



THE REPUBLIC OF UGANDA
MINISTRY OF WATER
AND ENVIRONMENT

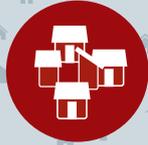


2020 // 2040

THE WATER SECURITY ACTION & INVESTMENT PLAN FOR GREATER KAMPALA METROPOLITAN AREA

Ensuring Water Security For Inclusive Urban Growth

GREATER KAMPALA METROPOLITAN AREA



KAMPALA CITY

LUBIGI TREATMENT PLANT



CENTRAL BUSINESS DISTRICT

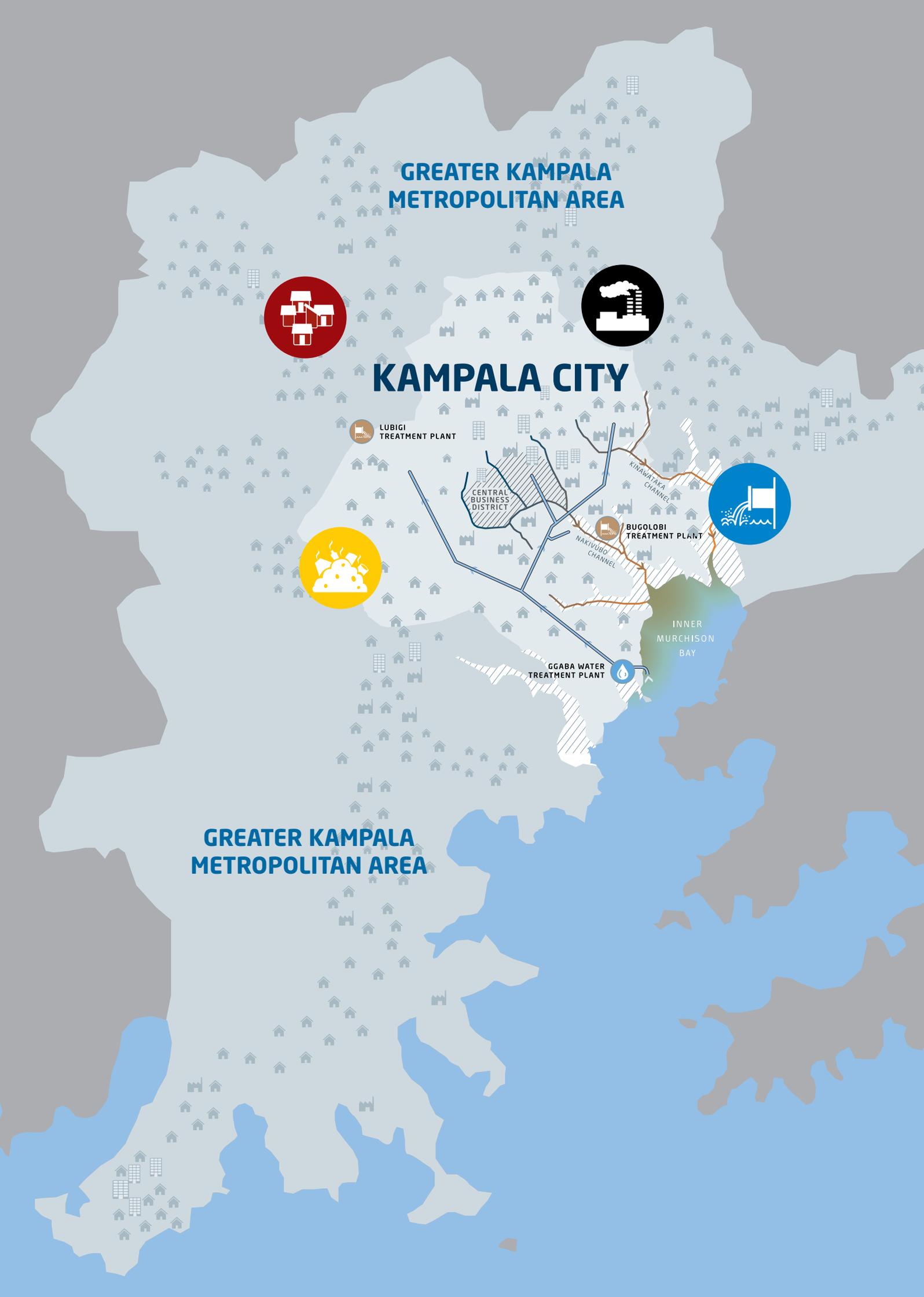


BUGOLOBI TREATMENT PLANT

GGABA WATER TREATMENT PLANT

INNER MURCHISON BAY

GREATER KAMPALA METROPOLITAN AREA





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For Inclusive Urban Growth



FOREWORD

Water and environmental resources play an integral role in Uganda's economic growth and development. Hence, the potential of realising national ambitions enshrined in Vision 2040 will largely depend on our ability to invest in integrated and holistic solutions that address multiple water security threats including effects of climate change. Rapid urbanisation, industrialisation and population growth pose severe water and environmental risks for the population which could compromise existing and future economic growth opportunities. Water security is therefore a pertinent concern in urban areas, particularly in the Greater Kampala Metropolitan Area, one of the fastest growing metropolises in the world, and Uganda's economic hub.



In September 2018, the Ministry of Water and Environment in collaboration with Kampala Capital City Authority (KCCA), National Water and Sewerage Corporation (NWSC) and Uganda Manufacturers Association (UMA), with support from Uganda Water and Sanitation NGO Network (UWASNET), and Environment and Natural Resource Civil Society Organisation (ENR-CSO) Network, spearheaded the development of the WATER SECURITY ACTION AND INVESTMENT PLAN (WSAIP) for Greater Kampala Metropolitan Area. We employed a multi-sectoral participatory and consultative approach to engage various government ministries, departments and line agencies, local governments and municipalities, civil society organisations, private sector actors, the academia and urban residents.

The WSAIP is designed to provide a comprehensive approach to collective planning for water security. It relies on evidence and multi-stakeholder collaboration to mitigate current and future water security threats with a goal to enhance urban resilience, inclusive growth and wealth creation. The plan considers water security not just as adequate quantities of acceptable quality of water for current and future generations but rather in its entirety as a cross-cutting and multi-dimensional concept that can catalyse socio-economic development; improve public health; reduce water related pollution and disasters; and ensure preservation of ecosystems.

It presents approaches and decision support tools to guide stakeholders in planning and prioritisation of water security in the short, medium and long-term; and a portfolio of investment opportunities as a stimulus for stakeholders to start investing in water security now rather than later.

The WSAIP is aligned to the objectives and ambitions of the third National Development Plan (NDP III) for the period 2020/21–2025/26 and is guided by government policies and frameworks with linkages to multi-sectoral and institutional strategic and development plans that cut across integrated urban planning and land-use; water supply and sanitation; water and natural resource management; pollution control; and climate change, to create an integrated approach to understanding and improving water security.

The development and implementation of the WSAIP is based on the stewardship approach that supports multi-stakeholder (private, government and civil society sectors) collaboration to collectively work towards achieving water security through continuous coordination and monitoring of the changing water security landscape, identification of threats and implementation of integrated actions to mitigate those threats. I therefore, call upon all stakeholders from both public and private sectors, development partners, civil society, the academia and urban residents through their local leaders, to align their operations to the water security paradigm and support the implementation of the WSAIP to achieve inclusive growth and development of Greater Kampala Metropolitan Area.

The Ministry of Water and Environment commits to spearhead the championing of water security in Uganda and implementation of WSAIP in collaboration with all stakeholders.

For God and My Country.

Hon. Cheptoris Sam
Minister of Water and Environment
The Republic of Uganda

PREFACE

Water security, economic growth and sustainable development are closely interconnected, and it is essential to consider all of these concurrently when planning for the Greater Kampala Metropolitan Area (GKMA). A major concern for the metropolitan area is ensuring a high rate of economic growth that is both sustainable and equitable. For economic growth to be sustainable, urban water security threats resulting from rapid urbanisation need to be the focus of the region's development agenda. Whilst the current urbanisation rate presents vast opportunities for social economic transformation, it also causes various complexities due to its informal and uncoordinated nature which is evident in the informal settlements within the GKMA where a large percentage of the population live.



Informal settlements are hotspots for water security challenges such as inadequate access to water and sanitation infrastructure and basic services, vulnerability to floods, public health risks and degradation of wetland and forest landscapes. For GKMA to realise its full potential, we must integrate water and environmental resource management in urban development planning processes, implement strategic action for resilience to water security threats, and promote green livelihood opportunities.

The Water Security Action and Investment Plan (WSAIP) provides the Greater Kampala Metropolitan Area city authorities; municipal and town councils; and policy makers with a comprehensive analysis of the water security risks, and recommends an approach toward achieving water security. Considering that water security is a multi-faceted issue, it calls for coordinated multi-sectoral collaboration and strategic investment where all GKMA authorities work closely with central government, private sector, civil society, academia and international development partners, for the successful implementation of water security investments and the WSAIP as a whole. This calls for each stakeholder to own the WSAIP and continually plan and budget for water security. In relation to this, I extend my gratitude to the Mayors Forum for their political support during the development of the WSAIP.

I likewise commit to support its implementation; and urge all actors in Greater Kampala Metropolitan Area to embrace the WSAIP and commit to partner with us as we work towards a water secure and prosperous GKMA.

For God and My Country.

Hon. Hajjati Minsa Kabanda
Minister of Kampala Capital City and Metropolitan Affairs
The Republic of Uganda

ACKNOWLEDGEMENTS

I extend my sincere gratitude to the Water Security Action and Investment Plan (WSAIP) Steering Committee, the project coordination team and the entire technical team for supporting the completion of this plan.

Our gratitude goes to GIZ International Water Stewardship Programme for coordinating and providing technical support towards development of the plan; as well as to DFID's Cities and Infrastructure for Growth (CIG) programme, and the German Federal Ministry for Economic Cooperation and Development (BMZ), for the funding. Sincere appreciation also goes to Industrial Economics, Incorporated (IEc) for the technical support provided during the development of the plan and its accompanying tools.



Special thanks to our lead partners; Kampala Capital City Authority (KCCA), National Water and Sewerage Corporation (NWSC), Uganda Manufacturers Association (UMA), the Uganda Water and Sanitation NGO Network (UWASNET) and the Environment Natural Resource (ENR) CSO Secretariat.

Invaluable technical support was also provided by various ministries, departments and authorities including; National Environment Management Authority, Ministry of Lands, Housing and Urban Development, Ministry of Agriculture, Animal Industry and Fisheries, National Forestry Authority, National Planning Authority, Uganda Bureau of Statistics, Office of the Prime Minister, Uganda National Meteorological Authority, Uganda Cleaner Production Centre, District Local Governments (Wakiso and Mukono), Municipal authorities (Entebbe, Kira, Nansana, Makindye Ssabagabo and Mukono) and the academia (Makerere University Kampala).

I commend the exemplary collective action and stewardship exhibited in developing this plan and hope that the WSAIP becomes a guiding tool for future sector initiatives. I commend you all and look forward to this continued collaboration for the successful Implementation of the Water Security Action and Investment Plan for Greater Kampala Metropolitan Area.

For God and My Country.

Alfred Okot Okidi
Permanent Secretary, Ministry of Water and Environment
The Republic of Uganda



EXECUTIVE SUMMARY

INTRODUCTION

The Greater Kampala Metropolitan Area (GKMA) is strategically positioned as the economic engine set to drive Uganda's transformation to middle income status by 2040 (Uganda Vision 2040). Located along the northern shores of Lake Victoria, the GKMA is characterised by low lying hills and wide wetland valleys and river systems which have enabled a conducive environment for the region's urbanisation through provision of water, wastewater treatment, flood control, stormwater drainage services, and livelihood opportunities to over 4.5 million people; facilitating the establishment of expansive settlements, road networks and commercial centres (NPA, 2018).

However, the rapid urbanisation and industrial development that established GKMA as an economic engine has significantly contributed to the degradation of environmental assets and ecological services, threatening the future health of the economic, social and environmental systems that are currently driving the growth of Kampala city and surrounding metropolitan areas. Wetland coverage has reduced by 48% from 194 square kilometres in 1996 to just over 100 square kilometres in 2019/2020; over 1.4 million people have no access to adequate clean safe water and sanitation; and between 40 to 60 percent of the population reside in informal settlements (KCCA, 2018). Of significant concern is the continued deterioration of water quality in the Inner Murchison Bay, the main source of drinking water for Kampala Capital City, with Biochemical Oxygen Demand (BOD) levels averaging around 7.62 mg/l, representing significant levels of pollution (Akurut, 2017).

Higher levels of investment in water supply and sanitation are needed to keep up with the rising population numbers; growth in industrial and economic activities; and the effects

of climate change. Currently, over 1.4 million people have no access to adequate clean safe water and sanitation, and between 40% to 60% of the population reside in informal settlements (KCCA, 2018). In 20 years, the consequences of inaction are predicted to include: further deterioration of water quality resulting in a 142% increase in BOD levels across metropolitan river catchment systems, rendering Inner Murchison Bay hypoxic; further reduction in wetland coverage to 64 square kilometres, only one third of the 1996 coverage; 180% average increase in flood risk and subsequent economic costs associated to flooding; and 11,000 tonnes of solid waste will end up in the environment, exacerbating surface water pollution and flooding.

The Water Security Action and Investment Plan (WSAIP) is a blueprint response to mitigate water security threats arising from increased urbanisation. It provides: a framework of approaches and tools to support short and long-term planning for water security; evidence to catalyse investments; and a prioritised pipeline of investment opportunities to address water security challenges facing Greater Kampala Metropolitan Area (GKMA) in the short-term.

Projections indicate that investing in water security in GKMA would yield cumulative benefits of US\$ 22 billion (US 2018\$)¹ from 2018 to 2040, in terms of GDP at a cumulative cost of US\$ 4.3 billion (US 2018\$).

By 2040, this investment would have increased GDP per capita in GKMA by US\$ 195 annually, which is a 4.2% increase in GDP over a scenario with more limited water security investments. These benefits would extend to the rest of the country, providing a national benefit of US\$ 52 GDP per capita each year.

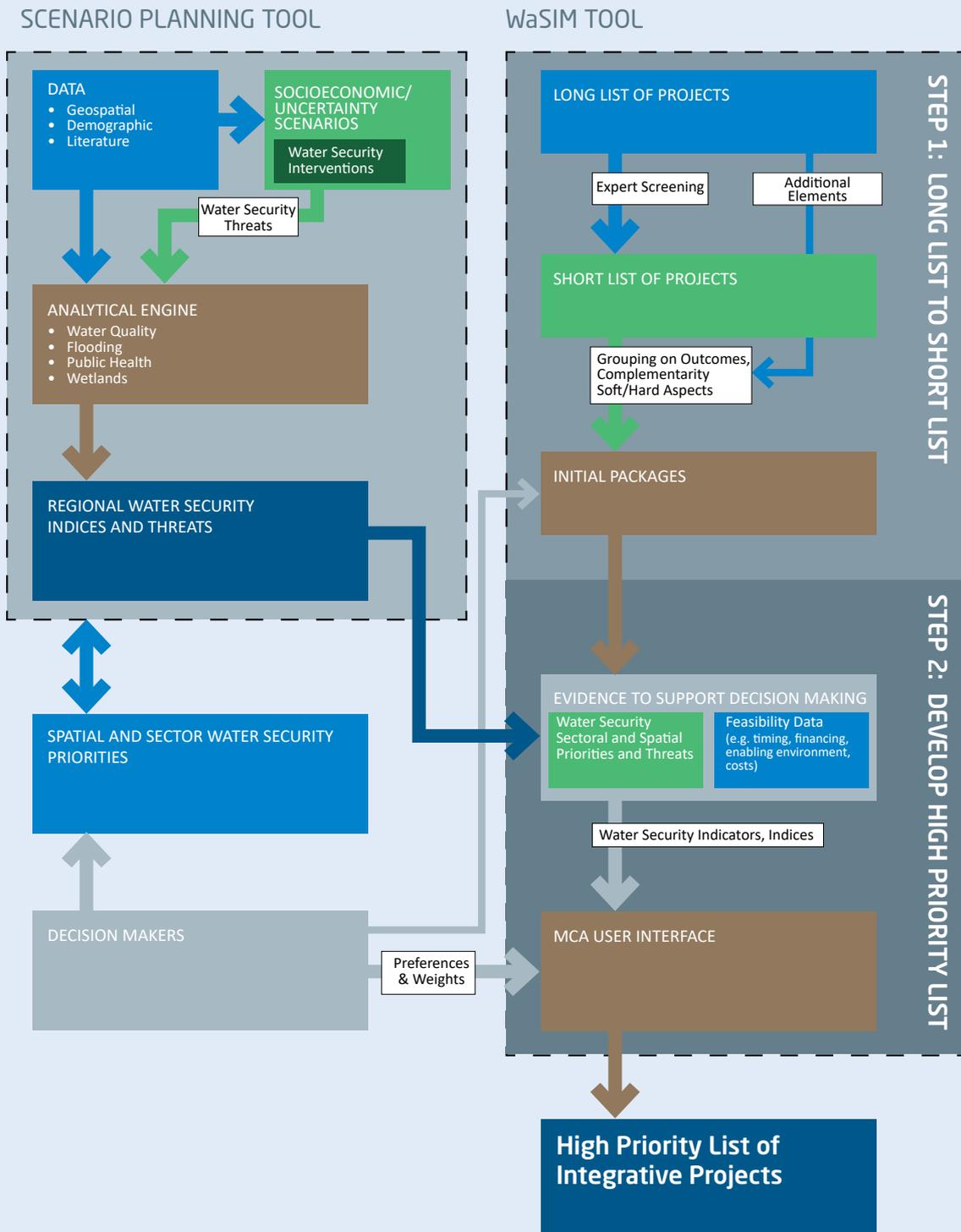
PLANNING FOR A WATER-SECURE FUTURE

Planning for a water-secure future is a continuous adaptive process that requires stakeholders to continuously monitor the changing water security landscape and make decisions based on the magnitude of risks present at a given time. Similarly, investing in water security is not a one-off expenditure but rather an ongoing commitment requiring stakeholders to continuously identify and prioritise investments based on the level and magnitude of water security risks. This requires evidence to inform decision-making. One of the outputs of the WSAIP is an evidence-based decision support

framework that consists of the Scenario Planning Tool (SPT) and the Water Security Investment Model (WaSIM). The SPT is a visual spatial tool designed to provide screening-level information to decision-makers on key water security threats. The WaSIM is a Multi-criteria Decision Analysis Screening Tool that utilises an Excel-based platform to present information available in the Scenario Planning Tool, along with information on the characteristics of selected investment actions (projects) to allow stakeholders to make informed decisions about prioritisation of investment projects.

¹ This financial projection is based on the USD value of the year 2018.

Figure ES-1: SPT and WaSIM Decision Support Framework



INVESTMENT OPTIONS FOR A WATER SECURE FUTURE

The WSAIP sets six (6) strategic goals to support the realisation of a water-secure future in the short (2025), medium (2030) and long (2040) term. These are:

Goal 01	To institutionalise water security and decision support tools in order to translate the concept of water security into practice.
Goal 02	To reduce the amount of pollution loadings entering Inner Murchison Bay in order to increase Dissolved Oxygen by 85% by 2040.
Goal 03	To reduce the volume of solid waste entering the environment by increasing the current rate of solid waste collection and recycling by 50% by 2030.
Goal 04	To dampen flood peak flows in flood hotspot areas by 40% by 2040 through sustained conservation and rehabilitation of natural ecosystems as well as investment in blue-green infrastructure.
Goal 05	To increase water supply and sanitation coverage in poorly served areas by 50% by 2030.
Goal 06	To strengthen the institutional framework to enable multi-sectoral inter-institutional collaboration to address water security risks at the hydrologic/environmental systems scale.

The WSAIP has six focus areas through which the six strategic goals will be achieved. The strategic focus areas are described in TABLE ES-01.

Table ES-1: Strategic Action Areas

01

EVIDENCE-BASED INTEGRATED PLANNING

The WSAIP aims to facilitate movement of water and environment security investment planning from an ad hoc siloed approach towards a more integrated one. As stakeholder goals and interests differ, the realisation of a water-secure future necessitates strengthening evidence to inform integrated planning and action.

Promoting evidence-based integrated planning for water security will involve institutionalising water security and its decision support tools as well as investing in data and information gathering.

03

SOLID WASTE MANAGEMENT

Solid waste management is a significant threat to both water quality and flooding. Currently only 50% of the 4000 tonnes of waste generated per day is collected and disposed of safely. The indiscriminate disposal of solid waste on roadsides and in drainage canals, streams, lakes, rivers and wetlands threatens natural water ecosystem functions and public health.

Reducing the amount of waste generated, improving collection and disposal services by 50%, and doubling recycling efforts will reduce the amount of waste in drainage canals, wetlands, and water bodies. This should go hand in hand with promoting behavioural change.

05

WATER SUPPLY AND SANITATION

Nearly 1.2 million people in GKMA have no access to safe water and about 300,000 have no access to basic sanitation. Safe water supply is threatened by water quality concerns and inadequate access infrastructure. A growing population requires increasing investment first to maintain and then grow current levels of safe water supply and sanitation.

Increasing sanitation coverage by 50% would create access for over 142,048 and 394,702 unserved urban dwellers in 2019 and 2040 respectively; while increasing water supply access by 50% would create access for about 580,501 and 709,021 unserved urban dwellers in 2019 and 2040 respectively.

02

SURFACE WATER POLLUTION CONTROL (INNER MURCHISON BAY)

Industrial and domestic pollution loadings account for the largest percentage of pollution sources contributing to the deterioration of surface water quality in GKMA especially in areas of high population density, where developments have replaced natural buffer systems. As industrialisation and urbanisation continue in the GKMA, it is extremely important to reduce the amount of domestic and industrial loadings entering Inner Murchison Bay by 30% and 80% respectively.

Reducing domestic loadings requires doubling sewer network connections and increasing access to faecal sludge treatment services for onsite systems. Investment in satellite as well as secondary wastewater treatment facilities will reduce industrial loadings.

04

INTEGRATED FLOOD RISK MANAGEMENT

The continued establishment of informal settlements in wetland areas as well as the increase in impervious surfaces, worsen the potential for flooding. Developed land in productive wetland areas around GKMA has more than doubled in the last 20 years and lowland forests have almost been eliminated, reducing the capacity of natural ecosystems to regulate floods.

Reducing the extent of urban flooding necessitates investment in blue-green flood management infrastructure that would include conversion of at least 12% of urban land into forest and rehabilitating 70% of the degraded wetlands.

