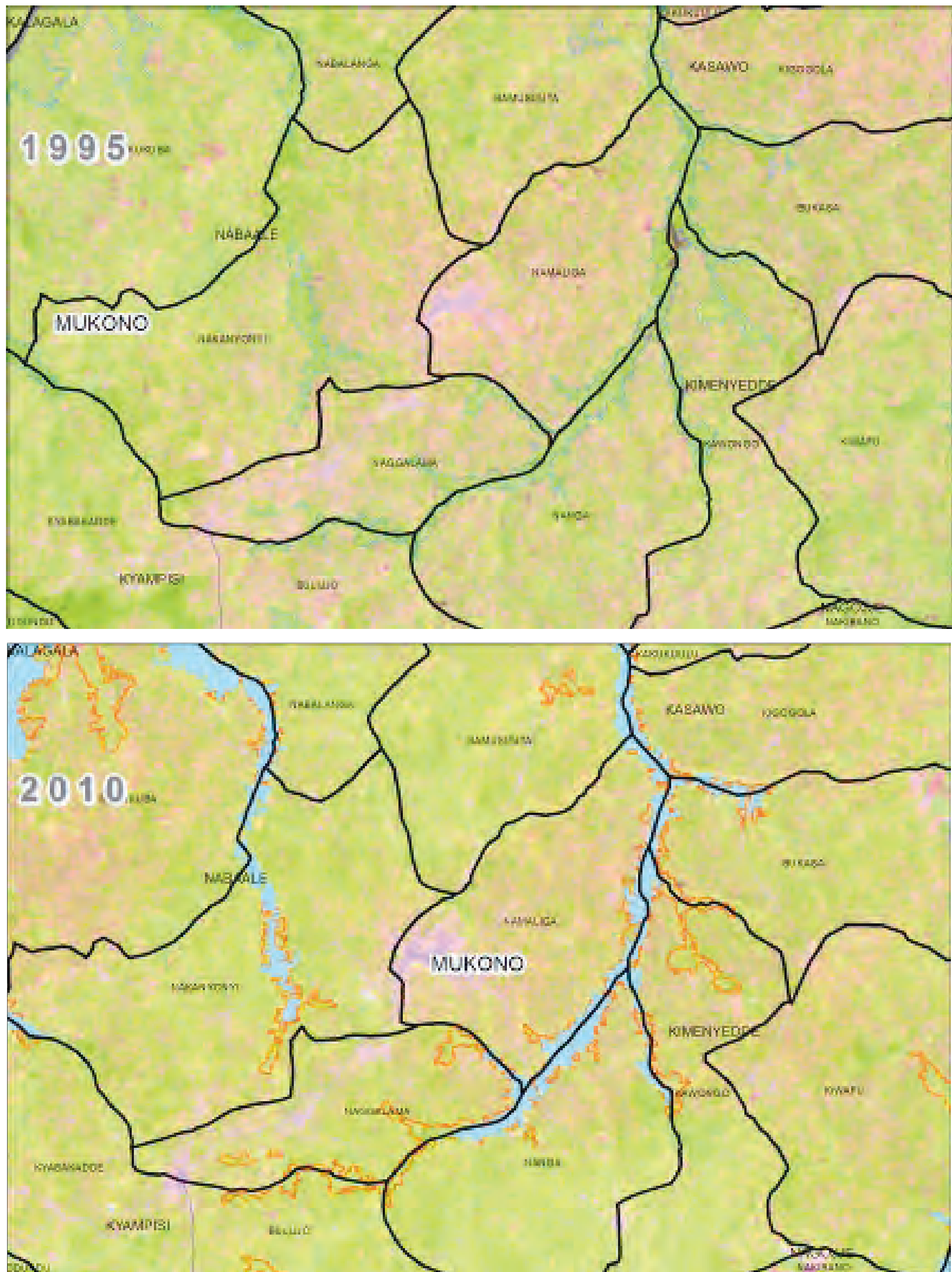
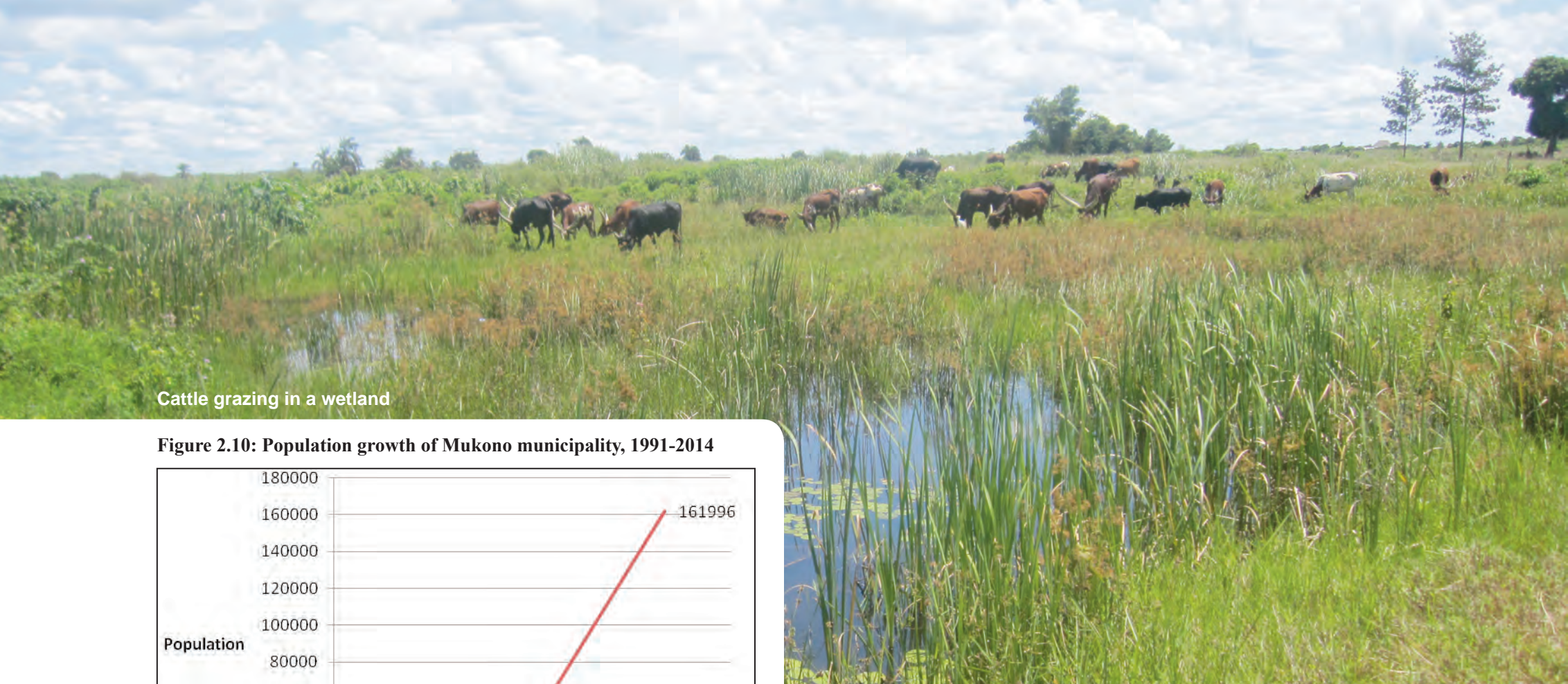


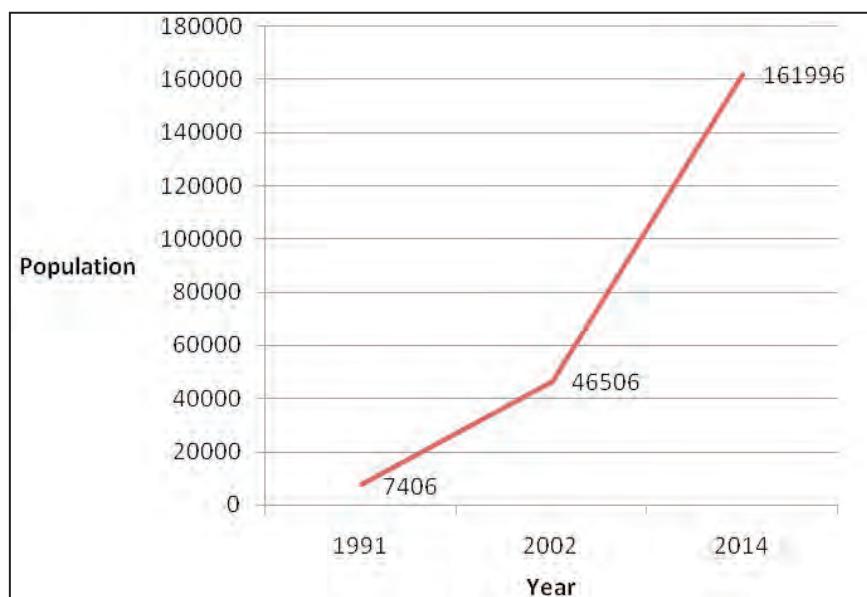
Figure 2.9: Expansion of Mukono Town





Cattle grazing in a wetland

Figure 2.10: Population growth of Mukono municipality, 1991-2014



Source: UBOS 2014

MWE

The main provisioning functions of the wetlands in this district are water, food, land for agriculture and pasture, fuel wood, wetland products for making mats, craft materials, building materials, medicines, honey, transport, sand, gravel and clay. Some of the wetlands are under threat for these products and have been proposed for official protection. Table 2.5 highlights the main land uses in the wetlands and the threats facing them.

Table 2.5: Major land use and threats facing the wetlands in Mukono District

Drainage basins	Wetland name	Main land use	Threats
Lake Victoria	<ul style="list-style-type: none"> Bumbabumba Bumbura Grants' Bay (Kasirye) Kabaale Kafuuta Katiiti Kayobe Kiwembo Mugangu Nabanga Nakibega Nakimbolede Nalubaale Sowe Nalutengera Namafuko Namagombe Namasoloza Namunda Nkone Nkogwe Tte Zirimiti 	<ul style="list-style-type: none"> Brick making Sand mining Cultivation Settlement Ranching Subsistence farming 	<ul style="list-style-type: none"> Pollution Bush burning Soil erosion Agricultural encroachment Hunting Brick burning Deforestation Papyrus harvesting
River Sezibwa	<ul style="list-style-type: none"> Lwajjali Musamya Kaasala Njogezi Nakiyanja 	<ul style="list-style-type: none"> Livestock grazing Woodlots Industrial development Harvesting of crafts materials and trees Cultivation Domestic water usage Fishing and hunting Fuelwood 	<ul style="list-style-type: none"> Cultivation Sand mining Water collection Bush burning Soil erosion Artificial drainage for solid waste disposal Road construction

Source: WID 2000b



Namanve

Namanve Wetland

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. This wetland performs important water purification functions and supports a thriving sand mining industry. It is located in Nama subcounty and some of the nearby villages include Gwaffu, Nantabulirwa and Seeta (WID 2000b).



The original vegetation was predominantly *Miscanthidium violaceum* and *Cyperus papyrus*. In 1928, the government decided that this would be a good site to grow Eucalyptus trees for fuelwood. As a result, the indigenous trees were removed and

drainage channels established (Eggeling 1935). In 1997, about 1,006 ha of this forest reserve including the wetland was degazetted to provide land for an Industrial Park established by the Uganda Investment Authority (Kazoora undated).



Njogezi Wetland

River Sezibwa System

Found near the urban areas of Mukono and Nkokonjeru town councils, it includes Lwajjali, Musamya and Kaasala, Njogezi and Nakiyanja among others as shown in Table 2.3. Environmental issues here include encroachment in the form of sand mining, brick making and vegetable cultivation.

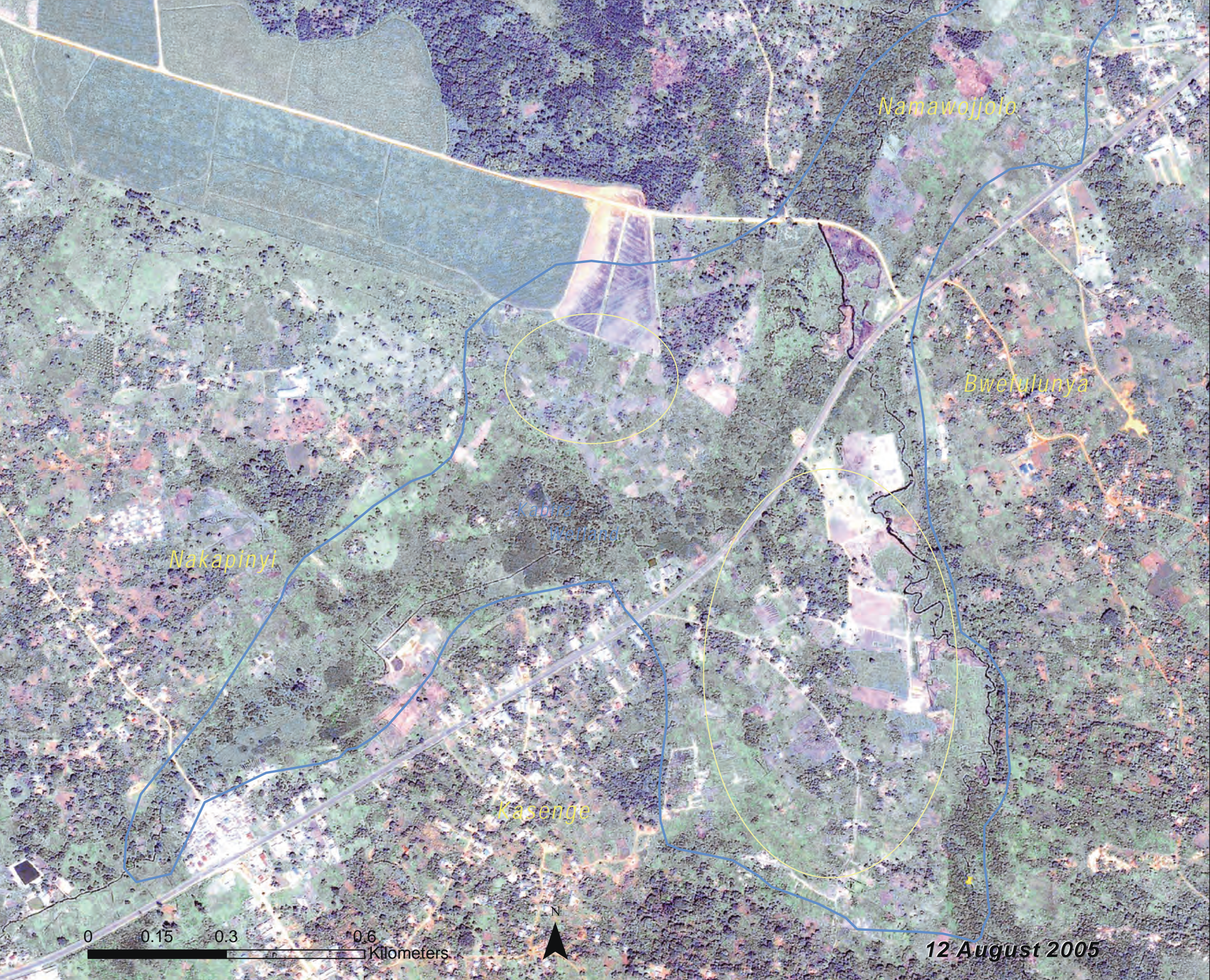
Njogezi Wetland

This is a seasonal wetland is located in Mukono Municipality with nearby villages including Nakabago, Nasuti, Kanga and Ntaawo. It can be reached via the Mukono-Nakabago road. Njogezi wetland lies between the two rivers of Njogezi and Lwajjali, flows through a generally steep valley that has been heavily eroded by surface

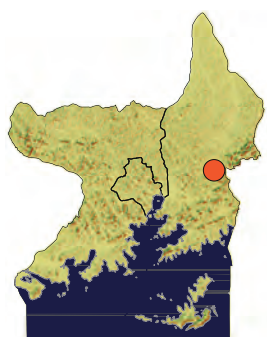
run off. The major drainage system is finally into Ssezibwa River (WID 2000b). Vegetation includes swamp forest, shrub land, bush land, reeds; woodland and natural grasslands. *Afromomum*, *Mimosa pigra*, sedges, eucalyptus are significant species. Wild animals are monkeys and frogs. Birds include Hammerkops and Guinea Fowls. The current land use includes harvesting of crafts materials, cultivation for food crops such as yams, maize and eucalyptus plantations. The surrounding area is used for subsistence agriculture and human settlements. Proximity to and the expansion of Mukono Town Council means that the wetland is likely to face threats from soil erosion, solid waste disposal and brick making for construction. The expansion of Mukono town is likely to affect part of this wetland. The Nabale and Kasaala wetland near Namataba are gazetted as an Industrial zone for Mukono Municipality.



Making bricks



12 August 2005



Mbalala (Nakawolole)

Mbalala Wetland (Nakawolole)

Mbalala wetland (also called Nakawolole wetland) is a permanent wetland that drains areas of Mukono Municipality in the villages of Ngandu, Kigombya, Lwanyonyi, Mbalala, Kasenge, Namawojjolo and Walusubi; and discharges into the River Sezibwa System after Namawojjolo. The land tenure system in this area is largely private Mailo. It mainly serves as flood control area for areas mentioned above. The wetland was previously used for brick-making, sand mining and subsistence crop production. The lower part of the wetland after Mbalala village towards Namawojjolo is partly used for sugarcane cultivation (by Sugar Corporation of Uganda Limited - SCOUL) as well as the Nandagi Central Forest Reserve.

As the Seeta-Mukono area rapidly gets urbanised, the Mbalala wetland is continuously being degraded due to pressure from infrastructural developments such as roads, industries, schools and human settlements.

The main industries located within this wetland tributary of Sezibwa River system include Abacus Pharmaceuticals, Raj Developers, Stirling Materials Yard, Tian Tang Group (steel recycling), Comfoam (mattress), Unistrong Industries (aluminium), Global Paper Product Industries, EON Investments, CCLE Tyre and Lubricants, Lida Packaging and Grow More Seeds.

The catchment of this wetland is also rapidly experiencing developments including Riley Packaging industry, Quality Plastics, Kato Aromatics, Seeta High School, Mukono as well as construction of residential and commercial settlements in Kigombya-Lwanyonyi, Namuyenje, Nangwa, Mbalala and Namawojjolo. During the last 10 years a total of 16 industries have been established in this section of the wetland.



Establishment of these developments involved draining the wetland through infilling with murrum and channeling both of which have negatively impacted the hydrology and ecology of the wetland. The currently observed deterioration in water quality in River Sezibwa is largely due to pollution from industrial effluents, solid waste and erosion from the catchment. The developments in and around the wetland have greatly increased the run-off causing frequent flooding at Mbalala Trading Centre along the Kampala-Jinja Highway.



Sugar cane

AdamCohn / Flickr / CC BY-NC-ND 2.0

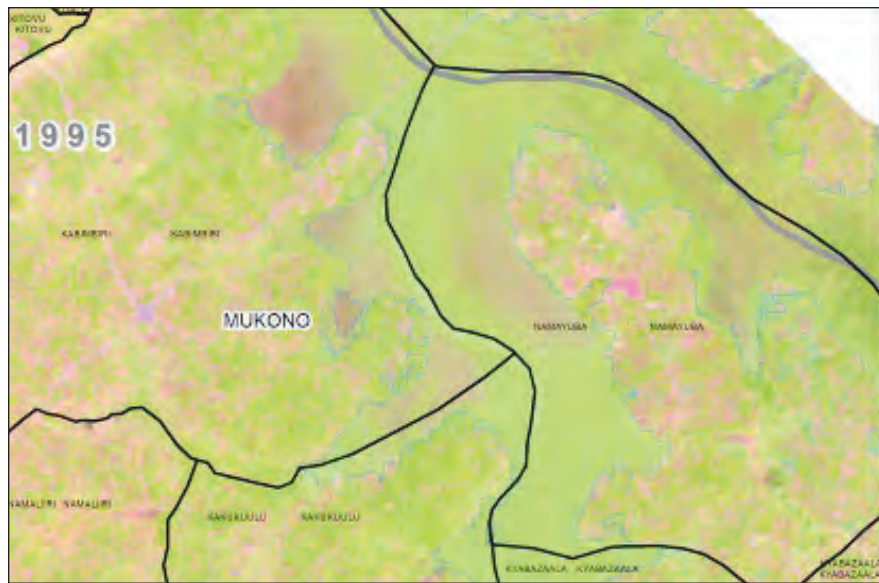
Flourishing rice grain

Namayuba Wetlands

These wetlands are found east of Mukono District at the border with Kayunga district. They are very wide, stretching over 2 km in many places. Wetlands in Namayumba in Ntunda subcounty and Kakukuulu in Kasawo subcounty are like other wetlands in the region. Fringes of wetlands are cultivated until the depth of water becomes prohibitive. What is unique about this wetland system is that the quantity of water increased tremendously and can be seen as patches of open water in two places. One water body is at the junction of wetlands north of Namayuba parish, Ntunda subcounty and the other water body in form of a river is in the wetland on the western side of Namayuba parish (Figure 2.11).

The reason for the emerging open water patches in the wetland system is not clear, but it is thought to be caused by increased runoff in the catchment areas due an increase in hard surfaces that reduce water infiltration. Another possibility could be impeded drainage upstream thus causing the water level in the wetland to increase.

Figure 2.11: Namayuba wetland

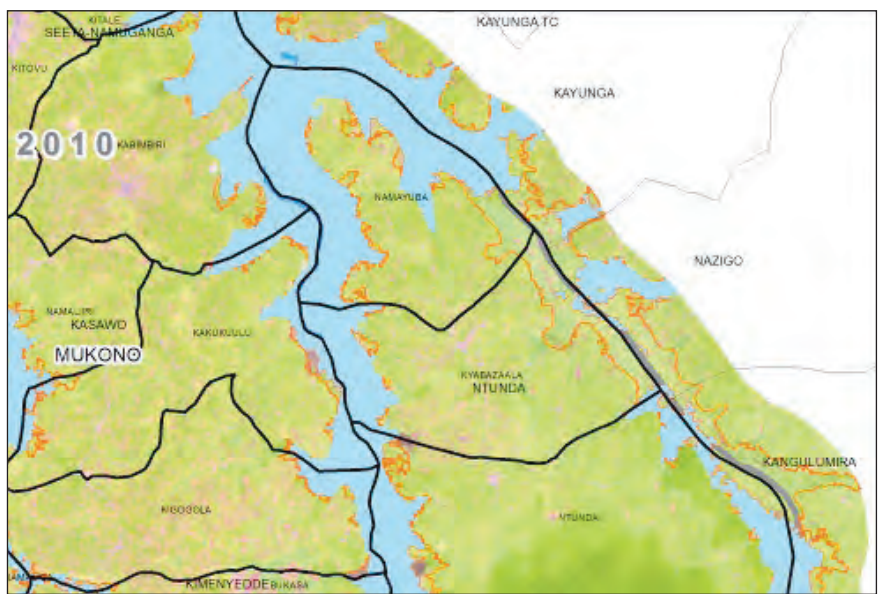
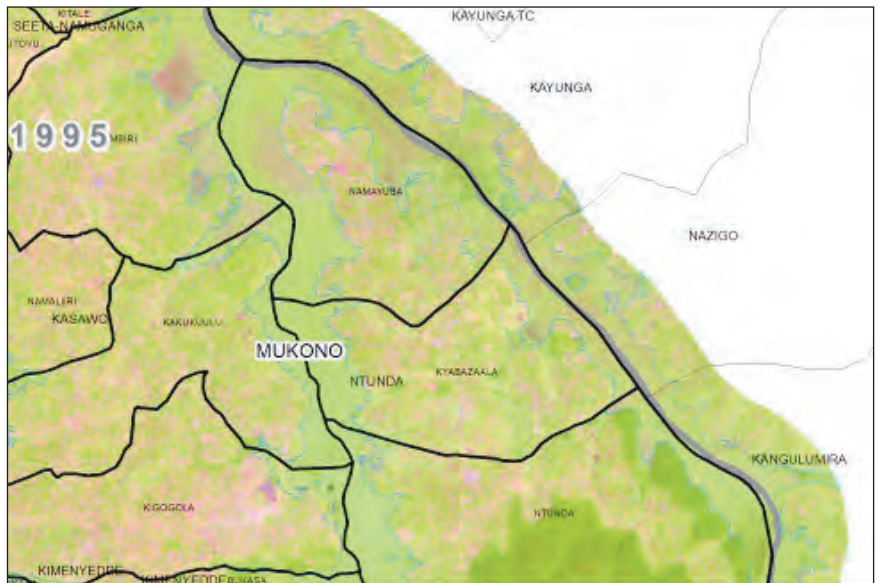


Gates Foundation / Flickr / CC BY-NC-ND 2.0

Ntunda-Kyabazala Wetland

This is a wide wetland on the eastern side of Namayuba and Kyabazaala parishes. It forms the boundary between Mukono and Kayunga Districts. This part of the wetland system has suffered degradation more than any other area in the study area. It is the largest single continuous wetland that has been degraded. Like in many other places, agriculture is to blame for the degradation. The extent of degradation almost matches the kind done in eastern Uganda where paddy rice is grown. The destruction of the wetland extends far into Kayunga District as shown in Figure 2.12.

Figure 2.12: Wetlands in Ntunda and Kyabazala



Lake Victoria System

Some of the wetlands found in the Lake Victoria system include Kayobe, Tte, Namafuko, Namasoloza swamp that drains into Zirimiti wetland, Nakibega, Namagombe, Nkone and Nalutengera. These face encroachment in form of cultivation, sand and brick making. Brick making is common in those wetlands located near the urban areas but those near the lake edges are not as affected as they are waterlogged most of the time and as such they are very difficult to encroach on. However, these wetlands need to be gazetted urgently before the increasing pressure on Kampala's wetlands spills over into Mukono, as has already happened in Wakiso.

Namafuko Wetland

This is a permanent wetland located in Nama and Nakisunga subcounties. The Namafuko swamp that supplies Lake Victoria proper through a wide flat valley is characterized by sandy, gravel soils and several islands and uplands surrounding the swamp. Vegetation includes natural grasses, bush land, papyrus, ferns, sedges, reeds, elephant grass, *Solanum*, *Albizia*, *Acacia* and palms. Bird species present include Hammerkops; and the animals present include monkeys, Njobe, snakes, Edible rats and Mudfish.

Namasoloza Wetland

This is a permanent wetland located in Ntenjeru subcounty which can be accessed using the Mukono-Ssanga road. It drains into Zirimiti swamp and finally into Lake Victoria through a wide flat valley that slopes gradually (WID 2000b). The vegetation includes swamp forest, natural grass and bushland with Papyrus, palms and *Solanum*. Common animals include monkeys, Bush buck, Mudfish and herons.

Current land use includes thatching materials, cultivation, firewood and hunting. The surrounding area is under subsistence agriculture, brick burning and human settlement. The major threats include deforestation, vegetation burning, brick burning and soil erosion.

Zirimiti Wetland

Zirimiti swamp drains directly into Lake Victoria through a wide flat valley characterized by sandy loam soils and hilly surroundings with isolated islands. It is located in Ntenjeru subcounty. The dominant vegetation include swamp forests, natural grass with papyrus, *Aichornia*, *Loudetia*, *Miscanthus*, *Afromomum*, *Lantana camara*, *Solanum*, *Typha*, ferns, palms, *Spathodia*, *Acacia*, *Albizia* (WID 2000b). Some of these plants such as *Lantana sp.* are invasive alien species (Box 2.1). Common animals include Wild Pigs, Mudfish, Heron, Weaver birds, Hammerkops and Ibis. The wetland is under threat from road construction, bush burning and hunting.

Box 2.1: Impacts of the invasive plant – *Lantana camara*



Leaves and flower of *Lantana camara*

Alvesgaspar / Wikipedia Commons / CC BY-SA 3.0

Lantana camara originated in South America and is a fast growing invasive perennial plant that is widespread in Uganda. It has been spotted in some wetlands in Mukono. It contains a chemical pentacyclic triterpenoid which results in liver damage and photo sensitivity. It is also allelopathic, meaning that it secretes chemicals that reduce the growth of surrounding plants by inhibiting germination and root elongation. This can affect the economy by reducing agricultural yields of certain crops and hindering pasture with impacts on food security. It is also a habitat for tsetse flies. These can have negative effects on human and livestock health.

Source: Cabi 2013, Walton 2006

stttijn / Flickr / CC BY-NC-ND 2.0

WETLANDS IN WAKISO DISTRICT

Wakiso District is situated in the central southern part of the Central Region of Uganda. It is made up of two counties (Busiro and Kyadondo) and 17 subcounties (including one Municipal Council - Entebbe), 153 parishes and 164 villages. It is the most populous district in the country and most of these people live in the peri-urban areas around Kampala city (UBOS 2014). Makindye-Ssabago subcounty is the most populated rural subcounty in the country with 284,067 people. This subcounty is host to Kaliddubi wetland. Wakiso district has an area of 2,807.7 km² of which 8.6% is covered by permanent and seasonal wetlands (UBOS 2013). Most of the permanent wetlands are found in Entebbe Municipality and Busiro County along the shores of Lake Victoria

The wetlands in this district have important regulatory roles including shoreline stabilization around Lake Victoria. They help in stabilizing the extensive riverbanks network and play a part in sedimentation and nutrient retention, flood control and moderation. This is especially important since the catchment areas have been degraded leading to increased run-off and soil erosion. Many of the wetlands discharge or recharge groundwater and hence maintain stream flow and in turn ensuring the constant supply of domestic water.

Wakiso District is a major source of sand and clay for the construction industry for neighbouring urban areas. Most of these activities are not regulated therefore the activity has degraded the fragile ecosystems. Sand extraction and other human activities such as brick making are degrading mostly the riverine wetlands with large open pits, a sign of where such activities have taken place. Deforestation usually accompanies these activities as the forests are usually the source of the wood fuel to burn the bricks. When the pits fill with water during the rains, they provide breeding sites for malaria-carrying mosquitoes.

Wetland conversion for agricultural development is on the increase. This involves dairy farming in such areas as Kasangati and Nangabo; and agricultural crop production for instance potatoes, maize, yams and sugar-cane in many wetlands such as Nakabutwa, Kaziri and Nakalere (WID 2000b). Floriculture is a growth industry on the nearby wetlands on the shores of Lake Victoria close to Entebbe namely Lutembe (Kachindo) and Nambigirwa (WID 2000b). The activity is likely to threaten wetlands due to the intensive use of agro-chemicals required in flower growing. Settlements in wetlands close to urban or trading centres are on the increase.

Wetlands in Wakiso belong to one of two systems – the Lake Victoria or the River Kafu system as described below (Figure 2.13).

Lake Victoria System

The wetlands of the Lake Victoria drainage system form a very extensive periphery along the north western shore of the lake. The rivers draining these wetlands have indefinite water courses and are embedded in deeply incised valleys. The wetlands have a close relationship with the lake in terms of hydrology and soil.

Kaliddubi Wetland

This wetland is located in Makindye-Ssabagabo in Wakiso district, the most populated rural subcounty in Uganda. Kaliddubi swamp used to run from Wankulukuku in Rubaga division (Kampala), across Entebbe Road through

Makindye-Ssabagabo and pour into Lake Victoria at Munyonyo. However, it has now been reduced to a meager trickle due to encroachment on the section along Busabala Road where banana and maize plantations have been established and permanent houses built in breach of environmental laws. Many of the encroachers do not have land titles nor approved plans for their buildings. The catchment area for this wetland includes Kaliddubi, Gangu, Buziga, Ndikuttamada and Luwafu. Its tributaries include Walugogo and Lufuka wetlands.