06

INSTITUTIONAL STRENGTHENING

The hydrological system of river catchments and wetlands that cross existing administrative boundaries presents a water security risk such as bringing pollution from upstream to downstream populations. Additionally, the disconnect between the geographic nature of wetlands and river catchments, administrative units and institutions, provides a very complex regulatory framework.

To realise a water-secure future, it is necessary to institute a multi-stakeholder platform on water security and to empower a set of catchment organisations to implement change on the hydrological scale. Specific actions include establishing an Inner Murchison Bay Catchment Organisation to address pollution control and creating multi-stakeholder partnerships to address water security threats in specific catchments.

IMPLEMENTATION

The WSAIP adopts a project-based approach to investment planning using an evidence-based decision support framework. A pipeline of 13 investment projects is listed in Table 2; these have been selected to kickstart the investment process.

TABLE ES-02: A Pipeline of Investment Projects

CORE PROJECTS	Years	US\$ Million
Greater Kampala integrated urban catchment management	5	23.20
Scaling up solid waste management options in Greater Kampala	5	70.23
Accelerating access to adequate and equitable water supply	10	151.8
Greater Kampala urban forest ecosystem management	5	12.43
Public private partnerships for faecal sludge management	10	98.77
Greater Kampala wastewater management project	5	50.00
Sustainable management of urban wetland systems	5	81.96
Strengthening industrial compliance to laws, regulations and standards	5	8.51
Retrofitting informal settlements to enhance water security	5	30.14
Integrated urban flood risk management	5	84.12
ENABLING PROJECTS		
Greater Kampala water security observatory	5	12.40
Citizens environmental monitoring and reporting app – Spot it? Say it!	5	6.23
Operationalising payment for ecosystem services in urban setting	5	15.61
TOTAL		645.4

CONCLUSION

Urbanisation, economic development and industrialisation need not result in a decline of water security in the Greater Kampala Metropolitan Area if policymakers can implement appropriate policies and suitable strategies to prevent their undesirable consequences. It is possible for GKMA to have an appropriate response and the blueprint for that response is the Water Security Action and Investment Plan.

RECOMMENDATIONS

- 01.** Explore the formation of a permanent inter-governmental secretariat dedicated to ensuring a water-secure Greater Kampala Metropolitan Area.
- 02.** Invest in research and data acquisition to support evidence-based planning. The research should aim to understand the rate of change of and demand for urban natural resources and services, and the effects of urbanisation on water security beyond 2040.
- 03.** Establish a Water Security Observatory to:
 - Serve as a data centre and analysis unit for open-access to information related to water security
 - Provide guidance for monitoring and data collection
 - Develop the infrastructure and human resources to function as a centre of excellence to support evidence-based water security planning

NEXT STEPS

- 01.** Operationalise the proposed multi-sectoral water security governance structure, that is, the secretariat consisting of the following committees: Water Security Task Force, Water Security Investment Committee, ad hoc Water Security Technical Unit, ad hoc Water Security Data Centre that will later become a Water Security Observatory, and two multi-sectoral multi-disciplinary technical expert committees on Water Security and Urban Natural Resources, and Water Security and Urban Services.
- 02.** Establish a framework for the funding and implementation for multi-stakeholder water security investment actions and projects.
- 03.** Invest in the enhancement and expansion of the Water Security Decision-Support Tools under the coordination of the Water Security Technical Unit.
- 04.** Invest in capacity building for the Water Security Technical Unit and local analysts. This shall include an intensive six-month training on the water security and Water Security Decision Support Tools.
- 05.** Establish a bi-annual Water Security Forum which seeks to foster dialogue among GKMA stakeholders, decision-makers, and development partners.

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LIST OF ACRONYMS

AFDB	African Development Bank Group
BAU	Business as Usual
BOD	Biochemical Oxygen Demand
CSO	Civil Society Organisation
CGE	Computable General Equilibrium
DEA	Directorate of Environmental Affairs
DO	Dissolved Oxygen
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
FS	Faecal Sludge
FSM	Faecal Sludge Management
FSC&T	Faecal Sludge Collection and Transport
ENR-CSO	Environment and Natural Resources Civil Society Organisation Network
GKMA	Greater Kampala Metropolitan Area
GDP	Gross Domestic Product
GoU	Government of Uganda
IEc	Industrial Economics, Incorporated
IPF	Infrastructure Prioritisation Framework
IPCC	Intergovernmental Panel on Climate Change
KIIP	Kampala Institutional and Infrastructure Development Project
MCDA	Multi-criteria Decision Analysis
PTF	Kampala Pollution Control Task Force
NDP	National Development Plan
NPA	National Planning Authority
PES	Payment for Ecosystem Services
PPP	Public Private Partnership
SPT	Scenario Planning Tool
TC	Town Council
UWASNET	Uganda Water and Sanitation NGO Network
MC	Municipal Council
WASH	Water Sanitation and Hygiene
WSAIP	Water Security Action and Investment Plan
WaSIM	Water Security Investment Model
WSLUNR	Water Security Land and Urban Natural Resources
WSUS	Water Security and Urban Services
WSTF	Water Security Task Force
WSTU	Water Security Technical Unit
WSDC	Water Security Data Centre
WSIC	Water Security Investment Committee
WSO	Water Security Observatory
WMZ	Water Management Zone

GLOSSARY OF KEY TERMS

Biochemical Oxygen Demand (BOD)	The amount of dissolved oxygen needed (i.e., demanded) by aerobic biological organisms to break down organic material present in a given water sample at a certain temperature over a specific period.
Dissolved Oxygen (DO)	A measure of how much oxygen is dissolved in the water and available to living aquatic organisms.
Circular Economy	A circular economy model aims to close the gap between the production and the natural ecosystems' cycles on which humans ultimately depend.
Evaluation Criteria	Set of criteria used to measure proposed projects. These criteria represent the primary goals of the stakeholders in terms of enhanced water security.
Prioritisation	The final step in the project selection process. This step utilises the WaSIM to develop a list of final actions and investments (the prioritised list of projects).
Scenario Planning Tool (SPT)	A visual spatial tool designed to provide screening-level information to decision-makers on key water security threats.
Screening	The second step of the project selection process. The long list of projects is distilled to a short list by applying the evaluation criteria in a qualitative manner. Additional institutional criteria may also be applied.
Short List of Projects	The result of the screening step; this list of projects meets initial screening criteria and will be modelled in the WaSIM to produce the final prioritised list of projects.
Total Nitrogen (TN)	The sum of nitrate-nitrogen ($\text{NO}_3\text{-N}$), nitrite-nitrogen ($\text{NO}_2\text{-N}$), ammonia-nitrogen ($\text{NH}_3\text{-N}$) and organically bonded nitrogen.
Total Phosphorus (TP)	This is a measure of both inorganic and organic forms of phosphorus. Phosphorus can be present as dissolved or particulate matter.
Urban Resilience	The measurable ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming toward sustainability.
Water Security	The capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability (UN 2013).
Water Security Investment Model (WaSIM)	An Excel-based Multi-criteria Decision Analysis Screening Tool used in the prioritisation step to evaluate the costs and benefits of water security actions and investments.



1. INTRODUCTION

1.1 Background

Over the last decade, Uganda has made great strides in providing water to its population with nearly 79% of its urban population having access to safe water (MWE, 2019). Nevertheless, the high rate of population growth (3% per annum), economic development - 6.3% in 2019 (AFDB, 2020) and rapid urbanisation, pose severe water and environment risks for the urban population and national economy, particularly in Greater Kampala Metropolitan Area (GKMA), Uganda's economic engine (NPA, 2018).

The multiple water security challenges that threaten GKMA's economic growth are apparent. Clean drinking water is increasingly unavailable as the quality of natural water continues to deteriorate, making water production and supply more costly (NWSC, 2019). Rapid urbanisation and industrialisation have contributed to the degradation of the natural support systems as settlements and industrial parks expand into productive ecosystem areas (WB, 2015). The capacity to treat industrial effluent remains low with most industries discharging raw and/or partially treated effluent directly into storm water channels, ultimately polluting Lake Victoria, Kampala's main freshwater source (MWE, 2018). On the other hand, more than 90% of the population continues to rely on local sanitation solutions with limited capacity and infrastructure to manage faecal sludge, resulting

in widespread contamination of the environment and water resource systems (Gibson et al., 2018). Likewise, solid waste management remains a challenge with 50% of the generated waste winding up in drainage channels, wetlands and waterbodies (NPA, 2017). Last but not least, flooding has become a major risk to livelihoods with a rise in cases of widespread disruption of economic activities, destruction of property, loss of lives, and outbreak of waterborne diseases following each flooding event (KCCA, 2019).

The third National Development Plan (NDP III) 2020/21-2024/25 recognises the relevance of water for economic growth under its objective to enhance the population's productivity and social wellbeing by "ensuring availability of adequate and reliable quality freshwater resources for all uses". The realisation of this NDP III objective and Uganda's Vision 2040 economic growth targets, requires a tripling of reliable water supply relative to today's levels, and heavy investment in environmental and water resources management (WB, 2015). However, with competing demands and limited financial resources, investments in water security must be specifically targeted to maximise impact. This underscores the need for a Water Security Action and Investment Plan (WSAIP).

1.2 Objectives of the Plan

The WSAIP aims to set the water security agenda for GKMA by providing a common understanding of the current and anticipated water security threats, and a list of investment actions (projects) to mitigate those threats, enhance resilience and support inclusive socio-economic development. The three overarching objectives of the plan are:

- (a) To empower** stakeholders through the use of decision support tools, to understand, prioritise, and monitor environmental threats and the changing landscape of water security.
- (b) To provide** evidence to catalyse actions and investments that systematically reduce water security risks and increase resilience to water security threats.
- (c) To set the agenda** for water security to inform environment and water resource goals, actions and strategies at local and metropolitan level.

1.3 Preparation of the Plan

The WSAIP was developed through a collaboration between the Ministry of Water and Environment (MWE), Kampala Capital City Authority (KCCA), National Water and Sewerage Corporation (NWSC), Uganda Manufacturing Association (UMA), and members of the Kampala Pollution Task Force (PTF), a multi-stakeholder platform that aims to strengthen collective action for a pollution-free GKMA by safeguarding water and environmental resources while fostering inclusive growth and prosperity. Financial support was provided by DFID's Cities and Infrastructure for Growth Program (CIG) and the German Federal Ministry for Economic Cooperation and Development (BMZ) through GIZ's International Water Stewardship Program (GIZ IWaSP).

The process of developing the WSAIP included four stages summarised in Figure 1-1.

- **Stage I** involved the mobilisation of stakeholders and development of a stakeholder engagement plan followed by a situational analysis to identify past and current water security threats

- **Stage II** had results from the situational assessment used in selecting priority water security action areas which formed the basis for further water security assessment, scenario development and socio-economic analysis
- **Stage III** involved the identification and selection of investment actions
- **Stage IV** concluded in the formulation of the WSAIP and accompanying implementation arrangements

Stakeholder consultation, engagement and empowerment occurred throughout the plan preparation process. Over 1,500 stakeholders representing the public sphere (.gov), private sector, (.com) and civil society (.org) were involved in the process (WSAIP Technical Report, 2019).

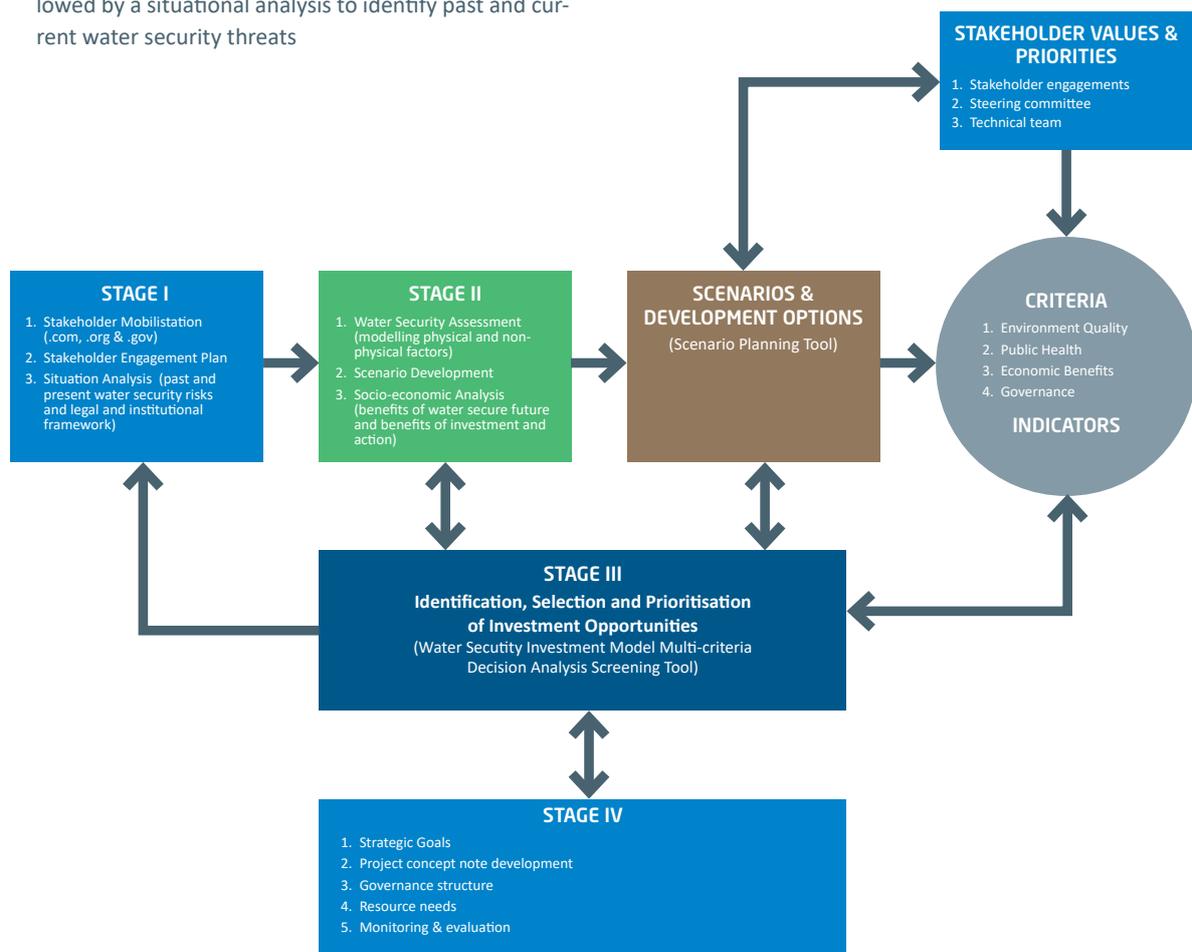


Figure 1-1: WSAIP Development Process

BOX 1-1. STRUCTURE OF THE DOCUMENT

The WSAIP consists of six sections:

1. **The Introduction** summarises the purpose and objectives of the WSAIP and shades light on its development process.
2. **The Status of Water Security** introduces the concept of water security and summarises the current status of water security in GKMA.
3. **The Economic Benefits of Improved Water Security** analyses the merits of enhanced water security in GKMA.
4. **Planning for a Water-Secure Future** presents key components of the planning process.
5. **Investment Options for a Water-Secure Future** summarises the strategic intervention areas, scenarios and policy options, and presents strategic goals of the WSAIP.
6. **Implementation** summarises the execution arrangements of the WSAIP. This includes a pipeline of investment actions, proposed governance structure, financing, and monitoring and evaluation processes.

A final subsection summarises the key conclusions and recommendations for next steps.



2. THE STATUS OF WATER SECURITY

This section introduces the concept of water security and summarises its current status in Greater Kampala Metropolitan Area.

2.1 The Water Security Concept

The United Nations (UN) defines water security as “the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability (UN, 2013)”.

The four core elements of the UN definition are:

(a) Access to safe adequate quantities of acceptable quality drinking water for sustaining livelihoods, human well-being, and socio-economic development.

(b) Availability of adequate amounts of water for economic activities and development, energy production, industry and transport.

(c) Preservation of ecosystems to deliver water-related ecosystem services. This includes protection of freshwater resources, and the aesthetic and recreational opportuni-

ties associated with aquatic ecosystems and human-made reservoirs.

(d) Effective management of climate-related water hazards such as floods and droughts, and associated risks.

To achieve a water-secure future, the World Bank identifies five thematic areas of action: building sustainable services to ensure current resources continue delivering benefits into the future, inclusiveness, institutional strengthening, leveraging commercial and non-state financing mechanisms, and building resilient water-related services (WB, 2018).

Successful water security programmes provide for an integrated set of solutions that are neither supply nor demand-driven but are a result of dialogue between local communities in need of water and environment services, individuals/institutions contributing to water security threats, government, the private sector, and financial institutions that provide the much-needed investments.

2.2 Geopolitical Description of Greater Kampala Metropolitan Area

The WSAIP covers the GKMA which includes the whole of Kampala district (city), along with parts of Mukono and Wakiso as shown in Figure 2-1. The metropolitan area covers over 30 sub-counties/divisions inclusive of municipalities of Entebbe, Nansana, Kira, Mukono and Makindye-Ssabagabo.

The area is earmarked as Uganda’s industrial centre and economic engine as it contributes to 65% of Uganda’s non-agricultural GDP and accounts for 10% of the country’s population by day (NPA, 2017). The rapid growth in population and urban sprawl has however contributed to several structural and socio-economic challenges including a rise in informal settlements, poor infrastructure and service delivery, and environmental degradation among other things. Targeting GKMA as a key investment area is envisaged to bring about high positive multiplier effects on the economy and contribute to overall poverty reduction (NPA, 2018).

Figure 2-1: Greater Kampala Metropolitan Area



The GKMA is drained by 15 sub-catchments² shown in Figure 2-2. Kampala City is drained by Kinawataka (6), Nakivubo (1), Kansanga (4), and Nalukolongo (3). The Mukono area is partly drained by Namanve/Bumbubumbu River (12) and Nakalere (11). Lubigi (2) and Mayanja (5) drain parts of Kampala and Wakiso while Nalubega (7), Walufumbe (8), Mayanja North (9), Katonga (10), Kajjansi (13), Namatambala (14) and Nakati (15) drain the Wakiso area. The catchments fall under three water management zones (WMZ), namely; Victoria, Kyoga and Albert. Nearly 70% of the GKMA land area falls within the Lake Victoria Basin WMZ.

- | | |
|---------------|-------------------------|
| 1 NAKIVUBO | 9 MAYANJA NORTH |
| 2 LUBIGI | 10 KATONGA |
| 3 NALUKOLONGO | 11 NAKALERE |
| 4 KANSANGA | 12 NAMANVE / BUMBUBUMBU |
| 5 MAYANJA | 13 KAJJANSI |
| 6 KINAWATAKA | 14 NAMATAMBALA |
| 7 NALUBEGA | 15 NAKATI / KANYOGOGA |
| 8 WALUFUMBE | |

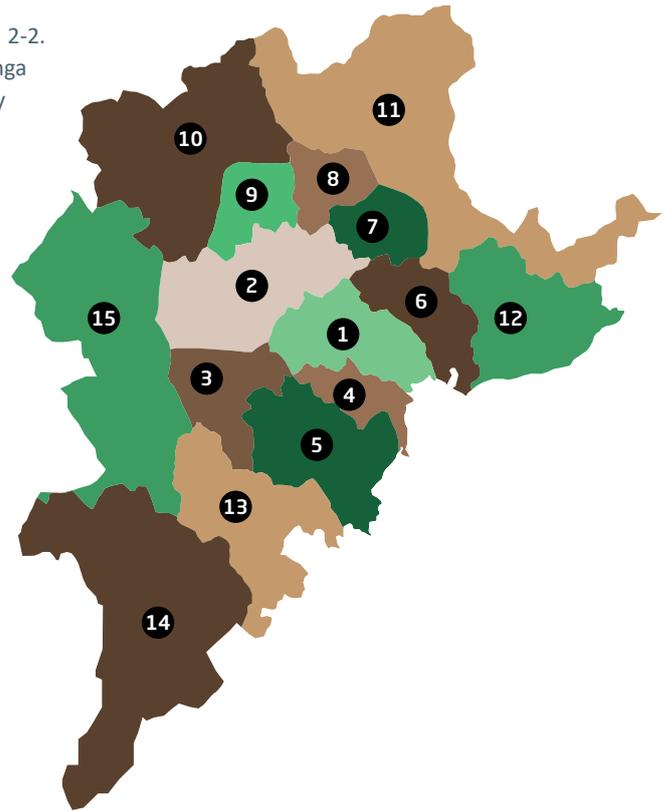


Figure 2-2: GKMA Catchments

2.3 Rapid Situation Assessment

This subsection summarises the status of water security in GKMA in accordance to the UN definition. The assessment considered: (a) access to adequate amounts of safe water to sustain human wellbeing, domestic and socio-economic development and industry (water supply and sanitation), (b) protection against waterborne pollution (water quality management), (c) preservation of ecosystems and (d) effective management of climate-related hazards and risks (such as floods and droughts).

The rapid assessment utilised several methods:

(a) Analysis of existing literature backed by discussions with stakeholders to identify key water security threats and data gaps.

(b) Analysis of identified threats using the Pressure-State-Impact-Response (PSIR) analysis framework to determine cause-and-effect relations that lead to a certain water security level. This resulted in the creation of a water security dashboard and index (of 32%) for Greater Kampala Metropolitan Area as shown in Figure 2-3 below.

(c) Gap and barrier analysis to identify interventions most critical to GKMA's water security.

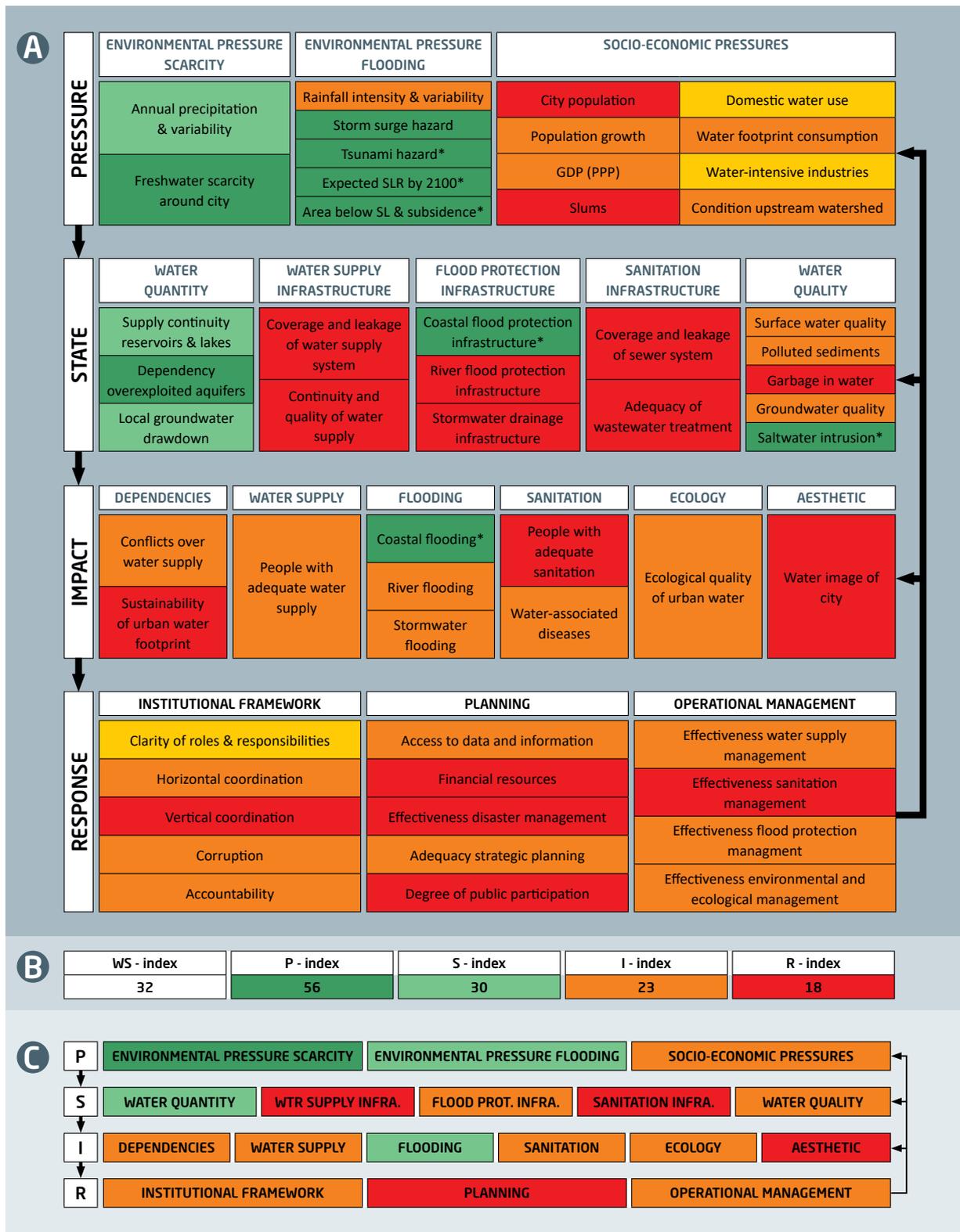
(d) Use of models to virtualise the status of key water security threats.

The summarised outcomes of the Pressure-State-Impact-Response analysis at pressure level shows the relatively high socio-economic pressures (insecure) in terms of high population growth, low GDP, large slums, polluting industry and deteriorating conditions. With regards to the state of the urban water and sanitation systems, only the water quantity is secure whereas water supply and flood protection infrastructure is inadequate; sanitation infrastructure is very insecure; and water quality is highly deteriorated.

On the impact level, none of the water system functions are sufficiently fulfilled, with a poor response to major threats to water security from both institutional, planning and operational management perspectives. Subsection 2.3.1 onwards further elaborate the status of these key water security threats.

² Not all sub-catchments have official names. Where no official name exists, the WSAIP generated provisional names based on the longest river systems in a given sub-catchment.

Figure 2-3: The Water Security Dashboard for GKMA (a); PSIR Indices (b); Category Level (c)



LEGEND

SCORE

1	Very insecure
2	Insecure
3	Around acceptable threshold
4	Secure
5	Very secure

2.3.1 Water Supply and Sanitation

The most recent hydrological assessments for GKMA estimate that surface water draining into Lake Victoria Basin is about 109MCM/Yr (DWRM, 2013). Different studies estimate that groundwater recharge rates averagely range from 90-220mm/yr accounting for 7-20% of the average annual rainfall. Spatially interpolated data for groundwater indicates yields ranging from 4–11m³/hr, enough to support water supply for peri-urban and rural households within GKMA (Nsubuga et al., 2014). Although available water resources surpass current water demand, cases of insufficient water supply as a result of inadequate infrastructure exist across the metropolitan area, with Mukono and Wakiso being the most affected as shown in Figure 2-4.

Current water supply coverage ranges from 85% in central Kampala (Nakivubo sub-catchment) to 23% in the western parts of the metropolitan (Nakati sub-catchment).

Four sub-catchments namely: Nakati (15), Katonga (10), Nakalere (11) and Lubigi (2) draining Kajjansi TC, Wakiso TC and Kyengerera TC, Kira MC, Kasangati TC, Bweyogerere, Namugongo and Wakiso division, are home to populations of more than one hundred thousand people without access to adequate amounts of safe water.

Whilst coverage is highest in catchments draining Kampala district, pockets of unserved persons exist especially in divisions with high slum populations such as Kawempe and Nakawa.

Overall, safe water supply is threatened largely by inadequate access infrastructure and poor water quality (MWE, 2019). Over 92% of the population have access to basic sanitation – a toilet.

However, safe handling and treatment of faecal sludge remains a challenge for the future particularly in low-income areas. Table 2-1 summarises the status of water supply and sanitation across Greater Kampala. Limited access to water supply and sanitation impacts household health care expenditure with households spending about US\$ 5 million on the treatment of diarrhoeal diseases per annum (WSAIP Technical Report, 2019).

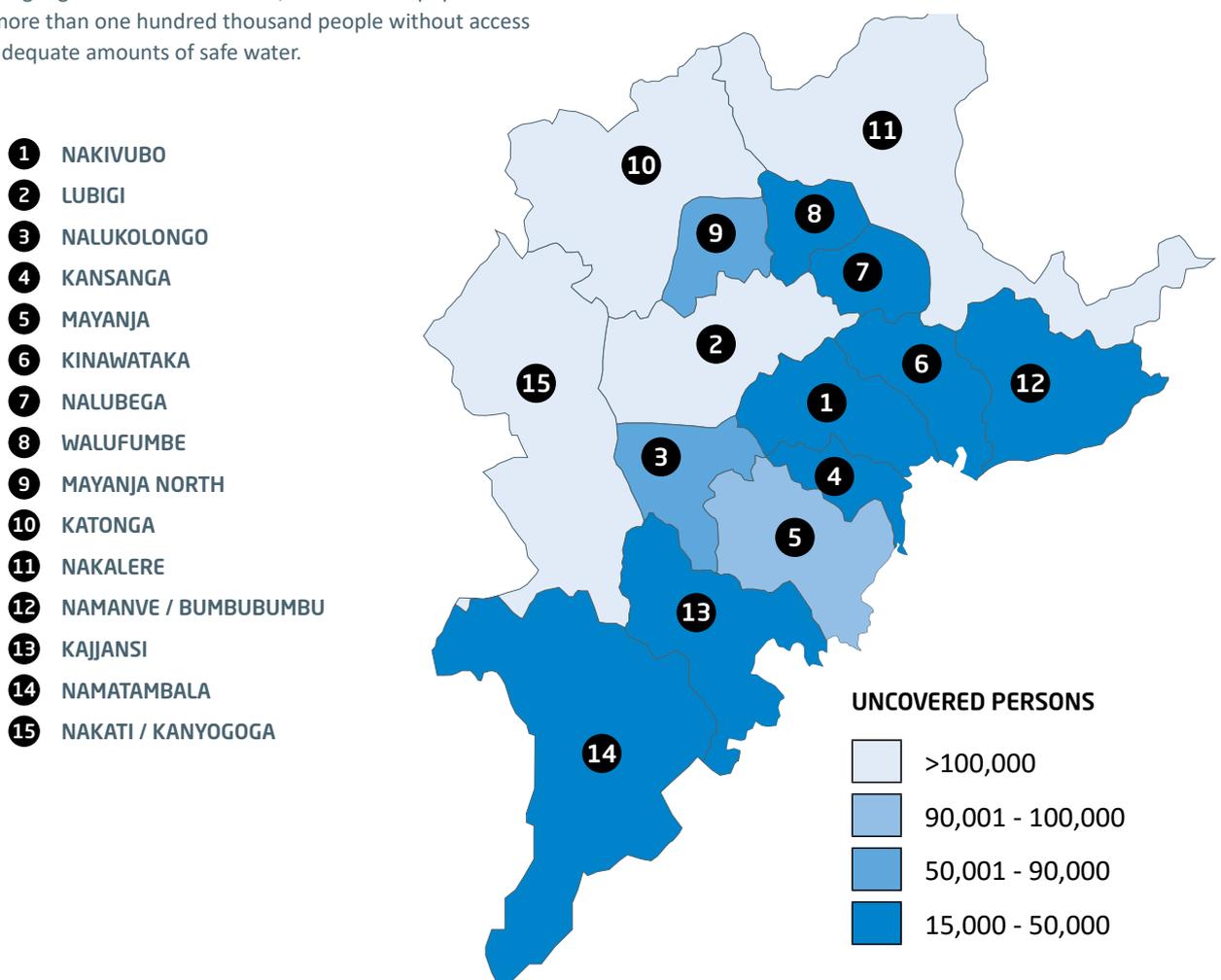


Figure 2-4: Current Water Supply Coverage

Table 2-1: Status of Water Supply and Sanitation in GKMA

SUB-CATCHMENT	% COVERAGE (2018)		UNCOVERED PERSONS (2018)		REPORTED DIARRHOEAL CASES (PER YEAR)
	Water Supply	Sanitation	Water Supply	Sanitation	
NAKIVUBO	85.5%	91.7%	38,206	20,495	19,875
LUBIGI	74.3%	91.8%	158,289	53,031	73,416
NALUKOLONGO	70.2%	93.4%	70,528	18,577	31,298
KANSANGA	85.4%	87.8%	19,480	11,036	10,298
MAYANJA	71.7%	92.3%	90,334	22,951	39,849
KINAWATAKA	84.1%	91.4%	33,472	14,168	16,352
NALUBEKA	84.7%	91.6%	22,813	9,778	11,179
WALUFUMBE	74.7%	92.3%	30,036	10,404	14,026
MAYANJA NORTH	71.4%	91.2%	57,370	15,363	25,529
KATONGA	48.2%	91.4%	147,840	23,551	61,295
NAKALERE	63.6%	92.8%	129,405	27,423	55,558
NAMANVE / BUMBUBUMBU	67.4%	93.3%	37,984	9,993	16,852
KAJJANSI	57.0%	92.1%	43,923	8,571	18,652
NAMATAMBALA	60.0%	91.7%	42,325	12,879	19,266
NAKATI / KANYOGOGA	23.0%	92.2%	238,994	25,875	95,673
	68.1%	91.8%	1,160,999	284,095	509,118

2.3.2 Water Quality Management

With a population density of 8,800 people per square kilometre, only about 10% of the population in Kampala is served by the public sewer system. The rest of the population within the GKMA rely on on-site sanitation facilities with limited capacity and infrastructure to manage faecal sludge (Gibson et al., 2018). This results in pollution loadings expressed in terms of Total Nitrogen (TN) and Total

Phosphorus (TP). They range between 2770 TN and 454 TP in Lubigi, and 460 TN and 75 TP in Kajjansi sub-catchments. Limited industrial compliance to wastewater discharge standards further exacerbates the problem as most industries continue to unload untreated and/or partially treated effluent directly into surface water bodies and wetlands (MWE, 2018).

Figure 2-5: Domestic and Industrial Loadings by Sub-catchment

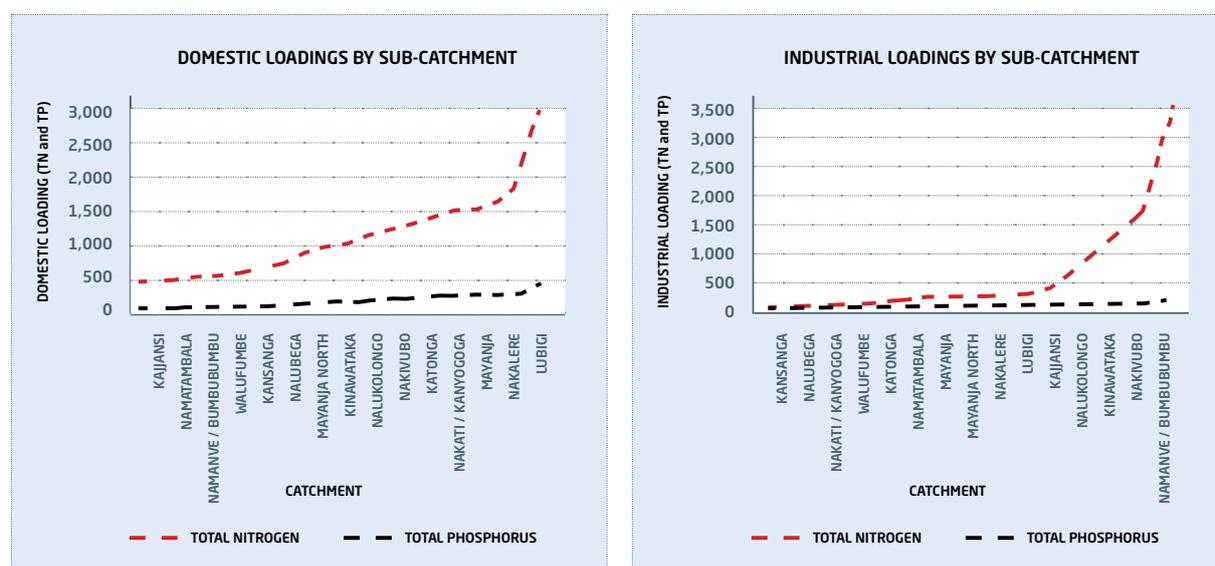


Figure 2-5 summarises domestic and industrial loadings entering the environment by sub-catchment. Highest industrial loadings are observed in Namanve followed by Nakivubo, Kinawataka and Nalukolongo sub-catchments.

The Inner Murchison Bay (IMB) is the main source of drinking water for Kampala City. The IMB catchment (circled

red) covers an area of 282 square kilometres and overlaps GKMA as shown in Figure 2-6. It consists of five sub-catchments namely Nakivubo (1) which drains Kitante and Lugo-go, Kansanga (4) drains Gaba shoreline (a source of significant pollution), Kinawataka (6) drains Nakawa industrial area, Mayanja (5) drains Masajja and Makindye area, and Namanve/Bumbubumbu (12) drains Namanve area.

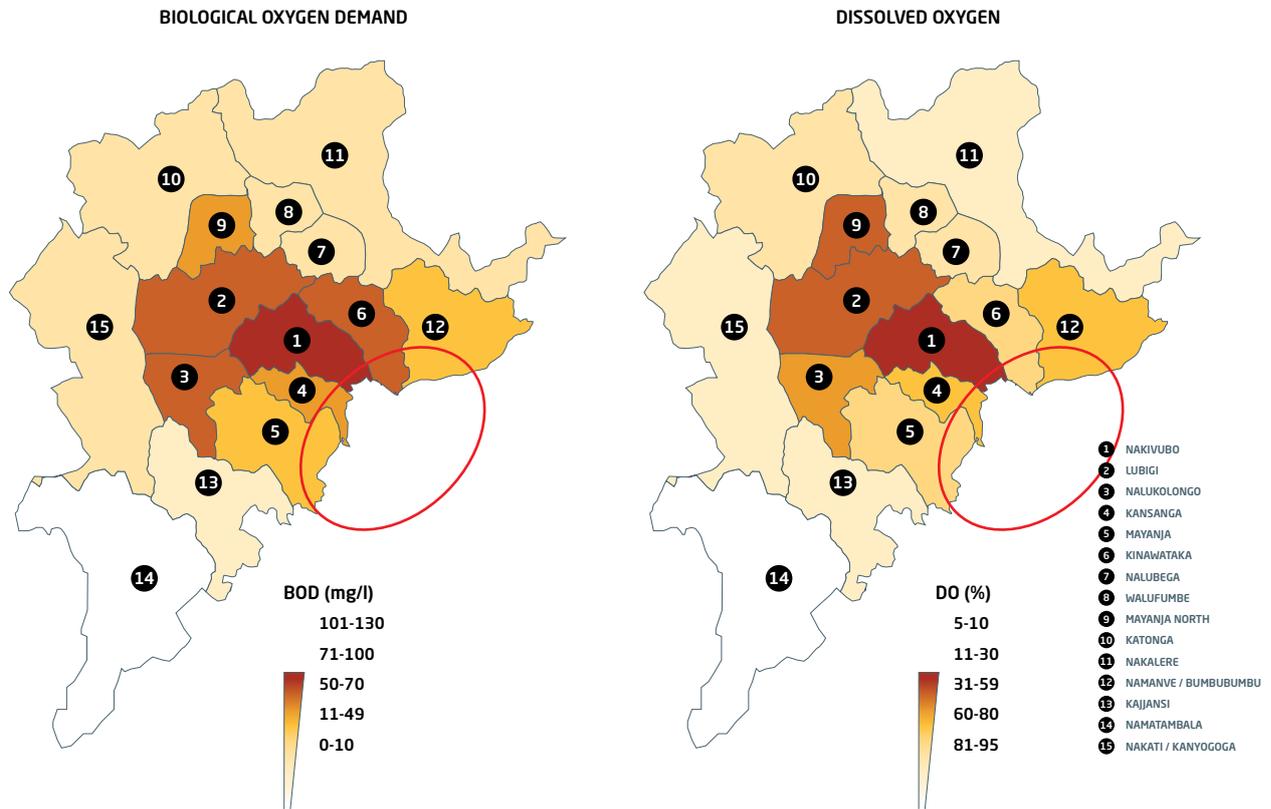


Figure 2-6: Status of Water Quality across GKMA

The IMB is currently classified as eutrophic with Biochemical Oxygen Demand (BOD) levels averaging around 7.62 mg/l and Dissolved Oxygen (DO) levels averaging 71.6%. BOD measurements at sub-catchment level range between 103 mg/l in Nakivubo and 52mg/l in Mayanja sub-catchments. The relatively high BOD levels in Nakivubo sub-catchment are partly attributed to the severe degradation of the Na-

kivubo wetland system as nearly 50% of the wetland area is modified for industrial and settlement purposes (MWE, 2015; WB, 2015). Groundwater quality is mainly threatened by micro-biological contamination especially in areas where there is considerable interaction between surface water and groundwater.

2.3.3 Ecosystems and Land Use Change

Land use change is largely driven by rapid urbanisation; developed land has more than doubled in the last 20 years, predominantly in productive wetland areas. Wetland coverage has reduced by 48% from 194 square kilometres in 1996, to just over 100 square kilometres (WSAIP Technical

Report, 2019). Lowland forest coverage in Kampala has reduced from 7.6% to 0.4% of the total land area (MWE, 2015) as informal settlements continue to be established in low lying areas (KCCA, 2018).

2.3.4 Climate-related Hazards

In GKMA the key climate-related hazard is flooding. Flash floods are a serious recurring water security threat in Kampala and neighbouring town councils (KCCA, 2019). They arise as a result of a combination of factors: intensive rainfall, high rates of surface run-off influenced by Kampala’s topography that consists of a series of developed hills and low-lying wetland areas, and inadequate stormwater drainage infrastructure (UN Habitat, 2013). Comparing wetland

extent and flood peak flows, it is evident that flood risk is highest in catchments facing severe wetland loss, rendering natural ecosystem buffers ineffective as shown in Figure 2-7. The most at-risk sub-catchments include Nalubega (7), Nakivubo (1), Mayanja (5), Lubigi (2) and Nalukolongo (3) which drain areas of Nakawa, Makindye, Kawempe, Nansana, Kyengera Town Council, Nabweru, Central Business District and Masajja.

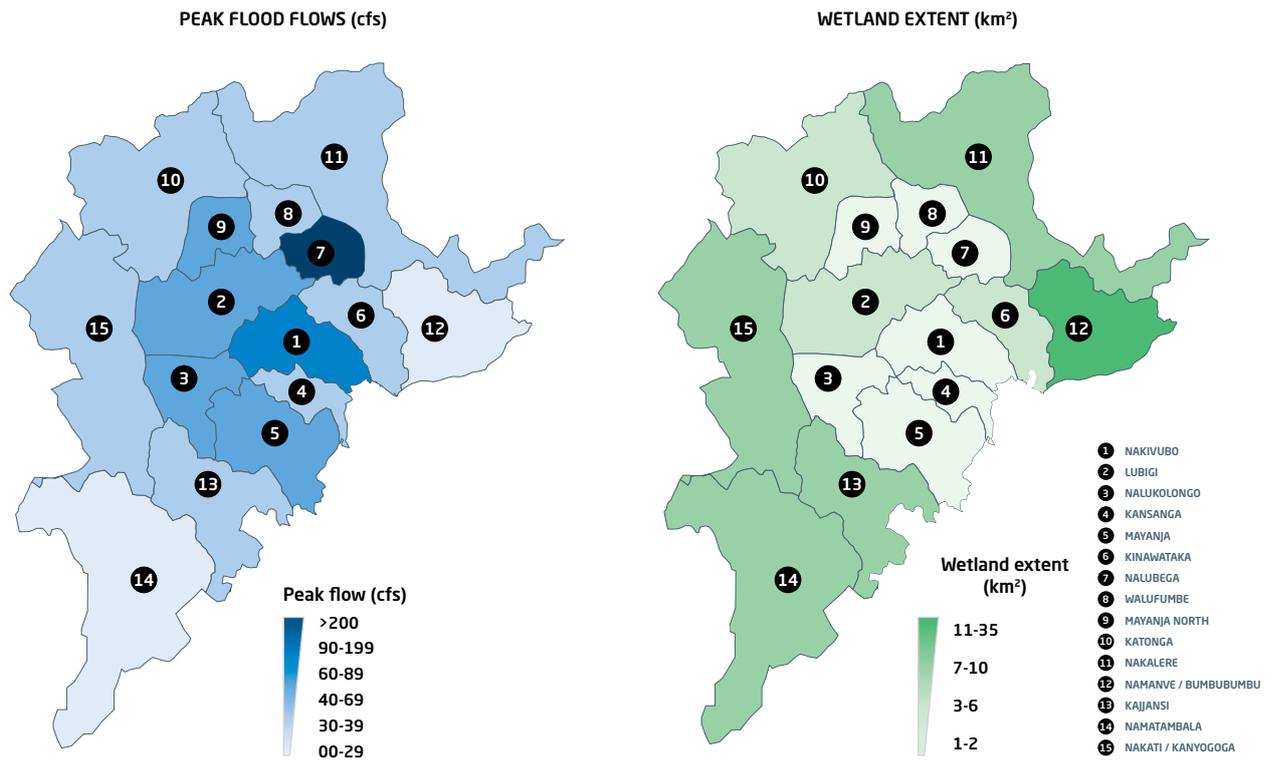


Figure 2-7: Current Status of (a) Peak Flow and (b) Wetland Extent Across GKMA



Figure 2-8: Flooding due to Encroachment on Lubigi Wetland

Figure 2-8 provides evidence of flooding due to encroachment on Lubigi wetland that buffers areas of Bwaise, Namugooona and Busega (Namagembe, 2019).