Kasa Mabamba Wetland Ramsar Site

This permanent wetland is situated in Mabamba Bay west of Entebbe International Airport in Kasanje subcounty. It is approximately 9 km south west of Kasanje trading centre and 35 km south west of Kampala along the margins of the lake (Byaruhanga and Kigoolo 2005). It is a vast marsh of *Miscanthus* sp stretching through a long narrow bay, fringed with *Cyperus papyrus*. There is a narrow open water channel with some *Nymphaea caerulea*, *Cladium mariscus* and at times roving papyrus islands. Forests dominated by *Piptadeniastrum*, *Albizia* and *Celtis* and the occasional *Phoenix* sp line the outer edges of the wetland.

The species rich Mabamba Bay is home to over 300 birds, including the globally threatened Shoebill, large congregations of migrants such as Blue Swallow, White-winged Tern, Gull-billed Tern and papyrus-endemic bird species such as Papyrus Gonolek and Papyrus Yellow Warbler. Other species of interest include the Goliath Heron, Lesser Jacana, Spur-Winged Goose and Squacco Heron. The Bay also supports a lucrative fisheries industry and thus is a source of fish for home consumption and commercial use. It is also a source of raw material for local crafts, building materials, water for domestic and livestock use, as well as non-wood products such as medicinal plants and mushrooms.

The site is of special interest for nature conservation. It is one of Uganda's 33 Important Bird Areas and since 2006 a Ramsar-listed wetland (Byaruhanga and Kigoolo 2005). The value of this wetland is enhanced by the fact that it supports young Shoebill at a critical stage in their development when they are expelled from their parents' territories. Eco-tourism and related economic activities are on the rise. However there is need for strict regulation and adherence to environmental laws since it is a site of international importance.

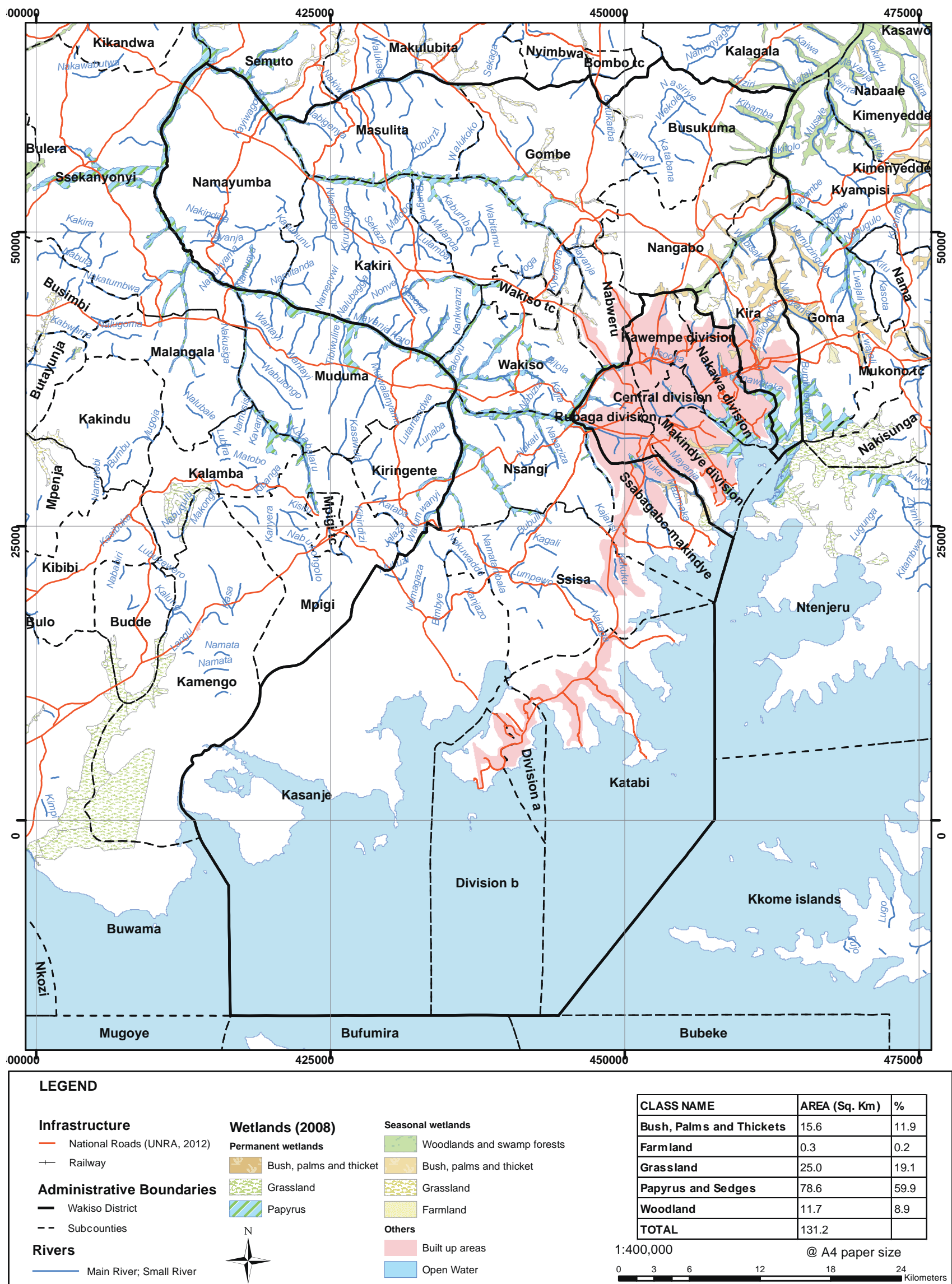
Kasa Mabamba wetland is still relatively intact given that it is far from the urban setting. By 2000, there were just a few developments that had cropped up along the road accessing the wetland. Otherwise, the general surroundings are still virgin interspersed with subsistence cultivation.

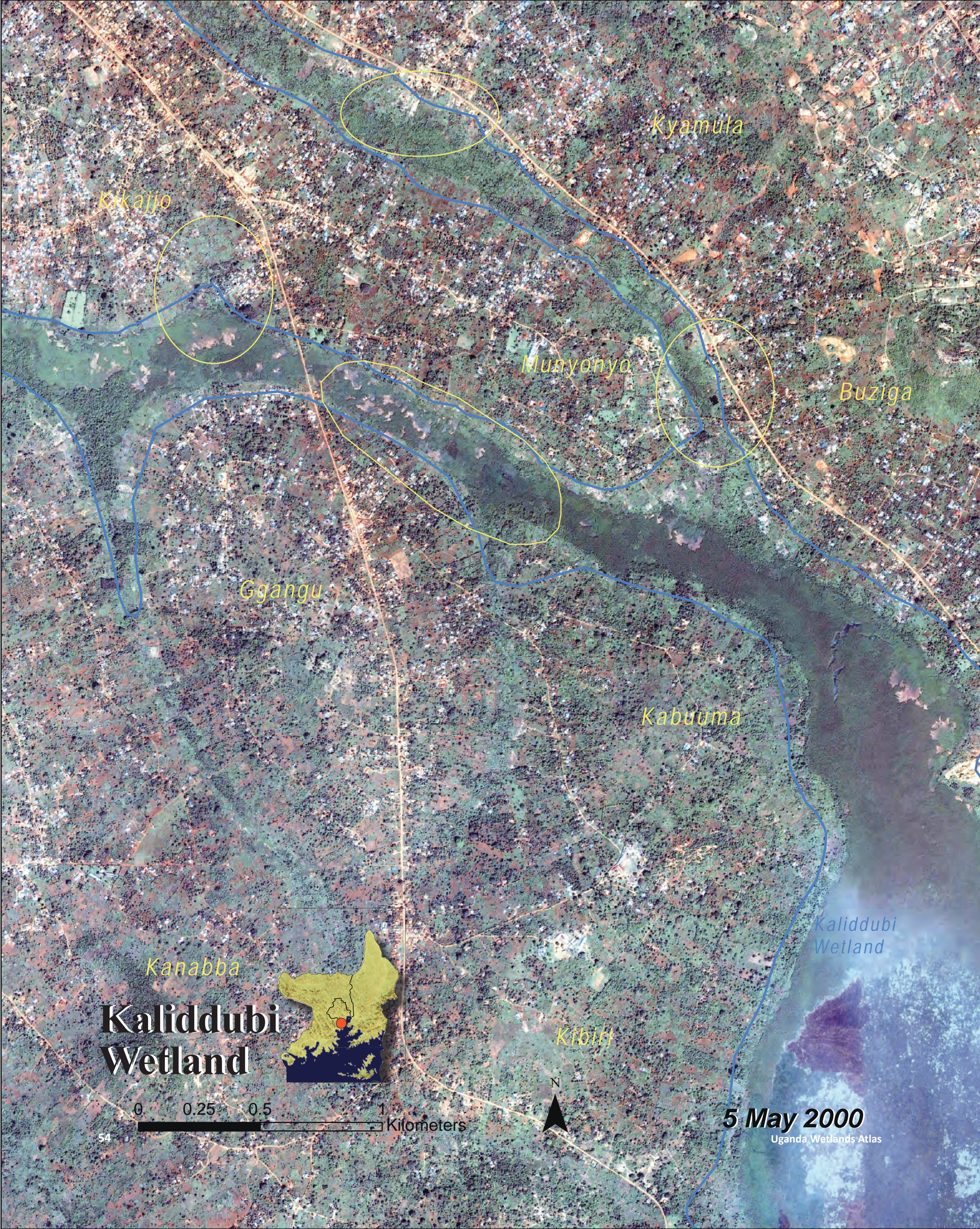
Makanaga Wetland

This wetland, located in Bussi subcounty about 75 km southwest of Kampala, has important socio-economic and cultural values. The Wanema cultural site for the Genet cat (Kasimba) clan is found at Buyembe village on Zzinga island. The wetland is rich in species including migrant birds such as Shoebill Storks, Terns and Gulls; animals such as Sitatunga, African Civets, Otters, Black and White Colobus monkeys and large bats.

The major threats to this wetland include poaching, bushfires, agricultural encroachment, water pollution, bad fishing methods and lack of awareness by the local people about the importance of this area (UWEC 2014). Bush burning is common during the dry season and is used by hunters to trap the Sitatunga, but it also destroys fish breeding grounds and bird's nests. The growing population and agricultural activities are also contaminating the water through improper waste disposal and irresponsible use of agro-chemicals (UWEC 2014).

Figure 2.13: Wetland in Wakiso District





Kikajjo

Kyamula

Munyonyo

Buziga

Ggangu

Kabuuma

Kanabba

Kibiri

Kaliddubi
Wetland

Kaliddubi Wetland



0 0.25 0.5 1 Kilometers



5 May 2000

Uganda Wetlands Atlas



Kyamula

Kikajjo

Munyonyo

Buziga

Ggangu

Kaburima

*Kaliddubi
Wetland*

Kanabba

Kibiri



6 December 2013



Lufuka (Kayirigiti)

Lufuka (Kayirigiti) Wetland

Lufuka wetland is located in Makindye subcounty, between Mutungo and Kigo on the shores of Lake Victoria and it is accessible through the road leading to Kigo Prison. It is a permanent swamp on the northern shores of Lake Victoria, extending slightly inland below Mutungo and Ziranumbu hills. River Lufuka (Kayirigiti) drains into it. In 1996 the wetland

was dominated by papyrus as well as patches of *Miscanthus* and *Loudebia* with just a few parts modified for agriculture. Cormorant, cranes and storks are present and there is the occasional sighting of Sitatunga. The wetland is used for cultivation and hunting and is a source of papyrus and raw materials for local crafts. Land use in the neighbourhood includes fishing villages, settlements, hotels and prison farms.



Drainage and deforestation are the main threats to this wetland. As early as 1999, there were signs of vegetation being cleared right up to the lake front and there were many drainage channels in the gardens (WID 2000b). By 2000, the wetland was still generally intact except for cultivation along the edges. There was also another development with open water probably fish ponds that covered a relatively large area. However between 2008 and continuing on till

2012 increasing dumping of murram was observed over an extensive area; and by 2013, the wetland was completely cleared and a facility that appears to be linked to and accessing the open water built. This implies that the facility in the neighbourhood has probably extended its operations to the wetland. By 2014, half the wetland had been converted and is likely to disappear soon if this continues.



Lutembe

Lutembe Wetland Ramsar Site

Lutembe Bay Wetland (also called Kachindo swamp) is a Ramsar Site located on the shores of Lake Victoria, 16km along Entebbe Road. The villages in the vicinity include Bwerenga, Namulanda and Dewe. The hills surrounding the wetland include Dewe-Danyi-Bwebajja. It

is shallow wetland with a *Cyperus papyrus* border protected from the wave action of the lake by a papyrus island. The prevailing vegetation is a medley of papyrus in the direction of the water, with *Miscanthus* and *Vossia* towards the dry land eventually merging with remnants of swamp forest.



This site is the most important area for the conservation of water birds in Uganda (see Box 2.2). However, this breeding sanctuary for migratory birds is now threatened by human activity. The wetlands have been encroached upon by horticultural and real estate industries, flower farms and residential buildings. High rise fences have been erected blocking communities from accessing the

wetland for domestic water, fishing, raw materials for local crafts and impacting the thriving tourist industry.

Infilling with murram to create dry ground for flower farm construction has been ongoing since 2005 and analysis in 2011 showed new establishments

Box 2.2: Lutembe Bay wetlands—an important bird sanctuary

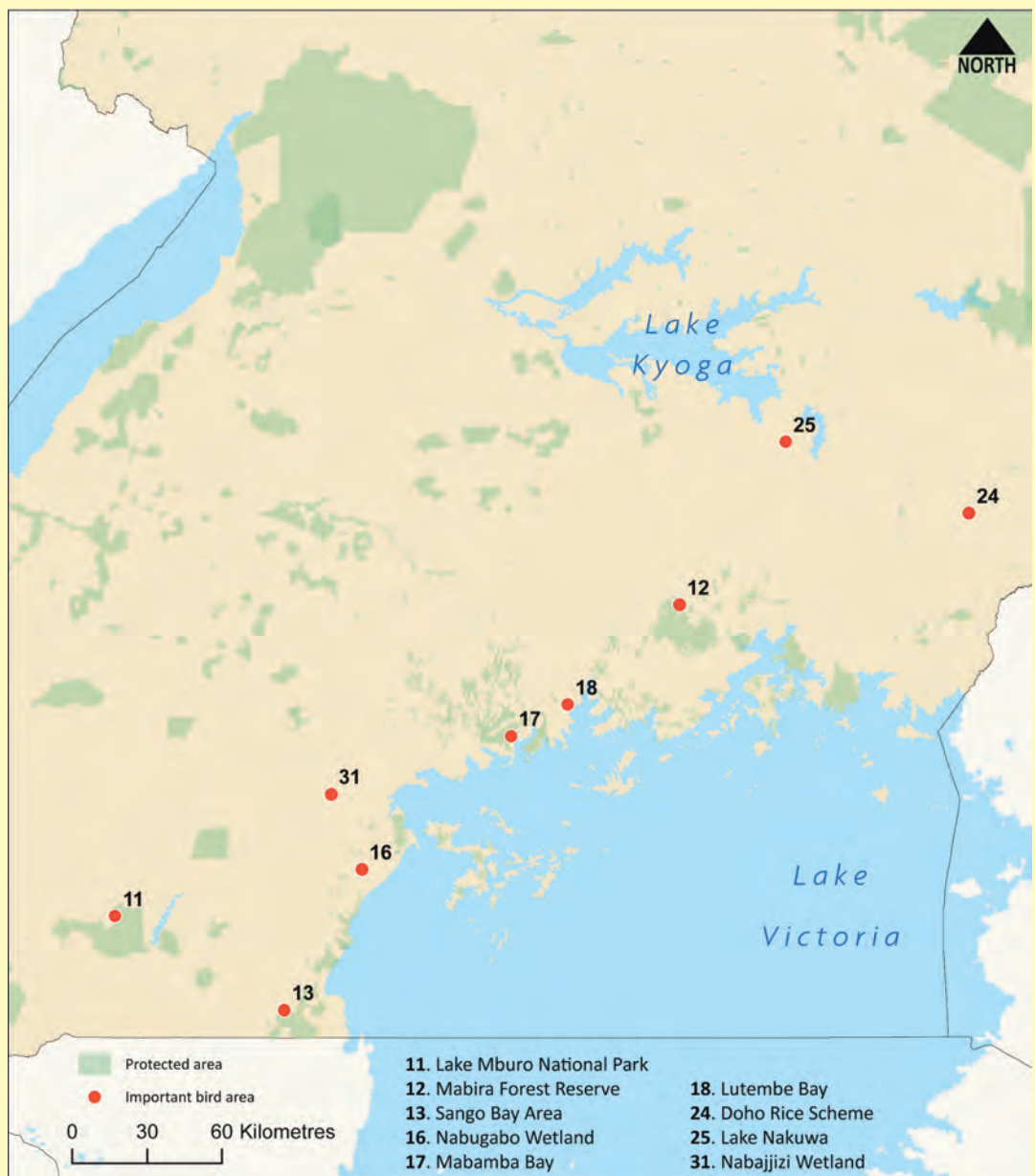
Lutembe Bay is habitat to both native and Palearctic migrant birds. They come mainly from the Arctic region that includes mainland Europe, the Scandinavian countries and Russia. Nine out of 12 months are spent here and they only go back to Europe to breed. Lutembe Bay is one of Uganda’s 33 Important Bird Areas (IBAs). The bay is notable for its population of as many as 1.5m White-Winged Tern and over 70% of the global population of White-Winged Black Terns (*Chlidonias leucopterus*), large numbers of the Grey-Headed Gulls (*Larus cirrocepharus*), Black-Headed Gulls (*Larus ridibundus*) and Gull-Billed Terns (*Sterna nilotica*). Apart from Palearctic migrant birds, Lutembe is also home to seven globally threatened species like the Papyrus Yellow Warbler, Papyrus Gonolek, Shoebill, African Skimmer, Great Snipe and Madagascar Squacco among others.



African Skimmer

Hector16 / Flickr / CC BY 2.0

Map Source: Nature Uganda 2009;
Source: Byaruhanga and others 2002, Birdlife International 2015, Boere and others 2006



Location of the Important Bird Areas (IBAs) around Lake Victoria

built further into the wetland. This building continued into 2013 and 2014 as shown in the image. There are other flower farms in the surroundings as well as a few settlements. These have both been expanding steadily and getting closer to the wetland. The pressure on the wetland for development is intense pitting development and conservation against each other. Urgent attention is required, considering the value of this wetland.

Lumpewo Wetland (Kajjansi)

Lumpewo wetland forms part of the boundary between Ssisa and Makindye subcounties and is located roughly 2 km off Kampala-Entebbe Road west of Kajjansi extending to the lake shore. Nearby villages include Lweza, Katende, Bweya, Birongo and Dewe. The inflow includes Rivers Kakuku, Kyetinda and Kajjansi. The catchment includes Bweya, Bwebajja, Kitende, Wasozi and Nabusanke hills. In 1996, the wetland was dominated by papyrus with *Miscanthus* sp. and *Loudetia* sp in some parts. Sitatunga and Crested crane were present.

The threats include drainage for agriculture, pollution, brick making and over-harvesting of clay and sand (WID 2000b). The edges of the wetland area especially in Kirongo have been exposed to extensive sand mining activities

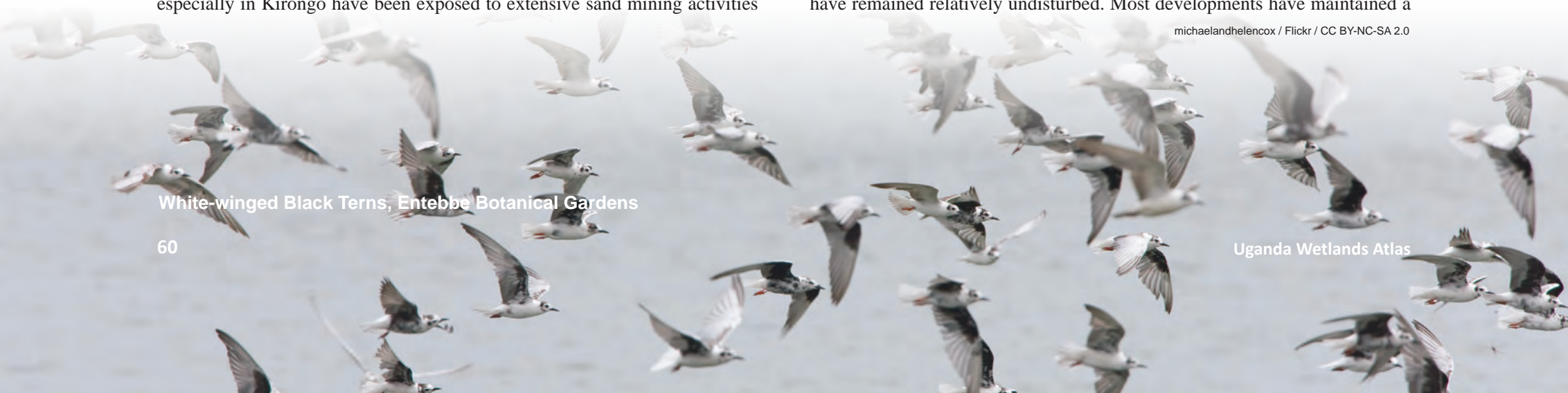
leaving behind many open pits. Brick-making is common in the upstream area close to Kajjansi Trading Centre. The wetland in areas like Ssisa and Kajjansi are also under threat from settlement expansion from Kampala as land availability decreases and prices soar. The 2014 image shows a large portion of the wetland covered by developments with the eastern part of Ssisa also showing signs of encroachment (Figure 2.14). Cultivation has been on the increase since 2004, although part of the catchment is protected by an existing tea estate. Further analysis of the satellite images shows an increase in water bodies in the Kajjansi system. This could be attributed to an expansion in fish farming and increased runoff from built up areas in the surrounding such as Seguku.

This wetland is very close to the Lutembe wetland which is important for biodiversity conservation. Lumpewo wetland could provide important buffering function if its ecological integrity is maintained.

Kisubi Bay Wetlands

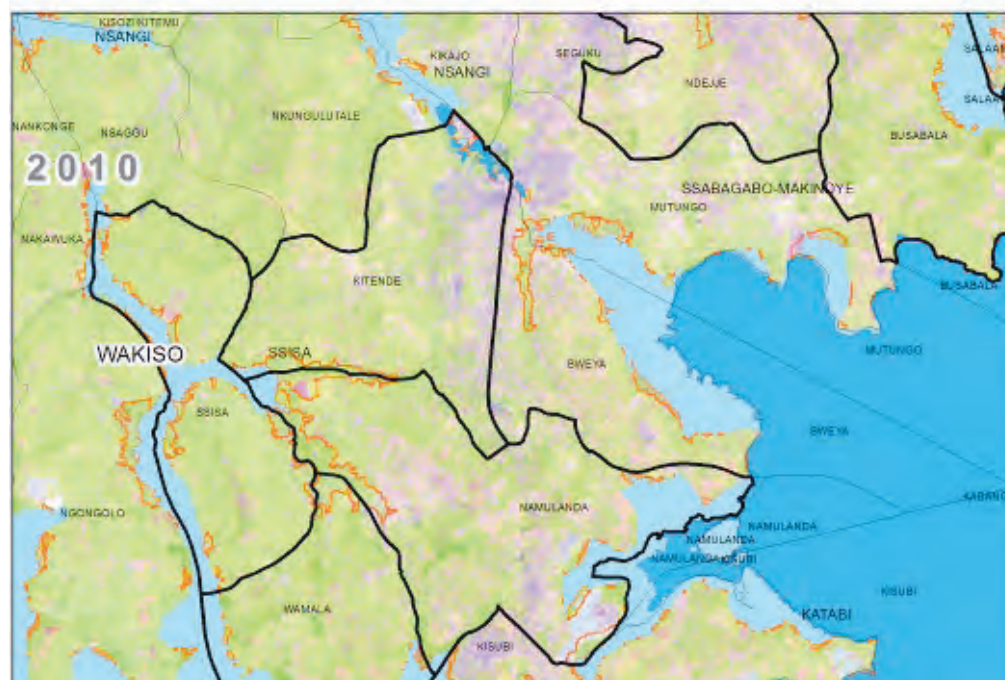
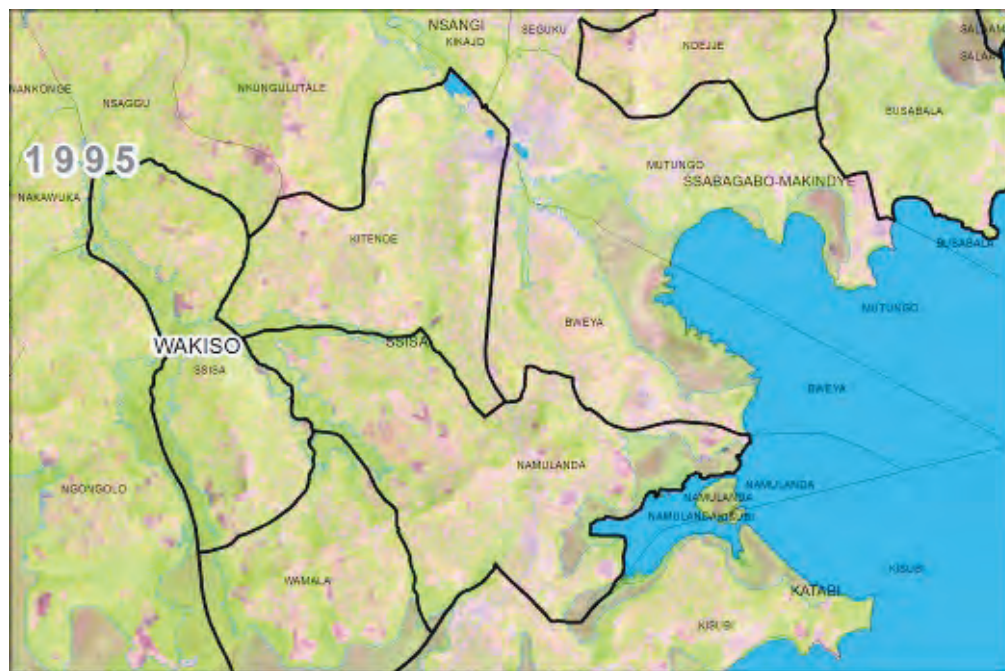
Kisubi Bay is one of the areas on the Lake Victoria shoreline which reflects a good land use system side-by-side with a wetland. The wetlands and shoreline have remained relatively undisturbed. Most developments have maintained a

michaelandhelencox / Flickr / CC BY-NC-SA 2.0



White-winged Black Terns, Entebbe Botanical Gardens

Figure 2.14: Changes in Kajjansi and Ssisa wetlands



distance from the shoreline which is a requirement under the law that requires a protection zone of 200m to be maintained around major lakes. Even the green houses have maintained a greenbelt along the shoreline and the water in the bay reflects as black which is the colour for clean water.

Entebbe Peninsula Lakeshore Wetlands

The Entebbe peninsula has four main wetland systems namely Kanyamusanga, Namiro, Lunyo and Busambaga. All the wetlands along the shoreline of the peninsula, are located on the western side in Waiya Bay in Entebbe Municipality. The Kanyamusanga wetland is located in the valley below Musooli-Bunonko, Mayanzi, Bugungu and Entebbe International Airport. Namiro wetland is in the valley between Entebbe International Airport and Kiwafu. Lunyo is situated in the valley below Katabi, Busambaga, Lunyo and Banga; while Busambaga is to be found in the valley below Busambaga.

Miscanthus is the main species with scattered papyrus and *Typha* species. Papyrus mostly occurs on the fringes and at the lake shoreline. The wetland is part of Entebbe Bird Sanctuary. When it rains in Entebbe, the wetlands serve as filters allowing sediment and nutrients from the storm water to be retained thus ensuring the quality of the water in Waiya Bay. This Bay is noted for high quality of water due to the fact that the wetlands still perform their ecological functions.

Kanyamusanga wetland performs tertiary treatment of sewage from the airport while Namiro performs a similar role for the area in the vicinity. The wetlands are intact except for Namiro where cultivation has been on-going since 2006 and continues to expand from the edges. To-date, the cultivated area covers about one third of the wetland and has reduced the natural vegetation that provides buffering functions. The cultivation is taking place just below the sewerage ponds. There has been a gradual increase in settlements over the last ten years. The areas of Katabi and Kiwafu are now heavily settled with settlements very close to the wetlands.

Namiro wetland was at the centre of controversy in 2013 when it was claimed by an individual, highlighting some of the challenges faced by District Land Boards. The law is clear on the matter of ownership of land in wetlands and therefore land titles should not be issued in wetlands.

Tende Bay Wetlands

Tende Bay is situated between Lyamutundwe and Kisubi along Entebbe Road. Two wetlands are located here. They are generally intact and the major activity taking place is sand mining with abandoned pits visible. The activity continues to expand up to today. Fish ponds were established in 2005 upstream of the wetland close to Lyamutundwe; and by 2011 settlements were growing on both sides of the wetland especially close to Entebbe Road. There are also big estate developments and flower farms within the vicinity of the wetland located on the road to Garuga.

The area has sand reflections and this means that the wetlands are recipients of silt that comes along with storm water. Conversion of these wetlands will increase siltation in the bay as well as the lake. It is necessary to protect them so that they can continue to provide the buffering function to the lake.

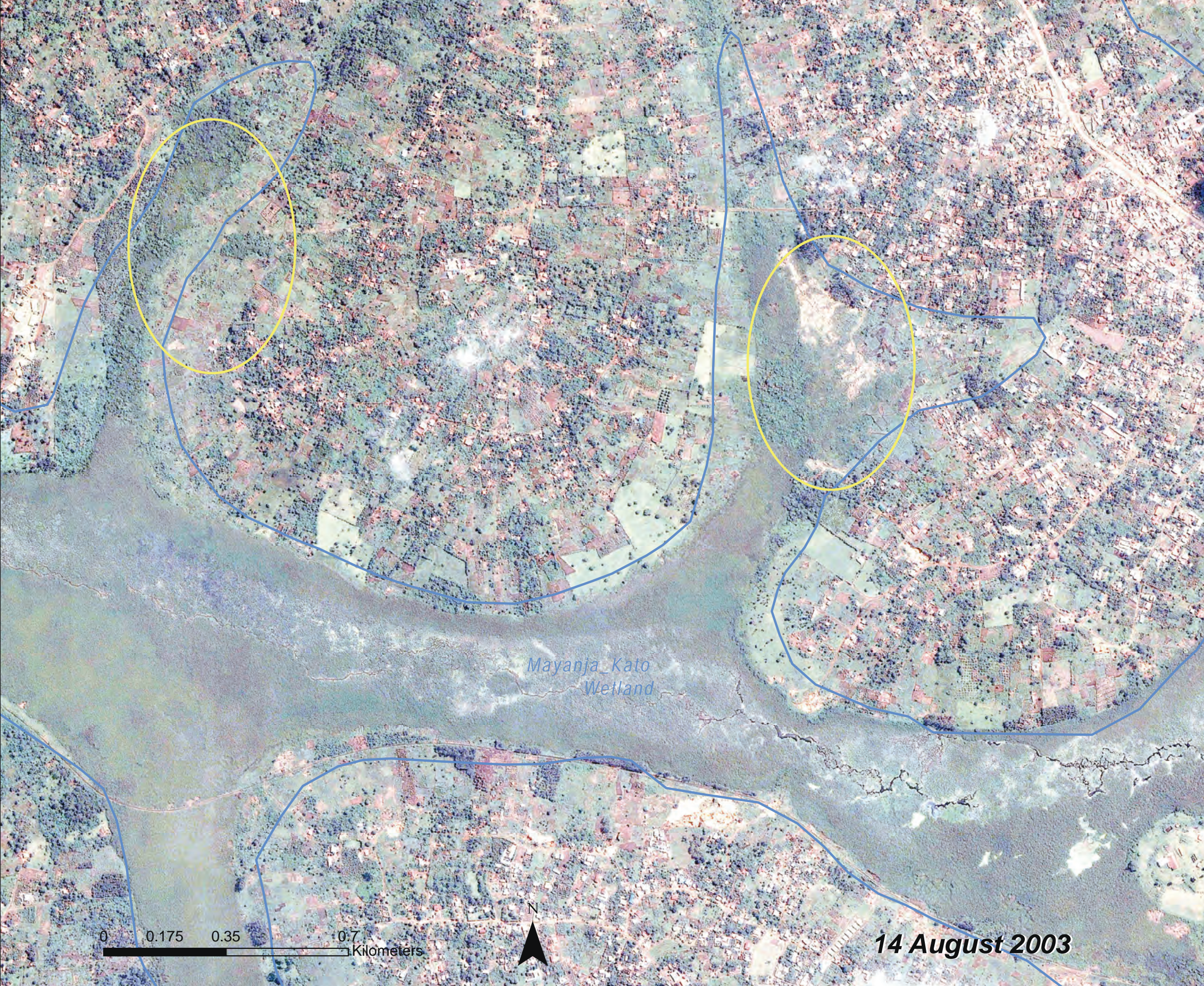
Nambigirwa Wetland

This is a shoreline wetland found on the eastern side of Waiya Bay, extending approximately 6 km inland. Kalandazi, Nalumenya and Mugomba riverine wetlands are tributaries of this vast wetland. Nambigirwa wetland forms part of the boundary for the subcounties of Entebbe Municipality, Katabi and Ssisa. Located west of Kisubi and north of Kitubulu, it is accessible along Entebbe road.

Papyrus and *Miscanthus* sp are common and there are pockets of swamp forest with *Raphia* sp. along the edges and upstream area of the wetland. The wetland is a habitat for a number of cranes and other birds; Black and White Colobus monkey's are also present. Although Sitatunga and Bushbuck were common, the numbers have vastly reduced due to hunting activities.

The wetland acts as a sediment and nutrient trap adequately buffering the lake. This is important since the green spaces that would allow for infiltration of storm water in the immediate surroundings are limited.

Although Nambigirwa wetland is generally intact, pressure from settlements is growing especially along Entebbe road close to Namulanda, Kisubi, Lyamutundwe, Bayita Ababiri and Katabi areas. Settlements have intensified and grown right down to the edges of the wetland. The development of a new road (Entebbe Express) in 2013 through Sekiwunga in Ssisa subcounty is likely to attract developments that will intensify settlements on the side of Ssisa subcounty introducing more pressure towards the wetland. Protecting this wetland early enough will define the limits for developments into the wetland so that it continues to serve its ecological function.



Mayanja-Kato

River Kafu System

The Kafu drainage system consists of the permanent wetlands of Mayanja and Lugogo that drain into the River Kafu. Within Wakiso district, the main wetlands in this system are the Mayanja Kato and Mayanja Wasswa which also have several other smaller ones draining into them. Some of these tributary wetlands include Namaya-Mwerango, Muyobozi, Munyika-Mondo, Tugavune, Katabana and Nasirye (Nastri).

Mayanja-Kato Wetland

This wetland is permanently flooded and covers an area of 54.1 km² (WID 2000b) It is set in a relatively thin but long valley formed between many small hills, including the section called Lubigi on the map. Some of the tributaries that feed it include Namaya-Kasenso-Mwerango, Muyobozi, Nonve and Kanyogoga. It joins up with Mayanja-Wasswa wetland which

then drains as Semugabi in Mubende district. Its catchment is extensive and many rivers feed it. The main ones include Kanyogoga, Nabazizi, Namusizabulusi, Kasomba, Wakyato, Balisanga, (Tulivle), Nonve, Nalubagga, Nakatumbe, Namitanda, Kasiwa, Wemago, Nakinyika, Namukyama and Kayanja. Most of the rivers are in deeply incised valleys and have indefinite water courses which give rise to the wetlands. The main vegetation is papyrus. There is swamp forest along some stretches with some areas dominated by *Piptadeniastrum*, *Albizia* and *Celtis sp.* The wetland has Sitatunga and Bushbuck; while the swamp forest is rich with monkey species mostly the Red-tailed monkey. Some riparian wetlands with forests are protected under Central Forest Reserves. The main threats in the area include over-harvesting of papyrus in some parts such as Lubigi, irresponsible dumping of garbage, brick making and deforestation. Hunting and agriculture is also carried out on the seasonal fringes of the wetland. The satellite images of 2004 and 2014 show changes in the informal settlements especially in areas of Bulenga, Bulaga and Sumbwe.

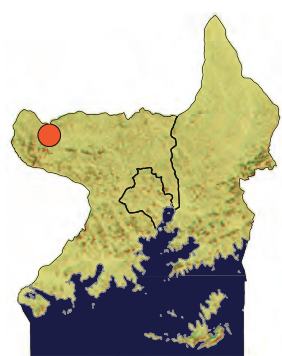


River Kafu system



Miscanthus

D H Wrighty / Flickr / CC BY 2.0



Mayanja Wasswa

Mayanja Wasswa Wetland

Mayanja Wasswa is a permanent wetland extending over an area of 45.0 km² in the subcounties of Namayumba, Kakiri, Masulita, Wakiso and Gombe. It is about 7 km north of Kakiri on Hoima road and stretches all the way from Matuga hill (WID 2000b). The rivers draining into the wetland have indefinite water courses with impeded drainage with the exception of a few. There are many seasonal wetlands linked to it. The watershed is quite extensive.

In the permanent wetland, the dominant vegetation type is Papyrus; while in the seasonal wetlands *Miscanthus* and occasionally *Phoenix* are common. Among the animal species are Sitatunga and Bushbuck. The main activities include hunting, cultivation and ranching along the seasonal fringes. Over-harvesting of vegetation is an emerging problem. Settlements and brick-making are also increasing in the immediate surroundings.



River Mayanja

MWE

CONCLUSION

This chapter has provided an overview of the major wetlands in the study area, categorizing them by the major lake or river system to which they belong. It has also highlighted some of the challenges that the different wetlands face. These challenges are set to increase intensifying the pressures on the wetlands and leading to further degradation unless the underlying drivers are tackled.

An understanding of the main drivers of wetlands degradation is thus necessary to aid any decision making on wetlands. These are discussed in Chapter 3 that follows.

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Flooding at Kinawataka washing bay

CHALLENGES AND CONSTRAINTS OF WETLANDS MANAGEMENT

DRIVERS OF WETLANDS CONVERSION

INTRODUCTION

Population and socio-economic growth are the two main forces driving wetlands change in the study area. The links between population change, economic activity and wetlands degradation are well documented. These interlinkages create and shape each other, driven by human actions or proximate causes. These proximate causes stem from the requirement to provide the very basic human needs of shelter, food and water among others. In trying to provide these necessities at an individual level, people will indulge in various activities that impact the environment differently. The activities include agriculture (expanding land requirements, land tenure issues, floriculture and siltation); settlement (expanding settlements, water supply, water purification and over-extraction of resources); industrial development and tourism.

These drivers of change are of concern because by causing or promoting wetlands change and degradation they undermine the ability of the wetlands to provide the ecosystem services for which they are so valued. Wetlands destruction costs Uganda nearly U.Shs 2 billion per year; and contamination of water resources which is partly caused by reduced buffering capacity of wetlands near open water bodies costs the country nearly U.Shs 38 billion annually (ARCOS undated).

Key messages

Wetlands degradation costs the country about Ugshs 2 billion per year.

The main drivers of this degradation are the activities associated with high population and socio-economic growth such as agriculture, settlements and industrial developments.

High population growth creates high demand for land and enormous pressure on natural resources especially wetlands.

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.

Poor land management has led to confusion regarding wetlands boundaries and issuing of land titles in wetlands which is against the law.

Photo: Peter Tang Dalsgaard / World Fish / CC BY-NC-ND 2.0

Feeding fish





Settlements in Kasokoso in Kira Town Council

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Population explosion

Kampala, Wakiso and Mukono are among the most populated areas in Uganda. According to the provisional results of the 2014 National Census, Wakiso District was the most populous in Uganda, with a population of 2,007,700 followed by Kampala with the population of 1,516,210. Mukono District is the 7th most populous district with a population of 599,817. Kampala City currently absorbs 25% of the national urban population down from 41% in 1991 (UBOS 2014). This decline is indicative of the fact that the smaller urban centres around it are growing faster. For instance between 2002 and 2014 Wakiso Town Council had the highest growth rate (11.9%) while Mukono Municipality with a growth rate of 10.4% was the third fastest growing urban centre in the country (UBOS 2014). Kampala's growth rate between 2002 and 2014 was 2%. This confirms that Wakiso and Mukono are under pressure as peri-urban areas and also due to their proximity to Kampala are taking in the overflow from the city.

The household size in 2014 ranged from 3.5 in Kampala to 4.0 in Mukono; and the district population growth rate in Wakiso was 6.61% per year as shown in table 3.1 (UBOS 2014). This high population growth creates high demand for land and enormous pressure on natural resources especially wetlands (Box 3.1).

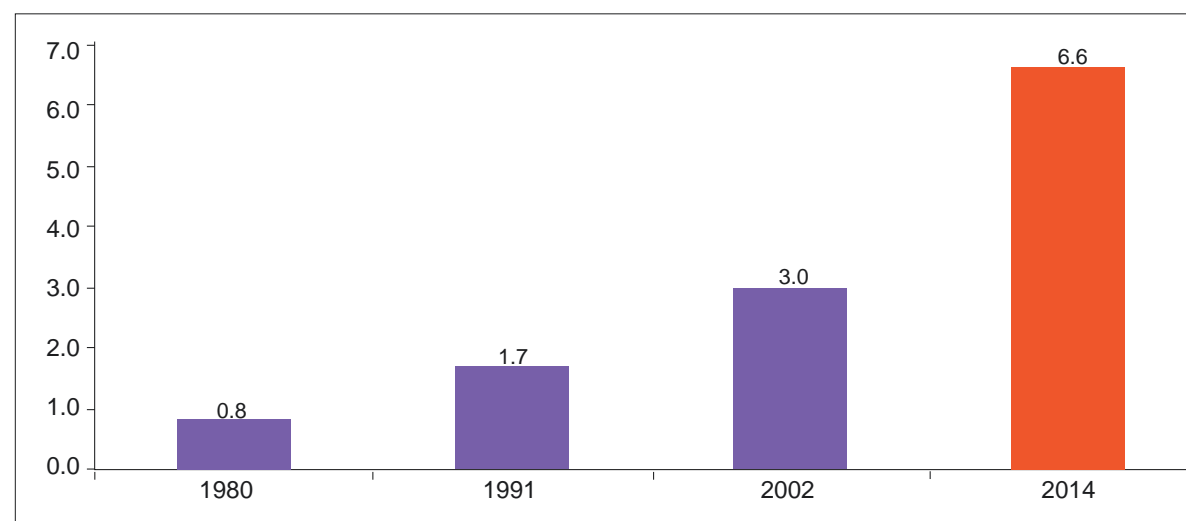
Urbanisation is on the rise (Figure 3.1) and so is the phenomenon of urbanized rural life. This is mainly as a result of employment in the towns which forces unemployed migrants to utilize wetland resources to make a living (Lwasa 2005, Byaruhanga and Ssozi 2012). The wetlands prove attractive because

Table 3.1: Key Population indicators in 2014

District	Total population (1980)	Total population (1991)	Total population (2002)	Total population (2014)	Average household size (2014)	Population growth rate (%) (2014)
Kampala		74,247	1,189,142	1,516,210	3.5	2.02
Mukono		319,434	423,422	599,817	4.0	2.91
Wakiso	389,400	562,600	907,988	2,007,700	3.9	6.61
Uganda	12,600,000	16,700,000	24,200,000	34,800,000	4.7	3.2

Source: UBOS 2014

Figure 3.1: Urban Population 1980, 1991 and 2002 and midyear (2014) projection (in millions of people)



Source: UBOS 2014

Note: 1980, 1991 and 2002 data is from population censuses while 2014 data is a projection.

they are highly productive areas seemingly free of encumbrances; where land is presumed free or cheap (Box 3.1). Even when legal protection is obvious institutional weakness and political interference often combine to continue wetland encroachment and degradation. The threats to wetlands and human activities include drainage for urban and industrial development, excessive harvesting of vegetation such as papyrus for making crafts, palms and wetland woods for fuel; clay mining for brick and tile-making; and overuse for effluent discharge. Some of these are shown in Table 3.2.

Table 3.2: Human activities in wetlands and their impacts

Activity	Likely problems caused by this use
Drainage	Abstraction of water results into a net decrease in the water table especially in the valley wetlands.
Grazing	Traditional practices of bush burning to allow for growth of fresh vegetation eventually leads to changes in the ecological character of wetlands.
Clay mining	The open pits that are left behind after abstraction of soil, fill with water creating habitat for vectors that cause diseases such as malaria and bilharzia. It also causes a lowering of the water table and changes the ecological character of the wetland.
Fishing	At present fishing poses no problem but if the net sizes are not maintained at 2-inch mesh for gill nets then the fishermen could deplete the fish population since the nets could also capture young ones.
Cutting of vegetation	At present most of the papyrus being harvested is unsustainable because of repeated harvests at short intervals.
Rice-growing	Has created large areas of monoculture, which among other things, has attracted bird pests. Rapid decline of fertility because of poor management practices where rice is harvested and the straw is burnt.
Sewage	Especially in urban areas that have established sewage treatment works. Such wetlands must be regulated and prevented from silting up or accumulating toxic metal waste.
Hunting	This activity is regulated by Uganda Wildlife Authority, but enforcement is weak. This has led to a reduction in the numbers of wetland-residing animals such as the Sitatunga and the Shoe-bill stork. Bush burning is also undertaken to drive out the animals being hunted.
Sand mining	Most of the sand mining activities are not regulated and as such leave sand borrow pits with stagnant water. Like clay borrow pits, these act as habitat for vectors. In all sand mining areas community roads have been completely destroyed by heavy trucks that transport sand to the markets.
Settlements	Established after reclamation through drainage and dumping murrum. This affects the hydrology, impacts biodiversity and often leads to flash floods. Sanitation is also a big challenge leading to contamination of surface and ground water which results into disease and epidemics.



Expansion of Miami Beach into Lake Victoria

Box 3.1: Expanding settlements as a proximate cause of wetlands degradation

Several factors impact the rate of urbanization in the country. These include natural urban population growth, the creation of new urban administrative units, re-gazetting of some urban areas, poverty that leads to rural-urban migration in an attempt to enhance earnings, insecurity in some areas or internal migration due to natural causes as was seen in the 1980s when crop failure led to a flood of migrants to Kampala (Mukiibi 2011, UBOS 2014, KCCA 2012).

In many urban areas, there is a growing trend of unplanned settlements. The driving forces behind this growth include the high cost of land, inadequate supply of affordable housing and high rates of poverty (Nyakaana and others 2007). Further although some of the urban areas have development plans, there is a disconnection between the urban plans and their implementation. For example despite the existence of a Physical Development Plan for Kampala, residential, commercial and industrial infrastructure is being erected in areas that are not planned for them. In Mukono, manufacturing, including growth of the timber and fishing industries, has attracted migrants seeking employment; with the rate of growth in some of the urban centres

like Mukono municipality estimated at 10.4% (higher than Kampala which averages 2%) leading to the mushrooming of unplanned settlements with poor sanitation and waste management practices (UBOS 2014). Such areas where this expansion of settlement is evident include Mukono town and Seeta in Mukono District.

The urban poor end up occupying land informally and at times illegally – mostly in the wetlands where tenure is unclear. The housing in these areas is of poor structure, damp (due to erection in water logged areas), with poor sanitation exposing residents to water borne diseases such as cholera and creating the potential for conflict since housing is built in road reserves hindering access for any planned developments. UBOS (2010) indicates 70.2% of residents in Kampala live in tenements (*mizigo*), the majority (68%) of which are single rooms. These tenements are usually built without adequate sanitation and drainage and usually in fragile areas such as wetlands, making them prone to flooding. Although 87.4% in Kampala use pit latrines (UBOS 2010), open disposal of human waste is common in the slum areas and together with poor maintenance of the sewer system and storm water networks has created avenues for contamination of the water supply network, wetlands, streams, rivers and lakes (Nyakaana and others 2007).

Socio-economic pressures

Wetlands conversion has been found to be positively correlated to built-up area, population density and proximity to roads, market accessibility and market influence (Lwasa 2005). These factors indicate relatively high human pressures on land resources in an area, for example through settlement expansion. Wetlands located close to markets and roads are easily accessible thus more vulnerable to conversion because, for instance, the natural products obtained from the converted wetlands such as crops and livestock products can be traded at markets.

Erratic implementation of economic development plans by the relevant authorities at times encourages wetlands degradation, with investors or even government institutions being licensed to develop wetlands. Pressures on land for development are forcing encroachment to happen in the wetlands. For example, in the Kampala City area the available vacant land is estimated at less than 10% while 7% is covered by wetlands and this has drastically

decreased in the recent past as shown in Figure 3.2 (KCCA 2012). In order to ensure sustainability of the wetlands, development should be encouraged to take place in the peri-urban areas surrounding the city and in neighbouring districts such as Mukono, Wakiso, Mpigi and Buikwe.

Analysis of the key economic hubs of Kampala City and Entebbe Municipality highlights traffic, infrastructure, housing, environmental, social and planning challenges associated with population growth (UN Habitat 2010). This is hindering economic growth. Although much is being done to address these issues (such as the implementation of an urban development corridor between these two towns), greater cooperation between the authorities involved is called for. Other plans include the construction of light rail between Kampala, Wakiso and Mukono (NPA 2007). Enhancing transport between these will greatly ease some of the congestion within Kampala by allowing commuters to reside in the more remote peri-urban areas instead of building housing in the wetlands.

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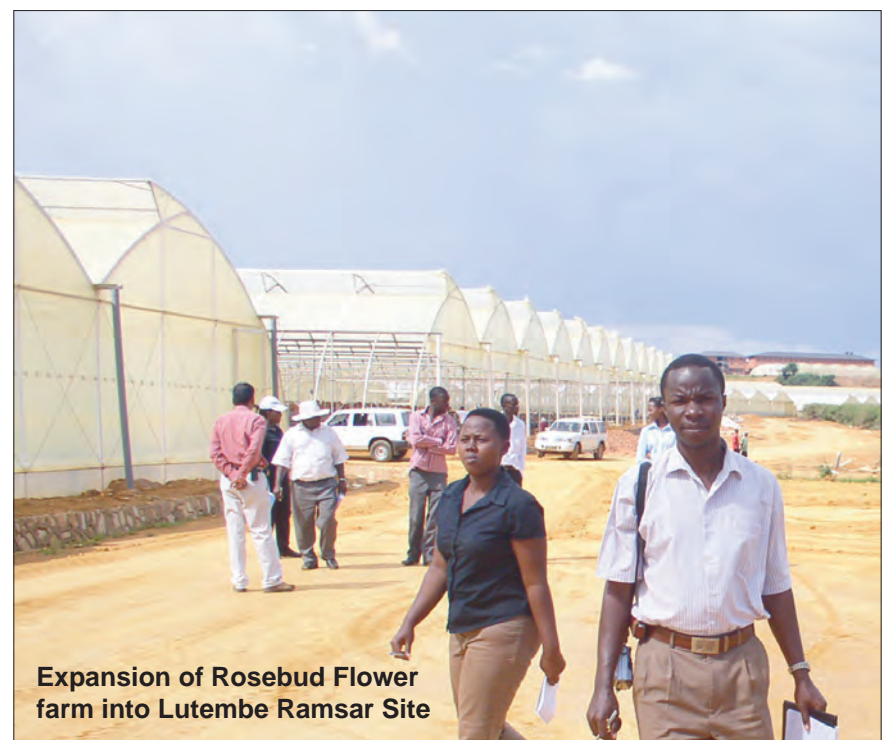


Impounded trucks carrying murrum for infilling into wetlands

Agriculture

Wetlands are ecosystems critical to agriculture for the simple reason that they have a regular supply of water and the soils are usually fertile enough to support crops without the addition of expensive fertilizers. However, there is also a long-standing misconception that drained wetlands provide superior and sustainable returns to crop production. The rash conversion to agriculture over time tends to damage the soil with the result that the initial high yields in wetlands are not sustained. Agriculture involves the seasonal removal of vegetation cover which leaves the wetlands exposed to erosion. This leads to increased sedimentation, loss of soil fertility, reduced water quality ultimately impacting the lake ecosystem. Wetlands contribute enormously to household food security and also indirectly through ecosystem services such as moderation of climate and nutrient retention (Turyahabwe and others 2013a). Proximity to the urban areas of Kampala, Wakiso, Entebbe and Mukono is the driving force behind the increase in wetland areas under subsistence farming along the shores of Lake Victoria as they provide the markets for wetlands produce (Turyahabwe and others 2013b). As seen in Figure 3.3, subsistence farming is the most widespread land use in the study area.

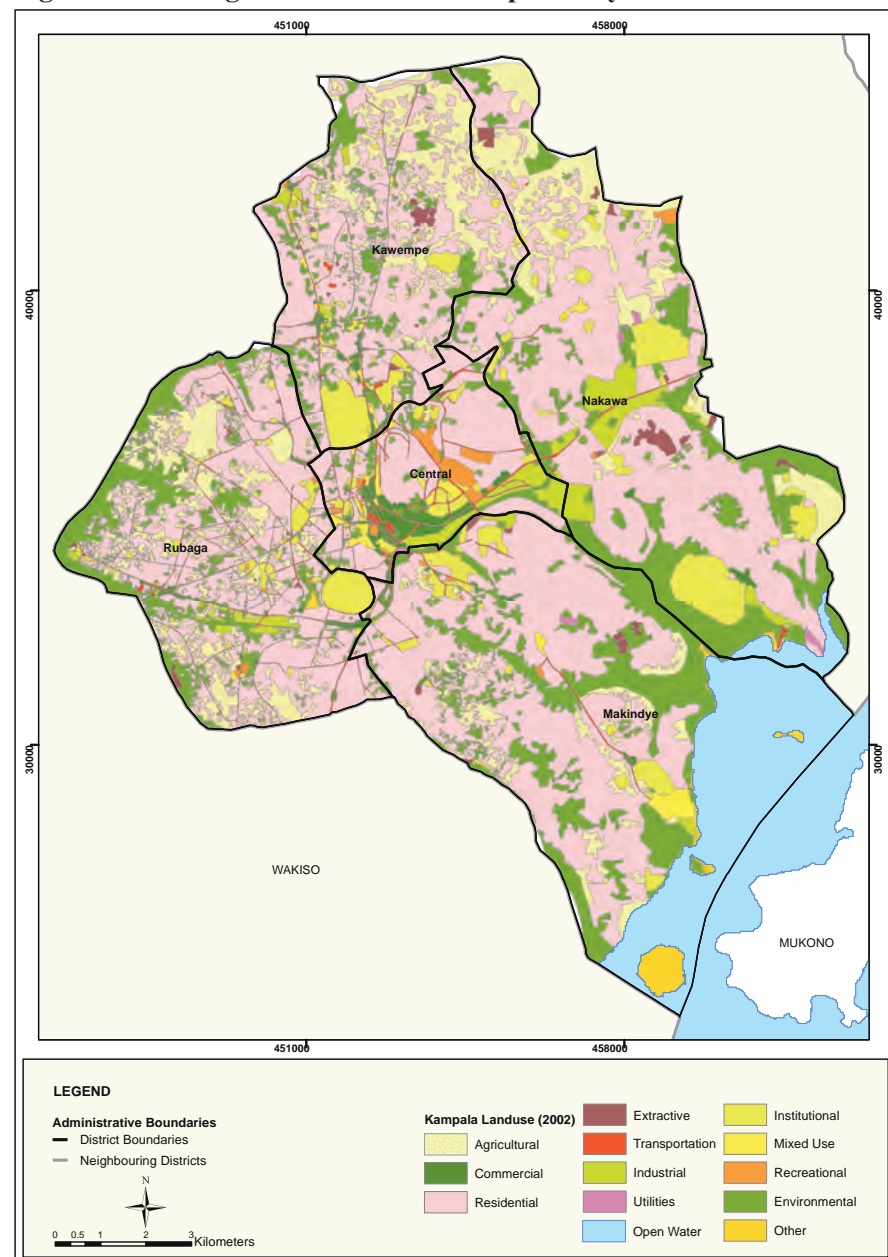
Commercial agriculture is also a threat. Floriculture, for instance, is a growth industry in the Lake Victoria wetlands close to Entebbe such as Nambigirwa, Kachindo and Mabamba. There are 15 flower farms registered with the Uganda Flower Exporters Association some of them operating within the 200m protected lake shore zone (UFEA 2014). A number of issues are associated with flower farms – proximity to the lakeshores, the extensive usage of



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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.

Figure 3.2: Changes in land use in Kampala City



Source: KCCA 2012

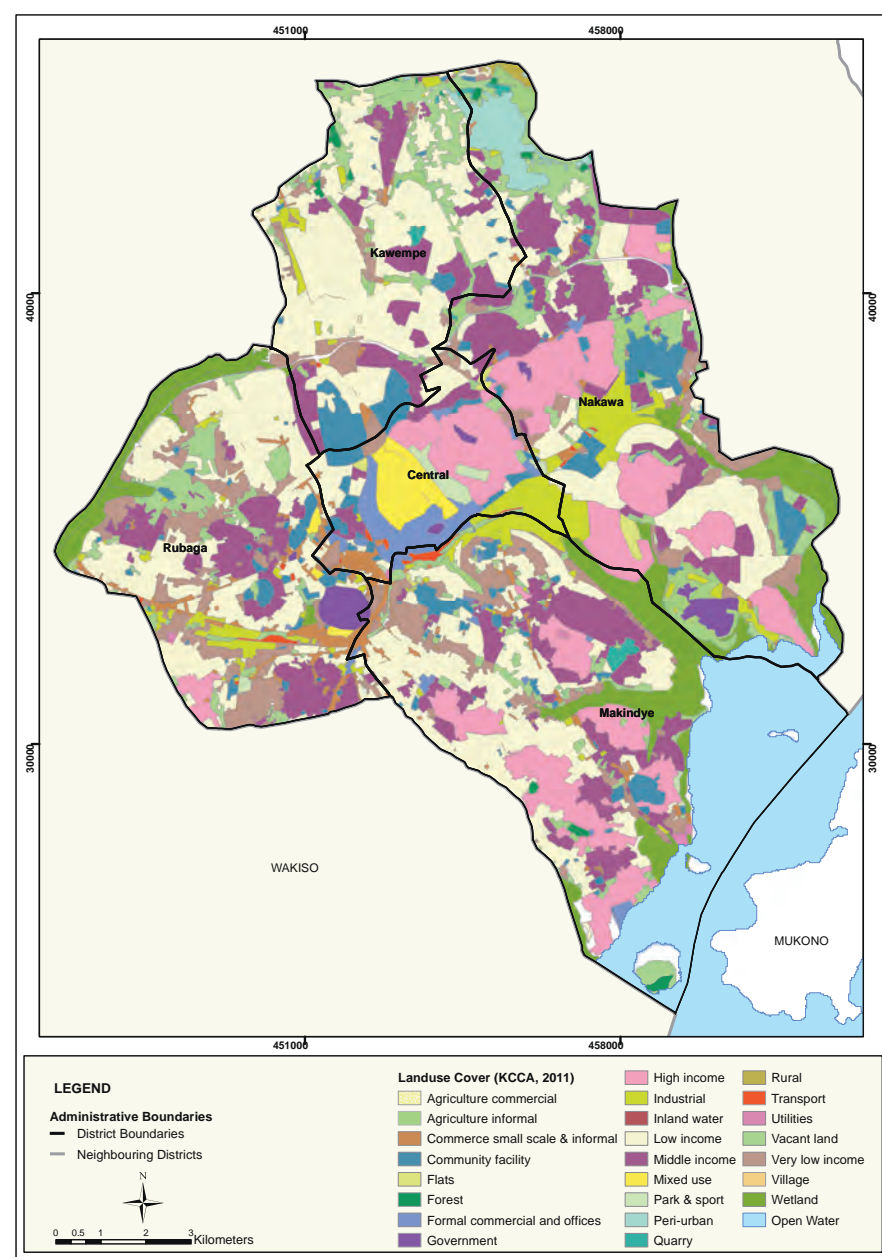
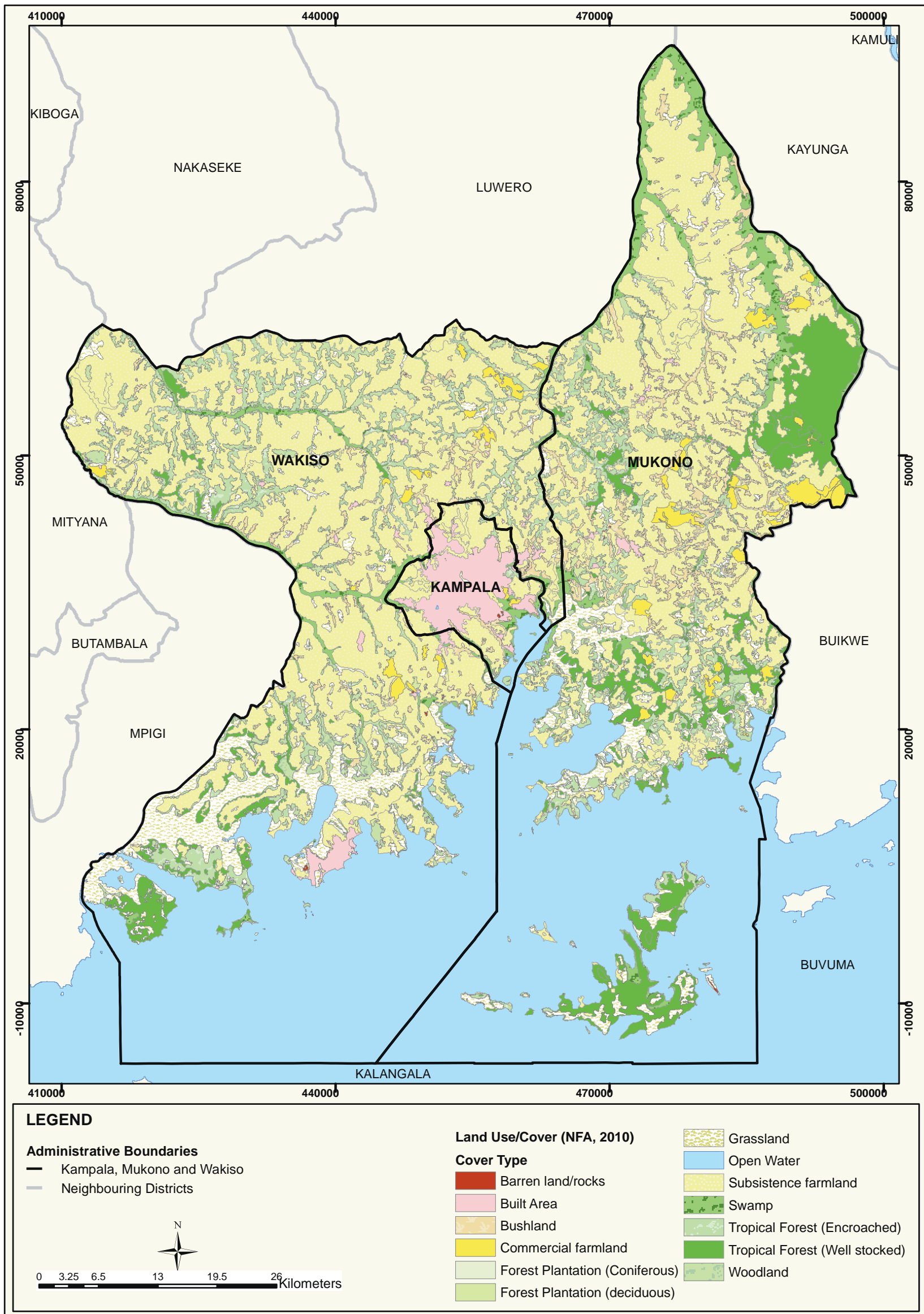
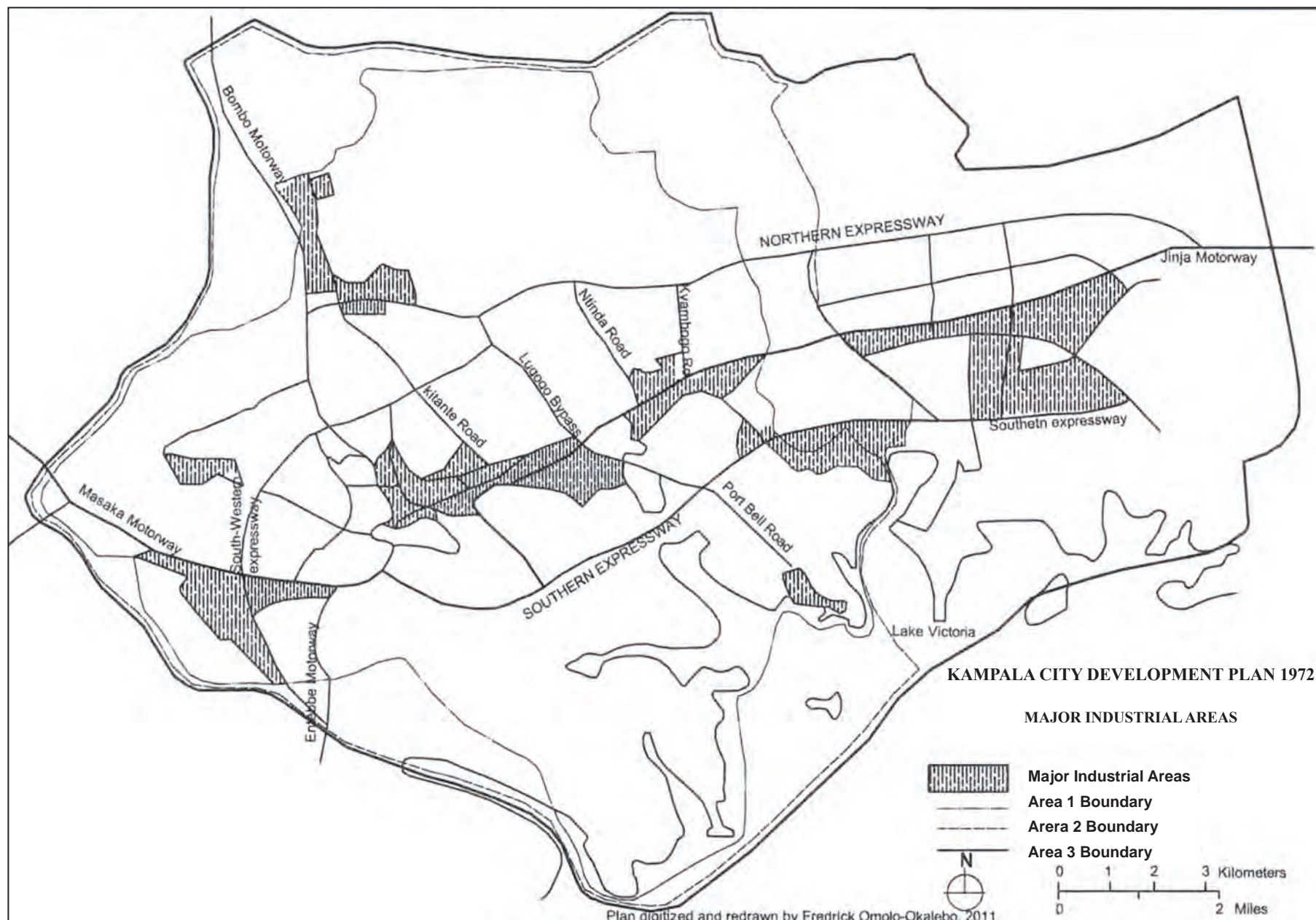