Flood risk is exacerbated by urbanisation which creates impervious surfaces and poor solid waste management practices. Per capita and total waste generation have increased over the past several years as shown in Figure 2-9, a trend that is likely to continue (KCCA, 2017). At present only about 50% of the generated waste is collected and disposed of properly (KCCA, 2017). The rest is openly dumped and washed into drainage channels, streams, lakes, rivers and wetlands, threatening natural water ecosystem functions, flood control and public health.

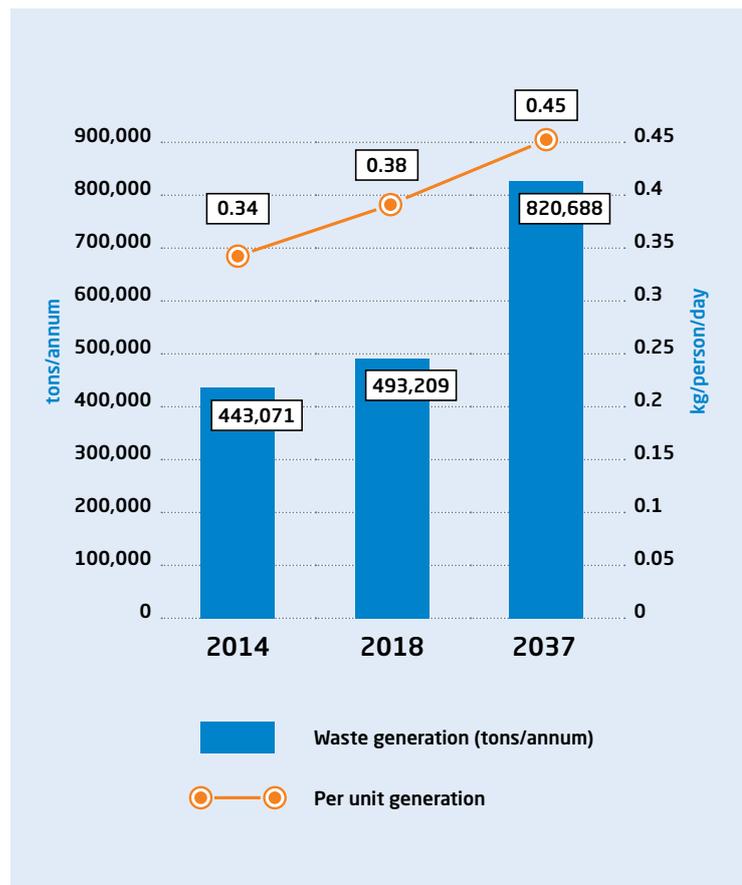


Figure 2-9: KCCA Waste Generation Forecast

Figure 2-10 shows solid waste in drainage canals: culverts are filled with garbage in 2-10b and 2-10d; KCCA employees remove waste from drainage canals in 2-10a; and absence of proper solid waste collection and disposal facilities in informal settlements – Bwaise and Namuwongo – in 2-10c (Habonimana, 2014; KCCA, 2018).



Figure 2-10: Solid Waste in Drainage Systems and the Environment

2.4 Water Security Risks Facing Industry and Business Sectors

The industrial and services sectors are central in driving Uganda's economic path to middle income status with growth of both sectors averaging 6.2% and 7.6% respectively in 2019 (AFDB, 2020). A survey of 500 large and medium industries and enterprises within GKMA highlighted the following water security risks facing the industrial sector (WSAIP Technical Report, 2019):

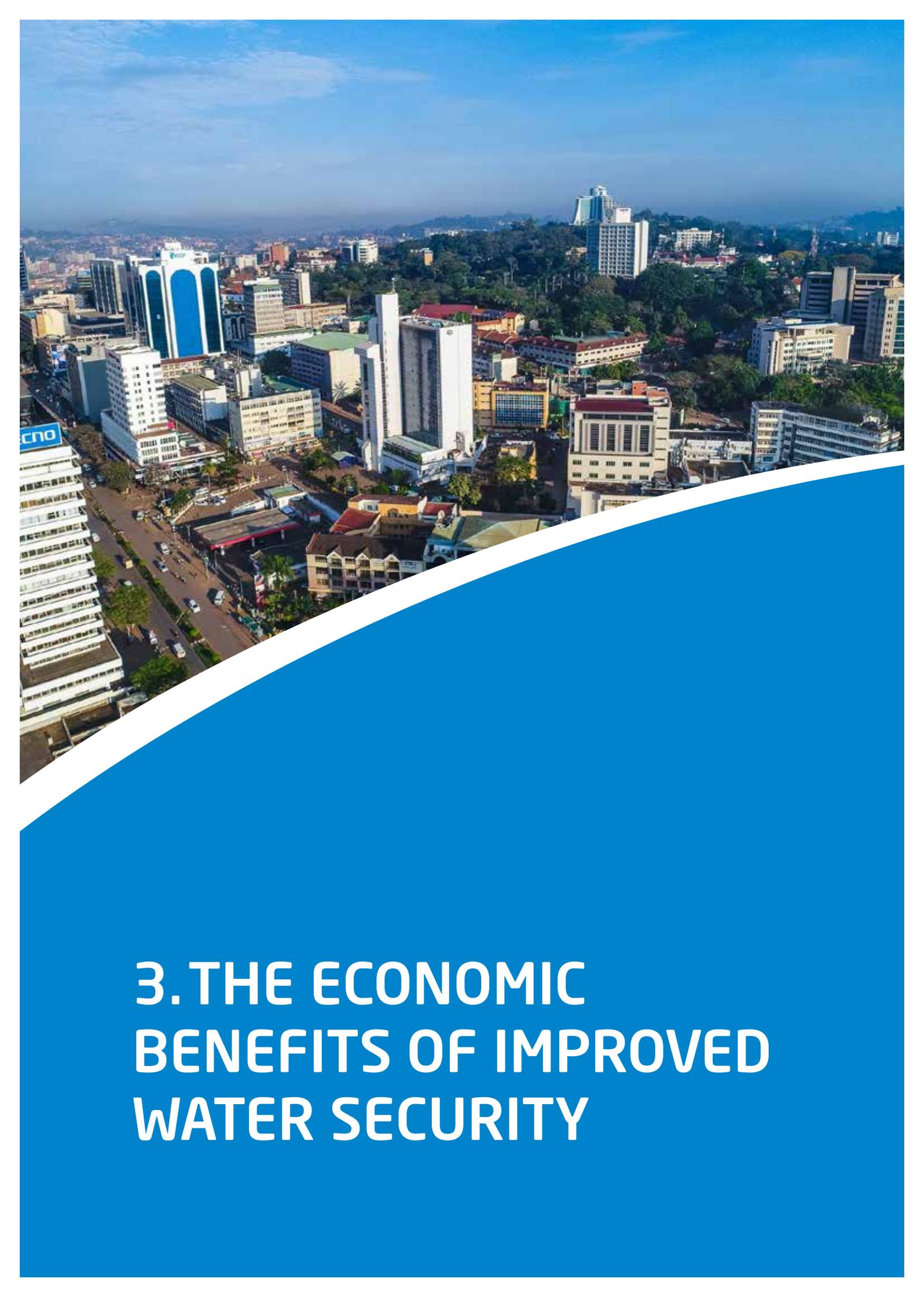
- (a) Several industries are located close to key ecosystems namely Lake Victoria, Inner Murchison Bay, wetlands, forest reserves, rivers, and streams/channels.
- (b) Over 10% depend on more than one water source due to intermittent supply and variability in the quality of water.
- (c) More than half of the companies generating wastewater either perform minimal or no on-site treatment of wastewater prior to discharge.
- (d) Almost all industrial parks lack designated solid waste treatment and recycling facilities, and neither is industrial symbiosis practiced on a substantial scale.

BOX 2-1. SUMMARY ON THE STATUS OF WATER SECURITY

Water security threats facing Greater Kampala Metropolitan Area are interlinked and require integrative action.

- **Safe water supply is threatened to a large extent by inadequate access infrastructure and water quality (pollution)**
- **There is a heavy dependence on on-site sanitation facilities with limited capacity and infrastructure to treat faecal sludge**
- **Risk to surface water quality is highest in catchments with high population density, where domestic and industrial loadings are highest and haphazard land use has removed natural flood buffers and filtration**
- **Wetland coverage has reduced by 48% from 194 square kilometres in 1996 to just over 100 square kilometres**
- **Flood risk is highest in catchments facing severe wetland loss rendering natural ecosystem buffers ineffective**
- **Inadequate solid waste management exacerbates surface water pollution and flood risk**

Call for action: Multi-stakeholder integrative planning and action.



3. THE ECONOMIC BENEFITS OF IMPROVED WATER SECURITY

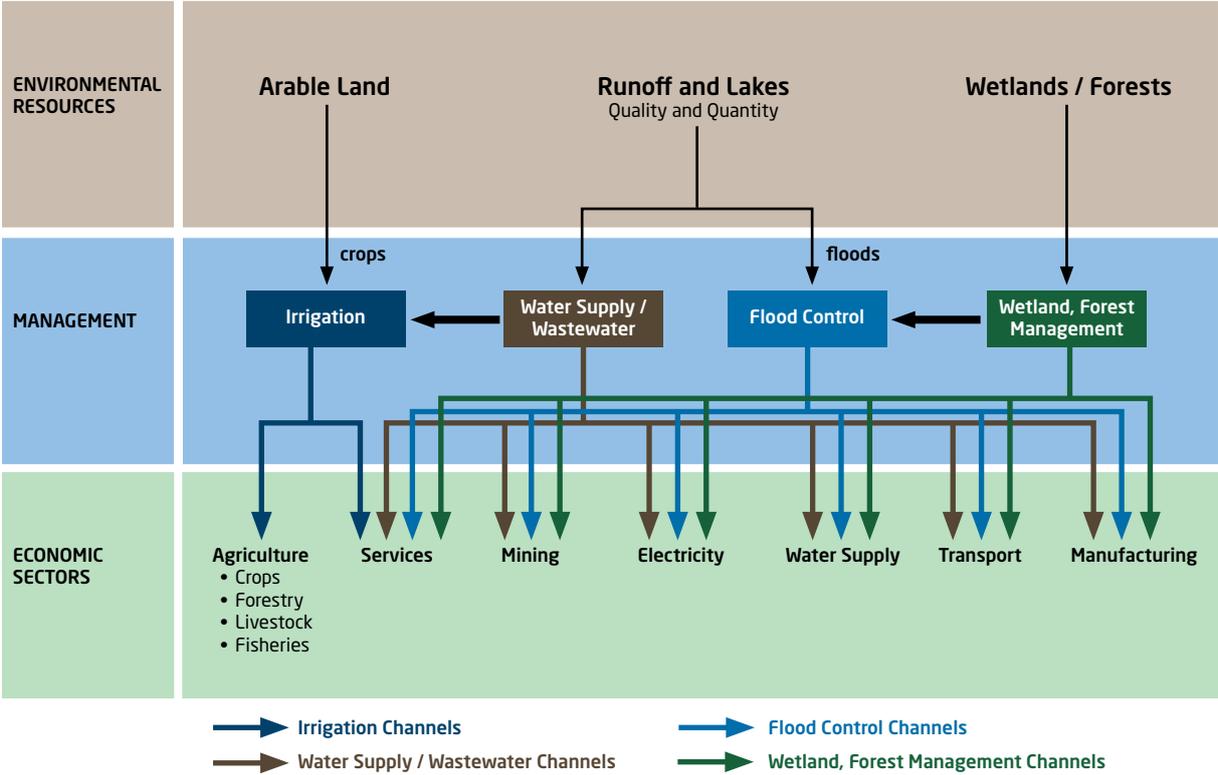
The threats introduced in the preceding section come with associated costs, economic and otherwise. This section analyses the benefits of enhanced water security in Greater Kampala Metropolitan Area. Computable General Equilibrium models³, developed for the Ministry of Water and Environment study on *The Contribution of Water Development and Environment Resources to Uganda's Economy*, were used to measure the economywide benefits and impact of water security investments on net GDP growth in GKMA and nationally (IEc, 2016).

3.1 Water Security and Economic Growth

Water and environmental investments impact the economy via a complex interconnection of the economic production factors of labour, capital, and natural resources. Investments that enhance these factors of production ripple through all sectors of the economy. For example, investments in urban and rural water supply and sanitation increase the supply and quality of labour which is the major productive factor of the commercial and manufacturing sectors. Investments in environmental management improve ecosystem services

such as reduced flooding, improved water quality and improved public health. These services reduce government expenditure on infrastructure repairs and health care, enhancing the GDP. This linkage between water security activities and the national economy was modelled based on “channels” of water and environmental development and management to a range of economic sectors as illustrated in Figure 3-1.

Figure 3-1: Channels Between Water Security Activities and Economic Sectors



3 Computable general equilibrium (CGE) models are a class of economic models that estimate how an economy might react to changes in policy, technology, development of water resources, investment in water supply and sanitation, and the like.

3.2 The Macroeconomic Impact of Water Security for Greater Kampala Metropolitan Area

There are very clear links between economic growth and water security, but this relationship changes over time as economies and countries become more developed. As water-related risk decreases, investment in economic activity increases and economies grow. Investments in water security are complementary to investments in education and health, reducing illness and associated costs. In turn, this has a positive feedback on income. Under these conditions, the economic value of enhancing water security increases. Nevertheless, stakeholders need to determine the appropriate levels of investment in water security in relation to other key priorities such as energy, health care and other non-water-related infrastructure development programmes.

Biophysical models were used to estimate the interaction of natural systems and water security interventions. The results of these models were then fed into an Economy-wide (Computable General Equilibrium) Model to estimate a variety of economic indicators related to the specified management regime. The goal was to determine the multiplier effect, i.e. the impact that change in one economic sector would have on other sectors and the economy in terms of

contribution to GDP, and other economic indicators. A detailed description of the economic analysis is found in the Ministry of Water and Environment study on *The Contribution of Water Development and Environment Resources to Uganda's Economy* (IEc, 2016) and the WSAIP Technical Report (2019).

Results from this study were disaggregated to generate water security investment for GKMA and impact of investments at metropolitan (GKMA) and national level as shown in Table 3-1, which also provides CGE national water security results gleaned from CGE model results.

(a) National study benefits by channel are multiplied by the expected share of benefits of investing only in the GKMA.

(b) Nationwide GDP benefits of nationwide investment [2] are adjusted to GKMA-only investment results [3] using the ratio of total benefits between the two studies.

(c) National GDP benefits of GKMA investment [3] are adjusted to GKMA GDP benefits [4] using the GKMA share of GDP by sector [1].

Table 3-1: Disaggregation of National Economy and Water Security Investments from National Level to Region (GKMA) Level

Sector	[1] GKMA GDP Share	[2] National Investment / National GDP Benefits	[3] GKMA Investment / National GDP Benefits	[4] GKMA Investment / GKMA GDP Benefits
All sectors		67.14	31.56	14.19
Agriculture		5.65	2.65	0.86
Rainfed crops	20%	(5.05)	(2.37)	(0.47)
Irrigated crops	0%	4.10	1.93	-
Livestock	0%	0.94	0.44	-
Forestry (incl. firewood)	40%	(0.13)	(0.06)	(0.02)
Fishing	50%	5.79	2.72	1.36
Industry		23.26	10.94	4.69
Mining	55%	1.42	0.67	0.37
Manufacturing		13.75	6.47	3.52
- Food processing	45%	0.48	0.23	0.10
- Textiles, clothing and leather	55%	(0.08)	(0.04)	(0.02)
- Wood and paper products	55%	2.20	1.03	0.57
- Chemicals	55%	7.56	3.55	1.95
- Non-metal minerals	55%	1.39	0.65	0.36
- Metal products	55%	1.03	0.48	0.27
- Machinery	55%	0.29	0.14	0.07
- Other manufacturing	55%	0.85	0.40	0.22
Electricity	50%	3.12	1.47	0.73
Water purification and distribution		0.22	0.10	0.06
- Distributed	50%	0.16	0.07	0.04
- Self-sourced	80%	0.06	0.03	0.02
Construction	87%	4.75	2.23	1.94
Services		38.23	17.97	8.65
Private services	51%	28.18	13.25	6.76
Government	40%	10.05	4.72	1.89

Extracting the results specifically related to the cost and benefits of water security investments in GKMA showed that the cumulative benefits from 2018 to 2040, in terms of GDP from increased investment in water security, were US\$ 22 billion (US 2018\$) while the cumulative costs were US\$ 4.3 billion (WSAIP Technical Report, 2019) as shown in Figure 3-2. By 2040, this investment would have increased GDP per capita by US\$ 195 annually in GKMA, which is a 4.2% increase in GDP even in a scenario with limited water secu-

rity investments. Without any investment in water security, GDP will remain as observed in the business-as-usual (BAU) scenario. The benefits of a GKMA investment programme extend to Uganda as a whole. This analysis shows a national benefit in 2040 of US\$ 52 GDP per capita each year from the GKMA investments. About half of the total GDP benefits of GKMA investment stay in GKMA and the rest flow through the economy and lead to GDP growth in other regions.

Figure 3-2: GKMA Economic Growth 2010 - 2040

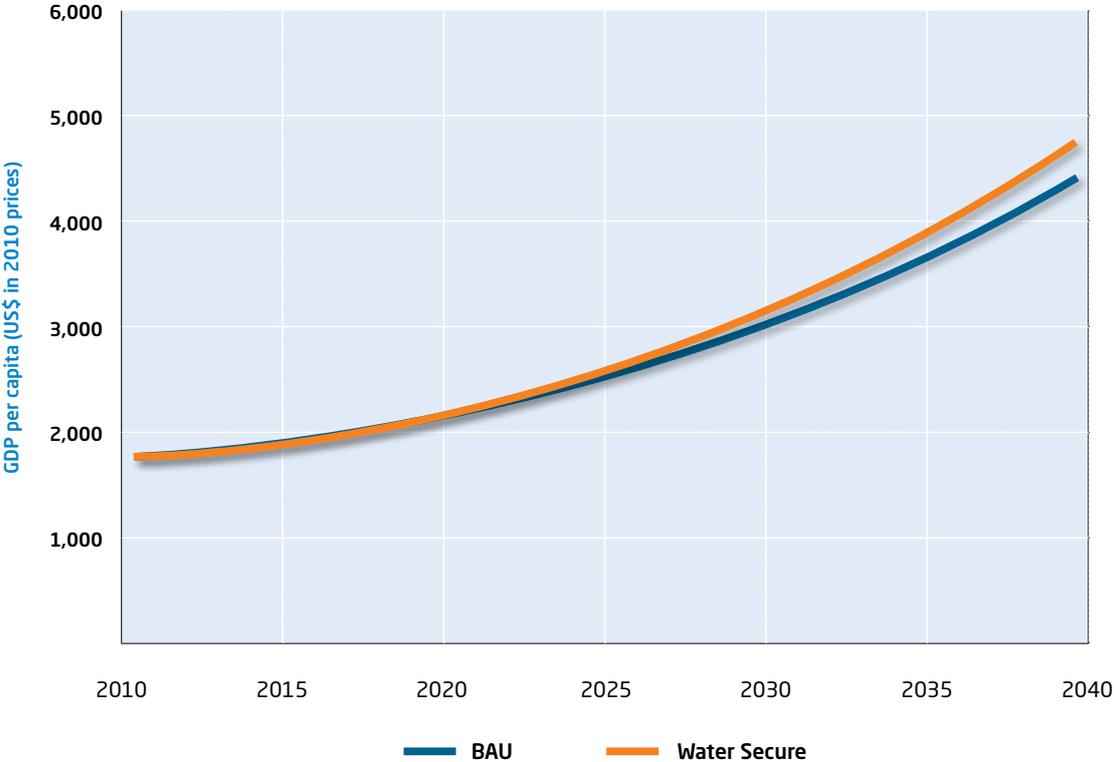
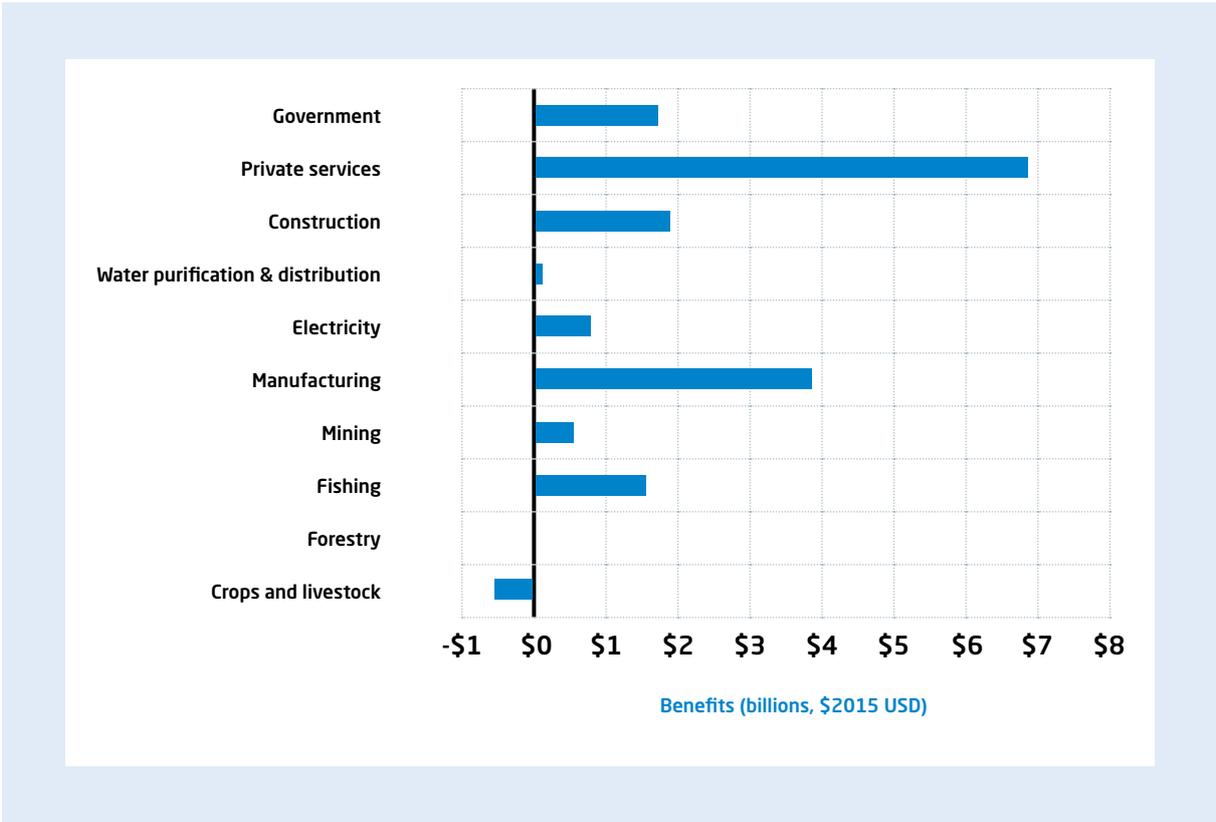


Figure 3-3 shows that investment in safe water and sanitation in GKMA mostly benefits the private services sector, manufacturing and government. GDP from crops and livestock drops in a water-secure future as the GKMA regional economy moves to a service industry base.