Figure 3.3: Land use and land cover of Kampala, Mukono and Wakiso



Source: NFA 2010

Figure 3.4: Major industrial zones in the 1972 Kampala Development Plan



Source: KCCA 1972

Industrial development

Industrial development has been identified as one of the most detrimental activities on wetlands; and in the urban areas of the study area they are seen as the largest and cheapest land areas available for industrial development. The 1972 Kampala Development Plan issued guidelines for establishing the major industrial areas in the city. These were that the site should have good transport links, be close to high-density residential areas, be dispersed in various parts of the city, be on relatively flat land and not be prone to flooding (Omolo-Okalebo 2011).

To that end a total of 1,678 ha was reserved for industrial development in Nakawa, Ntinda, Nalukolongo, Portbell and Kinawataka (Omolo-Okalebo 2011). Several industries have since been built including fish factories, foods and beverages industries, plastics manufacturing industries, container terminals,

motor vehicle parking yards, detergent manufacturing industries, aluminium products manufacturing industries and ware houses. Demand for land for industry has continued to grow and in the 1990s, government degazetted some protected areas and reallocated the land use. This was the case with Namanve Industrial Park which was hived off from a Forest Reserve (Omolo-Okalebo 2011). Figure 3.4 shows the proposed industrial zones according to the 1972 development plan.

The increasing number of industries is putting pressure on the wetlands. For instance the wetlands between Nakawa and Kireka and part of Nalukolongo are no longer able to perform their function as natural sieves of industrial waste purifying wastewater of hazardous chemicals. Wetlands can only be effective bio-filters under low nutrient loading and abundant swamp vegetation. So the heavy pollution loads from industrial sewerage discharge is likely to impact the quality of water in Lake Victoria.

Robert Lutz / Flickr / CC BY-NC-ND 2.0



THE LAND TENURE ISSUE

Land is the most important natural resource. It is central to livelihoods and human wellbeing and thus it is at the centre of many disputes and much controversy. A great deal of the uncertainty surrounding wetlands revolves around the question of land tenure, ignorance of those who either own or purport to own it and the weakness of institutions charged with enforcing the law.

According to the Constitution and the Land Act, wetlands are held in trust by the Government. This means that the government will protect the wetlands for the benefit of the people of Uganda. The law also allows for wetlands to be used, but as stipulated in the Wetlands Policy, it must be used wisely. This implies that the resource should not be degraded so as to still continue providing the functions as stipulated in Chapter 1.

Complex land ownership issues

Land administration in Uganda has been complicated by the multitude of land tenure systems that exist. There are four land tenure systems in existence – Mailo, Customary, Leasehold and Freehold.

Despite the fact that wetlands cannot be legally owned by individuals, very many wetlands in Kampala district have ‘assumed ownership’. Utilisation of the wetland for a long time by ‘assumed owners’ ends up bringing conflicts when the law is enforced. Most of the wetlands in this category fall under the customary land tenure. The so-called owners eventually begin to transact sale of the wetlands and this complicates matters when the Regulatory Authority begins to implement the law, as is currently happening.

Another complication is to do with those who own Mailo land in Buganda region. Enforcement of the wetlands regulations on private land is expensive as those who may be cooperative, first demand for compensation which may not be budgeted for.

Weak institutions

In many cases, the very institutions that are responsible for protecting and enforcing the law regarding wetlands are the very ones that violate the constitutional provisions. For instance at both Central and Local Government level, there have been instances of wetlands abuse under the guise of providing communities with opportunities for poverty reduction and economic growth. This is happening despite the fact that local authorities and District Land Boards must operate within the requirements of laws such as the National Forest and Tree Planting Act of 2003 or the National Environment Act of 1995 which have specific provisions for land management in fragile areas such as wetlands.

With decentralisation of land management functions there have been worrying trends such as an increase in fake surveys leading to errors like acreage, dimensions or even total absence of the physical plot on the ground in the preparation of titles (PSFU 2010). In Uganda, possession of a Land Title gives the person proof of ownership of the land. So of recent, most Ugandans who had failed to utilise titled wetlands because of the current laws and regulations have resorted to selling on such wetlands to investors or developers, many of whom are foreigners. In other cases, some of the District Land Offices hold survey records that the Central Land Office may not have, complicating the management of survey information at a country level.

Improving the land management function throughout the country is urgently required. However, it is unlikely that the government will expand the enforcement mechanism in the foreseeable future and as such a more effective means of halting wetland abuse needs to be found. This could include streamlining the land management functions of the local authorities and aligning them with the functions at the centre; or by enhancing community policing on issues of wetlands management, planning and enforcement. What is clear however is that there still remains a fundamental weakness in the sense that local authorities have not translated the powers given to them for natural resources management into meaningful action especially as far as wetland resources are concerned.

Trust for Africa's Orphans / Flickr / CC BY-NC-ND 2.0



Socio-economic activities among communities



Expansion of industrial and agricultural activities in a wetland

ADDRESSING THE LAND OWNERSHIP ISSUE

Cadastral mapping

Administering land under the different tenure systems has implications on surveying, mapping and important technical aspects such as the identification of land parcels (PSFU 2010). Cadastral surveys which, in particular, are important for marking or re-establishing boundaries and sub-divisions of land underpin the titling of land; and are a key component of the land administration process.

A cadastral map is a general land administrative tool used by a broad range of people (laypeople and professional) for all manner of things including selling of land, valuation and planning among others. It is useful because it shows all of the land parcels in relation to one another and to the adjoining roads; and can be superimposed on natural features to further aid decision making.

The Department of Surveys and Mapping uses the process of cadastral mapping as a means of defining land boundaries for purposes of showing land ownership or establishing land rights. About 15% of the land in Uganda is under the manual cadastral register and most of this is located in Kampala (PSFU 2010). Survey information for the rest of the country is scattered and patchy.

Wetlands demarcation

The challenges faced in wetlands management today have prompted the government to embark on clearly defining the wetland boundaries using fixed boundary markers. Boundary delineation is being done using remote sensing techniques and Geographic Information Systems. These boundaries will then be gazetted for legal recognition and will then be used by different stakeholders to guide land allocation, ensure regulated use and access depending on prevailing needs. The process of wetlands demarcation started in Kampala and has so far been done for Nakivubo, Kyetinda, Kansanga and Lubigi wetlands with others underway. Box 3.2 describes the process of boundary delineation of wetlands.

Box 3.2: Process of boundary demarcation of wetlands

1. Identify areas of wetland using identified characteristics (hydic soils, hydrophytic flora and a waterlogged environment) as highlighted in Chapter 1.
2. Demarcate the boundaries depending on whether it is a Temporary, Seasonal or Permanent wetland. These three zones can be deciphered according to the degree of soil wetness.
3. The important boundary to be able to determine is the edge of the Temporary zone, as this will demarcate the edge of the wetland habitat. Vegetation and soil characteristics can be used to define this boundary especially if the wetland habitat is undisturbed.
4. If necessary establish a buffer strip around the demarcated wetland to further protect the habitat and water resource.

Source: NCT undated



Illegal settlement in a rural wetland

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Challenges of Wetlands Demarcation

The demarcation of wetland boundaries using visible pillars is not without its challenges. In the areas mentioned, there has been resistance from the communities, pillars have been extracted, officers threatened and bureaucratic red tape created making it difficult to continue the work.

In March 2008, Government of Uganda started the restoration of Kinawataka Wetland at Kasokoso. At that time small scale farmers were opening up the wetland for cultivation and digging drainage channels. The ecological boundaries of the wetland were clearly showed to the people in and contingent with the wetland before the drainage channels were blocked. The restoration exercise resulted into the recovery of the water table of the wetland. Subsequently most of the people within the wetland boundary were displaced by the water. However, in September 2009, the Local Leaders in Kasokoso mobilized the community and they invaded the wetland again and this time started erecting structures, constructing access roads and draining the wetland. This completely curtailed the natural recovery process of the wetland.

For boundary demarcation to be effective the cadastral mapping of the area must be regularly updated so that it mirrors the actual situation on the ground. The next section of this chapter analyses the cadastral overlays in some of the hotspots. It illustrates the ownership challenges and the wetlands management problem.

Hotspots

Wetlands in Uganda have traditionally been used as landmarks to indicate administrative boundaries of parishes, subcounties, counties or even districts. In undertaking this assessment, it quickly became clear that in some parishes wetlands were severely degraded, while in others the situation was not too dire. So it was decided to use parish boundary as the delimiter for the hotspots. The second

The whole of Kampala City (79 parishes) has been identified as a hotspot for wetlands degradation. In Mukono, 15 parishes have witnessed serious wetlands conversion.

reason for using the parish boundaries is because they are the smallest published administrative unit in the country (UBOS 2006). Hotspot parishes in the maps in this document are symbolized by thick parish boundaries.

The whole of Kampala City (79 parishes) has been identified as a hotspot for wetlands degradation (Figure 3.5). In Mukono, 15 parishes have been identified as hot spots for wetlands conversion. These include Namayuba, Kyabazala, Ntinda, Bukasa, Kiwafu, Kawongo, Namaliga, Nakanyonyi, Nabalango, Makukuba, Nagalama, Nanga, Dundu, Bukerere and Kikoko (Figure 3.6). Wakiso district has 21 parishes identified as hotspots for wetlands degradation. Those identified are Kitayita, Bale-Mukwende, Lwemwedde, Mwererwe, Gombe, Migadde, Kiryamuli, Ssanga, Buwambo, Katadde, Wattuba, Nakyesanja, Matuga, Ttikalu, Wambale, Magogo, Buwanuka, Ssentema, Lukwanga, Bukasa and Buloba as shown in Figure 3.7.

Some of the wetlands identified as hotspots in the study area are analysed in the next section: **Cadastral Overlays in Hotspots**. They include Nakivubo, Kinawataka, Kansanga, Kyetinda, Lubigi, Nsooba, Nalukolongo, Mayanja-Kato, Nabisasiro wetlands in Kampala City; Njogezi and Namanve in Mukono District; and Lutembe Bay and Kaliddubi wetlands in Wakiso District.

Figure 3.5: Wetland Hotspot areas near Lake Victoria

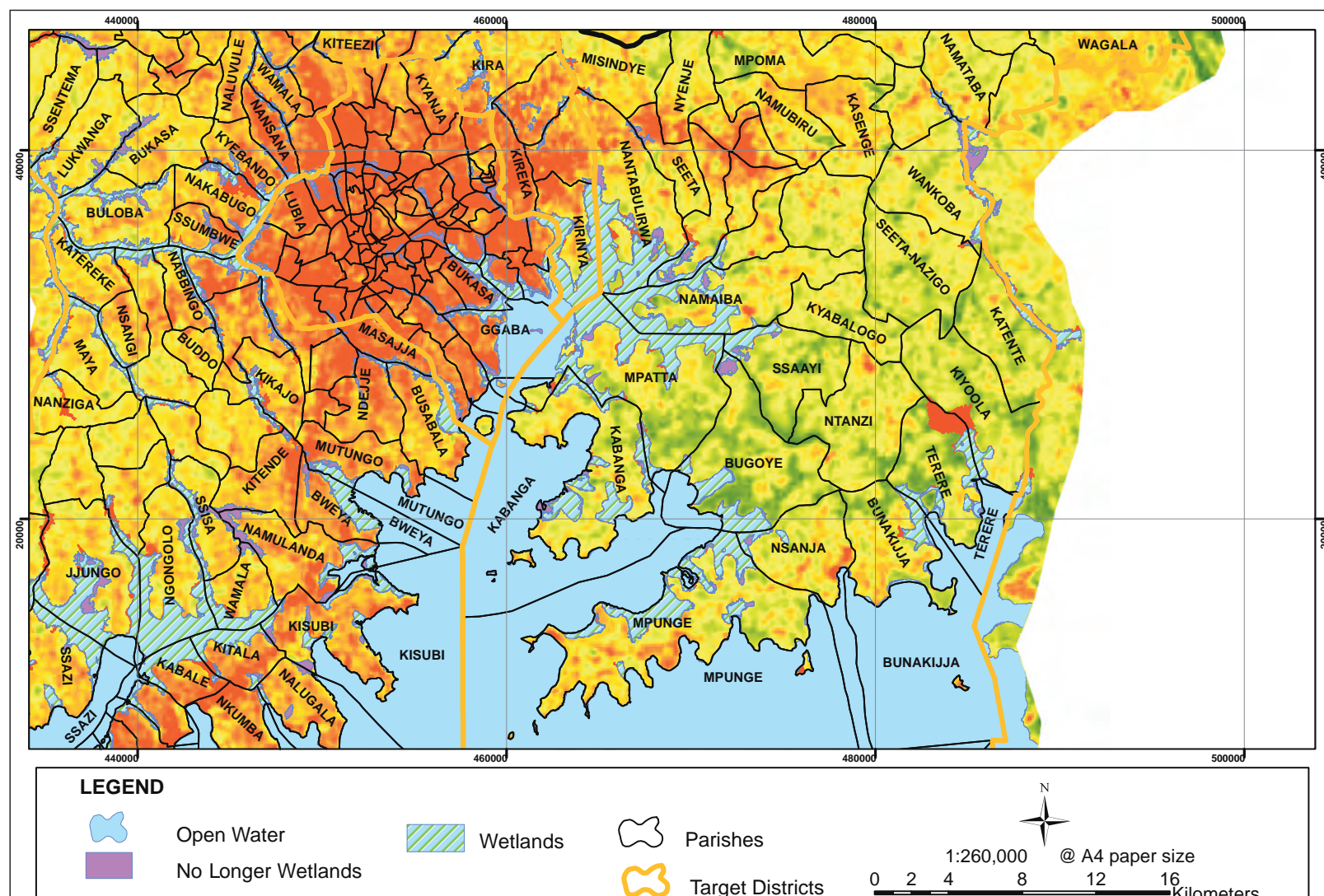


Figure 3.6: Hotspot parishes for wetlands degradation in Mukono District

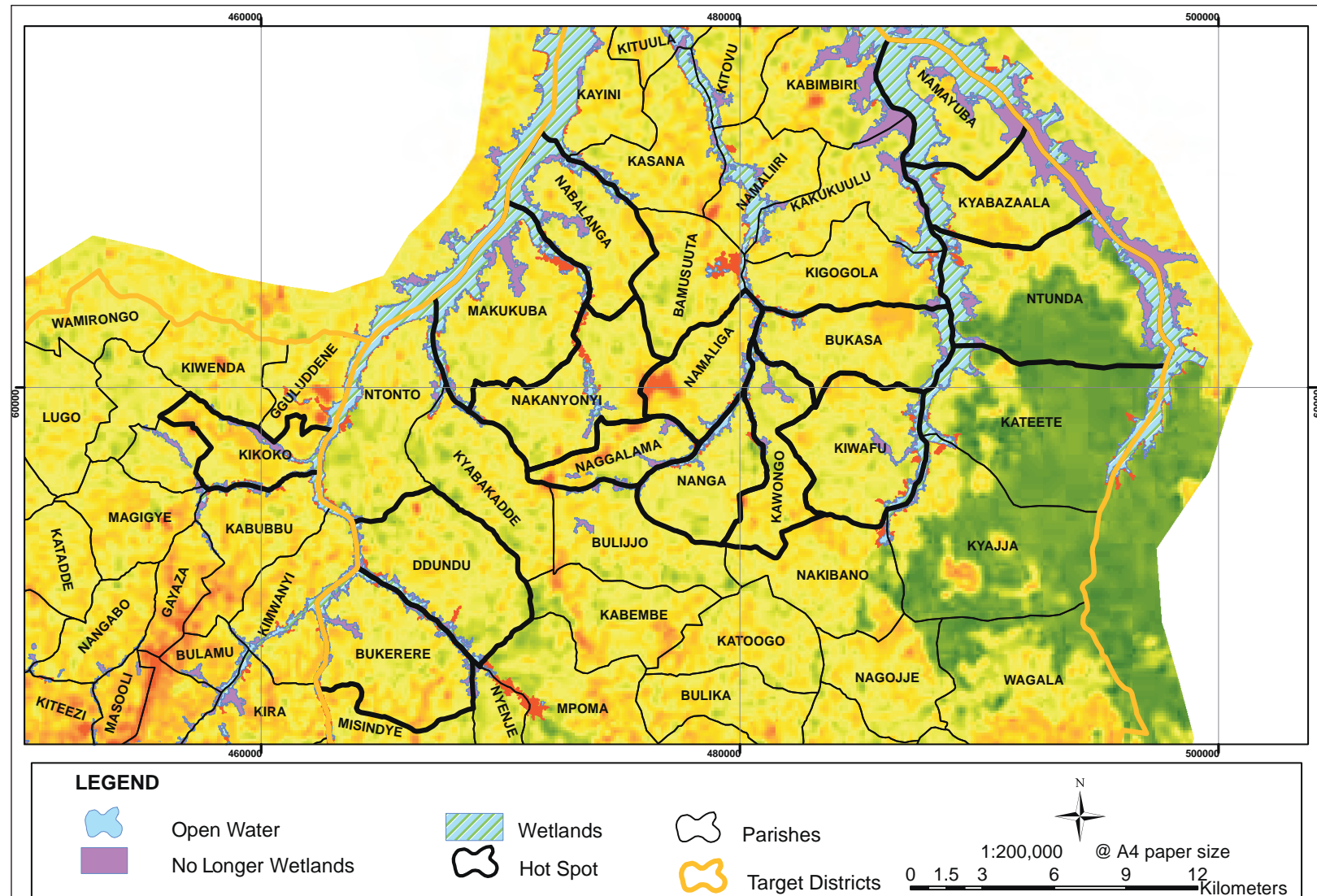
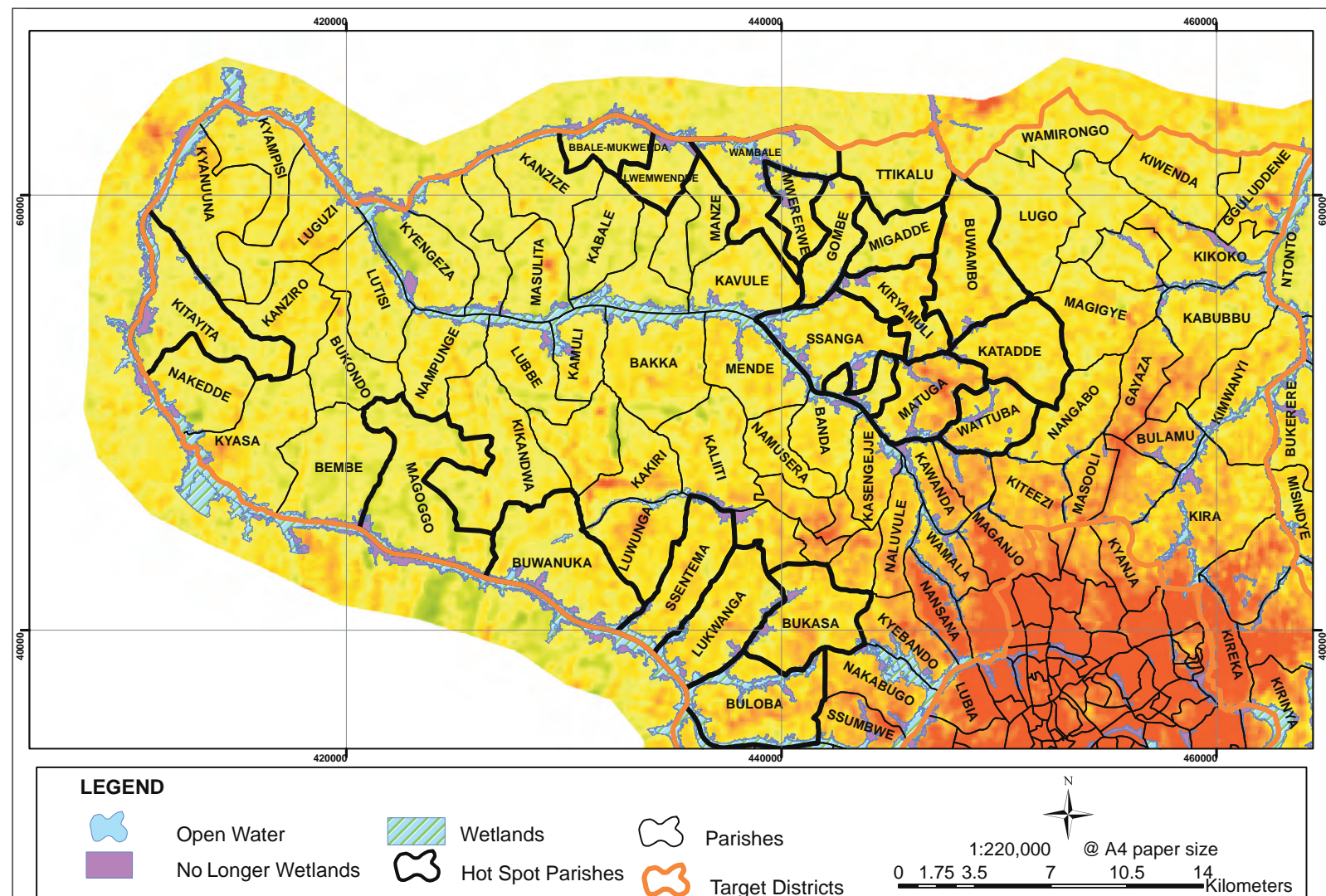
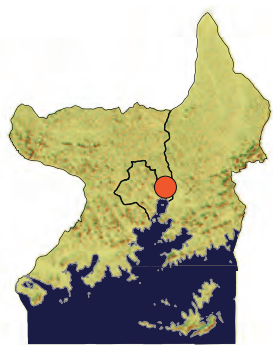
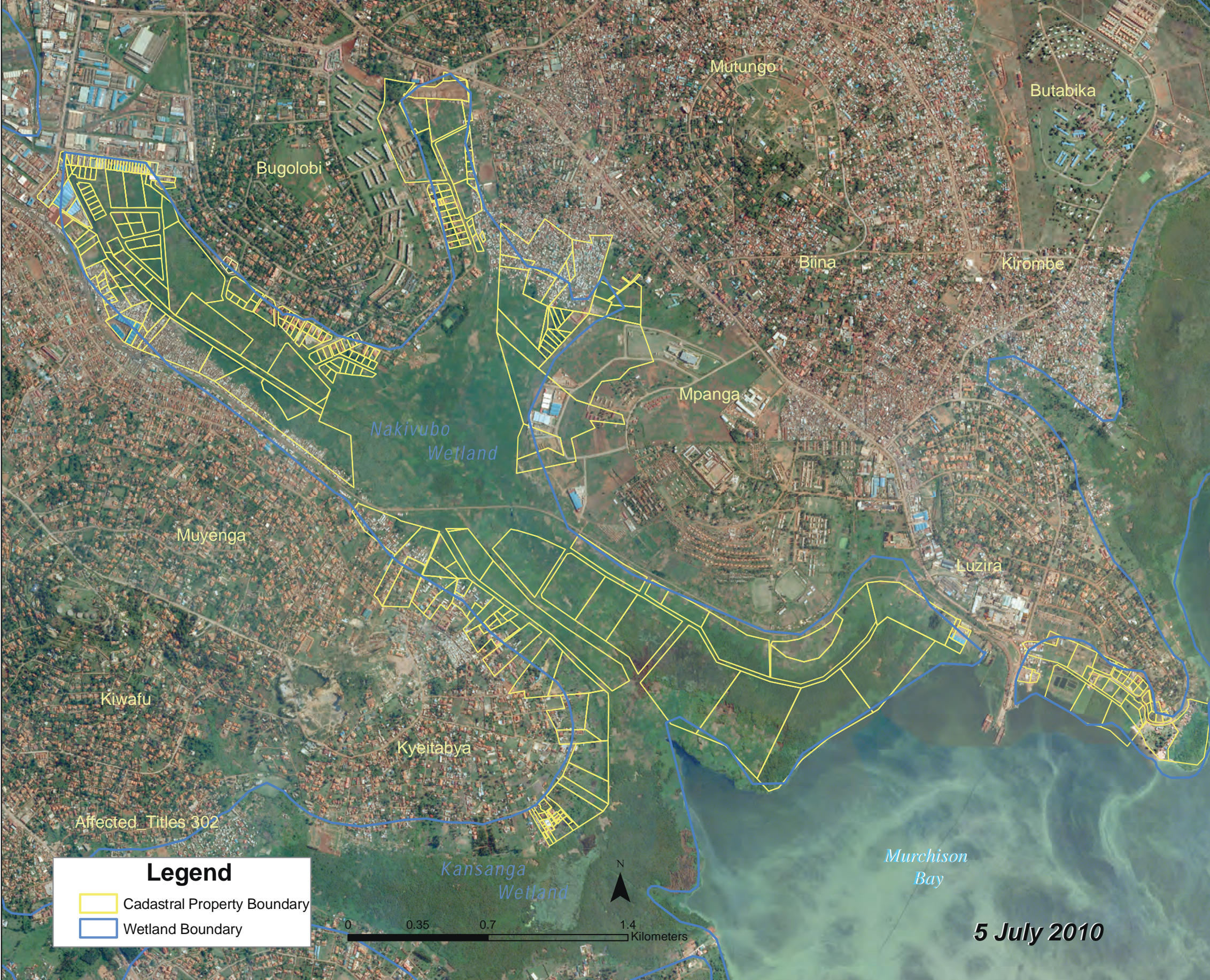


Figure 3.7: Hotspot parishes for wetlands degradation in Wakiso





Nakivubo

CADASTRAL OVERLAYS IN HOTSPOTS

Nakivubo Wetland State

Nakivubo wetland has reduced in size from approximately 2.5 km² to about 5.5 km² within a period of 20 years. The wetland is of particular significance because it acts as a sink for much of Kampala's domestic and industrial effluents. Otherwise this effluent would flow untreated to Murchison bay where Gaba water supply works is located. The wetland therefore plays an extremely important role in maintaining the quality of the city's water. It physically, chemically and biologically removes pollutants and sediments from wastewater which passes through it and reduces the pollution load entering the Inner Murchison Bay through mineralization and sedimentation.