Figure 3-3: GDP Impact of Water Secure Investments in GKMA



3.2.1 Comparison of Water Security Investments to other Government Investments

The analysis above shows that investments in water security provide positive GDP benefits and exhibit strong benefit-cost ratios. Table 3-2 provides a comparison of the impact of investments in oil production, climate change and malaria prevention on Uganda’s national GDP. It is evident that investment in water security provides similar if not greater returns than oil, climate change adaptation and malaria prevention over the same period. Investments in water security in Greater Kampala Metropolitan Area not only provide significant local environmental, social, financial and micro-economic benefits; but also, positive macro-economic benefits (GDP) that are on par with investments in oil production and superior to climate change adaptation and malaria prevention.

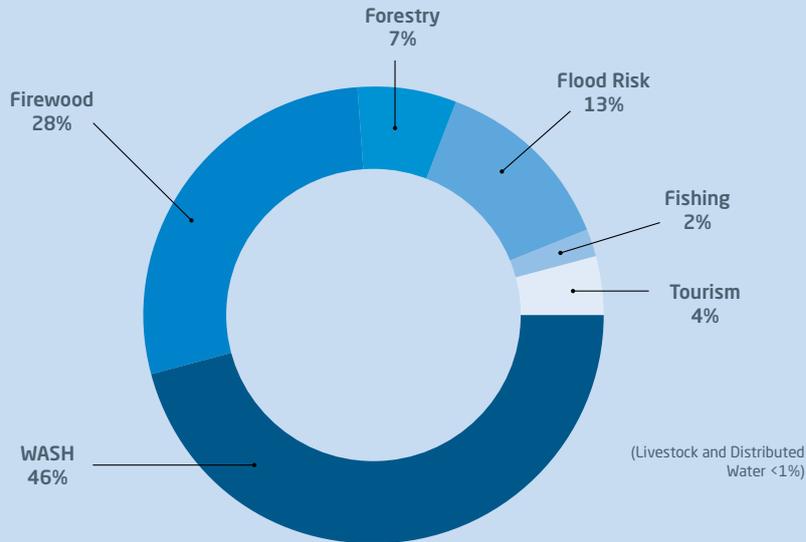
Table 3-2: Impact of Other Government Investments on National GDP

PROJECT	PHASE	IMPACT ON GDP PER ANNUM
OIL PRODUCTION	Construction phase – 2018	1.6%
	Operational phase – peak by 2028	7.2%
	Operational phase – end by 2044	1%
CLIMATE CHANGE ADAPTATION	National Benefits by 2047	1.9%
MALARIA PREVENTION	National Benefits by 2020	0.8%
WATER SECURITY	National Benefit by 2040	4.2%

BOX 3-1. SUMMARY OF THE ECONOMIC BENEFITS OF WATER SECURITY

- Most of the benefits of investment in safe water and sanitation in GKMA are in the private services sector
- GDP gains from water and environment interventions are more than eight times the investment costs
- **Assumptions:** GDP and channel attribution relies on imprecise data and GKMA's share of GDP is assumed constant over time

Share of Benefits by Investment Channel



\$195

GDP per capita in GKMA annually

This represents a 4.2% increase from the BAU scenario.

About half of the total benefits of investment in GKMA stay in GKMA as GDP benefits.

\$52

GDP per capita on average nationally each year

This represents a 4.1% increase from the BAU scenario.

The rest of the benefits flow through the economy and lead to GDP growth in other regions.



4. PLANNING FOR A WATER-SECURE FUTURE

Planning for a water-secure future is an adaptive process that requires stakeholders to continuously monitor the changing water security landscape and make decisions based on the magnitude of risks present at a given time. Similarly, investing in water security is not a one-off expenditure but rather an ongoing commitment to identify and prioritise investments based on the scale of water security risks. This section presents key components of the planning process.

4.1 Legal and Institutional Setting

Addressing water security requires a coherent approach between water polices and other sectoral or environmental policies (OECD, 2012). Employing a gap and barrier analysis, and a stakeholder consultation approach, various compo-

nents of the legal and institutional framework were analysed as shown in Table 4-1. Preparation of the WSAIP and its implementation aimed to address some of the institutional barriers presented in the gap and barrier analysis.

Table 4-1: Gap and Barrier Analysis for the Legal and Institutional Framework

THEME	SUB-THEME	CRITERION	CONTEXT	GAP	INSTITUTIONAL BARRIERS
LEGAL AND INSTITUTIONAL FRAMEWORK (WSS)	Policy and legal arrangements	Existence of legislation	Legislative framework in place	1	0
		Implementation of legislation	Level of implementation	0	-1
	Institutional arrangements	Existence and functioning of institutions	Institutions in place to implement legislation	0	-1
	Sectorial collaboration	Cooperation mechanisms among water users	Foster cooperation between stakeholders and various levels of government	0	-1
	Capacity of stakeholders	Mechanisms to deal with capacity gaps of stakeholders	Effectiveness of stakeholders to address challenges on water security (supply and sanitation)	-1	-1

Gap = any water security issue or threat not addressed; **Barrier** = policy or structure that prevents implementation

Green: Criteria met. **Yellow:** Criteria partially met. **Orange:** Significant gap or absent

This subsection summarises the legal and institutional context underlying the preparation and implementation of the WSAIP.

4.1.1 Policy and Legal Environment

Preparation of the WSAIP is guided by a wide-ranging policy and legal framework. The constitution of the Republic of Uganda (1995) provides fundamental principles to govern the country's water and natural resources. These principles align with the water security concept and set the scene for government to implement water security actions. The Constitution obligates the State:

- **To ensure that all Ugandans enjoy access to safe water**
- **To protect important natural resources, including land, water and wetlands on behalf of the people of Uganda**
- **To take all practical measures to promote a good water management system at all levels**
- **Take all possible measures to prevent or minimise damage and destruction to land, air and water resources resulting from pollution or other causes**
- **To promote sustainable development and public awareness of the need to manage water resources in a balanced and sustainable manner for the present and future generations**

The provisions of the constitution are operationalised through several water and environment sector legal and policy instruments namely; the Water Act, Cap. 152 (1997), the National Environment Act (2019), National Environment Management Policy (1994) and the National Water Policy (1999).

The Water Act, Cap 152 (1997)

The Water Act (1997) provides the legal framework for water management in Uganda. It provides for the use, protection and management of water resources and supply; the constitution of water and sewerage authorities; and facilitates the devolution of water and sanitation management services. The Water Act is operationalised through several regulations namely; the Water (Waste Discharge) Regulations (1998) to mitigate pollution, and the Water Resources Regulation (1998) to ensure the sustainable use and management of water resources.

The National Environment Act (2019)

The National Environment Act (2019) provides the legal framework for the sustainable management of the environment in Uganda to enhance water and environment security with focus on pollution control, waste management,

environmental planning, biological diversity management, environmental standards, environmental and social assessment, environmental compliance, and enforcement. The Act is operationalised through various regulations including The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, S.I. No 5/1999; The National Environment (Waste Management) Regulations, S.I. No 52/1999; and The National Environment (Wetlands, Riverbanks and Lake Shores Management) Regulations, No. 3/2000.

The National Environment Management Policy (1994)

The overall goal of this policy is "to promote sustainable economic and social development that enhances environmental quality without compromising the ability of future generations to meet own needs". The policy provides strategies on integration of environmental issues in national development planning processes, inter-sectoral cooperation and coordinated environment management.

The National Water Policy (1999)

The National Water Policy (1999) provides the overall policy framework for water resources management and development in Uganda. This includes guiding principles and strategies for water resources management, domestic water supply, water for agricultural production, and other water resource uses. This is aimed at achieving the overarching objective of the policy which is to "manage and develop the water resources of Uganda in an integrated and sustainable manner to secure and provide water of adequate quantity and quality for all social and economic needs of the present and future generations with the full participation of the stakeholders" (GOU, 1999). The National Water Policy promotes an integrated approach to water resources management and provides a legal framework for operationalisation of catchment-based water resources management (MWE, 2019b; MWE, 2019c). Table 4-2 summarises other key instruments that provide legal standing and principles within which the WSAIP will be implemented.

Table 4-2: Other Legal Instruments and Policy Instruments Anchoring the WSAIP

CATEGORY	INSTRUMENT	PROVISION
LEGAL FRAMEWORK	The Local Government Act (1997, Cap 243)	Defines roles for different levels of government in provision and management of water, sanitation and environmental activities including: management of forests, wetlands, sanitation facilities, water facilities, and protection of river banks and lake shores.
	The Land Act (1998 Cap 227)	Provides for the tenure, ownership and management of land, and requires a person who owns/occupies land to manage and utilise the land in accordance with the environmental and other laws.
	The Physical Planning Act (2010)	Provides for the establishment of physical planning structures at national, district, urban and local levels for the development and approval of physical development plans.
	The National Forestry and Tree Planting Act (2003)	Provides for the conservation; sustainable management and development; and the use of forests for the benefit of the people of Uganda.
	The Public Health Act (1935, Cap 281)	Consolidates the law in respect to public health, and places duties on the urban and local authorities in matters pertaining to public health, including sanitation management.
	The National Water and Sewerage Corporation Act (1995, Cap 317)	Establishes the National Water and Sewerage Corporation (NWSC) as a Water and Sewerage Authority responsible for operating and providing water and sewerage services in areas entrusted to it on a sound commercially viable basis.
	The KCCA Act (2010)	Establishes the Kampala Capital City Authority (KCCA) as the governing body of the city and lays out its roles and responsibilities which include: managing public health, sanitation, environment protection, drainage and physical planning for the capital city. The Act also provides for the role of the envisaged Metropolitan Physical Planning Authority (Greater Kampala).
POLICY DOCUMENTS	The National Climate Change Policy (2015)	Ensures a harmonised and coordinated approach towards a climate-resilient and low-carbon development path by supporting actions that promote a green economy and sustainable development.
	National Policy for the Conservation and Management of Wetland Resources (1995)	Promotes conservation of Uganda’s wetlands in order to sustain their ecological and socio-economic functions for the present and future wellbeing of the people.
	The National Forestry Policy (2001)	Promotes establishment of an integrated forest sector to harness economic, social and environmental benefits of forests and trees.
	The National Health Policy (2010)	Advances the delivery of promotive health services including addressing the increasing burden of diseases associated with access to sanitation and safe water.
	The Uganda National Land Policy (2013)	Promotes the efficient, equitable and optimal utilisation and management of Uganda’s land resources for poverty reduction, wealth creation and overall socio-economic development.
	The Uganda Gender Policy (2007)	Anchors gender mainstreaming for water, environment and sanitation management.

4.1.2 Institutional Setting

The water security institutional framework is the multi-jurisdictional aspect of water resource management and development. The institutional landscape governing the management of water security in Greater Kampala Metropolitan Area constitutes of collaborations between various ministries, district local governments, municipal authorities, civil society organisations and the private sector. This follows the national institutional set up of the Uganda water sector presented in Figure 4-1. The existing institutional setting demonstrates that realisation of urban water security requires collaboration across multiple fields (including natural resources management, water supply and sanitation, and urban planning), sectors and actors.

The Ministry of Water and Environment (MWE) sets the policies, standards and priorities for water development and management, whilst monitoring and evaluating sector development programmes to keep track of performance, efficiency and effectiveness in service delivery.

The Ministry of Water and Environment works closely with

four national agencies namely; National Water and Sewerage Corporation (NWSC) responsible for the delivery of water supply and sewerage services in urban areas; National Environment Management Authority (NEMA) responsible for coordinating, monitoring, regulating and supervising environment management; National Forest Authority (NFA) with a mandate to manage forest reserves for economic and sustainable development; and Uganda National Meteorological Authority (UNMA) responsible for providing climate-related information to support preparedness and mitigation of associated hazards and risks.

The Ministry also provides technical backstopping to local governments through Technical Support Units (TSU), Umbrella Organisations (UO), Water Management Zones (WMZ), and Water and Sanitation Development Facilities (WSDF) at regional level. Local government authorities/municipalities namely; Kampala Capital City Authority (KCCA), Entebbe, Mukono, Kira, Nansana and Makindye Ssabagabo are responsible for service delivery except for water supply in designated NWSC areas.

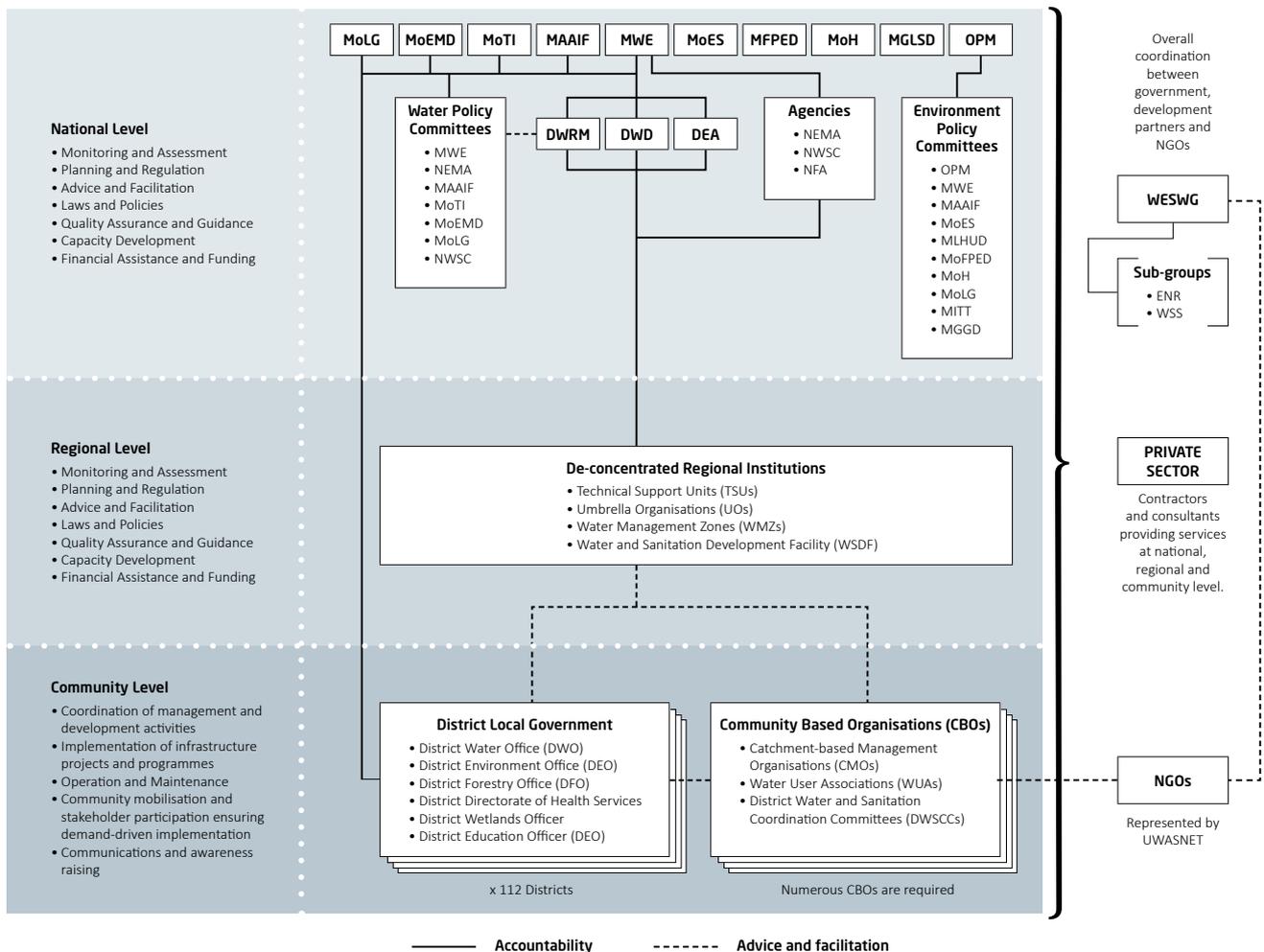


Figure 4-1: Institutional Set-up of the Ugandan Water Sector

4.1.3 National ambitions and Strategic Goals

The National Development Vision 2040 (GoU, 2015) sets Uganda's development strategies as aimed at "Transforming the Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years".

These aspirations are implemented through the third National Development Plan (NDP III 2020/21- 2024/25) which emphasises the need to break silos within the government actors and have coordinated planning and implementation to achieve national goals. This aligns with the need for collaboration for a water-secure GKMA. NDP III also supports investment in water security for the economic development

of Uganda through its programmes on: climate change; natural resources; environment; water management; sustainable urbanisation and housing; private sector development; and community mobilisation and mindset change.

Other national ambitions relevant to the WSAIP include the Uganda Green Growth Development Strategy 2017/18 – 2030/31 which aims to operationalise green growth principles to accelerate implementation of the Uganda Vision 2040; Sustainable Development Goals, particularly Goal 6 (UN, 2015); and the Water and Environment Strategic Investment Plan 2018-2030 (MWE, 2018).

4.1.4 Legal and Institutional Gaps

Important changes to the overriding legal and policy framework have occurred over the last several years. The delivery of water and environment resources has been decentralised to local governments with support and guidance from central government agencies. The management of water resources has shifted to a catchment-based system, with Uganda being divided into water management zones.

The institutional setting has also shifted, enabling involvement of a wider set of stakeholders through initiatives such as the Public Private Partnerships (PPP) Act of 2015 which backs private sector participation in key service delivery sectors of government. Nevertheless, several gaps still exist, for example:

(a) The concept of water security is not recognised in any of the existing water and environment legislative and policy frameworks (GOU, 1999). Specific components of water security are construed under various laws and regulations.

(b) The existing legal framework does not mandate any one actor to oversee sanitation management. Strategic and policy roles are shared among three ministries namely; Ministry of Health, Ministry of Water and Environment (MWE), and Ministry of Education and Sports, while service delivery is a mandate of local governments/urban authorities with guidance from the respective ministries. This has created overlaps in institutional mandates and roles, making vertical and horizontal coordination across these various actors a challenge (Komuhangi, 2019; Ekane et al., 2016).

(c) Social inclusiveness and attraction of private sector in water and sanitation service delivery remain a challenge,

as does the monitoring and enforcement of environmental regulations (WSAIP Technical Report, 2019; Akello, 2007).

(d) There is no coordinated strategic planning and investment across the Greater Kampala Metropolitan Area despite the gazettement of the GKMA as a special planning area by the government of Uganda in 2013 (GOU, 2017a). The inadequate and ineffective silo approach to planning and overlapping mandates complicates natural resource planning, and management in GKMA (GOU, 2017b; World Bank, 2015).

Ongoing efforts to address these gaps include:

(a) Updating the National Water Act (1997) and the National Water Policy (1999) to highlight water security as a key issue, reflect the water stewardship approach, and provide legal backing for enhanced private sector participation (Tindimugaya, 2020).

(b) Development of the Greater Kampala Economic Development Strategy (2017/2025) – currently in draft form – to provide a roadmap for investment to strengthen GKMA's position as the economic powerhouse to steer Uganda towards middle income status (NPA, 2017). The strategy has prioritised five programme areas namely: investment in competitive economic infrastructure; conservation and protection of environmental assets; transformation of the informal business sector; boosting tourism; and strengthening city and local government service delivery.

Nevertheless, to ensure a water-secure future for urban dwellers, there is need to invest in transformative institutions.

4.2 Transformative Institutions for a Water-Secure Future

These are organisations created to support the effective planning for and management of water and environment risks as the lowest appropriate hydrological unit – catchment. Operationalisation of catchment organisations is a prerequisite for ensuring a water-secure future given the geopolitical nature of water security threats facing the Greater Kampala Metropolitan Area. Figure 4-2 illustrates the spatial inconsistency between administrative (political) boundaries and the geographical nature of the water and environmental systems at risk in the GKMA.

The challenge of managing water security risks based on administrative boundaries is the failure to regulate hydrologic systems of streams and wetlands conveying risks such as pollution and floodwaters from upstream sources to downstream impacted population across administrative units.

In many cases municipality/city authorities, division/sub-counties, parish and village leaders have no authority to address water security threats such as pollution at a source outside their areas of jurisdiction.

The disconnect between the geographic nature of wetlands and river catchments, and administrative units and institutions, provides a very difficult regulatory environment to make major improvements in water security.

To realise a water-secure future, it is necessary to institute and empower a set of catchment management organisations with the authority to implement change on the hydrological and/or environmental system scale in order to improve water security in the upstream and downstream metropolitan area. For example, establishment of a Water Quality Management Organisation to regulate, monitor and invest in pollution control activities across the Inner Murchison Bay catchment is critical for its healthy functioning.