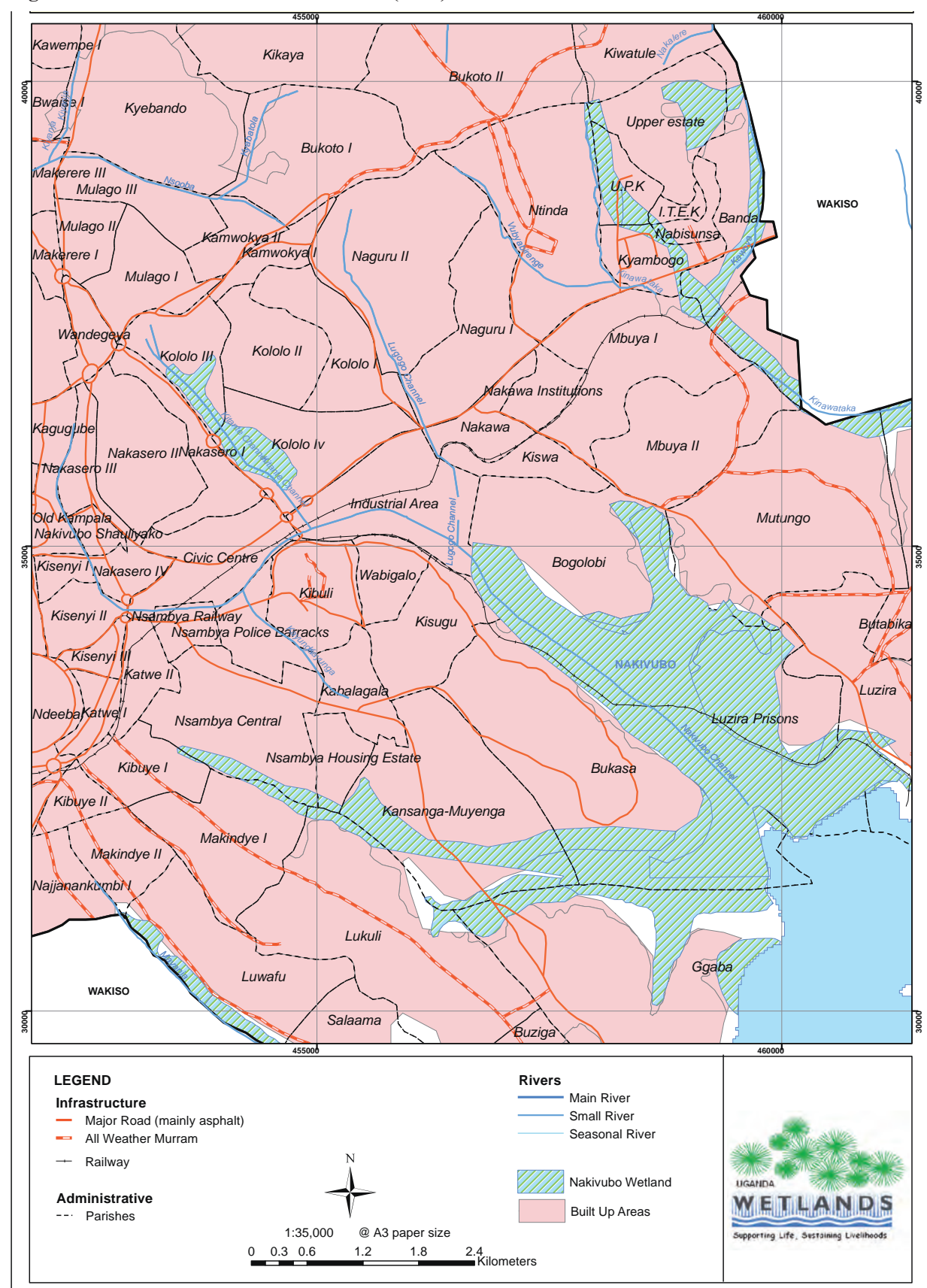
Although about 50% of the wetland has been modified, the lower part of this wetland is still relatively intact. The remaining core

wetland section (about 3 km²) is bordered by the villages of Luzira, Mpanga, Kitintale, Bugolobi, Kiwuliriza and Kyeitabya. It is now under severe encroachment from settlements, industrial development and agriculture. The slum close to Namuwongo and Kitintale villages is expanding into the wetland unlike the planned settlements in Bugolobi parish side that are under strict regulation.

The remaining section of Nakivubo wetland has all been alienated for construction of industrial warehouses and formal settlements around Bugolobi and Luzira. The areas where there are absentee landlords, such as Kitintale Zone 12 and Namuwongo, have not been spared. Unplanned settlements are continuously expanding deeper into the wetland. Most of these people have been displaced from their former residential areas of Namuwongo and Nakawa and some come from outside Kampala due to insecurity.

The main streams that feed this permanently waterlogged wetland include:

Figure 3.8: Nakivubo Wetland Catchment (2008)



- (i) Nakivubo channel which runs from Makerere Kivulu through Kisekka and Owino markets, Clock Tower to Sixth Street Industrial Area;
- (ii) Kayunga stream that starts from Kabalagala runs through the valley between Nsambya and Kibuli hills into Nakivubo channel;
- (iii) Kitante stream that starts from Mulago through the Golf Course and Jinja Road and the Yard into the channel; and,
- (iv) Lugogo stream that starts from Kira Road Police Station between Kololo and Naguru hills through Lugogo and Wankoko into the now constructed Nakivubo Channel.

Pressures

Between 1999 and 2004, Government of Uganda with financial support from World Bank (under the Nakivubo Channel Rehabilitation project) constructed a section of Nakivubo wetland from Makerere-Kivulu, through Kisekka and Owino Markets, Clock Tower up to the end of 7th Street in Industrial Area. The project aimed to reduce the frequency of floods on the road network which hinder traffic flows and have negative consequences on economic activities

and living conditions in the city. Instead however, the channelized section (Box 3.4) increased the velocity of the storm and pre-treated wastewater from the catchment into the already reduced wetland area downstream (between Bugolobi and Namuwongo parishes). To make matters worse, a river channel was created within the remaining wetland downstream that directs this untreated storm water and effluent direct into Lake Victoria.

Agriculture is still the most important driver in degrading this wetland. People go in to grow food crops such as yams and sugarcane. Parts of this wetland near Mukwano industries are used for producing seedlings and other planting material in commercial nurseries. The northern part of this wetland which used to separate Bugolobi, Mbuya II and Mutungo has been overrun by settlements.

Industrial development is another threat to this wetland. Developers have a preference for investing in Kampala and the neighbouring districts because these areas are well furnished with infrastructure such as electricity, roads, labour and are close to the markets. The Nakivubo and Kinawataka wetlands lie along the power supply route and are hence vulnerable.

Recommendations

- (i) All irregular land titles on public land within Nakivubo wetland which have not been developed should be recalled and cancelled.
- (ii) Nakivubo wetland should be restored to as near as possible to its original state to enhance its biodiversity, habitat, water quality regulation and flood control functions.
- (iii) All activities in areas such as Kyeitabya and Kitintale within the wetland should be regulated in accordance with the provisions of the National Environment Act Cap 153 and Regulations for the Management of Wetlands, Riverbanks and Lake Shores.
- (iv) A socio-economic study should be carried out to understand the magnitude of the challenges and the underlying causes of encroachment especially in the areas around Luzira Industrial Park, Kitintale Zone 12 and Namuwongo villages.

Box 3.3: What is channelization?

Channelization is an engineering technique employed to control floods, drain wetlands, control erosion or improve navigation. It involves straightening, deepening, widening, clearing or lining the existing water ways or stream channels. In Kampala, hundreds of kilometres of drainage ditches and channels have been dug to drain the numerous wetlands for construction and control of floods. Sections of the Nakivubo wetland were channelized to widen and deepen it for the purposes of reducing flooding. But there have been challenges. Channelization can negatively impact the surrounding habitats, aquatic ecosystem and the natural function of floodplains. For instance removal of lakeshore or wetland vegetation may destroy animal habitats and facilitate erosion increasing siltation.



Several plots have been parcelled out in the middle of upper Kinawataka wetland for residential development. If these developments proceed, the drainage will be impeded, thus exacerbating the flooding problem in the upper catchment of the wetland. This is the only drainage system for Ntinda, Kyambogo and Kiwatule.



There is frequent and severe flooding experienced at Kyambogo-Jinja Road junction after every heavy rainfall event. This is caused by increased run-off in the catchment due to large areas of paved surfaces, and roofed warehouses, industries and settlements which have replaced vegetated areas. There is rapid evacuation of the waters from these areas due to complete destruction of the wetland. The existing culverts are unable to cope with the water volumes. An intact wetland would have acted as a buffer, reducing the impact of floods.

Legend

- Cadastral Property Boundary
- Wetland Boundary



In July 2008, Government started the restoration process of Kinawataka wetland through community mobilization and sensitization on the importance of the wetland. The process involved demarcation of the wetland boundaries, blockage of drainage channels, removal of alien species and demolition of structures. The wetland eventually registered recovery. However, in September 2009, communities supported by their local leaders re-encroached the wetland, undermining its recovery and further destroying the wetland.



Kinawataka Wetland

Kinawataka Wetland State

Kinawataka wetland is a very important wetland running along the boundary between Nakawa Division and Kira Town Council in Wakiso District into the Inner Murchison Bay at Butabika Hospital before draining into Lake Victoria. The wetland used to be predominantly a permanent wetland dominated by native vegetation types such as *Cyperus papyrus* (papyrus), *Typha latifolia* (bulrush), *Phragmites mauritianus* (reeds), and *Phoenix reclinata* (Wild date palm).

The edges of the wetland was occupied by transitional and colonizing dry land species such as *Cyprus rotundus* (Coco grass), *Melinis ripens* (Red Natal grass), *Leonotis nepetifolia* (Lion's ear), *Digitaria abyssinica* (African couch grass) and *Imperata cylindrical* (Blady grass). The vegetation cover in the wetland encouraged infiltration and retention of water in the wetland, thus regulating flows in the rivers.

Five major rivers drain the Kinawataka catchment area namely:

- (i) River Vubyabirenge, along the valley between Ntinda and Naguru hill across Nakawa-Ntinda Stretcher Road. This river drains into River Kinawataka just before Kampala-Jinja Highway;
- (ii) River Kinawataka, along the valley between the Kyambogo University and Ntinda Ministers Village in Nakawa Division;
- (iii) River Fuwengombe, along the valley between Kyambogo and Banda hills drains into Kinawataka River;
- (iv) River Wamalenge, along the valley between Banda and Kireka hills drains Kawoya wetland into River Kinawataka just before crossing the Railway line; and,
- (v) River Wankolokolo along the valley between Nambole Stadium and Kireka hill in Kira Town Council, Wakiso District.

Box 3.4: Impacts of wetland reclamation on River Kinawataka

- Stream flow has been impeded in the area between Spear Motors and the former Coca Cola by indiscriminate depositing of effluent and industrial waste within the Kinawataka wetland.
- Backflow in the rivers has been caused by raising the level of the stream bed. This has caused backflow, soil erosion and subsequently flooding at different points near Coin (U) Ltd and Meera Investments.
- Reduced stream velocity resulting in increased flooding for example the area around Jinja road and Kyambogo junction.
- Over-saturation of swamps leading to flooding. For example poor size selection of the culverts installed at the crossroads to Ntinda and Kyambogo inundates the swamp causing it to overflow with the storm water when it rains.



A section of Kinawataka wetland

MWE

Pressures

A significant portion of the Ntinda Industrial Area is located within Kinawataka wetland system. The Industrial Area was gazetted in 1972 and the development plans issued by the then Kampala City Council (KCC), now Kampala City Council Authority (KCCA) show that the entire wetland was sub-divided into plots and planned with road networks. The removal of the vegetation cover, as a result of development activities and the increase in concretised surfaces (buildings, courtyards, roofs) have reduced the retention capacity and infiltration rates of the wetland. In the process of erecting industrial complexes, the developers have greatly affected the normal flow pattern of the stream (Figures 3.9 and 3.10)..

One of the major problems is physical planning of the area. Assessment of KCCA layout plans indicates that there is hardly any provision for drainage of the area because barely any space was left for construction of storm water channels. If this trend continues eventually all the vegetation cover in the wetlands will be removed. The removal of vegetation impacts the storm water run-off characteristics of the area, reducing the infiltration and retention capacity to almost zero. The upshot has been an increase in flash-flooding where most of the rains are instantaneously converted into run-off with much higher peak flows. Hydraulically this demands that the cross-sectional area of the rivers be enlarged to convey the storm water for the given rainfall intensities if flooding is to be avoided. Unfortunately this has not been possible since the current landuse in the layout plans mentioned earlier led to diversion of the planned channels. Instead the drawings indicate that either the rivers are cutting across demarcated plots or ending at some point within the plots. Indeed some developers have gone ahead to backfill the rivers hence diverting or narrowing the water flow. This situation could have been avoided with adequate planning for storm water run-off.

Recommendations

- (i) Re-plan the industrial area with provision for expansion of drainage channels and its buffer zone. In other words, establish the original course of the stream, expand and create a buffer zone.
- (ii) Curb the flooding at Kyambogo-Jinja Road junction through proper structural and construction re-planning.
- (iii) Secure the land parcels in wetlands that are still intact. Critical areas include:

- Kawoya wetland between Kireka and Banda hills; River Kinawataka just below the Ntinda Ministers Village Sewerage lagoons;
- The wetland area below Hill Crescent Road and Railway line;
- Wetland area below the sewerage lagoons at Nambole National Stadium that drains into River Nkolokolo towards Kasokosoko; and,
- The wetland area between Kasokoso and Butabika Hospital in the Inner Murchison Bay.

Figure 3.9: Kinawataka Wetland Catchment (2008)

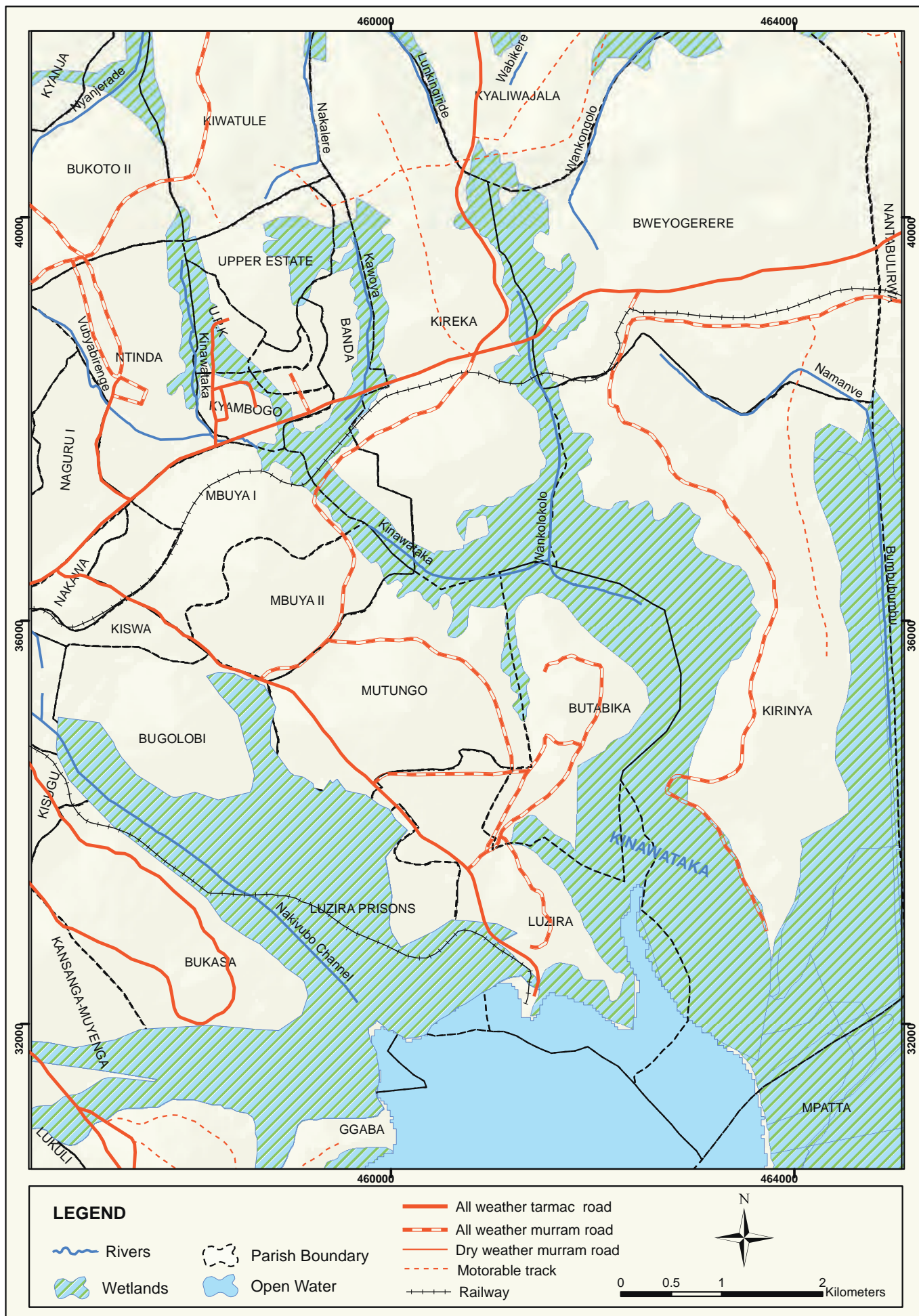
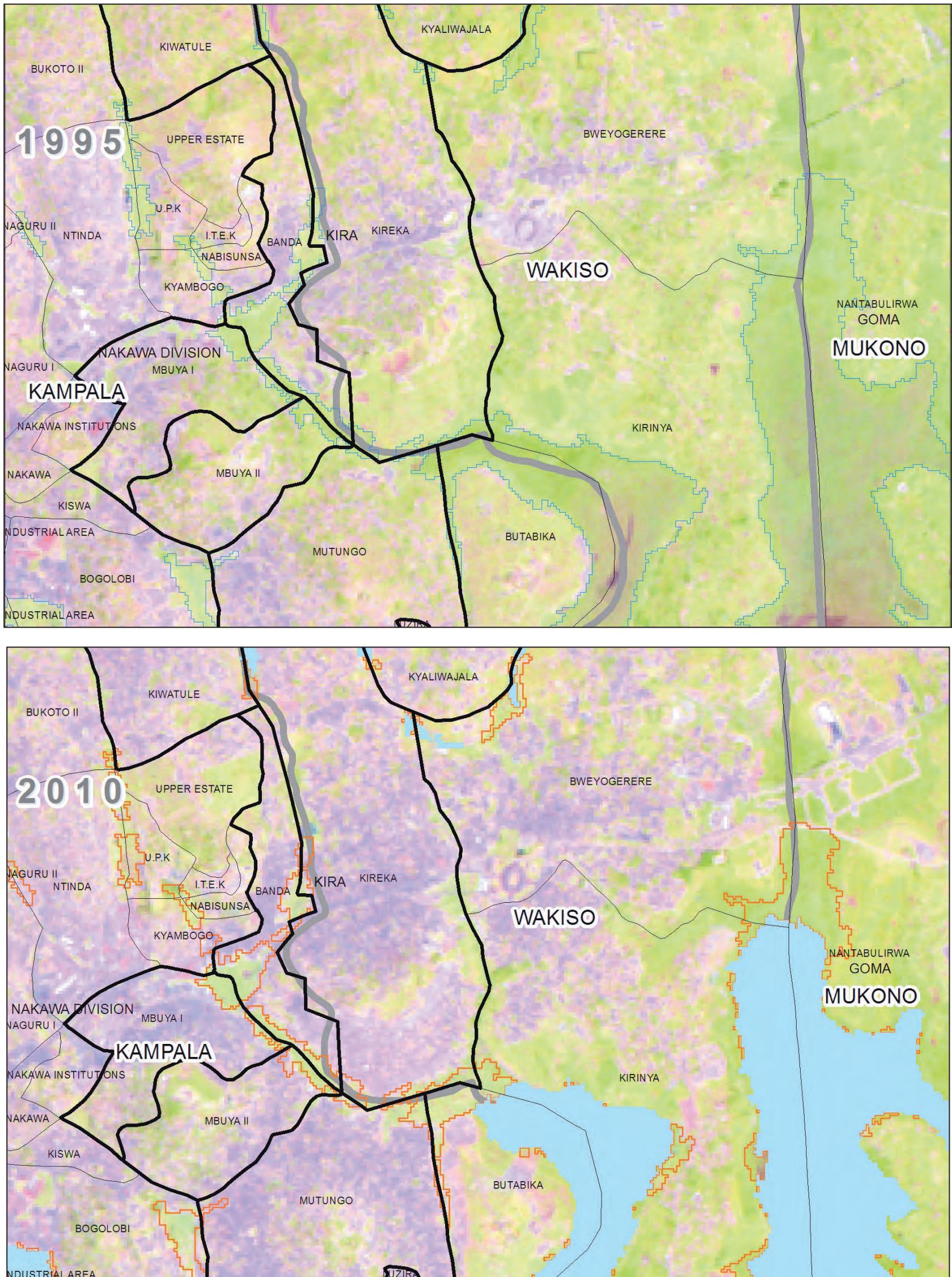
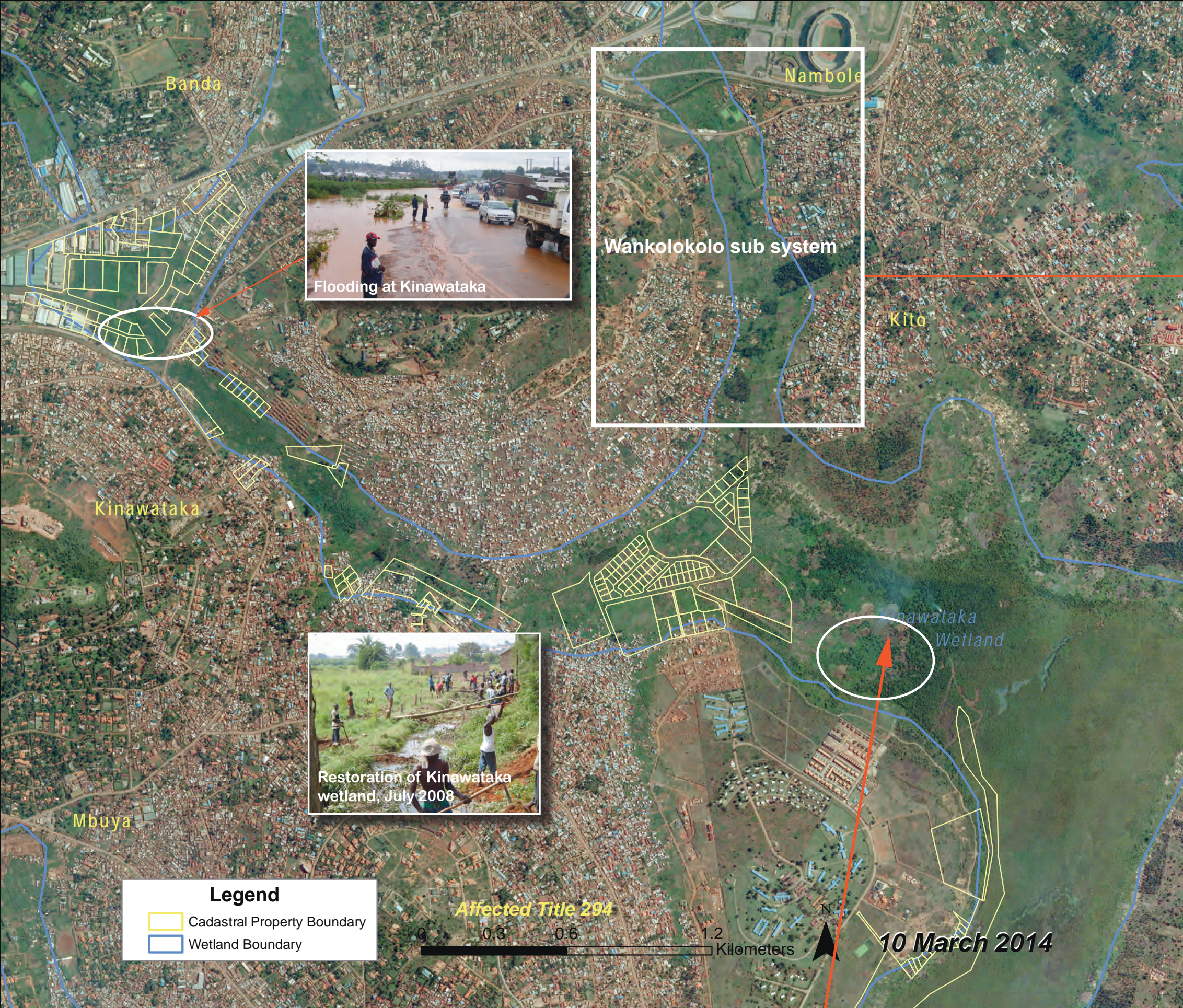


Figure 3.10: Hotspots on Kinawataka wetland



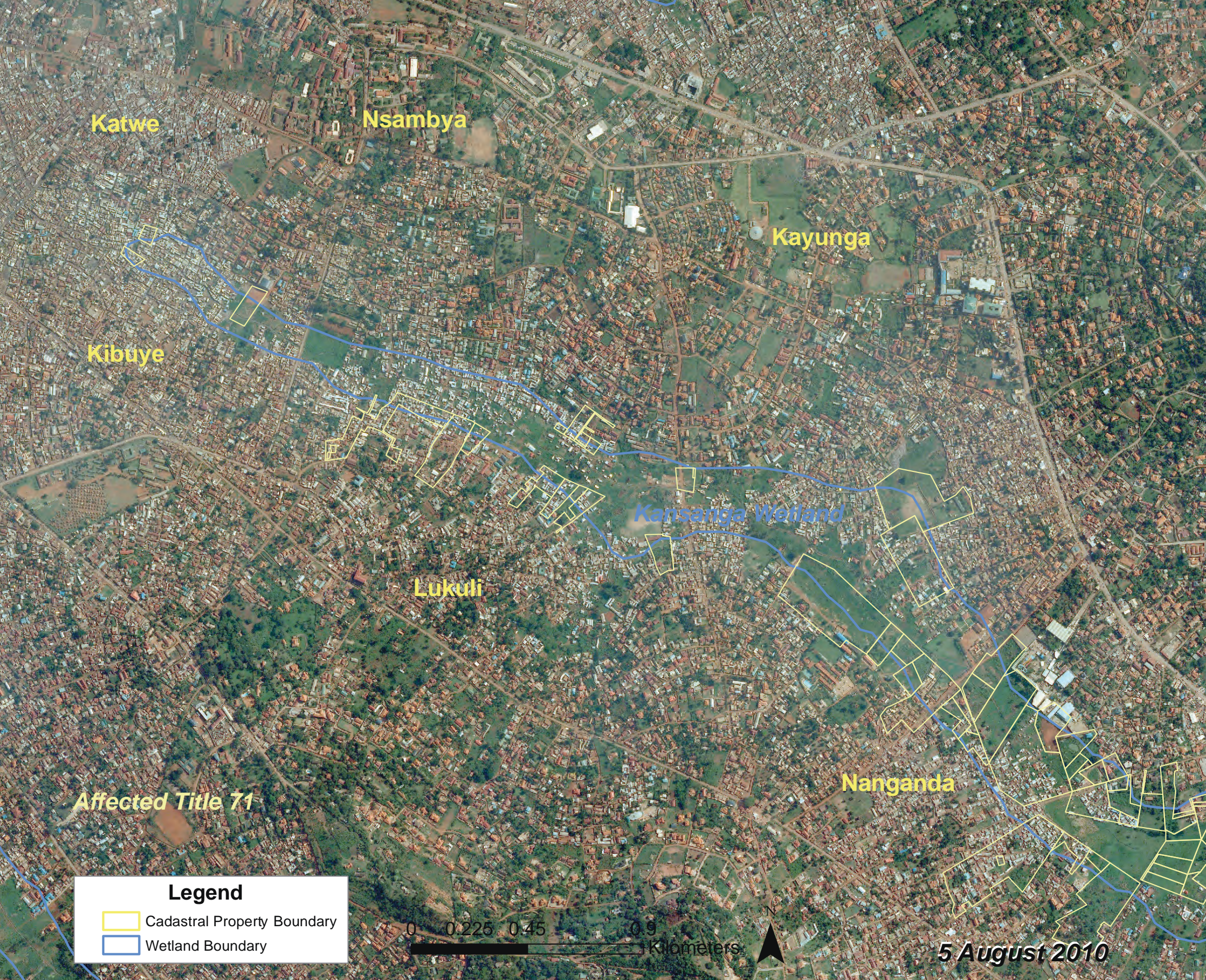


In 2014 a perimeter wall was erected by Royal Palms Suites at Butabika within Kinawataka wetland. The long-term hydrological and ecological integrity of the wetland has been compromised.



MWE





The entire Kansanga wetland is privately owned, largely occupied by informal settlement. Despite Government's efforts in conserving this wetland through sensitization, demarcation and restoration, there is continued encroachment of the wetland. Destruction of this wetland compromises the water quality in the Inner Murchison Bay, the main source of water for Kampala City.

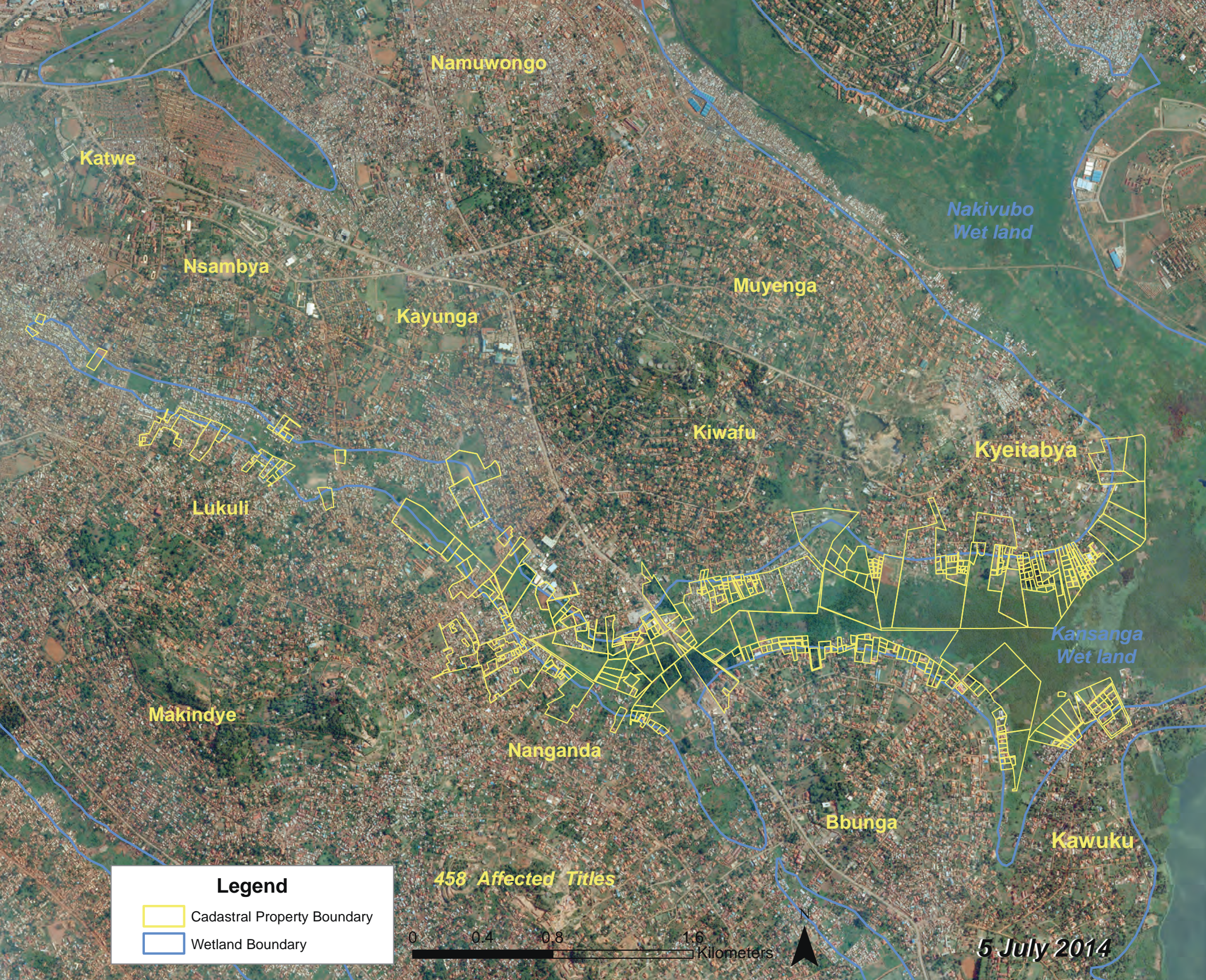


Kansanga Wetland

Kansanga Wetland State

The Kansanga wetland is in the south-eastern part of Kampala city and drains into Murchison Bay of Lake Victoria. Located along the River Kansanga, this wetland occupies the valley between Makindye, Nsambya, Bunga and Muyenga hills and is surrounded by the villages of Kalungu, Kiwafu, Kyeitabya, Bunga, Nsambya, Bukasa, Lukuli, Kayunga, Kansanga and Kawuku. It traverses the

parishes of Kansanga, Ggaba, Buziga, Nsambya, Kabalagala, Bukasa and Lukuli parishes covering the following villages: Lower Konge, Sankala, Kiwempe, Tyaba Zone, Nabutiti, Heritage, Kisilamu, Kitalanga, Kyeitabya, Soya, Kalungu, Kawuku and Ggaba villages (Figure 3.11).