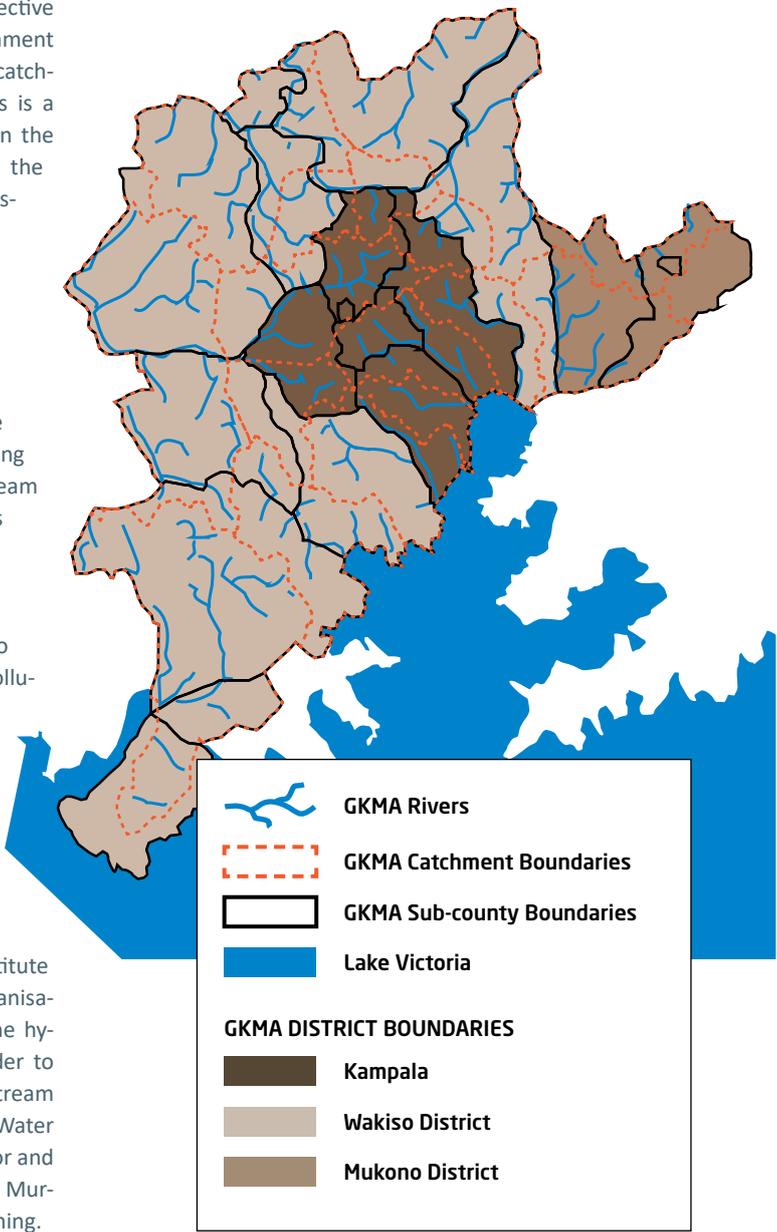


Figure 4-2: Overlay of Administrative and Hydrological Boundaries

4.3 Multi-sectoral Collaboration for a Water-Secure Future

Water security threats are interconnected; they prevail in a complex urban system where individual actors have different goals and interests. Confronting these threats effectively requires collective action from all actors. Therefore, development of the WSAIP followed a multi-stakeholder process to deliver a jointly owned plan that all stakeholders could commit to implement.

Over 1500 stakeholders participated in the plan development process (WSAIP Technical Report, 2019). Stakeholder engagement followed the stewardship approach which fosters dialogue between the private sector (.com), the public/government (.gov) and civil society/local communities (.org) to:

- (a) Encourage multi-stakeholder and inter-institutional working relations while aligning individual strategic goals, mandates and responsibilities under one overarching umbrella – water security.
- (b) Foster better appreciation of the water security concept and the need for collective planning and action.
- (c) Stimulate collective action to address common locally identified water risks and threats.

(d) Facilitate greater commitment and “buy-in” from all stakeholders at local, metropolitan and national levels.

Public entities such as Ministry of Water and the Environment (MWE), National Water and Sewerage Corporation (NWSC) and Kampala Capital City Authority (KCCA) supported the institutionalisation of WSAIP approaches in addition to mainstreaming water security and the stewardship approach into policies, strategies and action plans. Civil Society Organisations (ENR-CSO and UWASNET) created awareness amongst local communities, enabling them to identify household-level water security risks to ensure investment actions suit local needs; and engaged political leaders to garner legislative commitment to the plan. Identification of water security risks facing the industrial and business sectors was spearheaded by the Uganda Manufacturers Association (UMA) who also empowered industrialists and business owners to address water security threats at their level.

Figure 4-3 summarises key stakeholder groups and institutions involved in the WSAIP development process.



Figure 4-3: Key Stakeholders Involved in Developing the WSAIP

Table 4-3: Stakeholder Interests, Challenges and Opportunities

<p>STAKEHOLDER 1: MINISTRY OF WATER AND ENVIRONMENT (DWRM, DWD, DEA, and Climate Change Department)</p> <p>INTERESTS</p> <ul style="list-style-type: none"> ▪ Sustainable development and management of urban water and environment resources for inclusive growth, employment and wealth creation ▪ Increasing multi-sectoral collaboration between various actors including the private sector ▪ Fostering better understanding of the interrelationship between water, environment and economic growth ▪ Building strong partnerships to enhance water supply and sanitation services in underserved peri-urban areas outside NWSC jurisdiction; restoring and conserving degraded urban ecosystems (wetlands and buffer zones); improving compliance to environmental regulations; and promoting mitigation and adaption to climate change related risks like floods ▪ Creating transformative institutions to foster multi-stakeholder engagement in planning and implementation <p>CHALLENGES</p> <ul style="list-style-type: none"> ▪ Insufficient inter-sectoral and interdisciplinary collaboration to leverage human and financial resources for increased impact ▪ Limited investment in social and technological solutions to address various environmental- problems <p>OPPORTUNITIES</p> <ul style="list-style-type: none"> ▪ Recognition of the role of water and environment in economic development (NDP III & Vision 2040) ▪ Ongoing review of the Water Act and Policy ▪ Success stories and lessons from the application of the stewardship approach in catchment management ▪ Multiple avenues and opportunities for stakeholder engagement ▪ Existing platforms (e.g., PTF) on which to engage private sector and CSOs
<p>STAKEHOLDER 2: MINISTRY OF LANDS, HOUSING & URBAN DEVELOPMENT</p> <p>INTERESTS</p> <ul style="list-style-type: none"> ▪ Transforming informal settlements ▪ Integrated urban planning that enables existence of vital ecosystems and fosters inclusiveness <p>CHALLENGES</p> <ul style="list-style-type: none"> ▪ Uncoordinated planning and development <p>OPPORTUNITIES</p> <ul style="list-style-type: none"> ▪ Planning at GKMA level fosters inclusiveness
<p>STAKEHOLDER 3: NATIONAL WATER AND SEWERAGE CORPORATION (NWSC)</p> <p>INTERESTS</p> <ul style="list-style-type: none"> ▪ Securing water resources from the effects of urbanisation (pollution) and climate change (drought) to meet current and future demand ▪ Extensive creation of awareness on water security and embedding its agenda in daily operations at sectoral and institutional levels ▪ Ensuring the sustainability of investments through evidenced-based planning and building partnerships to implement mitigation actions ▪ Making water security a national agenda with legal and policy support ▪ Institutionalising water security across the water and environment sector <p>CHALLENGES</p> <ul style="list-style-type: none"> ▪ Lengthy process of institutionalising water security and WSAIP project outputs ▪ Complexities of making water security a national agenda ▪ Intermittent political support to drive the water security agenda <p>OPPORTUNITIES</p> <ul style="list-style-type: none"> ▪ Planning tools, pipeline of investments, knowledge and evidence from WSAIP project to support institutionalising water security ▪ Ongoing investment action e.g., Katosi (new water works for NWSC in Mukono) to act as a pilot ▪ Institutional capacity and political interest developed under the WSAIP

STAKEHOLDER 4: KAMPALA CAPITAL CITY AUTHORITY (KCCA)

INTERESTS

- Promoting systematic and consistent planning and collaboration for a water-secure future
- Reducing public health threats emanating from inadequate access to safe water and sanitation services
- Leveraging private sector investments
- Preserving urban ecosystems and strengthening governance structures

CHALLENGES

- Lack of a unitary governance structure to implement GKMA-wide strategies and actions

OPPORTUNITIES

- WSAIP provides a framework for coordinated planning to achieve SDGs
- Platforms e.g., PTF and Mayors Forum that foster collaboration
- GKMA Economic Development Strategy Delivery Unit

STAKEHOLDER 5: NATIONAL PLANNING AUTHORITY (NPA)

INTERESTS

- Multi-sectoral planning and action
- Operationalising NDP III
- Focusing on GKMA to attract investments and enable operationalisation of the Greater Kampala Economic Development Strategy

CHALLENGES

- Silo approach to planning
- Intricacies of forming governance structures at Greater Kampala level

OPPORTUNITIES

- Operationalisation of NDP III to promote multi-sectoral planning and action
- Recognition of GKMA as a single planning unit so as to leverage investments

STAKEHOLDER 6: NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

INTERESTS

- Reducing pollution loadings entering the environment
- Conserving urban ecosystems (wetlands)
- Innovating solutions to environmental challenges in urban settings
- Fostering integrated land use planning in urban settings

CHALLENGES

- Unsatisfactory compliance to environment regulations
- Societal inclination to maintain the status quo
- Conflicting mandates

OPPORTUNITIES

- Reducing wetland loss is a priority in the national agenda (NDP III)
- Opportunities to prioritise the environment as provided by the revised National Environment Act (2019)

STAKEHOLDER 7: NATIONAL FOREST AUTHORITY (NFA)

INTERESTS

- Increasing forest and tree cover across the GKMA landscape
- Protecting urban forest reserves e.g. Namanve
- Harnessing economic benefits of forest resources management and conservation

CHALLENGES

- Degazetting forest reserves for industrial and infrastructure development

OPPORTUNITIES

- Increasing forest coverage is a priority in the national agenda (NDP III)
- Multi-sectoral interest in tree planting as a climate change mitigation measure

STAKEHOLDER 8: MUNICIPAL COUNCILS (KIRA, MAKINDYE, NANSANA, ENTEBBE, MUKONO)

INTERESTS

- Increasing access to affordable safe water and sanitation services
- Incentivising urban ecosystems to promote conservation
- Reducing flood risks

CHALLENGES

- Inadequate information on water security in GKMA

OPPORTUNITIES

- WSAIP provides a holistic approach to water resources management

STAKEHOLDER 9: LOCAL GOVERNMENTS (WAKISO, MUKONO)

INTERESTS

- Increasing access to safe water and sanitation services
- Improving solid waste management by creating wealth from waste
- Fostering integrated urban planning
- Reducing ecosystem loss to rapid urbanisation
- Mobilising concerted efforts to achieve a common goal
- Enhancing technical capacities to address water security threats

CHALLENGES

- Conflicting mandates
- Failure to operationalise physical development plans
- Inadequate resources

OPPORTUNITIES

- WSAIP is a good guiding tool to enable stakeholders mobilise resources and operationalise other plans
- WSAIP provides a platform on which to mobilise concerted efforts towards a common goal

STAKEHOLDER 10: UGANDA MANUFACTURERS ASSOCIATION (UMA)

INTERESTS

- Empowering the private sector to address water security risks using innovative solutions
- Strengthening private sector engagement
- Promoting collaboration between private sector and the research institutions to enhance innovation for water security

CHALLENGES

- Fewer avenues for collaboration
- Limited investment in innovation

OPPORTUNITIES

- Expanding the scope of water security beyond GKMA

STAKEHOLDER 11: CIVIL SOCIETY (UWASNET & ENR)

INTERESTS

- Building synergies between politicians, private sector, government, civil society, and communities
- Steering individual action towards collective action

CHALLENGES

- Single, scattered and siloed actions

OPPORTUNITIES

- Water security issues are well aligned to sector goals

STAKEHOLDER 12: ACADEMIA AND INDUSTRIAL RESEARCH CENTRES

INTERESTS

- Promoting evidence-based planning to inform policy (investing in information systems and data)
- Innovating solutions to water security threats

CHALLENGES

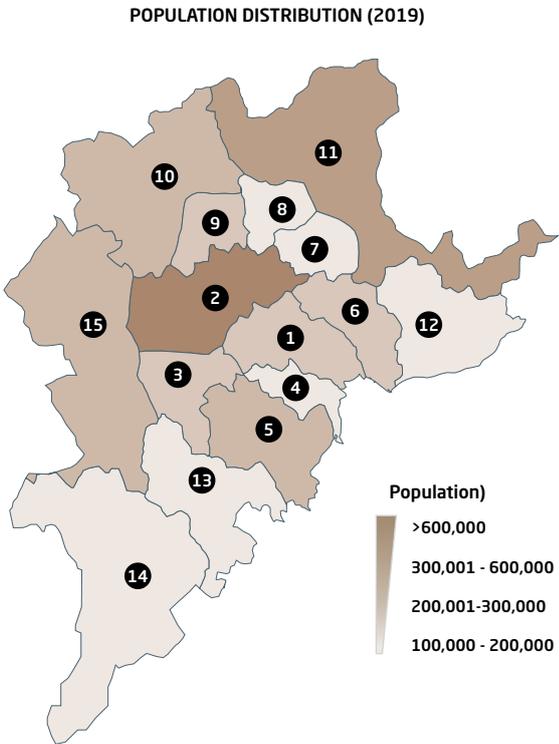
- Scanty data and information (evidence)

OPPORTUNITIES

- Multiple universities and research institutions to offer interdisciplinary collaboration

4.4 Drivers of Future Water Security Threats

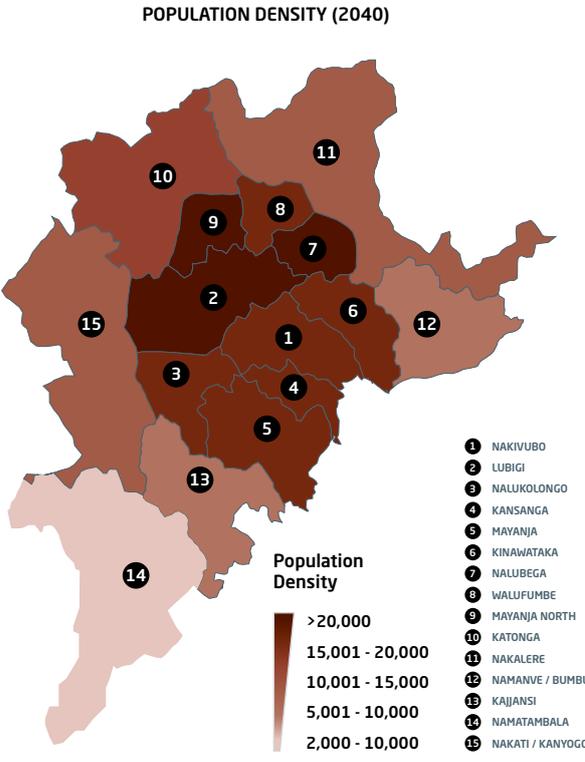
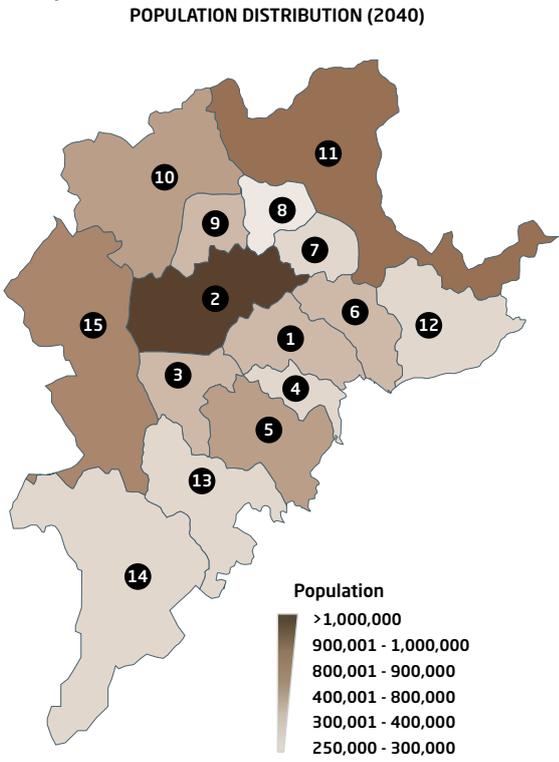
Water security threats are driven by several external factors. On their own, these drivers do not necessarily diminish water security, however, they do require careful consideration in management decisions to ensure policies developed address these growing pressures.



4.4.1 Population growth and urbanisation

Population growth and urbanisation are the most important drivers of water insecurity. As the country’s chief industrial centre and economic zone, the Greater Kampala Metropolitan Area has one of the world’s fastest growing populations with a combined annual growth rate of 3.9% (NPA, 2017) with the largest growth happening in areas of Mukono and Wakiso as shown in Figure 4-4.

The population of Greater Kampala Metropolitan Area is projected to grow from 4 million people in 2019 to 13 million people by 2040 (KCCA, 2012). Higher levels of investment in water supply and sanitation are needed to keep up with this population growth. Ecosystems are equally threatened by encroachment to accommodate growing towns and other land use changes. Current development patterns suggest both formal and informal settlements will continue to encroach on valuable natural systems, particularly wetlands (World Bank, 2015).



- 1 NAKIVUBO
- 2 LUBIGI
- 3 NALUKOLONGO
- 4 KANSANGA
- 5 MAYANJA
- 6 KINAWATAKA
- 7 NALUBEGA
- 8 WALUFUMBE
- 9 MAYANJA NORTH
- 10 KATONGA
- 11 NAKALERE
- 12 NAMANVE / BUMBUBUMBU
- 13 KAJJANSI
- 14 NAMATAMBALA
- 15 NAKATI / KANYOGOGA

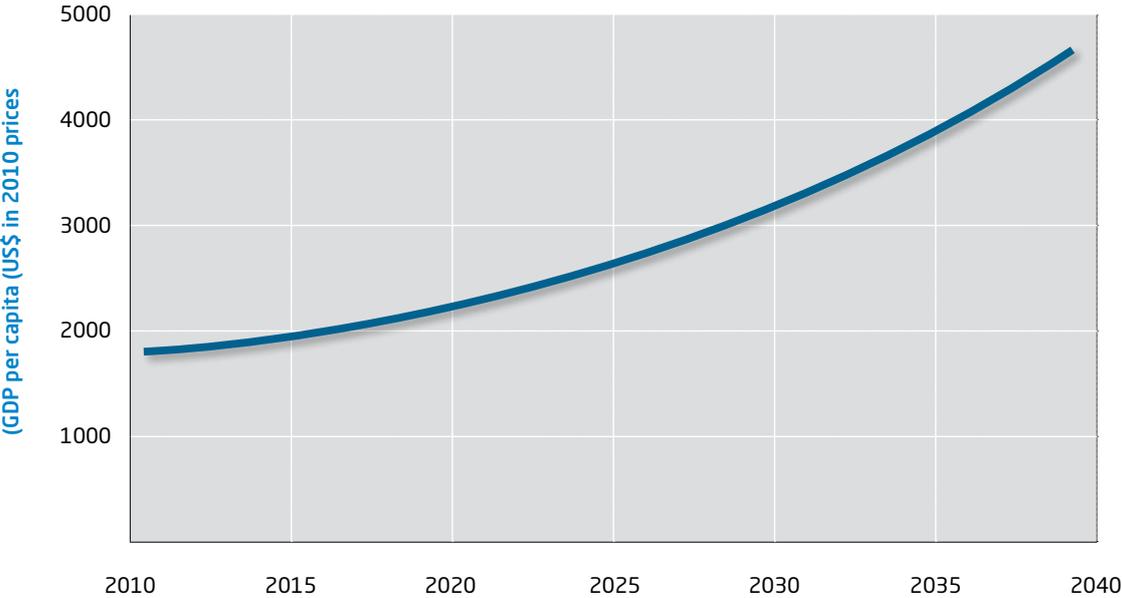
Figure 4-4: Current and Future Population Patterns in GKMA

4.4.2 Economic Growth

Economic growth will put more pressure on water security due to increased industrial activity, increased waste production and water demand. The negative impacts of this can be mitigated if households and industries invest their increased wealth in water security measures. For example, wealthier

households should be able to pay fees and connect to a sewer system, and industries should invest in on-site secondary water treatment facilities. Figure 4-5 shows the projected economic growth patterns for Greater Kampala Metropolitan Area.

Figure 4-5: Greater Kampala Metropolitan Area Economic Growth, 2010 - 2040



4.4.3 Climate Change

Climate change exacerbates water security threats by adding to the variability in natural systems.

Uganda’s climate is predicted to be hotter on average in the next 20 to 30 years with more uncertain precipitation, as seen in Figure 4-6, which shows a range of possible future climate change outcomes from the latest output of the Intergovernmental Panel on Climate Change (IPCC) model.

Changes in precipitation over the same period are less certain, with some projections indicating a wetter future and others indicating a drier future. However, extreme events are likely to become more frequent.

While some of the impacts of these changes may be seen in the near term, it is also possible that the larger impacts will only be seen after 2040. Water security solutions will need to account for potential changes in climate that could

intensify existing vulnerabilities. In Greater Kampala Metropolitan Area, temperatures are projected to increase between 0.5 and 3°C, and projected changes in precipitation range from -11% to +34% (Figure 4-7). This indicates that any investment planning needs to be prepared for a hotter and wetter future.