The wetland buffers Lake Victoria from the effects of pollution and sediment load generated upstream. It is critical for urban water filtration, purification and flood control in Kampala. The vegetation comprises of a mosaic of Papyrus, *Miscanthus* sp, *Typha* and *Phragmites* sp with relics of swamp forest dominated by *Phoenix* sp as well as sedges.

Pressures

A number of threats affect the integrity of Kansanga wetland system. These include; clearing of vegetation, informal settlements, extensive agriculture, pollution from urban and municipal sources, waste dumping, water diversion and artificial draining. Approximately 60% of the wetland has been modified (Figure 3.12). For instance, the western upstream part of this wetland has been totally built up but there is also scanty agriculture composed of yams and sugarcane. The same situation prevails in the mid part of the wetland where it crosses Ggaba road. Downstream it is generally intact because the quantity of water prohibits much encroachment.



Algae bloom in the Inner Murchison Bay attributed to nutrient loading. Degradation of wetlands undermines their ability to remove nutrients from the run-off entering the lake.

MWE

Recommendations

- (i) Secure and protect the wetland area that is still intact
- (ii) Formulate a management system for the wetland.
- (iii) Provide for a sufficient buffer in areas that have been severely

encroached upon especially Kansanga, Nanganda, Nsambya and Kirombe.

- (iv) Incorporate a demarcation exercise on the whole wetland into area implementation plans.

Figure 3.11: Kansanga Wetland Catchment (2008)

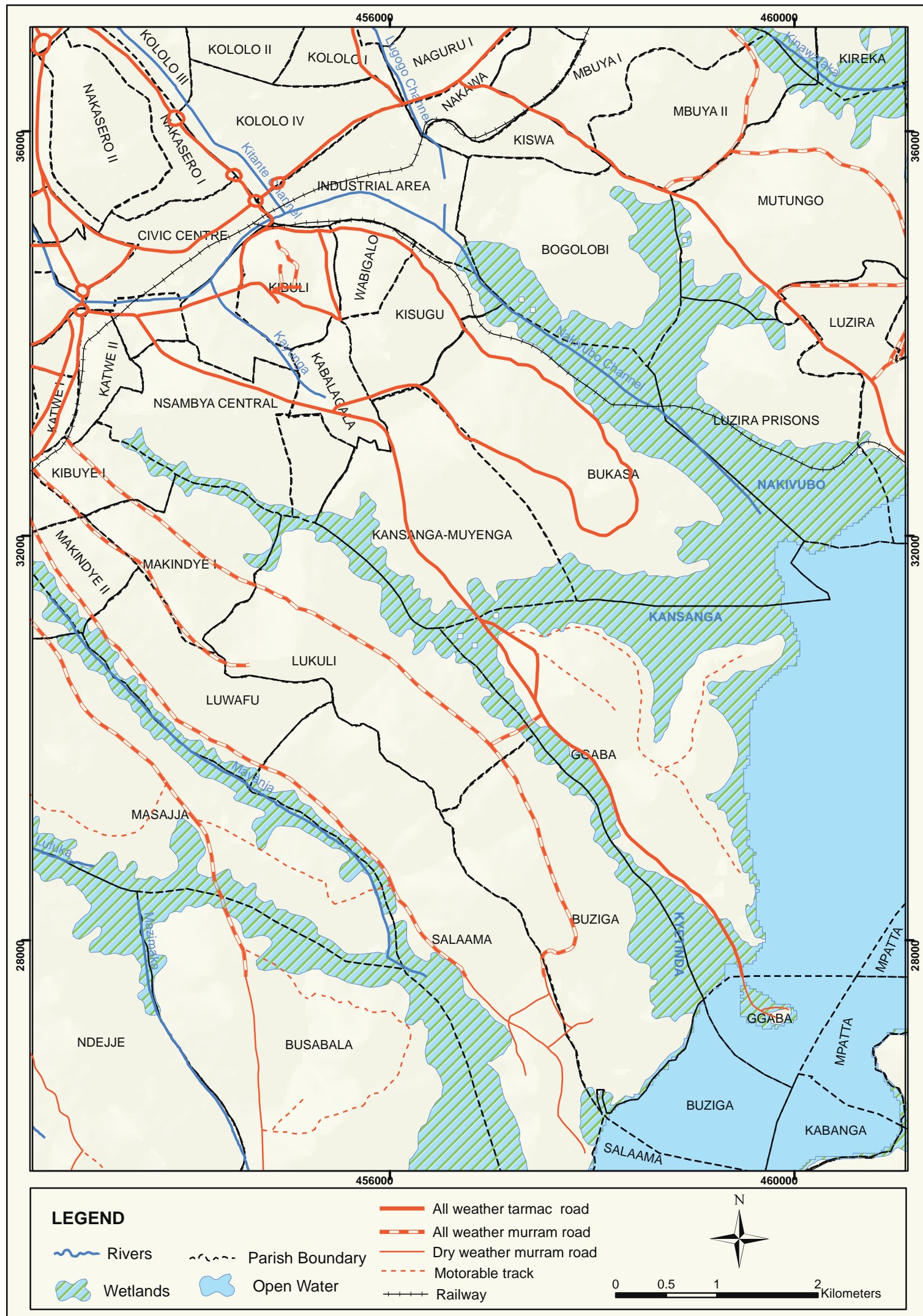
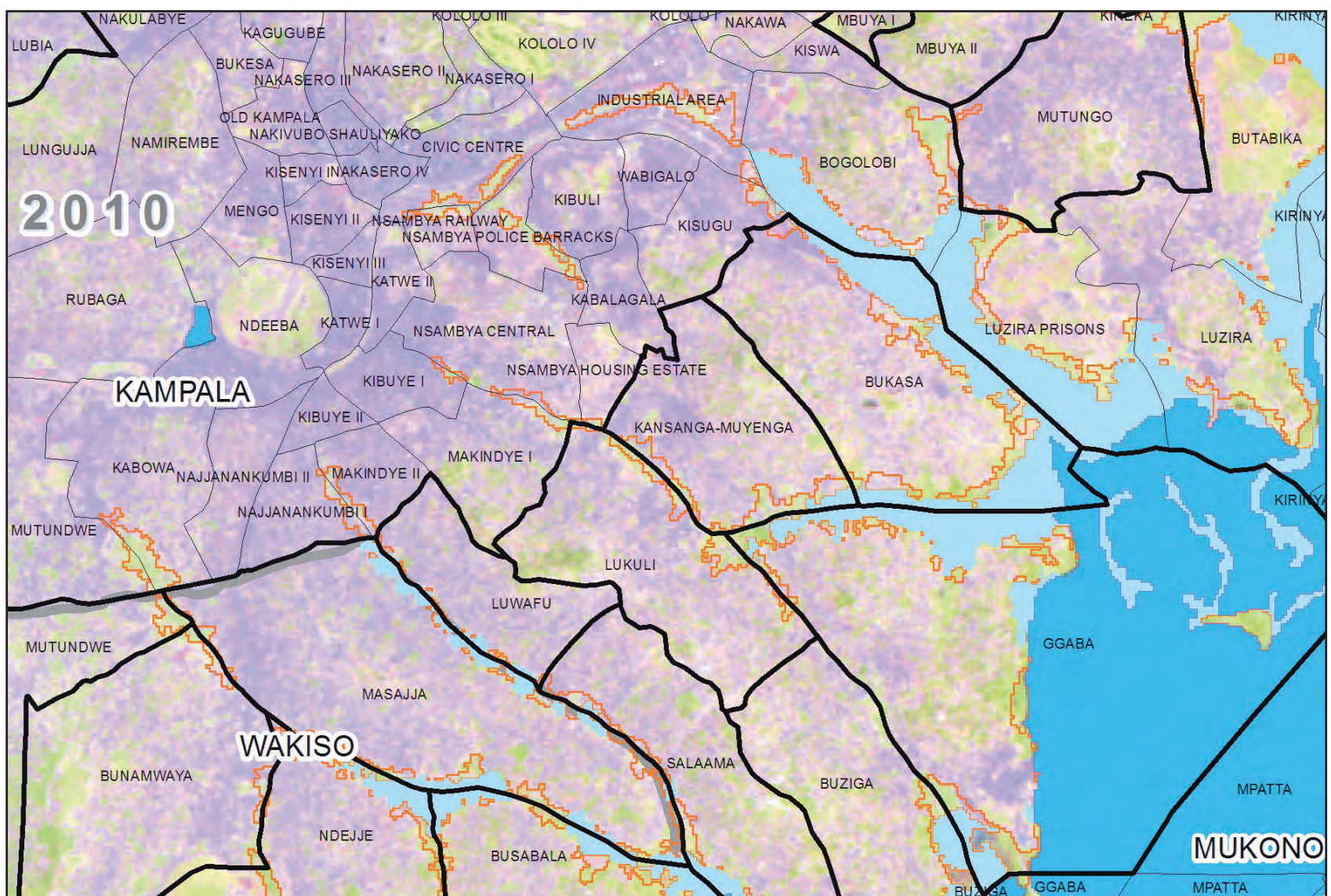
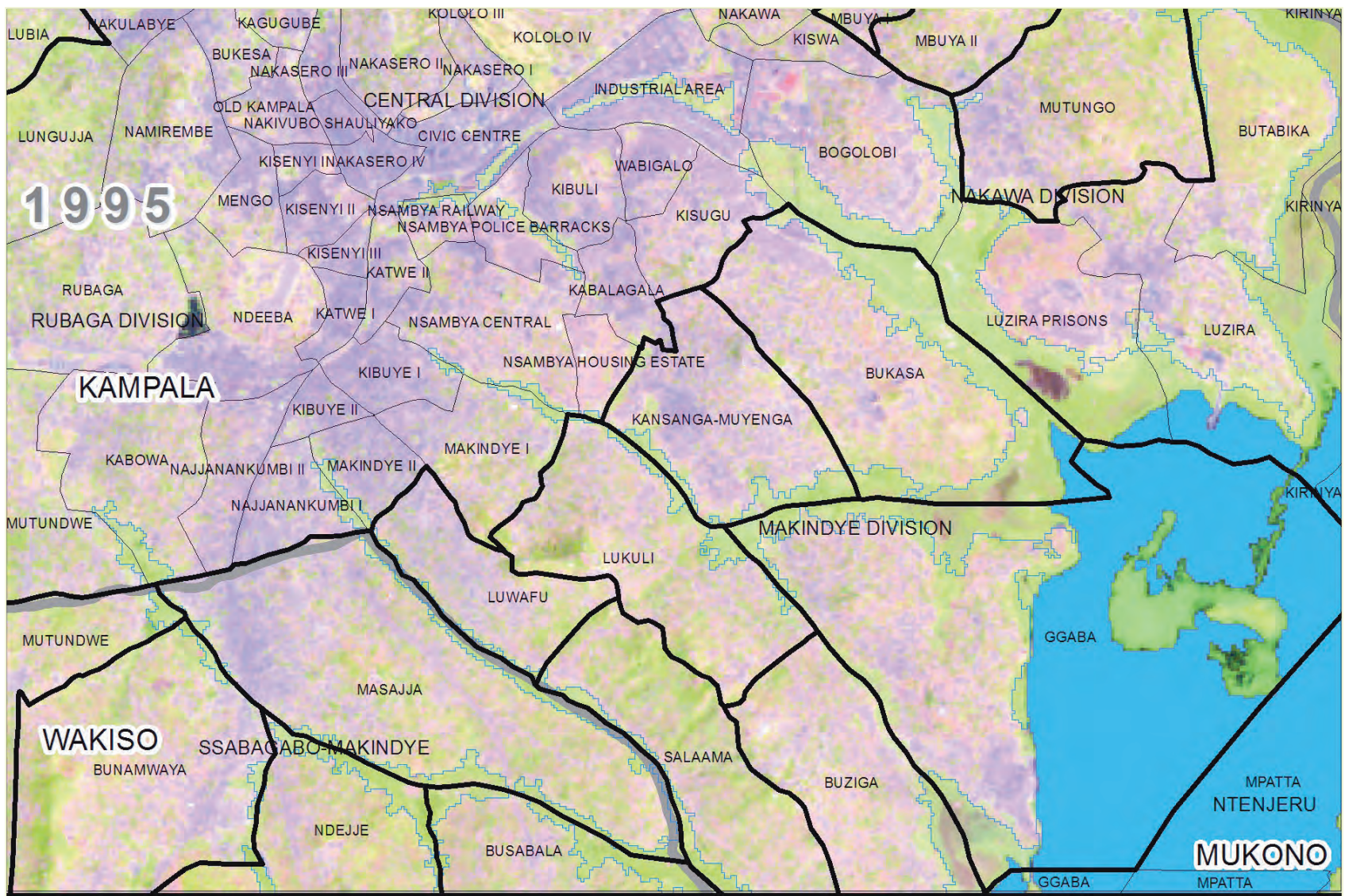


Figure 3.12: Hotspots on Kansanga and Nakivubo wetlands





Bunga

Kawuku

Murchison Bay

Gaba

Kyetinda Wetland

Mawanga

Lake Victoria

103 Affected Titles

Legend

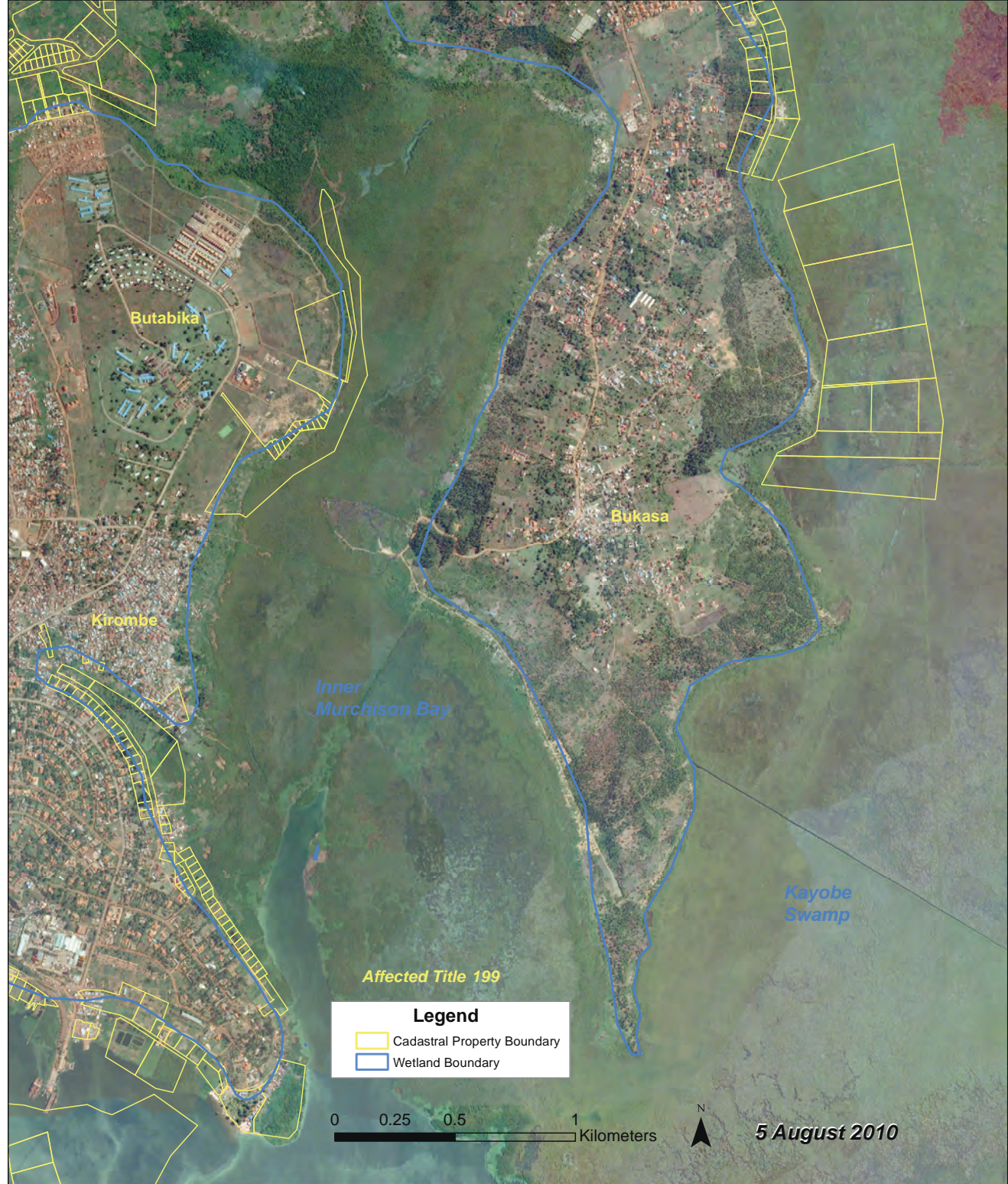
- Cadastral Property Boundary
- Wetland Boundary



5 March 2004



Despite the restoration of Kyetinda wetland twice, in 2008 and 2012, the wetland has experienced rapid encroachment from informal settlements especially at ‘Cape Town’ village near the Gaba Water Works by the lakeshore.



Kyetinda Wetland

Kyetinda Wetland State

Kyetinda wetland, located in Makindye Division, traverses the valley between Buziga and Bunga-Gaba hills finally draining into Lake Victoria. It covers an area of approximately 1.4 km². Kyetinda wetland is of critical importance because it buffers the Lake Victoria shoreline at Gaba-Munyonyo which is the source of water for Kampala City. The wetland also plays a major role in purification of effluents close to the Gaba

Water Works intake points before being discharged into Lake Victoria. It also performs other functions such as flood control and other hydrological roles.

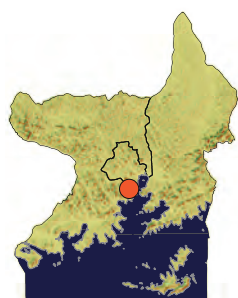
Pressures

Currently, the wetland is under serious threat from the construction of both permanent and semi-permanent structures. This area has attracted rapid settlement due to its high profile-prime status as a settlement for the rich. In some areas, the wetland system has been significantly reduced to a stream, increasing susceptibility to flooding.

In 2008, a group of Army Veterans invaded Kyetinda Wetlands just along the junction of Gaba road and Munyonyo Road to establish a market. NEMA in collaboration with the local area leaders evicted these Veterans forcefully and the wetland was restored. The rehabilitation exercise involved demolishing the temporary structures they had erected and blocking all the drainage channels in the wetland. Restoration activities have been continually undertaken since 2011. For instance, there have been efforts to demarcate the boundary of the wetland in Mawanga village located along the Munyonyo Road. So far the ecological boundary of the wetlands has been established and other ‘social boundaries’ implemented for awareness purposes.

Recommendations

- (i) Secure the remaining intact wetland section immediately.
- (ii) Cancel the titles for the plots with land titles but with no developments
- (iii) Promote the integrity of this wetland system by undertaking activities to restore it. These could include removal of settlements in the degraded wetland sections especially those between Ggaba Water Works and the Munyonyo junction and those blocking the channel. This particular section of the wetland is indispensable
- (iv) Develop a Framework Management Plan to guide the wise use of this wetland.



Kaliddubi Wetland

Kaliddubi Wetland State

Kaliddubi wetland is located at the boundary between Makindye Division of Kampala City and Makindye-Ssabagabo in Wakiso District. Its main catchment area on the Kampala City side are Munyonyo, Mawanga and Buziga while on the Wakiso side the wetland comes as far as Wankulukuku Stadium in Rubaga Division. The main wetland that drains into Kaliddubi wetland system are Mayanja that flows from Makindye Division along the Salaama Road between Luwafu, Makindye II, Kibuye II, Najjanakumbi and Masajja; Lufuka wetland that drains from Wankulukuku Stadium across Kampala-Entebbe road at Nyanama (Figure 3.13). The lower part of Kaliddubi wetland is relatively intact especially on the Wakiso side. However recently a road was created between Kaabuma and Munyonyo that opened up the area for development. As a result most of the communities that owned land on the hills are selling and relocating down into the wetland.

Though privately owned, the lower part (lake side) of Kaliddubi wetland is relatively intact and efforts should be made to quickly secure it. The wetland buffers the lake from pollution coming from Wankulukuku, Busabala, and Ndejje areas, which are all densely populated.

Pressures

The main drivers of degradation in this wetland arise from land ownership issues and human pressure from settlements and more recently industry. The entire Kaliddubi wetland is privately owned. Buganda Land Board is one of the major land owners in the wetland and its catchment area. This was one of the underlying causes of the invasion of the wetland in 2000 between Abuma, Masajja and Ndejje Villages. The encroachers used the slogan “Kabaka agabudde” meaning the King of Buganda “had served them”. By June 2012,

over 50 families had encroached on the wetland reclaiming and occupying the wetland and engaging in small-scale farming and erecting permanent structures. They also set up drainage channels dumping unseived wastes and soil directly into the water resource, contaminating Lake Victoria at the point where water ends up at Munyonyo.

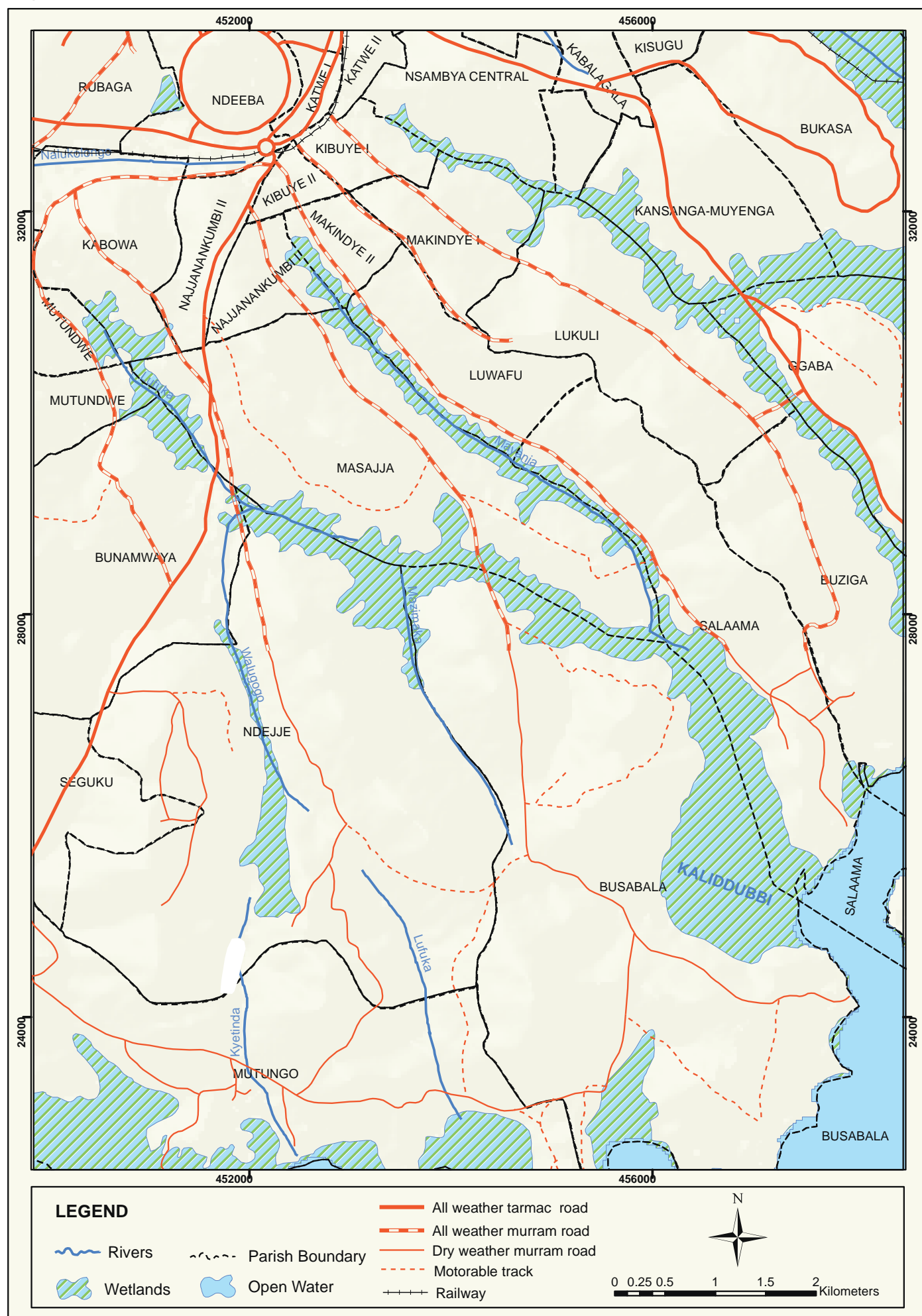
Floods are common where Lufuka wetland crosses the Kampala-Entebbe Road. This has resulted in destruction of property along the road at Batabata and interruptions to the road transport system. Although the Ministry of Works and Transport continually engages in the widening and dredging of the drainage channels in the wetland near this road, this flooding problem has persisted. The main cause of flooding along this road is the reduced flood plain upstream in Namasuba, Zana and Bunamwaya areas as a result of wetland encroachment for settlement and recently industrial development.

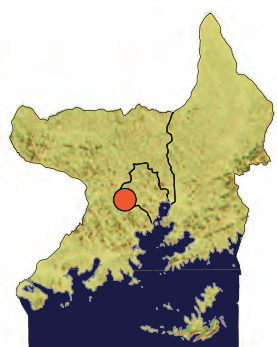
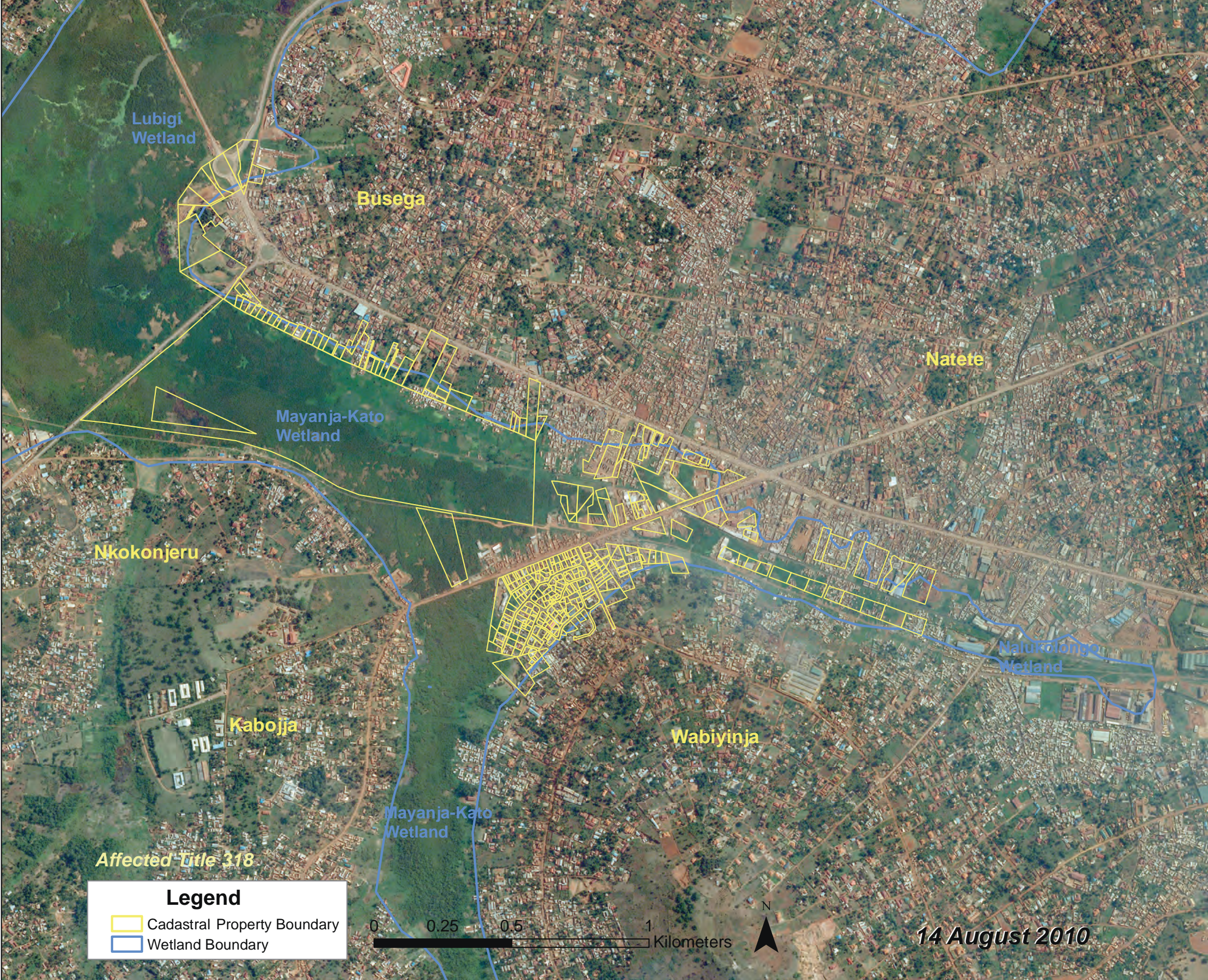
The flooding problem at Batabata is of major concern attracting the attention of the Head of State who directed that residents should stop encroaching and depositing solid wastes in the wetlands. The solid wastes clog the drainage channels and culverts. As part of the strategy to decongest the city and address the high traffic congestion, the Greater Kampala Metropolitan Area Master Plan has proposed the construction of the Kampala-Entebbe Expressway. The design of the New Kampala-Entebbe highway takes into consideration the expanse of wetland to be crossed and will thus be built on suspended pillars, minimizing the footprint on the wetland.

Recommendations

- (i) Restore the section of Lufuka wetland along the Kampala-Entebbe Road that usually floods after it rains. This should be done by demolishing the existing structures (residential and industrial) and allowing the wetland to regenerate.
- (ii) Regulate the activities of all landowners and land users in the wetland according to the Permitting System and the Law.
- (iii) Conserve the remaining intact section of the wetland in its natural state.
- (iv) Undertake the physical demarcation of the wetland boundary so as to guide any future development along the wetland.

Figure 3.13: Kaliddubi Wetland Catchment (2008)





Nalukolongo Wetland

Nalukolongo Wetland State

Nalukolongo wetland is located in the southern part of Kampala (in Rubaga Division) about 5.5 km west of the City Centre. The wetland forms the major drainage basin to the neighbouring hills of Wabiyinja and Natete that drains into the wetland. The main River Nalukolongo feeding the wetland starts from around Wankulukuku Stadium and drains the villages of Nalukolongo, Ndeeba, Mutundwe and Natete before draining into Mayanja Kato just after the old Kampala-Masaka Road. Most of the natural wetland section between Wankulukuku Stadium and old Kampala-Masaka Road at Natete has been totally reclaimed and reduced to drainage channels leaving only a few waterlogged areas.