Figure 4-6: Projected Climate in Uganda by 2040

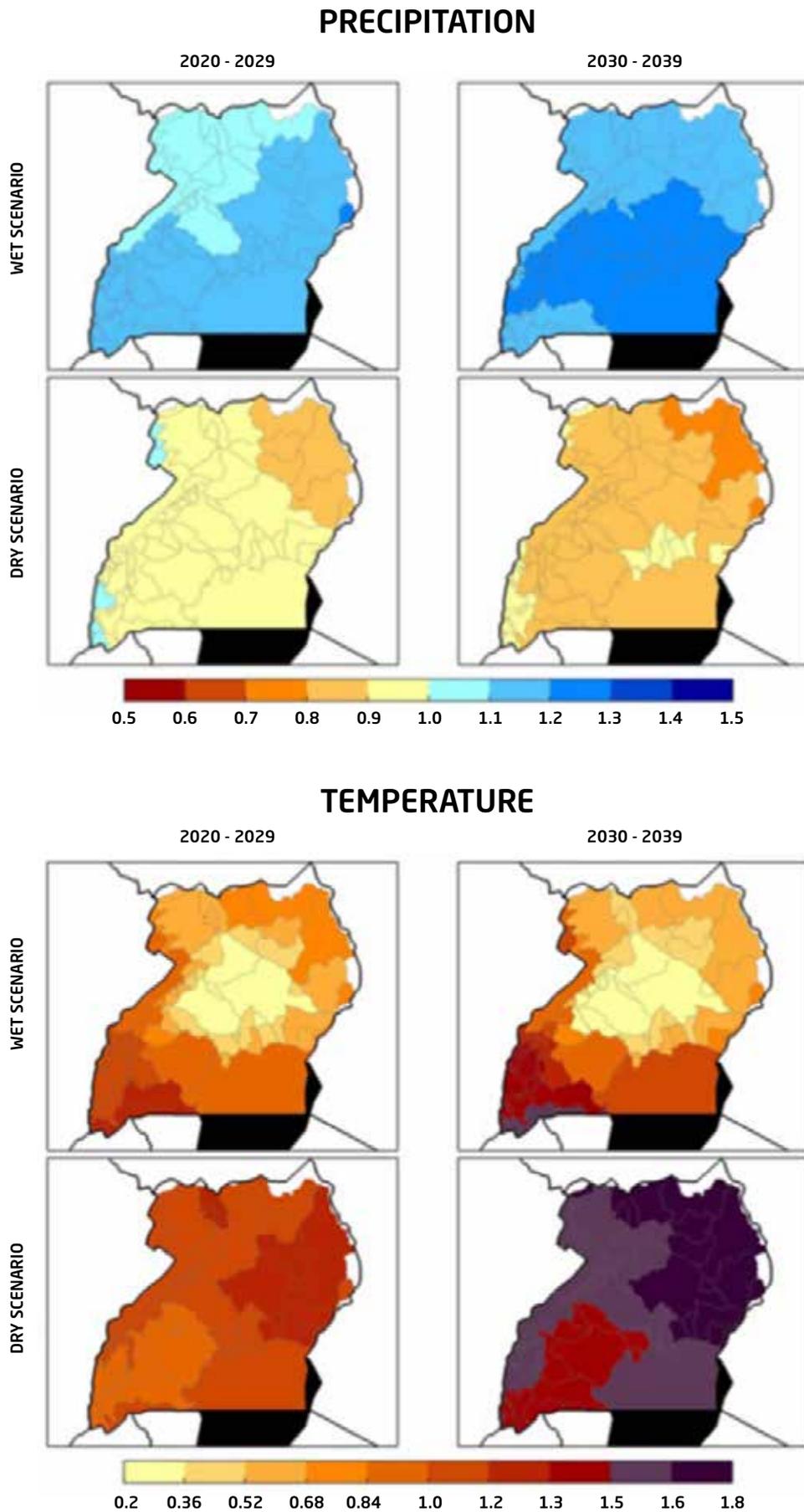
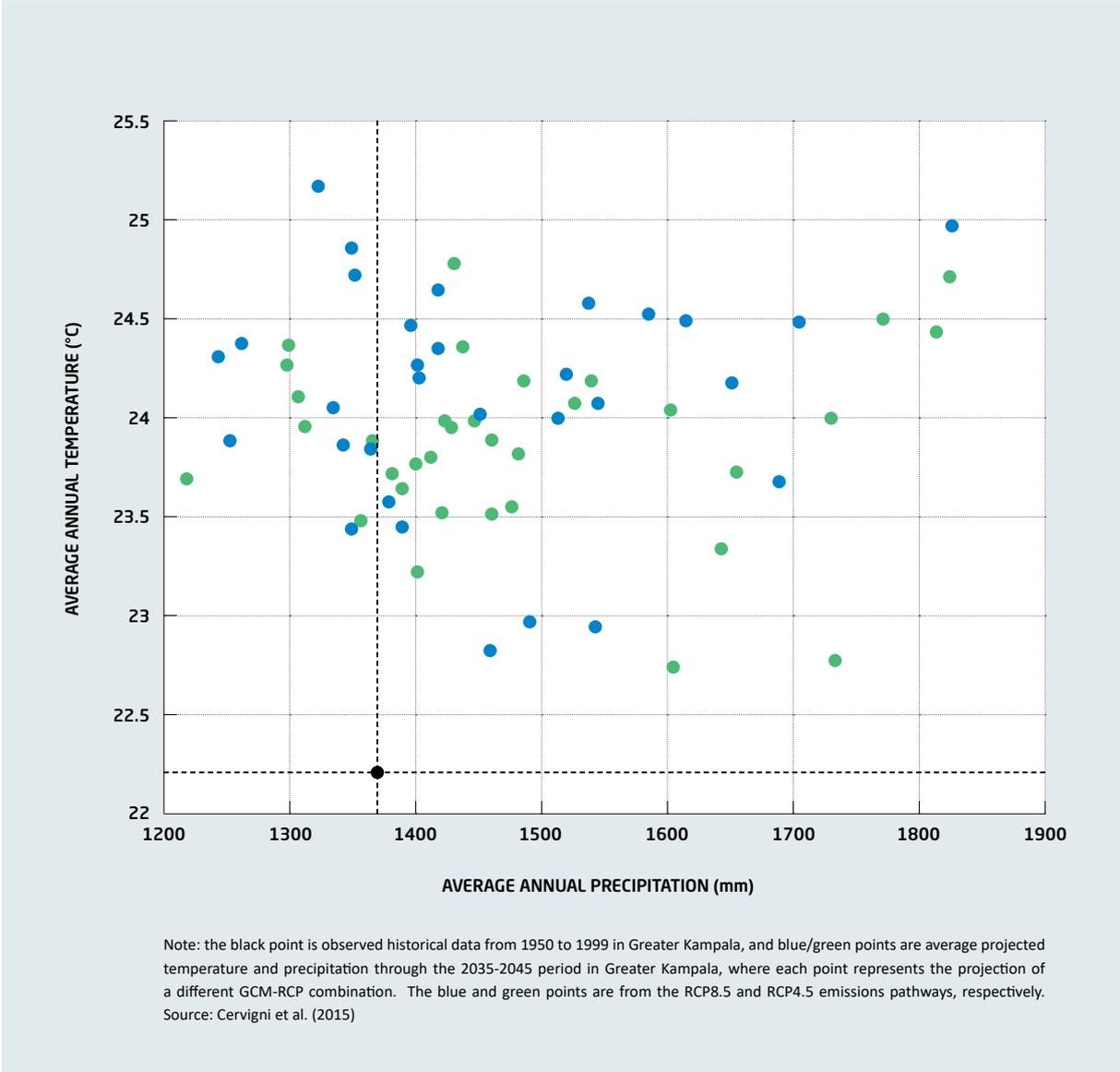


Figure 4-7: Projected Climate in GKMA by 2040 Across a Range of Models



The combination of projected changes (more heat, more rain) and anticipated increased frequency of severe floods and droughts, generates a range of likely impacts, namely:

(a) Flooding: more severe and frequent flood events will negatively affect the poorer populations that live in floodplains and reclaimed wetlands. Increased flood risk will threaten infrastructure throughout Kampala, leading to both repair and disruption costs, and financial losses to industries and businesses located in floodplains (Cervigni et al. 2015; Markandya et al., 2015).

(b) Sanitation: shallow pit latrines placed in floodplains become inaccessible during flood events – if these occur more regularly, further contamination of water sources will occur.

(c) Water quality: increasing temperatures will cause more rapid growth of bacteria in water sources, leading to harmful algal blooms and other water quality challenges as certain pollutants thrive in warmer waters.

(d) Health: waterborne diseases like cholera will occur with more frequency due to increase in occurrence and severity of floods (UN, 2011).

(e) Water supply: in northern regions of Greater Kampala Metropolitan Area that already have water availability challenges, increasingly frequent droughts will place greater stress on groundwater pumping.

4.5 Evidence-based Decision Support Framework

To facilitate planning for a water-secure future, an evidence-based decision support framework was developed to help stakeholders make transparent informed decisions regarding investments in water security. The decision support framework consists of two tools: **The Scenario Planning Tool (SPT)** and the **Water Security Investment Model (WaSIM) Multi-criteria Decision Analysis Screening Tool** shown in Figure 4-8. The outputs of this framework are not only the list of high priority integrative projects, but also a set of tools that facilitate inter-stakeholder, inter-institutional, and cross-spatial evidence-based integrated investment decisions on water security.

(WaSIM) **Multi-criteria Decision Analysis Screening Tool** shown in Figure 4-8. The outputs of this framework are not only the list of high priority integrative projects, but also a set of tools that facilitate inter-stakeholder, inter-institutional, and cross-spatial evidence-based integrated investment decisions on water security.

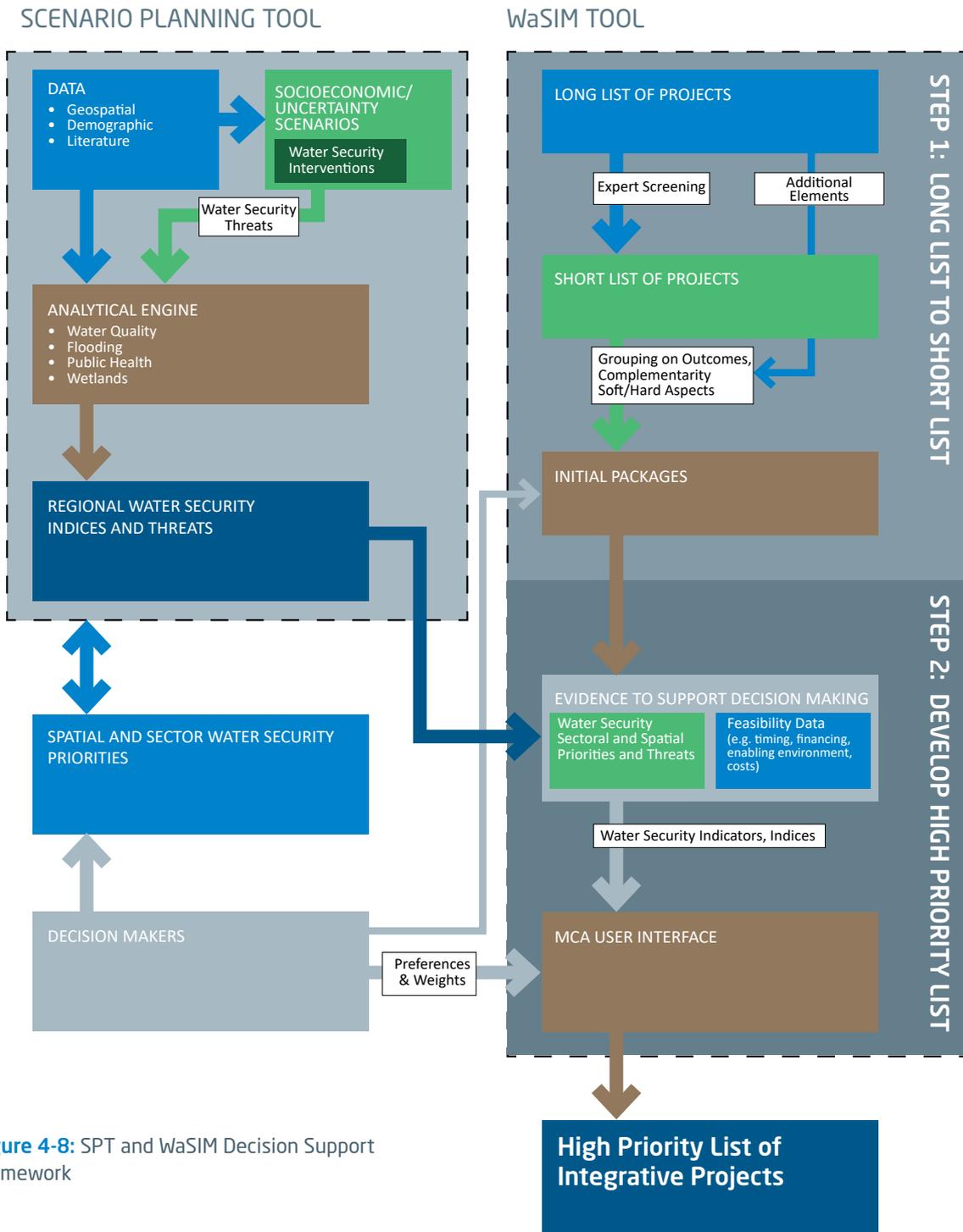


Figure 4-8: SPT and WaSIM Decision Support Framework

4.5.1 The Scenario Planning Tool

The SPT is a visual spatial tool designed to provide decision-makers with screening-level information on key water security threats like pollution (water quality), flooding, public health and ecosystem loss (e.g., wetlands) at catchment level, for the 15 catchments draining Greater Kampala Metropolitan Area. The tool presents information on the drivers of water security threats and uses those drivers to project the future status of water security. The SPT also allows stakeholders to explore current and future water security hotspots and select interventions at various levels. This way, they can locate and scale water security interventions and explore how the current and future status would change under different levels of intervention. Figure 4-9 provides an example of the SPT interface which is built in Power BI, a freely available software package from Microsoft.

The SPT stores outputs of five model interactions:

(a) The Flooding Model translates precipitation and land use information (wetlands and forest coverage) into expected peak flow.

(b) The Wetland Model uses historical rates of wetland degradation in Greater Kampala to forecast the likely wetland coverage in 2040.

(c) The Water Quality Model estimates biochemical oxygen demand (BOD) and dissolved oxygen (DO) concentrations in rivers within each catchment and for Inner Murchison Bay, based on expected loadings, land cover and stream flow, and temperature.

(d) The Public Health Model relies on literature on the effectiveness of clean water supply and improved sanitation to reduce illness and improve labour productivity.

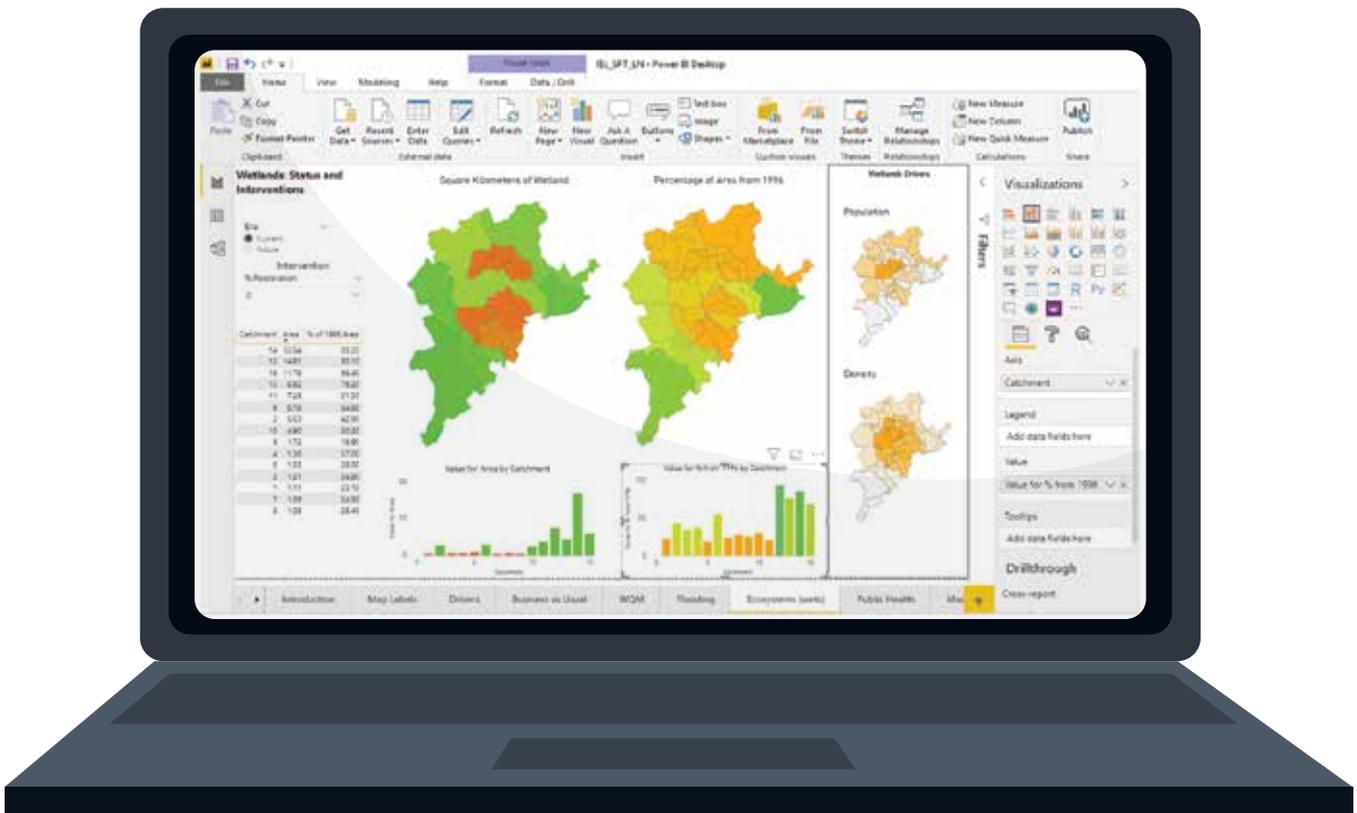
(e) The Socio-economic Model uses the outputs of the above four models to estimate three types of economic benefits:

(i) GDP measures using macroeconomics obtained from MWE studies on *“The Contribution of Water Development and Environment Resources to Uganda’s Economy”* disaggregated to Greater Kampala Metropolitan level.

(ii) Econometric measures using microeconomics obtained from local Greater Kampala Metropolitan Area studies and literature.

(iii) Social welfare; derived benefits that are reported in non-monetary terms such as employment and access to water or sanitation.

Figure 4-9: Example of Scenario Planning Tool User Interface

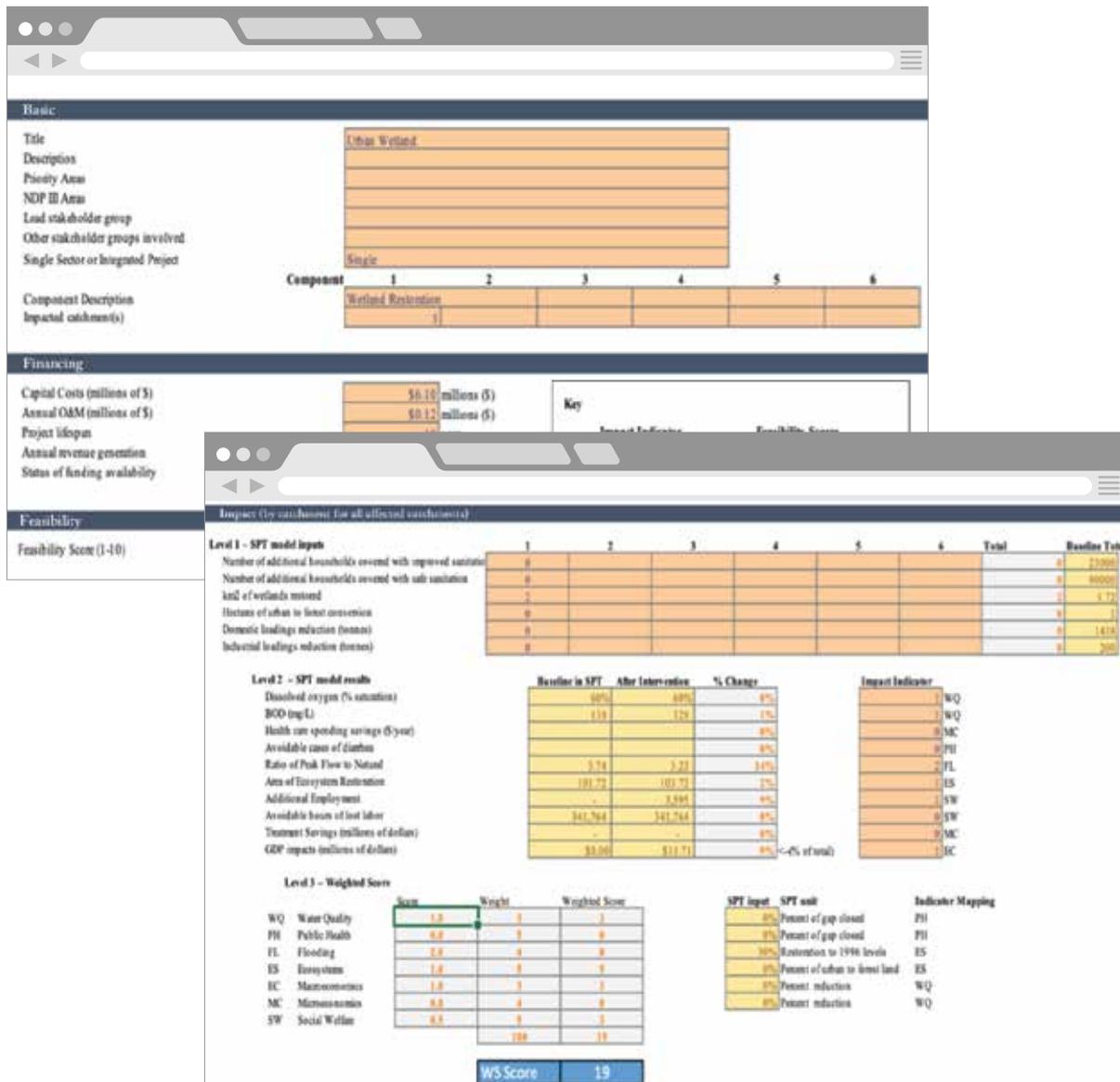


4.5.2 The Water Security Investment Model

The WaSIM is a Multi-criteria Decision Analysis (MCDA) tool that utilises an excel-based platform to present information available in the Scenario Planning Tool, along with information on the characteristics of selected investment actions such as project costs, location and benefits, to allow stakeholders make informed decisions about prioritisation of investment projects. Information on threats and potential benefits of an action from the Scenario Planning Tool is translated into the WaSIM as potential benefits of each proposed action. Results of the analysis are summarised in tabular and graphical form. Figure 4-10 provides an example of the WaSIM graphical user interface.

The Scenario Planning Tool and the WaSIM Multi-criteria Decision Analysis tool on their own do not select high priority projects; project selection requires stakeholders and decision-makers to interact with the evidence so as to choose the best investment actions. Information on user application of the SPT and WaSIM is contained in the WSAIP Technical Report (2019).

Figure 4-10: Example of Water Security Investment Model Excel Platform



BOX 4-1. PLANNING FOR A WATER-SECURE FUTURE

Solving interconnected water security challenges in complex urban systems requires collective action by different actors with specific responsibilities towards attaining water security for all.