Most of the natural wetland section between Wankulukuku Stadium and old Kampala-Masaka Road at Natete has been totally reclaimed and reduced to drainage channels leaving only a few waterlogged areas.

The only visible aquatic vegetation in the wetland, mainly papyrus and sedges, are restricted to a small area downstream after the old Kampala-Masaka Road towards Mayanja Kato and Lubigi Wetlands in Busega.



A degraded section of Nalukolongo wetland

NEMA

The only visible aquatic vegetation in the wetland, mainly papyrus and sedges, are restricted to a small area downstream after the old Kampala-Masaka Road towards Mayanja Kato and Lubigi Wetlands in Busega. As indicated in Chapter 2, the natural area of Nalukolongo wetland was reduced from about 0.91 km² to 0.5 km² to meet the demand for land for industrial development and unplanned settlements.

Pressures

In 1972, Nalukolongo wetland was one of the areas identified by the Kampala Structural Plan as an Industrial Area. This is because the wetland had good transport links, was close to high-density residential areas, and was relatively flat. Since its designation as an Industrial Area, the wetland has been parcelled out and reclaimed for industrial development. In 2008 about 12 ha of the permanent section of Nalukolongo wetland was zoned by Government for the construction of sewerage lagoons by the National Water and Sewerage Corporation under the Kampala Sanitation Program to improve water and sanitation services in and around the Nalukolongo Industrial area.

The key social and environmental problems in the wetland today include:

- Flooding along the entire river course from Wankulukuku Stadium to Old Kampala-Masaka Road in Natete.

- Waterborne diseases such as typhoid, cholera, malaria and dysentery.
- Clogging of heavily polluted drainage channels with lots of plastics and other waste that is dumped unscrupulously by the residents especially those in the slums.
- Incessant encroachment deeper and deeper into the wetlands by slums.

Recommendations

- (i) Cancel all illegal land titles on public land in Nalukolongo wetland
- (ii) Create a buffer zone of not less than 20m along Nalukolongo Stream between Nalukolongo and Natete (before the Old Masaka Road). The soil therein should be removed to mitigate the flooding problem in the Industrial Area.
- (iii) Demolish the illegal structures in the wetland after the Old Masaka Road and restore the wetland.
- (iv) Conduct a physical demarcation of the wetland boundary to guide development along the wetland.
- (v) Conduct an independent Environmental Audit on all developments in the Industrial Area to guide the government on their continued existence and recommendations for the conservation of the wetland.
- (vi) Close all industries in the Industrial Area that do not have approved and functional effluent and solid wastes management facilities.



Legend

- Cadastral Property Boundary
- Wetland Boundary



18 May 2014



Mayanja-Kato Wetland State

Mayanja-Kato is one of the largest, permanently waterlogged wetlands in Wakiso District with an area of about 54 km². It starts from Seguku and flows through the valley between Nalumunye and Bunamwaya into Natate area where it is joined by Nalukolongo wetland and then through Busega where it is joined by Lubigi wetland. The wetland then crosses the subcounties of Nsangi, Wakiso, Muduma and Namayumba through Mpigi District before it drains into the Kafu River in Mubende

The Kampala-Entebbe Express Highway is elevated on pillars to minimise impacts on wetlands. This is a good practice that should be adopted for all infrastructure development across wetlands.

District. Other wetland tributaries include Namaya-Kasenso-Mwerango, Muyobozi, Nonve and Kanyogoga.

Mayanja-Kato eventually joins up with Mayanja-Wasswa wetland which then drains as Semugabi (Mubende District). It has a very extensive catchment



Artistic impression of the Kampala-Entebbe Express Highway (UNRA)

Uganda National Roads Authority

area with many rivers flowing into it. Most of the rivers are in deeply incised valleys and indefinite water courses leading to the formation of wetlands.

Cyperus papyrus is the dominant wetland vegetation in this wetland. The fringes of the wetland have a stretch of swamp forest in some areas dominated by *Piptadeniastrum*, *Albizia* and *Celtis spp.* This forest exists as relics in many parts. The river courses also have swamp forest dominated by the same species. Encroachment for cultivation is mostly in the seasonal fringes. The wetland has a lot of Sitatunga and Bush buck, with many monkeys (mainly the Red-tailed monkey) in the swamp forest fringes.

The main land use in the wetland is traditional harvesting of wetland vegetation for crafts; and hunting and cultivation. Further afield in the catchment are settlements, cultivation, ranching, timber harvesting, charcoal-burning and brick-making. These land use activities have resulted in vegetation loss and increased siltation into the wetland. Of recent, the upper sections of the wetland especially between Nalumunye and Natete and more recently in Bulenga in Wakiso subcounty have been under severe pressure for settlements and industrial development.

Photo: MWE



Mayanja Kato along Old Masaka Road



Lutembe
Wetland

147 Affected Titles

Legend

- Cadastral Property Boundary
- Wetland Boundary

0 0.2 0.4 0.8 Kilometers



10 September 2014



Flock of Caspian gulls in Lutembe



Lutembe Bay Wetland

Lutembe Bay Wetland System State

This is a Ramsar site located in Wakiso District in Busiro South County at the mouth of Murchison Bay in Lake Victoria. It is located in the sub-counties of Ssisa and Katabi and in the parishes of Namulanda, Bweya and Kisubi. The Ramsar site and associated wetlands cover a total area of about 1,769 hectares and a distance of approximately 45 kilometers.

The Lutembe Bay wetland system is one of the most important wetlands of Uganda. Besides being designated as an Important Bird Area (IBA) for Uganda due to the large numbers of migrating birds from Europe, which come there annually, the wetland is important for other ecosystem services, among which are the following:

- The Bay is a habitat for species important for maintaining the biological diversity of the region including most of the wetland macrophytic plant species, with 18 genera and 19 species.
- It is one of the wetlands identified for wetland research by Wetlands International because of its rich biological diversity. Lutembe Wetland Research Centre has been established to promote wetland research in the Ramsar site.
- It is an important spawning ground and nursery on which fish stocks within the wetland depend. The marshes are breeding grounds for Lungfish and *Clarias*. The shoreline of Lutembe Bay is flat, indented and forested and provides water where most fishing occurs.
- It is also important for wetland edge gardening, and hosts a number of farmers who supply the nearby markets in Entebbe and Kampala urban centres, contributing to food security within and outside the immediate Ramsar Site area.
- The wetland is an important source of water for the riparian communities who do not have access to water supplied by National Water and Sewerage Corporation.
- The wetland provides the locals with clay for brick making, cook stoves and sand mining for construction, therefore providing the much needed day to day income and contributing to livelihood enhancement.

The Lutembe Bay wetland is a habitat for species important for maintaining the biological diversity of the region including most of the wetland macrophytic plant species, with 18 genera and 19 species. It is a designated Ramsar Site.

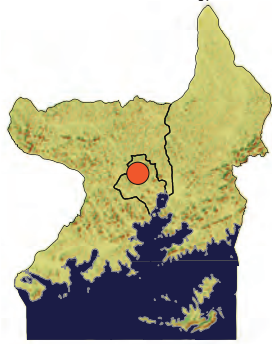
Pressures

- Encroachment by real estate developers and individuals who have obtained land titles within the wetland.
- Encroachment for Agriculture - small scale to medium scale agriculturalists are slowly encroaching and degrading Lutembe Bay Wetland, particularly as the catchment loses fertility and also parts of the plots of land are sold off.
- Encroachment by flower farms and industries. A number of flower farms have “mushroomed” in Lutembe wetland system and Ramsar site. These farms have not only extended into the wetland but may also have negatively affected the quality of the habitat for the birds, fish, animals and other micro fauna and flora. The main threat is due to discharge of agrochemicals into the wetland which eventually find their way into the lake with far reaching effects such as eutrophication affecting breeding grounds for fish species.
- Rampant sand mining and brick making along the length of Lutembe wetland system is drastically affecting the ecology and hydrology of the wetland.

Recommendations

- (i) Subject all major developments around the Ramsar site to Environment Impact Assessment and Environmental Audits.
- (ii) Monitor all the people who are carrying out water abstraction to ensure their adherence to the water abstraction regulations.
- (iii) Monitor all the major activities around the Ramsar site such as flower farming (horticulture) and estates development. The industries should be compelled to build waste treatment plants in order to minimize effluent discharge into the wetland.

Nsooba-Lubigi-Nabisasiro Wetland System



Nsooba

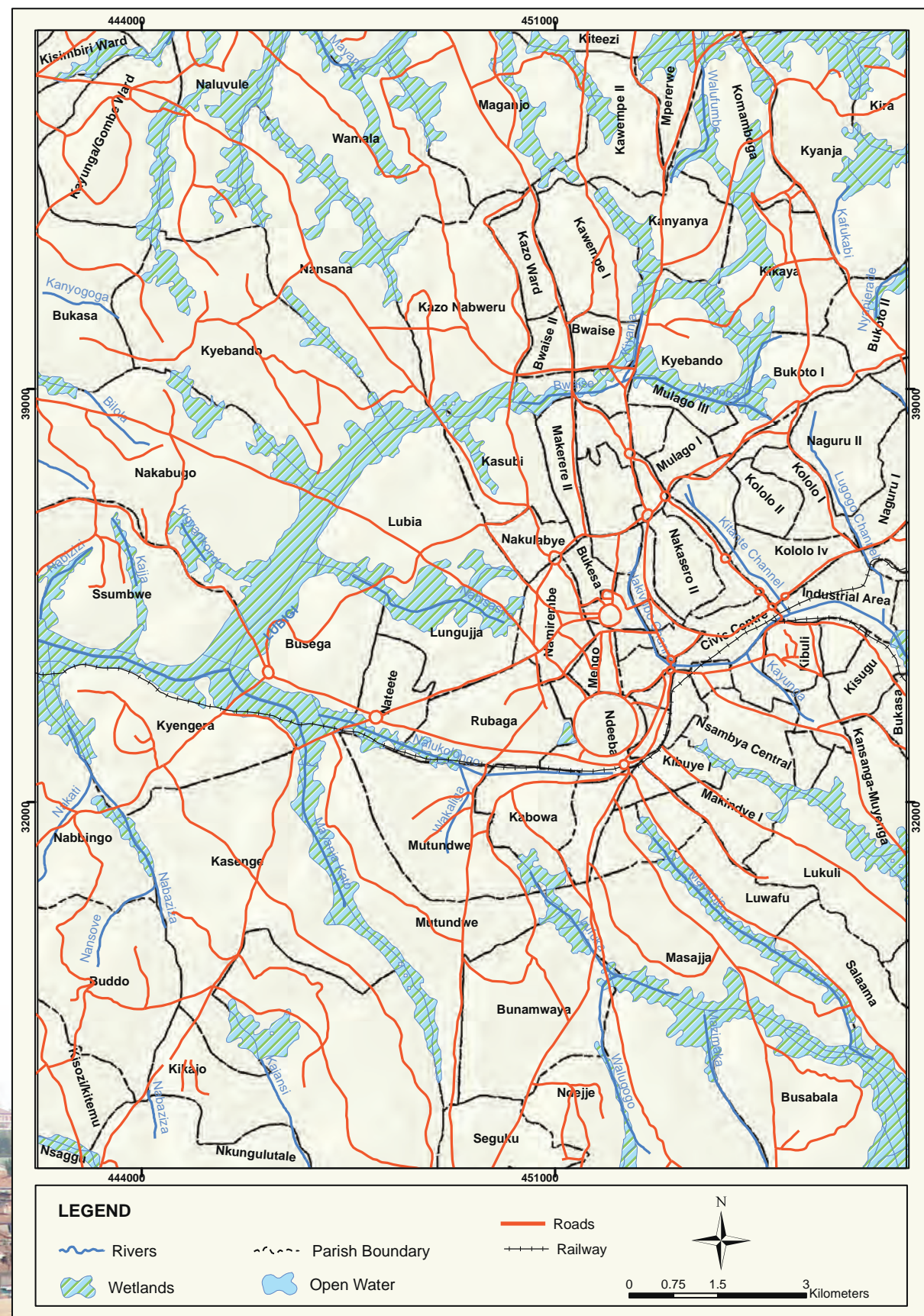
State

Nsooba wetland is located approximately 7.5 km west of Kampala City Centre in Rubaga and Kawempe Divisions. The surrounding villages include Busega, Natete, Masanafu, Namungoona, Nansana, Kawaala, Bwaise, Kalerwe and

Kyebando (Figure 3.14). It can be accessed on Masaka, Hoima, Mityana and Sentema Roads. Nearby villages include Busega, Natete, Masanafu, Kawala and Namungona. The wetland helps to store storm waters from Bwaise, Kalerwe, Kyebando, Mulago, Naguru, Mengo and the rest of Kampala City.

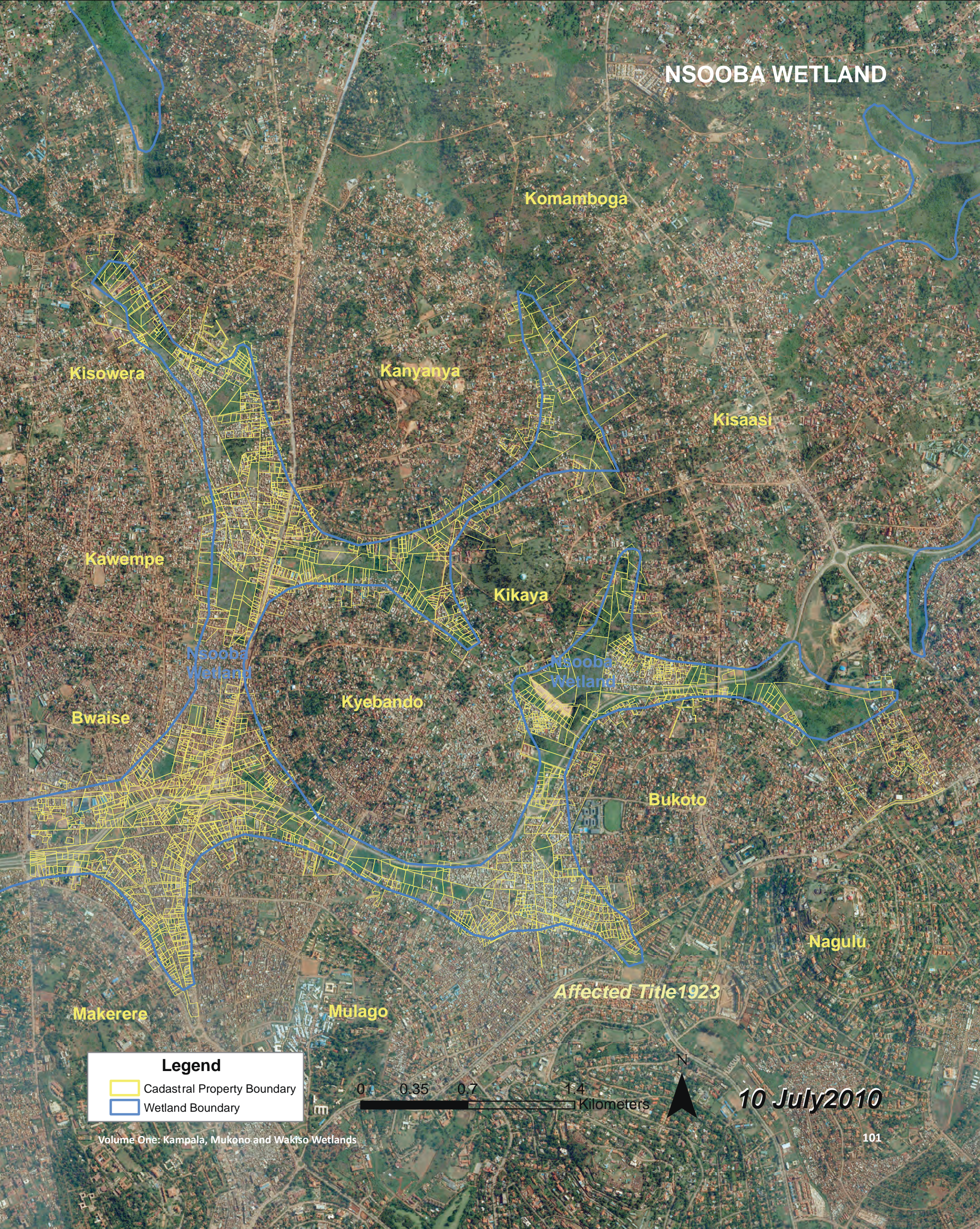
Nsooba is the most densely settled and degraded wetland in Kampala, suffering severe floods impacting a large number of people and their socio-economic activities. The area is vulnerable to water-borne diseases and is always the first to experience major outbreaks.

Figure 3.14: Lubigi Wetland Catchment (2008)





The frequently flooded Bwaise suburb

NSOOBA WETLAND



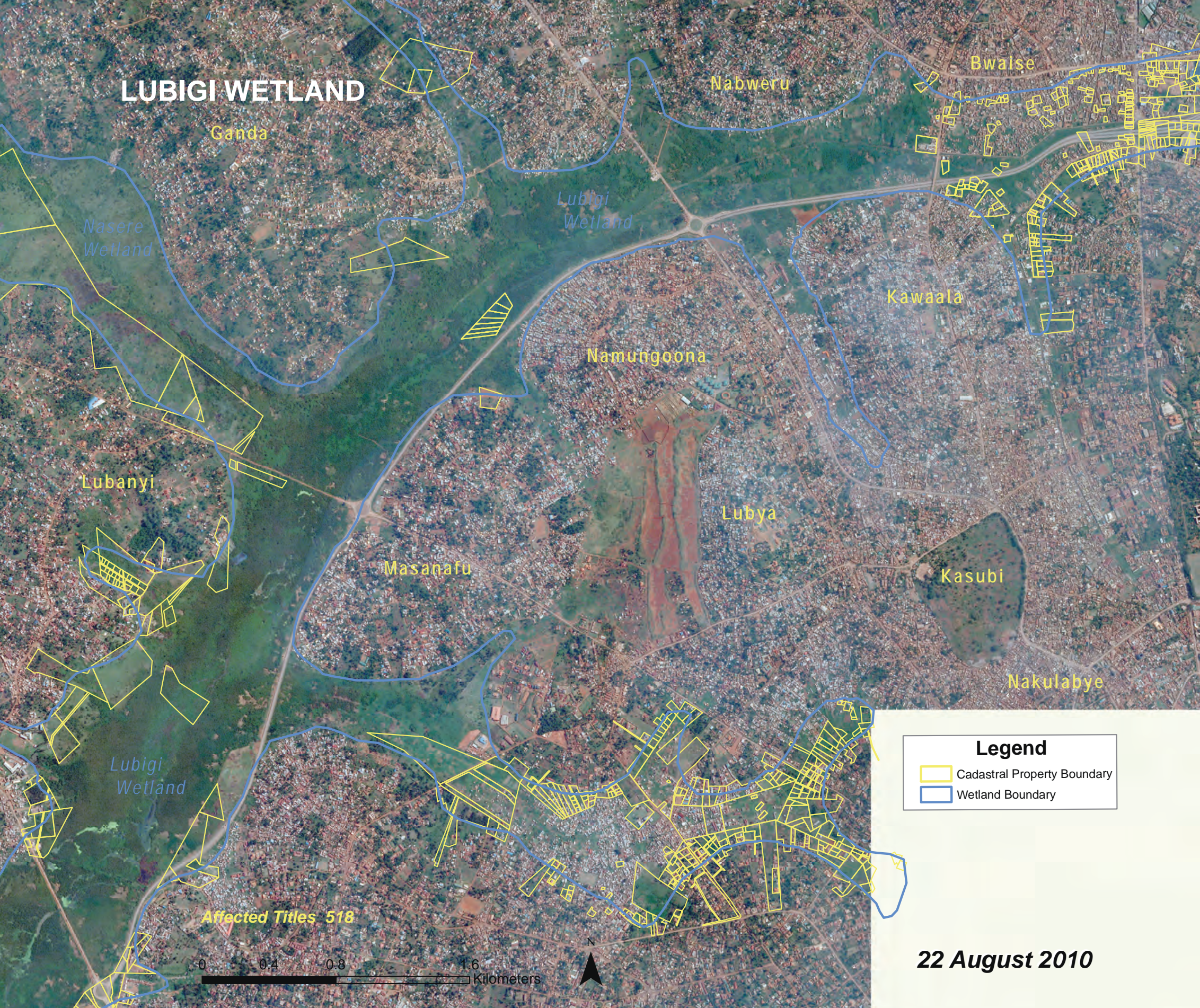
Legend

-  Cadastral Property Boundary
-  Wetland Boundary

0 0.35 0.7 1.4 Kilometers



10 July 2010



LUBIGI WETLAND

Nsooba wetland is part of the wider drainage network of Lake Kyoga. It is formed along the Lubigi River which occupies a shallow but wide valley with tributaries of Nsooba, Nabisasiro, Kiyunya and Nalukolongo that drains into Mayanja-Kato and eventually drains into Lake Kyoga. It is a permanent swamp dominated by *Cyperus papyrus* with patches of *Loudetia sp.*, *Echinochloa sp.*, *Typha sp.*, *Phoenix* palms and *Miscanthus*. The wetland is important for its rich biodiversity and is a habitat for Situngas and the Crested cranes.

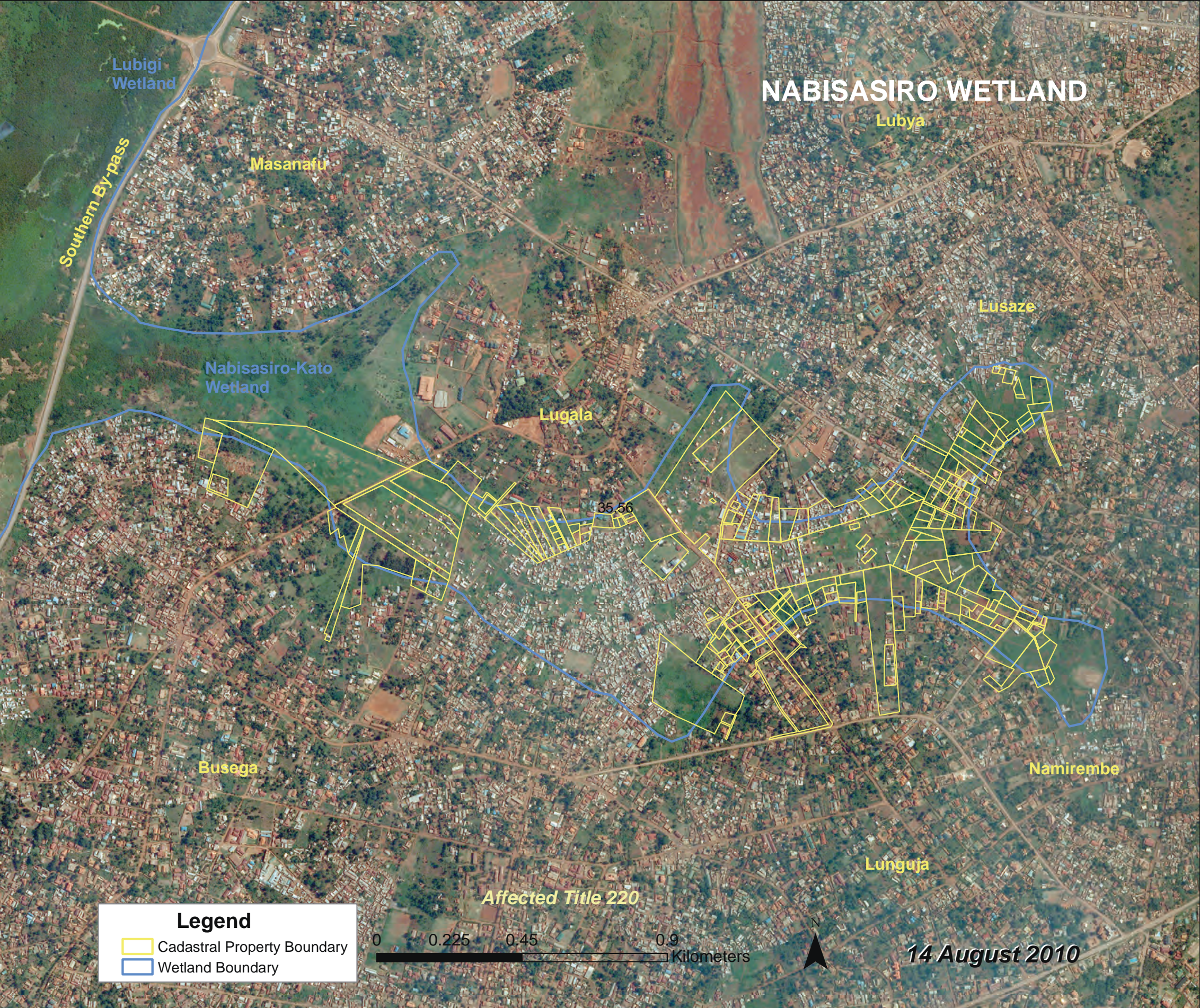
Pressures

The communities use the wetlands as a source of domestic water and craft materials. The catchments in the areas of Bwaise, Kyebando, Kisalosalalo, Kisasi and Gayaza are highly settled. This critical wetland is also highly threatened by various activities including infilling with murram and debris, dumping of solid waste, conversion for cultivation, and pollution from car washing bays, siltation from sand dealers, tree nurseries, brick making, settlements and other developments. This has led to extensive flooding in these areas whenever it rains and the risks of environmental disasters are still very high.



Restoration of Lubigi Wetland

MWE



Legend

- Cadastral Property Boundary
- Wetland Boundary



14 August 2010

Recommendations

- (i) Create a buffer zone of not less than 20m along the entire Nsooba-Lubigi River between Bukoto-Kisasi to Bwaise area and have the soil in this buffer excavated to mitigate the flooding problem in the area.
- (ii) Conserve the intact section of the wetland along the Kampala Northern Bypass in Bukoto, Kyebando; and between Kanyanya and Kalerwe along the Gayaza road to provide the current ecological services such as biodiversity conservation, flood control and water purification.
- (iii) Evict all encroachers on the Lubigi and Nabisasiro wetland and restore the wetland to its original state.
- (iv) Enforce the policy that the Kampala Northern Bypass should be the last development toward Lubigi wetland between Bwaise and Busega on the Kampala City side.



A section of Nabisasiro wetland

MWE



Najjera

Kyaliwajjara

Lunkingyo's
Wetland

Kiwattule

Nalya



Nakalera's
Wetland

Affected Title 270

Northern By Pass

5 August 2010

Legend

-  Cadastral Property Boundary
-  Wetland Boundary



Naalya Wetland State

Naalya wetland also called Lukingiride wetland lies within the upper most catchment of River Sezibwa wetland system. At Naalya, it marks the boundary between Kampala City and Wakiso District and drains the catchment areas of Kamuli (across the Kampala Northern Bypass), Naalya, Kiwatule, Najjera, Kira, Buwate and Kyaliwajjala before joining the Njogezi wetland system at Nakwero. The upper sections of Naalya wetland used to be intact until 2000 when it was opened up for cultivation. The lower sections of the wetland, mainly permanent wetland, are still relatively intact. A large section of the wetland is registered under the National Housing and Construction Corporation. All the other sections of the wetland are privately owned. This poses a major challenge in its management. Naalya wetland is of critical importance in the area because it is used for the tertiary treatment of wastewater from the National Housing Construction Corporation lagoons from the entire Naalya Housing Estate which has over 1000 households. It is also a major source of water for domestic use by the local community downstream in Najjera and other villages.

Pressures

There is intense landuse change in the entire catchment of the wetland, mainly for construction of residential houses and some industries along the Kiira-

Gayaza road at Buwate. The recent influx of investors in the area has resulted in a five-fold escalation in land prices over the last ten years. During the last two years, the number of proposals NEMA has been receiving from individual land owners to change the use of this wetland to green belts, development of car washing bays, and construction of structures and roads has been on the increase.

Recommendations

- (i) Conserve the intact section of the wetland in its natural state.
- (ii) Restore the degraded sections of the wetland that is currently under cultivation to as near as possible to its original state to effectively perform the tertiary treatment process.
- (iii) Regulate all activities in the wetland under the Permitting system as required by law.
- (iv) Develop a management plan for the wetlands that are owned by the National Housing and Construction Corporation. This should be an integral part of their project.
- (v) Carry out physical demarcation of the upper sections of the wetland between Naalya, Kiwatule, Najjera, Kira and Buwate as soon as possible to guide the rapid land acquisition and development in this area.



Walking in the lower section of Naalya swamp forest

Namanve Industrial Park State

Namanve Industrial Park also called Kampala Industrial and Business Park (KIBP), is an industrial and business park in Uganda developed by the Uganda Investment Authority (UIA), as a central place where investors can locate factories, warehouses, distribution centers and other business offices. The industrial park was created by an Act of Parliament in 1997 and occupies an area measuring 894 ha.

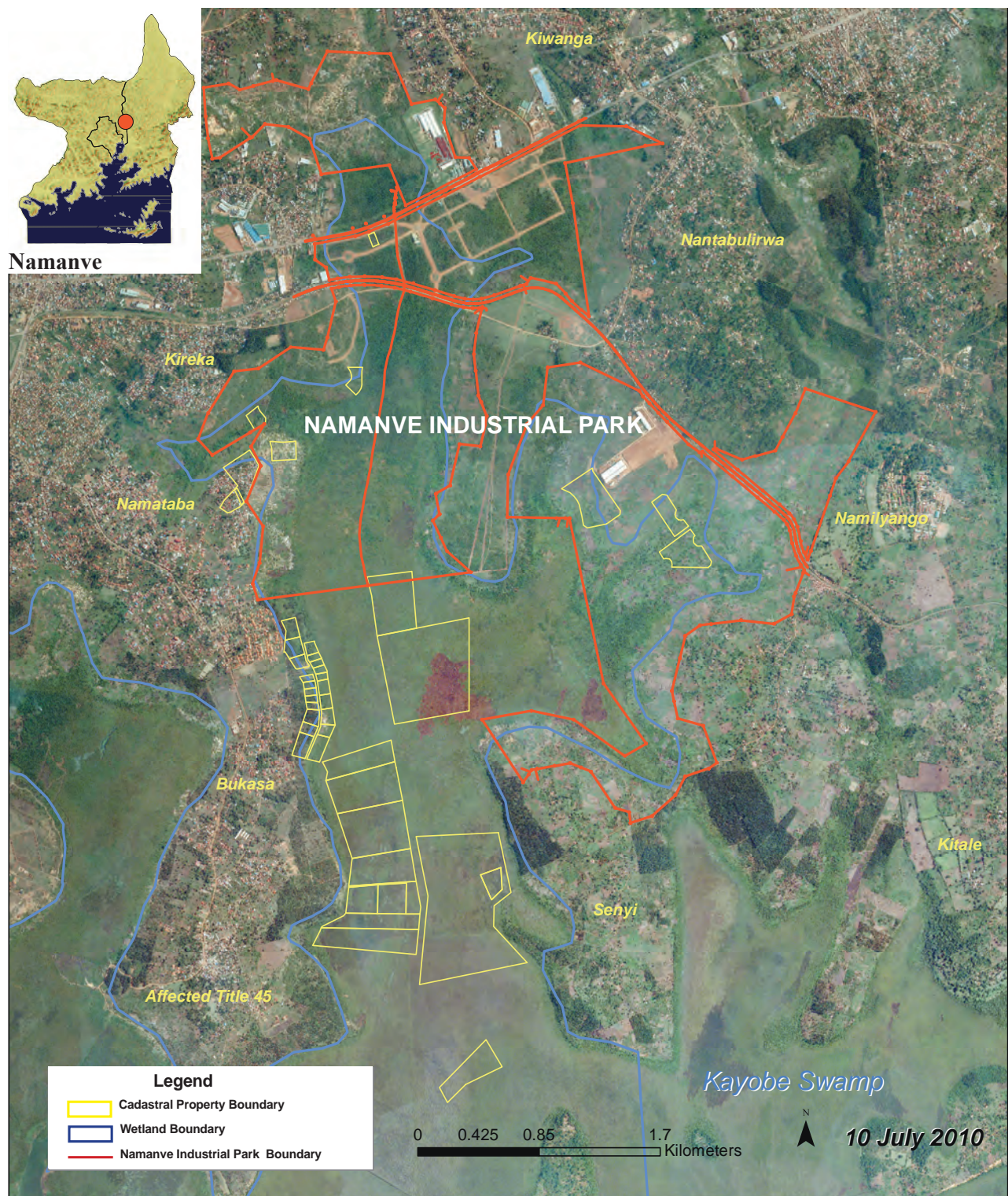
Out of these 894ha, approximately 190ha (representing 21%) comprise the wetland and natural drainage area. As required by law, the activities of the KIBP was subjected to an Environmental Impact Assessment (EIA) in 2001 and approved with conditions. One of the key recommendations of the EIA and approval was that the wetland in the business park be demarcated off and conserved for their ecological functions.

Pressures

Pressure for land for industry is the main threat to this wetland. In 2002, the Government of Uganda launched the KIBP Project to form the foundation for the turnaround of Uganda's industrialization. Over 200 businesses acquired land and space on concessionary terms, to establish their businesses in the new business park. In 2014, it was noted that most of the critical wetlands and drainage areas had also been zoned for the development of the Industrial Park by UIA. By 2015, the project had seemingly stalled because the World Bank, one of the funders, had pulled out citing environmental concerns among others.

Recommendations

- (i) Improve management of wetlands. The location of the proposed project site in Namanve will have a significant negative impact on the Namanve wetland area. Although from a socio-economic standpoint, the proposed site is strategically located in terms of proximity to Kampala for trade and commerce transactions, and easy access to skilled and unskilled labour to work during the construction and operation phases of the project; this increased population is likely to encroach on the wetland in the area. UIA and all other developers must stick to the original approved area for industrial development.
- (i) Enforce pollution control measures. The EIA of the KIBP identified disposal of effluent as a major concern given the possible impacts on the wetland, the Inner Murchison Bay area and the wider Lake Victoria. To address these concerns all industries in the Park should pre-treat their effluent before discharge into the environment as required by the law.
- (iii) Reinforce road construction and drainage. In order to conserve the existing wetland in the Park and also provide good road





All development activities in the KIBP should comply with the EIA requirements.

- (iv) Improve management of hazardous wastes. The Namanve Industrial Park has a high water table and there is a real possibility of contamination by industries. Thus industries such as those associated with the petroleum, petrochemical, tanning or pulp and paper should be located on higher ground and ideally on impermeable soils. In addition, groundwater monitoring wells should be installed.



Affected Title 91

Legend

-  Cadastral Property Boundary
-  Wetland Boundary



10 July 2010



Njogezi Wetland

Njogezi Wetland State

Brick making and sand mining are two popular activities that were common in 2002. However, by 2004, this declined and the wetland made a remarkable recovery, revegetating to almost its normal state. Other land uses present include fish farming and subsistence farming.

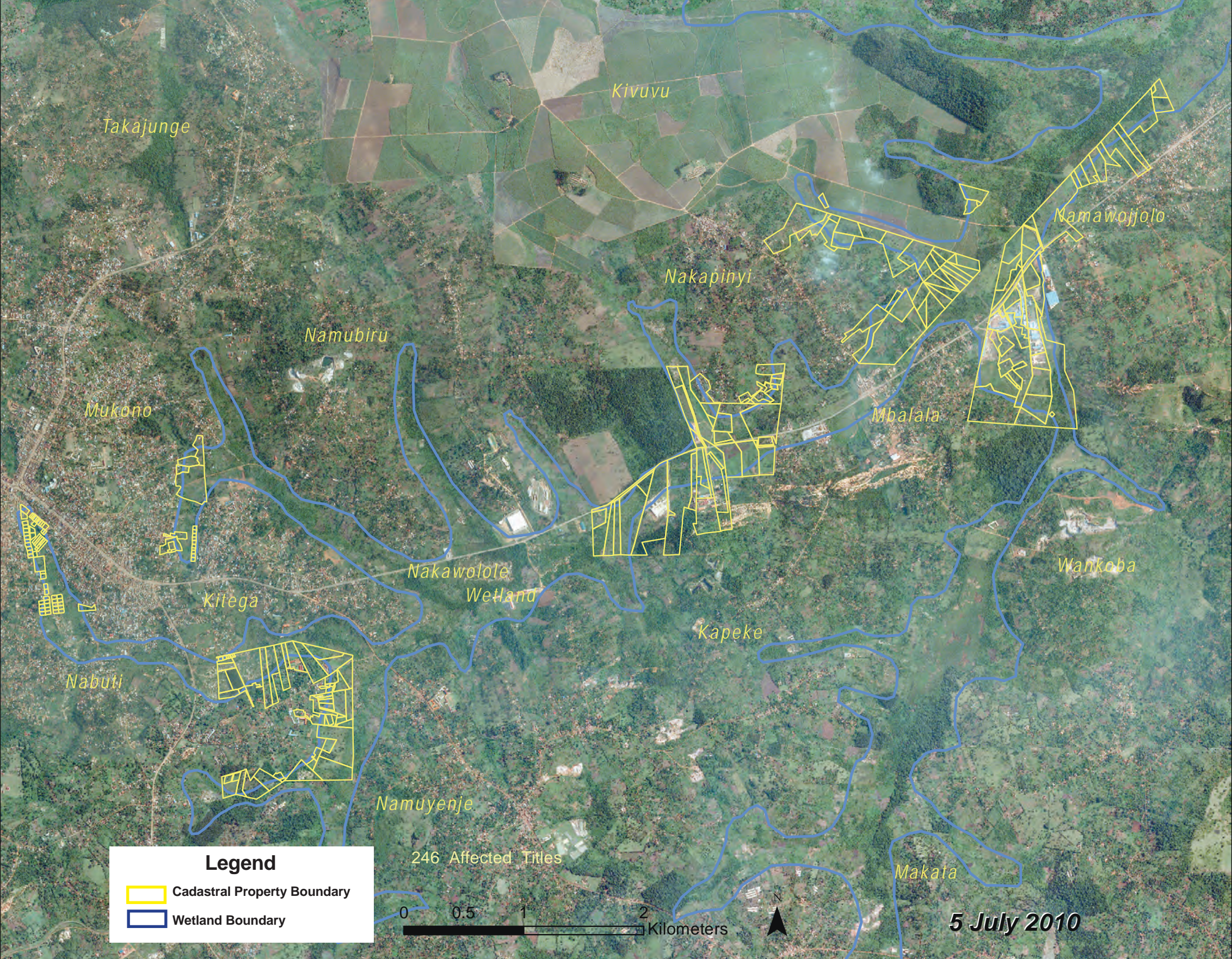
Pressures

The main pressures in this wetland are from the rapidly expanding industrial area and related activities including discharge of effluent onto land and water. For example the poultry wash down and effluent from Biyinzika Poultry Industry is of concern. So far 72 Titles have been allocated in this wetland with over 60 located in the upper area. Other threats come from brick making, sand mining, crop production, reclamation and backfilling for settlement. Brick making and sand mining are notorious for the pits left behind and for the deforestation that accompanies baking of bricks.

Ensure restoration of the wetland as soon as possible.

Recommendations

- (i) Carry out restoration of the degraded section of the wetland as soon as possible.
- (ii) Conduct the physical demarcation of the wetland boundary to guide development along the wetland.
- (iii) Develop and implement a wetlands management plan for the wetland
- (iv) Oblige Mukono Municipal Council to take charge of the wetland and conserve it as a green space or Nature Parks in accordance with the law for the good of all the people in the Municipality.
- (v) Regulate all the activities of the persons with land titles in the wetland.



Mbalala Wetland

Mbalala Wetland

State

Mbalala wetland lies between Mukono and Wakiso boundaries. It is a buffer for the lake as well as a nutrient filter for the lake.

Pressures

Threats to this wetland come mainly from industrial establishments. Some of the activities include back filling to create land for expansion and effluent discharge. This causes sedimentation due to soil erosion and increased water run-off during the rains leading to deterioration of water quality and biodiversity loss. Although wetlands

Ensure compliance with the original Management Plan.

have been gazetted as green belts or conservation areas under the Kampala Industrial Park Management Plan, this is not being implemented and they are continuously being degraded.

Recommendation

Implement and enforce the recommendations of the original Mbalala Wetland Management Plan.

CONCLUSION

The wetlands in Kampala city and in Mukono and Wakiso districts all provide an array of vital ecosystem services that are vital to other ecological processes, human wellbeing and national development. Despite this the wetlands in these urban areas are subject to a range of pressures whose impacts invalidate many of the national and local government social, environmental and development goals.

In many instances, ignorance is cited as the reason for encroaching on the wetlands. This chapter has used the cadastral overlays to highlight clearly where the wetlands boundaries and cadastral maps overlap. It is hoped that this will be used by the planners and decision makers to provide better services to the people and to ensure that the wetlands in study area are better managed.

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Papyrus Gonolek (*Laniarius mufumbiri*)

EMERGING ISSUES, CHALLENGES AND RECOMMENDATIONS

INTRODUCTION

Wetlands are primarily threatened by human induced activities at subsistence level and government or private-sector driven reclamation activities. These varied threats have been discussed in chapter 3 and include extracting wetland resources for utilization for instance for brick-making, subsistence agriculture, unplanned settlements and water consumption. These varied uses are driven by poverty, demographic factors, climate change and livelihood needs. Government or private sector driven reclamation activities include large industrial expansion allocations and infrastructural development for settlements and the like. The justification for these large-scale developments is that the economic benefits of wetland exploitation are thought to outweigh the potential economic benefits of wetland conservation.

Chapter 1 provided the background behind the national policies that have so far been designed to halt or reduce wetland loss and how these are interacting with the reality on the ground. The current state of wetlands in the study area was then discussed in Chapter 2. This chapter provides an overview of the key findings that have been discussed in the foregoing chapters and proposes some recommendations to address the identified constraints.

Key messages

There have been changes in the condition and quality of wetlands in Kampala City, Mukono and Wakiso Districts. Changes include disappearance of parts of wetlands as well as a significant deterioration in the quality of the wetlands.

The major drivers of wetlands destruction is agriculture in rural areas and construction of settlements and industries in urban areas. The area of wetlands in Kampala, Mukono and Wakiso between 1995 and 2010 reduced by 9,661 ha - a 14% decline. During this 15-year period, 8,997 ha of wetlands were infilled, converting them to drylands. This translates to a conversion rate of 600 ha per year. At this rate, all wetlands will be completely gone in 100 years time.

Existing legislation and governance systems have not managed to curb wetland destruction. Most of the wetlands under threat are in Kampala. Hotspots where wetlands have been modified have been identified and presented as maps in this report. The hotspots will act as nuclei for continued wetland destruction if urgent action is not taken. Remedial or mitigation measures should start at these hotspots.

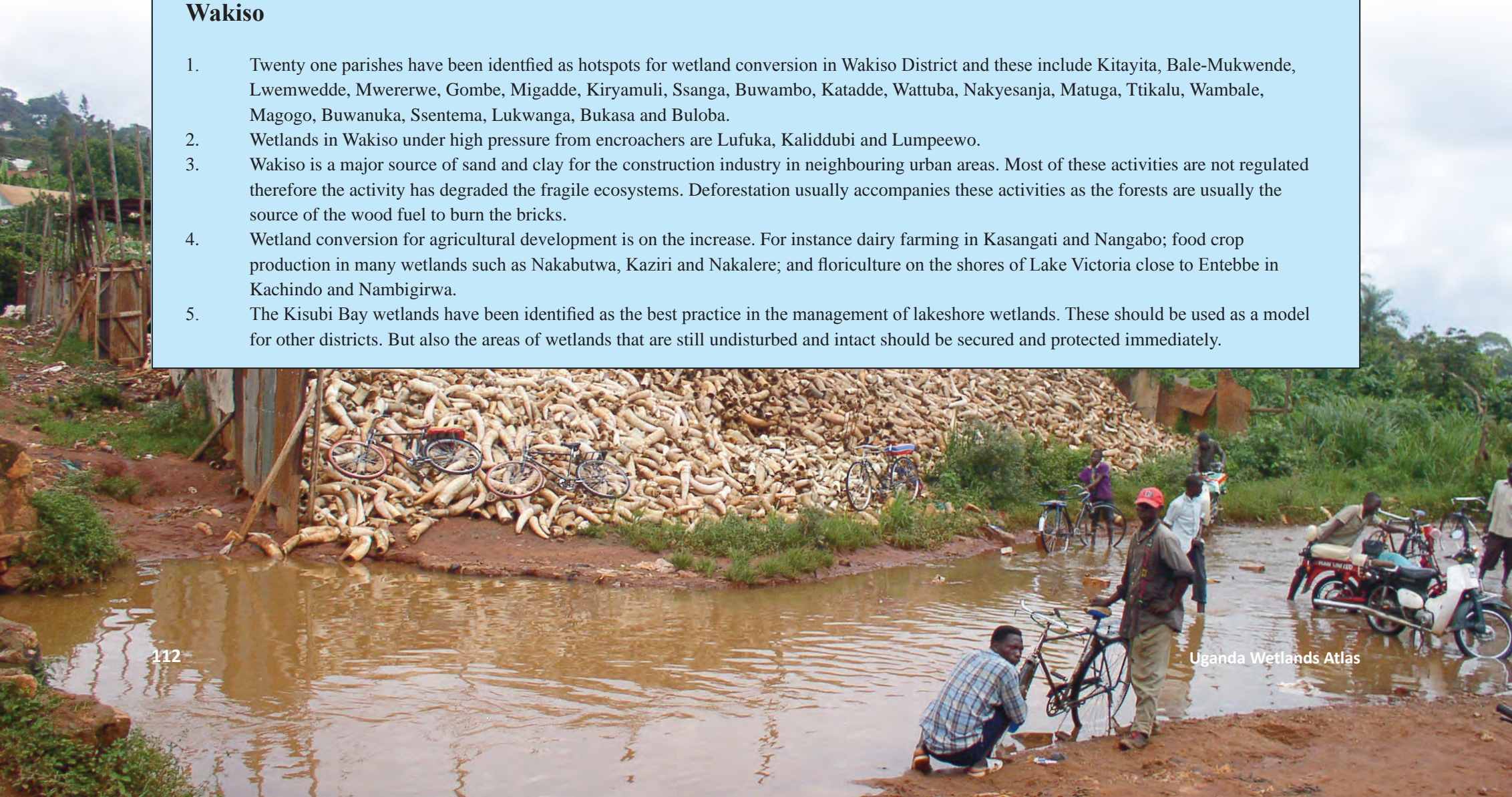
MWE



Cows grazing in a wetland

Table 4.1: Key findings

KEY FINDINGS	
General	
<ol style="list-style-type: none"> 1. The area of wetlands in Kampala, Mukono and Wakiso between 1995 and 2010 reduced by 9,661 ha - a 14% reduction in area. 2. During this 15 year period, 8,997 ha of wetlands were infilled, converting them to drylands. This translates to a conversion rate of 600 ha per year. At this rate, all wetlands will be completely gone in 100 years time. 3. Since 2010, there has been an escalation in encroachment into wetlands. 4. Land shortages and population pressure are the main drivers causing the degradation of wetlands. 5. The urban character of the study area 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 housing. 6. Wetlands located close to markets and roads are easily accessible thus more vulnerable to conversion because, for instance, the natural products obtained from the converted wetlands such as crops and livestock products can be traded in the markets. 7. The number of Titles in the wetlands hotspots by 2012 were as follows: 250 land titles in Nakivubo, Lufuka 3, Kinawataka 294, Mayanja-Kato 127 and Kaliddubi 206. 	
Kampala	
<ol style="list-style-type: none"> 1. The whole of Kampala has been identified as a hotspot for wetland conversion. 2. The location of Kampala on a fragile ecosystem has created on-going challenges in the management of the city. For instance the intense floods experienced in Bwaise from 2007 seem to be continually getting worse despite government interventions. The cause of these intense floods correlates with increased settlement in the catchment areas of Bukoto, Naguru, Mulago and Kyebando. In addition the flooding is also linked with an increase in paved compounds associated with the increase in formal housing greatly reducing the green spaces which used to encourage infiltration of storm waters in the catchments. 3. As a result, surface runoff is almost 100% leading to flash floods in the valleys which were once occupied by wetlands. These damage infrastructure, lead to deaths and communicable diseases and affect businesses and economic development. 4. The wetlands in Kampala under high pressure from encroachers are Kinawataka, Nakivubo, Lubigi, Kyetinda and Nalukolongo. 	
Mukono	
<ol style="list-style-type: none"> 1. Fifteen parishes have been identified as hot spots for wetland conversion in Mukono District and these include Namayuba, Kyabazala, Ntinda, Bukasa, Kiwafu, Kawongo, Namaliga, Nakanyonyi, Nabalango, Makukuba, Nagalama, Nanga, Dundu, Bukerere and Kikoko. 2. Brick making is common mainly along those riverine wetlands located near the urban areas due to the demand. This activity leaves the wetlands with large open pits, a sign of where such activities have taken place. These form breeding places for mosquitoes, the vectors of malaria and other pests. 	
Wakiso	
<ol style="list-style-type: none"> 1. Twenty one parishes have been identified as hotspots for wetland conversion in Wakiso District and these include Kitayita, Bale-Mukwende, Lwemwedde, Mwererwe, Gombe, Migadde, Kiryamuli, Ssanga, Buwambo, Katadde, Wattuba, Nakyesanja, Matuga, Ttikalu, Wambale, Magogo, Buwanuka, Ssentema, Lukwanga, Bukasa and Buloba. 2. Wetlands in Wakiso under high pressure from encroachers are Lufuka, Kaliddubi and Lumpeewo. 3. Wakiso is a major source of sand and clay for the construction industry in neighbouring urban areas. Most of these activities are not regulated therefore the activity has degraded the fragile ecosystems. Deforestation usually accompanies these activities as the forests are usually the source of the wood fuel to burn the bricks. 4. Wetland conversion for agricultural development is on the increase. For instance dairy farming in Kasangati and Nangabo; food crop production in many wetlands such as Nakabutwa, Kaziri and Nakalere; and floriculture on the shores of Lake Victoria close to Entebbe in Kachindo and Nambigirwa. 5. The Kisubi Bay wetlands have been identified as the best practice in the management of lakeshore wetlands. These should be used as a model for other districts. But also the areas of wetlands that are still undisturbed and intact should be secured and protected immediately. 	



IMPROVING THE SUSTAINABILITY OF WETLANDS

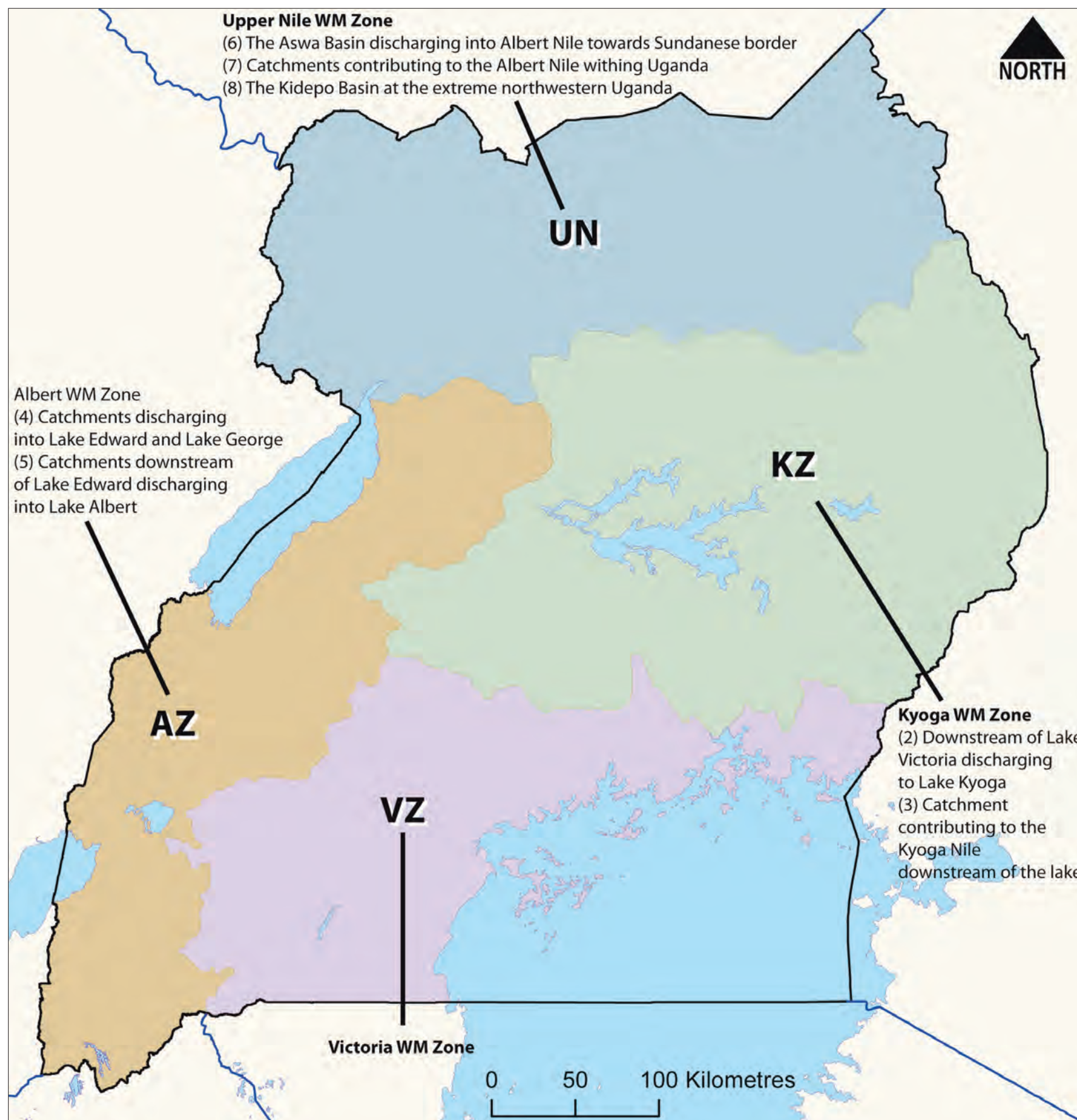
Strengthen inter-sectoral collaboration

It is essential that NEMA, the Wetlands Department and all other stakeholders in the environment sector including the Uganda Land Commission and District Land Boards have more coordinated and collaborative work processes so as to harmonize land use planning, reduce the leasing out of wetlands and rampant drainage and standardize their wetland advisory and coordination functions. Catchment management interventions should be carried out in close collaboration with the Department of Water Resources Management as many of the water bodies have wetlands at their edges. Figure 4.1 shows the water management

zones that the study area falls in. Going forward, catchment management plans should be developed for the sub-basins in the study area as a matter of urgency. Lessons learned from the pilot study on the River Rwizi catchment area should be adopted.

The Environment Police Protection Unit in the Ministry of Water and Environment should be fully utilized to strengthen enforcement and compliance. Further, the plans to support Wetland Regional Technical Support Units so as to strengthen the institutional structure for wetlands management at the lower levels should be fully implemented. Improvements in collaboration will need to be supported by adequate financing so that monitoring and enforcement activities can be undertaken in a manner that enhances synergy and utilizes the available resources in the most efficient way.

Figure 4.1: Water Management Zones (WMZs)



Source: Mwebembezi undated

Strengthen the land regulating offices

Strengthen the collaboration between the land titling, land management and the other land regulating institutions to avoid conflicting decisions. Harmonization of their mandates will ensure a more streamlined approach to wetlands management.

The Land Information System should also be strengthened and expanded so that areas of wetlands that are not titled and information on regulated or prohibited areas is made available to the relevant institutions, including the local authorities, banks and the Uganda Investment Authority, among others. This will help prevent the accidental allocation of land titles in wetlands.

Strengthen the Wetlands Information System

The National Wetlands Information System is currently being piloted in the Doho, Namatala and Awoja wetlands system in Eastern Uganda prior to being rolled out countrywide. It contains information on wetlands uses, the degree of utilization and the effect of these uses on the wetlands. The baseline data was obtained from a standardized inventory of wetlands carried out between 1997 and 2001. This baseline data now needs to be updated and added to.

Going forward, it would be useful to have the Wetlands Information System available online as then documents, maps, lead agency roles in wetlands management, restoration and mitigation activities, EIA permits, environmental audit permits and wetland policies would be easily available to all interested people including researchers, students, regulators, policy and decision makers at national and lower levels. It should also aim for inter-operability with other existing information databases in the country such as the land cover database with the National Forest Authority, the Environment Information System coordinated by NEMA and the National Statistical System run by the Uganda Bureau of Statistics.

Strengthen the legal framework

A fully-fledged wetlands law is called for given the pressures that Uganda's wetlands are under. Strategies for better management of wetlands as well as initiatives to mitigate and adapt to climate change should also be included.

The Ministry of Water and Environment has formulated a Wetlands Resources Management Bill and measures are underway to finalise it. Guidelines for the development of ordinances to guide the districts in the development of ordinances and by-laws should be rolled out immediately. This will support the continuous professional development activities to equip the Environment Officers with skills to produce District Environment or Wetlands Ordinances. By 2014, five districts had developed District Wetlands Ordinances. These are Adjumani, Budaka, Mbale, Ntungamo and Pallisa (MWE 2014).

The 2013 National Land Policy should be fully implemented as it will help clarify on the criteria for gazetting and degazetting of conservation areas, including wetlands.

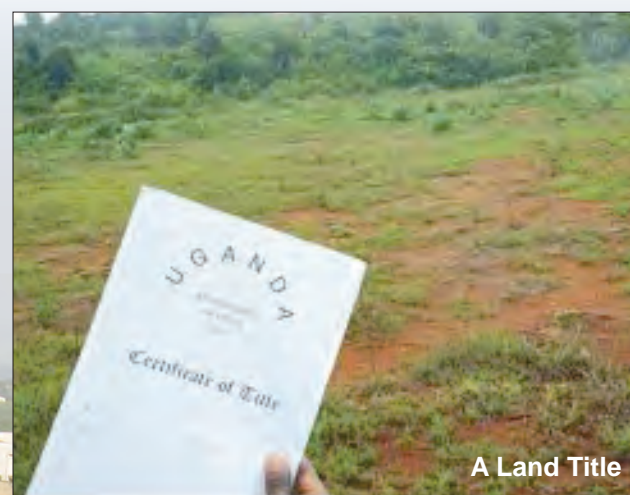
Restore the degraded wetlands

Restoration involves allowing the degraded wetlands to regenerate and recover some or all of their original state and functions. This involves identifying the wetlands sites or wetland systems where restoration activities would be beneficial in the long term and be able to generate environmental, social and economic benefits; and instigating the necessary measures to recover them. This is possible because even after degradation, wetlands retain their unique soil and hydrologic characteristics remain meaning that their natural functions can be reclaimed (EPA 2013). However restoration activities need strong technical backstopping and political support to ensure that it is effective and successful.

So far, Nakivubo and Kinawataka wetlands have been proposed for restoration. This process involves the initial removal of all alien species and the structures that have been built in the wetlands. The man-made drainage channels would then be unblocked to allow the water to reticulate through the floodplain. If necessary, some indigenous wetlands plant species are reintroduced to catalyse the regeneration process.

Before the restoration exercise begins, a technical assessment on the condition of the wetland is undertaken and a social assessment carried out. The social assessment enhances community participation and ownership in the long run by closing the gap between science, policy and community needs in the long run. Once an agreement is reached, the wetlands boundaries are marked and the wetlands left to regenerate. A management plan for the affected wetland is also developed and implemented.

Photos: MWE



A Land Title



Flooding in Kalerwe-Bwaise

MWE

Demarcate the wetlands boundaries

Demarcation of all wetlands boundaries should be done in preparation for gazettement. This should be a collaborative effort between the Ministry of Lands Housing and Urban Development, Ministry of Water and Environment, National Environment Management Authority and Ministry of Justice.

One of the arguments presented by wetlands encroachers is that they do not know where the wetlands boundaries lie. So in order to address that issue, the Wetlands Department developed a strategy and action plan in 2011 to guide the demarcation of wetlands boundaries (MWE 2013). Wetlands demarcation involves physical marking of the wetlands with mark stones, pillars and beacons. By 2013, five wetlands in Kampala (Nakivubo, Kyetinda, Kinawataka, Lubigi and Kansanga) were tested and 32 kms of Nakivubo wetland in Kampala, 36 Km of Lutembe wetland in Wakiso district marked with pillars. Marking of 37 kms of Kansanga and 15 kms of Kyetinda wetland systems in Kampala was also initiated.

The programme has faced some challenges including a long procurement process and political interference (MWE 2013). However, it has also had some successes. For instance some of the degraded wetlands were able to regenerate naturally following the eviction of encroachers (MWE 2013). Now plans are underway to develop Framework Management Plans and Community Based Wetlands Management Plans for the wetlands. These will harmonize the approaches and strategies for wetlands management, in general and should be finalised as a matter of urgency.

Improve sustainability of the urban areas

Integrate elements of sustainable city design into the urban areas. Specific recommendations include:

1. Decongesting the Central Region by encouraging developers to establish their facilities in other regions. This can be done by creating the

necessary business incentives including well planned industrial and office parks and other services such as housing, shopping and banking among others.

2. Ensuring that the drainage channels constructed are able to accommodate storm water in the hotspots identified. The size and type of culverts used should take account of flood frequency, discharge, headwater, slope, tailwater and outlet velocity (UDFCD 2001).
3. Enforcing the domestic waste management regulations so as to reduce the impacts of improperly managed waste on wetlands, biodiversity and public health.
4. Investing in formal low income housing will feed into Uganda's pro-poor policies and reduce the occurrence of illegal housing especially in the urban wetlands. The corporate sector should be encouraged to invest in some basic housing for their employees to improve their welfare, as most of their employees end up in living in the slums located in wetlands.

CONCLUSION

There have been changes in the condition and quality of wetlands in Kampala city, Mukono and Wakiso districts. Changes include disappearance of parts of wetlands as well as a significant deterioration in the quality of the wetlands.

The major drivers of wetlands destruction is agriculture in rural areas and construction of settlements and industries in urban areas.

Existing legislation and governance systems have not managed to curb wetland destruction. Most of the wetlands under threat are in Kampala. Hotspots where wetlands have been modified have been identified and presented as maps in this report. The hotspots will act as nuclei for continued wetland destruction if urgent action is not taken. Remedial or mitigation measures should start at these hotspots.

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ACRONYMS

DWRM	Directorate of Water Resources Management
EIA	Environment Impact Assessment
IMB	Inner Murchison Bay
KCC	Kampala City Council
KCCA	Kampala City Council Authority
KIBP	Kampala Industrial and Business Park
MWE	Ministry of Water and Environment
NEMA	National Environment Management Authority
UBOS	Uganda Bureau of Statistics
UIA	Uganda Investment Authority
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNRA	Uganda National Roads Authority
UWA	Uganda Wildlife Authority
WID	Wetlands Inspection Division
WMD	Wetlands Management Department

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