5. INVESTMENT OPTIONS FOR A WATER-SECURE FUTURE

5.1 Strategic Intervention Areas and Scenarios

The areas of water security interventions include: water supply and sanitation, urban drainage and flood management, wetland and forest rehabilitation, and institutional strengthening. The main short to medium-term benefits that are provided by water security interventions include:

- (a) Improved public health due to better sanitation and reduced water pollution.
- (b) Increased productivity because of reduced flood risk and/or reliable supply of water to households and businesses.
- (c) Reduced cost of water supply owing to reduced pollution of raw water quality.
- (d) Improved supply of ecosystem services as a result of restoring and securing the health of aquatic ecosystems, including provision of natural resources (e.g., fisheries), cultural services (e.g., recreation) and regulating services (e.g., water purification, flood mitigation).
- (e) Improved governance of water and environment resources.

This subsection elaborates on the selected intervention areas; demonstrates the consequences of inaction, that is, if investment remains at the same level in the future (2040) as it is today (2019) under changing social, economic and climatic conditions; and highlights potential intervention scenarios.

5.1.1 Strengthening Integrated Evidence-based Planning for a Water-Secure Future

The WSAIP aims to move investment planning related to water and environment security from an ad hoc siloed approach towards a more transparent evidence-driven integrated planning approach. Planning and implementation of water and environment programmes and/or projects remains largely confined within departments along institutional and sectoral mandates. Subsequently, the synergies and complementarities that could be derived from a more

holistic evidence-based approach are often forfeited, reducing project and/or programme impact. According to NPA (2020), uncoordinated approaches to implementation planning are unsustainable and counterproductive since isolated projects produce minimal to no impact. As stakeholder goals and interests differ, the realisation of a water-secure future necessitates concerted efforts and strengthening evidence to inform action.

5.1.2 Prevention, Control and Reduction of Surface Water Pollution

By 2040, surface water quality is projected to deteriorate further as BOD levels increase on average by 142% across the metropolitan river system. Rising BOD levels will lead to a reduction in Dissolved Oxygen resulting in the hypoxia of five river systems (Nakivubo, Nalukolongo, Mayanja North, Namanve and Lubigi), if immediate action is not taken.

Increase in BOD will be exacerbated by further reduction in wetland cover; increase in industrial and domestic loadings due to rise in urban population and industrial growth; and climate change. Highest deterioration is projected to occur in sub-catchments draining Kampala city and surrounding areas namely Nakivubo, Kinawataka, Nalukolongo, Lubigi, Nalubega, Mayanja, Kansanga, Mayanja North and Namanve, as shown in Figure 5-1.

Without intervention, the Inner Murchison Bay (IMB) system will not be able to support any form of life as DO is expected to decrease from 72% to 7% by 2040 as BOD levels rise.

Evaluation of pollution control intervention scenarios for the IMB using the SPT indicates that:

- (a) Reduction of domestic and industrial loadings have very similar impacts on BOD in terms of benefit per percentage reduction; however, the benefit is slightly higher per percentage reduction of industrial loadings.
- (b) Reduction in industrial and domestic loadings can quickly improve DO in the IMB.
- (c) 30% domestic loading reduction or 60% industrial loading reduction would result in 100% (or near 100%) increase in DO in IMB.
- (d) The impact of wetland restoration on BOD and DO in Inner Murchison Bay is minimal compared to that of reducing loadings.

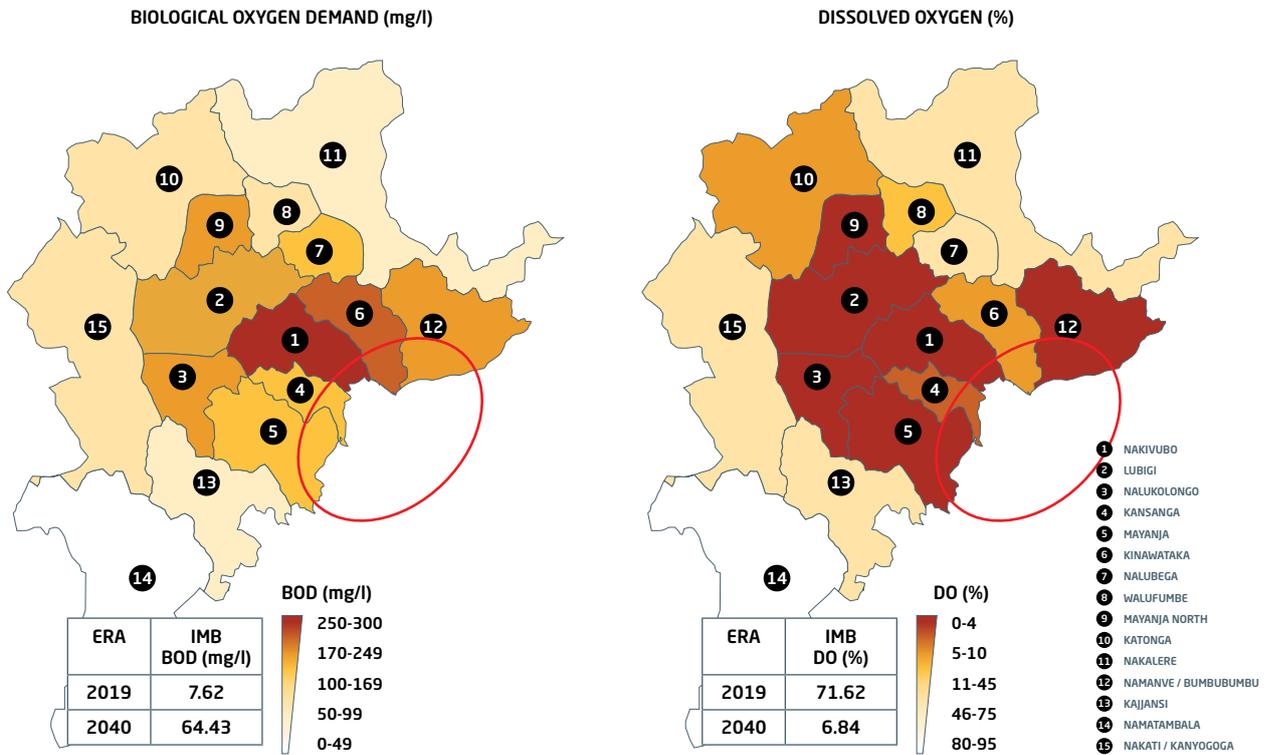


Figure 5-1: Future Pollution Hotspots (BAU Scenario)

5.1.3 Integrated Flood Risk Management

Flood peak flows are projected to rise by 180% on average across the metropolitan by 2040. Increase in peak flows is driven by changes in land use i.e., declining wetland and forest cover as a result of increased urbanisation and climate change. Sub-counties likely to be most affected are Nakawa, Central Business District, Makindye, Rubaga, Kawempe, Wakiso TC, Kira MC, Kasangati TC, Bweyogerere, Nansana, and Namugongo as shown in Figure 5-2.

Evaluation of flood mitigation intervention scenarios using the SPT indicates that:

- (a) Wetland restoration would result in about 30% reduction in peak flows.
- (b) Forest conversion and/or restoration would reduce peak flows by nearly 10%.

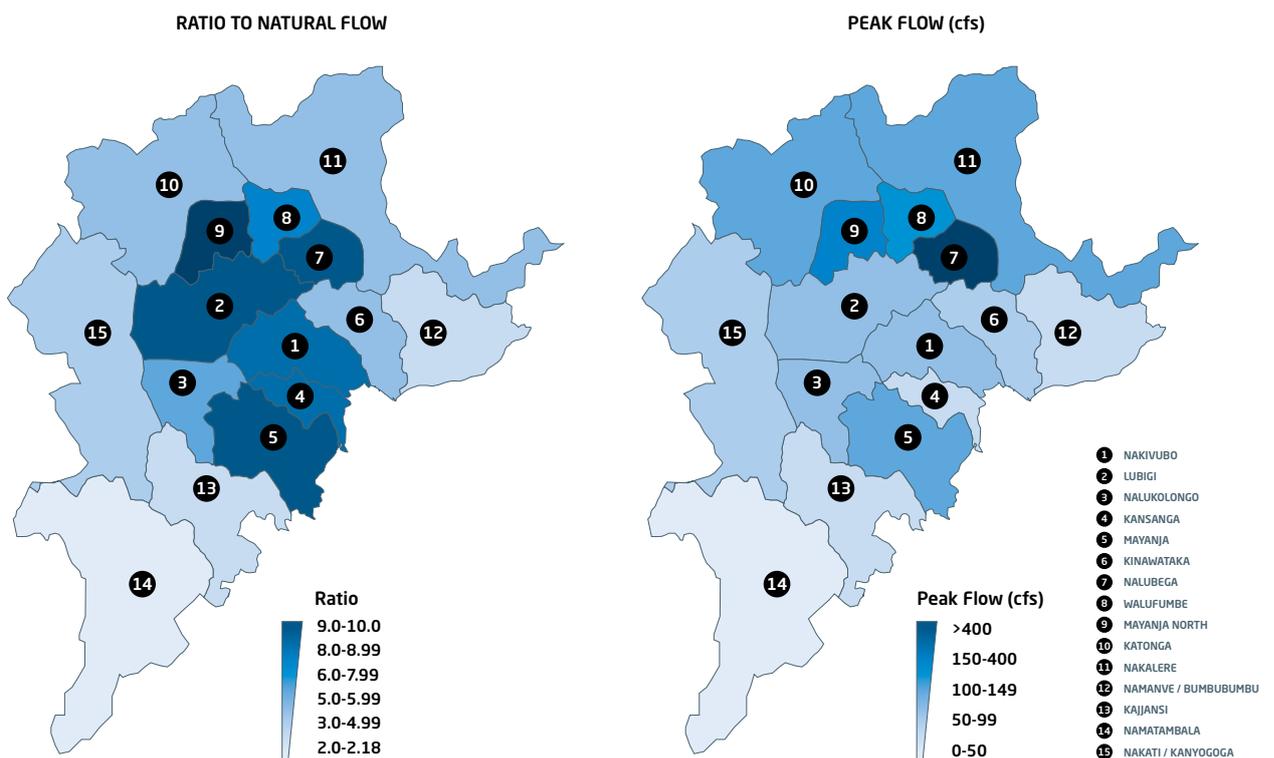


Figure 5-2: Future Flood Hotspots (BAU Scenario)

5.1.4 Solid Waste Reduction

Current estimates indicate that on average urban dwellers in Greater Kampala generate about 1kg of waste per person per day. Approximating a population of 4 million people suggests that 4,000 tonnes of waste is generated per day, 50% of which is collected and disposed of (NPA, 2017). The projected population growth of 13 million people by 2040 would increase the amount of waste generated per day to 13,000 tonnes. Without intervention (reducing the amount of waste generated and improving collection and recycling rates), about 11000 tonnes of solid waste will end up in drainage channels, wetlands, and water bodies, exacerbating surface water pollution and flooding.

5.1.5 Ecosystem Change

The region-wide wetland total is expected to drop to 64 square kilometres in 2040, only a third of the 1996 coverage. High wetland loss is expected in the northern and southern parts of the metropolitan in areas of Kira, Kasangati, Gombe, Mende, Wakiso, Nansana, Kyengera, Bweyogerere, Bunamwaya, Masajja, Makindye, Ndejje, among others as shown in Figure 5-3.

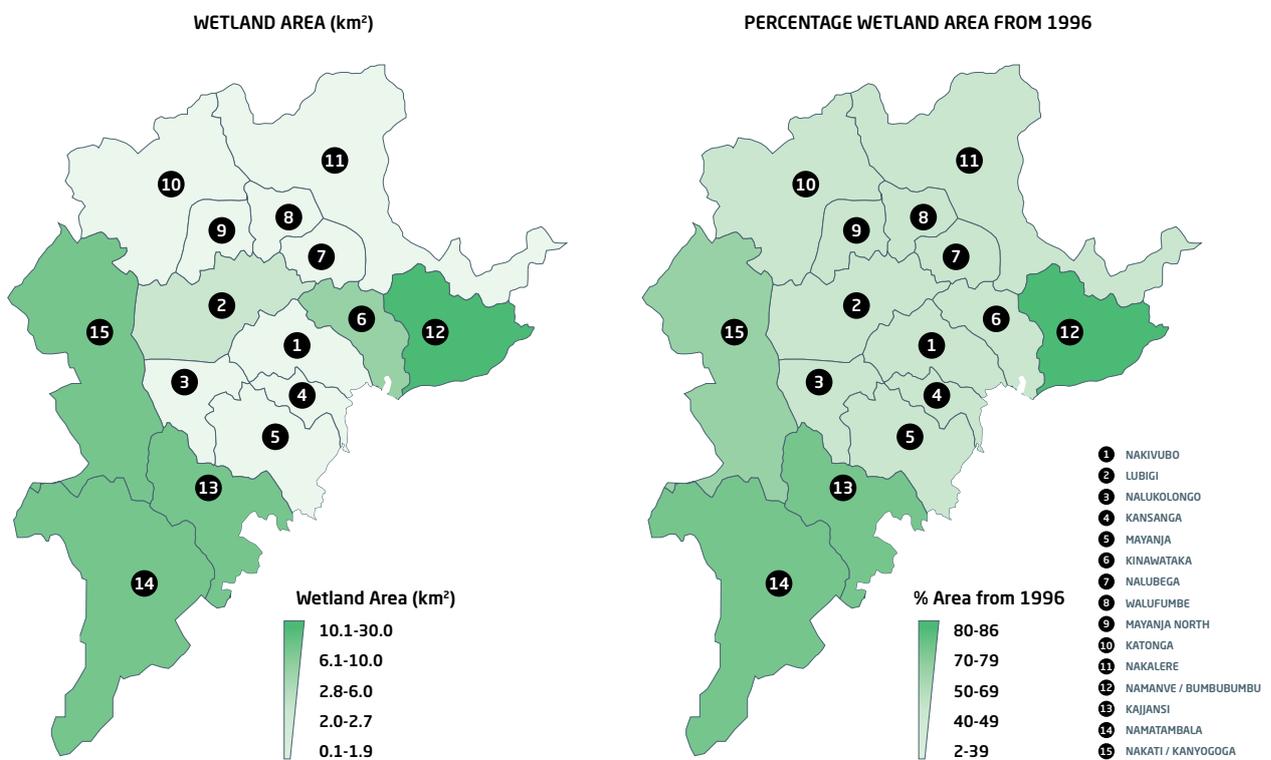


Figure 5-3: Future Wetland Extent - Loss Hotspots (BAU Scenario)

5.1.6 Water Supply and Sanitation

By 2040, 1.5 million people will have no access to safe water, and about 800,000 people will not have essential sanitation services across the metropolitan if investment in water supply and sanitation services remains at current levels. As the population grows, most of the sanitation and water supply needs will be experienced in peri-urban areas such as Kira, Kasangati, Gombe, Nabweru, Mende, Wakiso TC, Kyengera TC, Namugongo, Ndejje, Masajja and Goma as settlements

expand to areas further away from the city as shown in Figure 5-4.

Under the business-as-usual scenario (0% of the coverage gap closed) there are about four times as many diarrhoeal cases from inadequate water supply than inadequate sanitation.

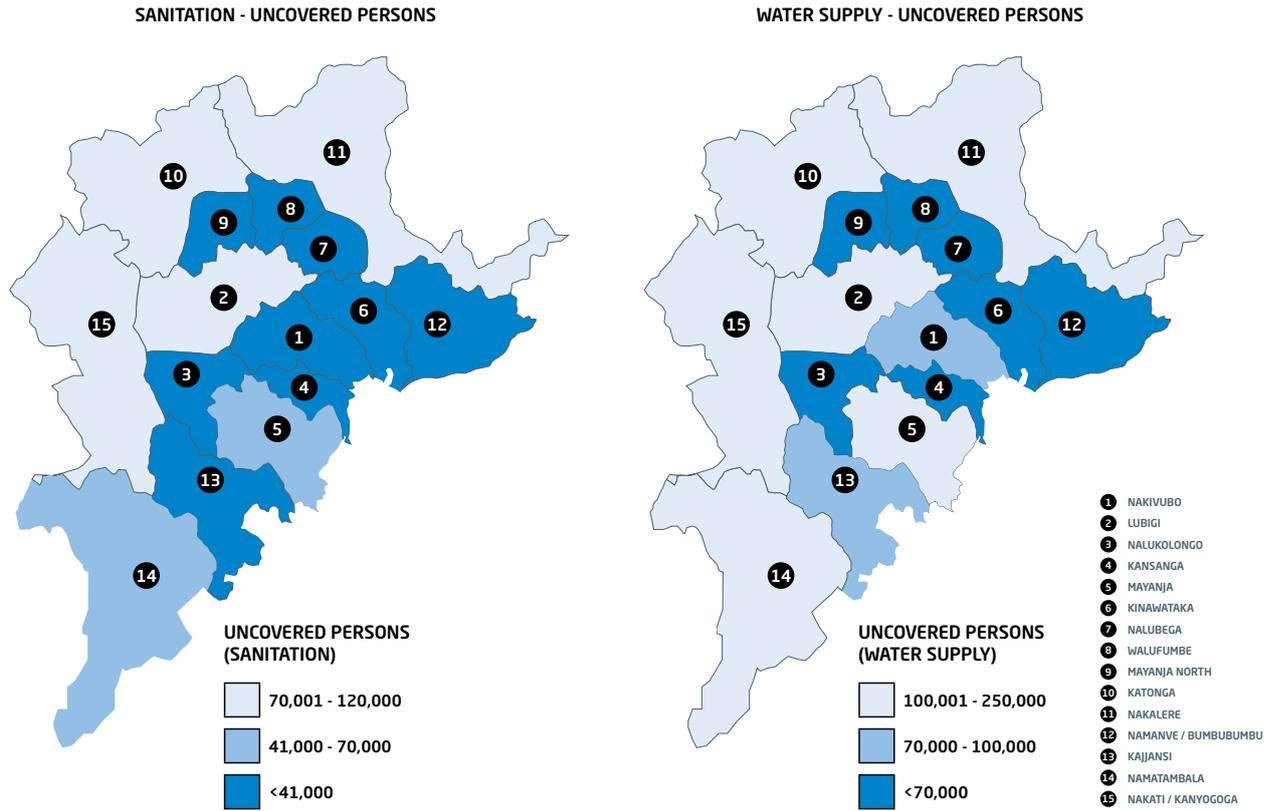


Figure 5-4: Future Unserved Populations - Hotspots (BAU Scenario)

5.2 Benefits of Intervening at Present

Reducing 50% domestic loadings and 100% industrial loadings entering Inner Murchison Bay would return US\$ 1.3 million and US\$ 2.64 million respectively, per year, in water quality benefits on investment even without considering climate change (current scenario). When the effects of climate change are considered (future scenario), reducing pollution

loadings would generate economic benefits amounting to US\$ 1.33 million dollars and US\$ 4.17 million dollars per year, at 50% and 100% intervention levels respectively. Figure 5-5 summarises the economic benefits derived from reducing pollution loadings entering IMB by catchment.

Figure 5-5: Economic Benefits of Reducing Domestic and Industrial Loadings into IMB

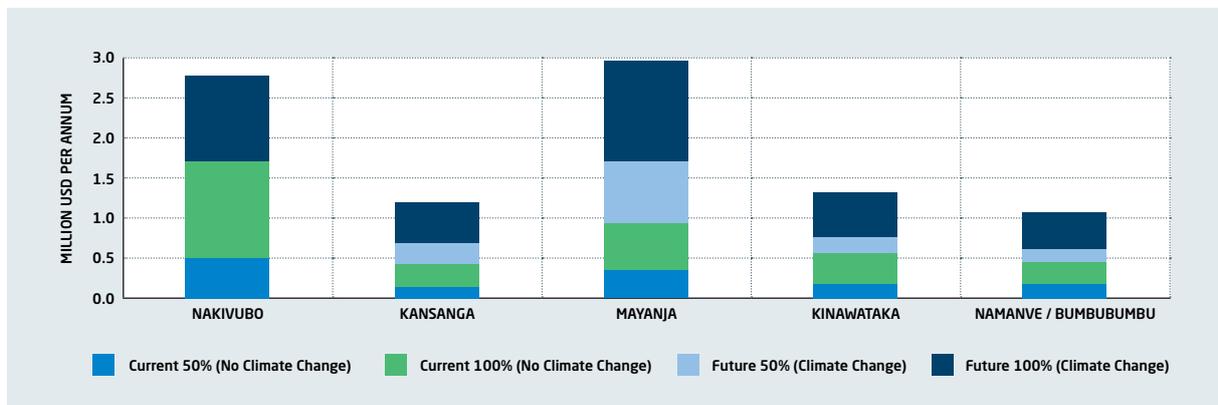


Table 5-1 summarises total economic benefits (Million US\$ per annum) derived from reducing flood risks, increasing water supply and sanitation, reducing industrial and domestic loadings and rehabilitating ecosystems (wetlands and forests) in the metropolitan.

The SPT shows the economic benefits for intervention by catchment and allows stakeholders to formulate various intervention scenarios and corresponding benefits. In a nutshell, investing now delivers more benefits than in the future.

Table 5-1: Economic Benefits of Intervention (US\$ Million Per Year) at Metropolitan Scale

INTERVENTION LEVEL	ERA	FLOOD REDUCTION	WETLANDS VALUE	WASH	WATER QUALITY	TOTAL BENEFITS
50%	CURRENT (No Climate Change)	11.3	131	717	3.8	864
	FUTURE (Climate Change)	13.4	184	1,098	4.0	1,298
100%	CURRENT (No Climate Change)	16.3	262	1,434	7.7	1,721
	FUTURE (Climate Change)	13.4	184	1,098	4.0	1,298

5.3 Policy Options (Evidence-based)

This subsection presents various intervention options to enable stakeholders address key water security threats facing Greater Kampala Metropolitan Area. The SPT provides different combinations of actions from which stakeholders can choose to achieve a certain goal. The targets and selected combinations reflect stakeholder choices.

5.3.1 Reaching Dissolved Oxygen Concentrations of 85% by 2040 in IMB

Policy options for improving water quality by increasing Dissolved Oxygen in the Inner Murchison Bay (action area) by 85% in 2040 (under climate change) are presented in Tables 5-2 and 5-3.

Table 5-2: Policy Option 1 - Reaching 85% Dissolved Oxygen in 2040 (Under Climate Change)

LOADING REDUCTION		WETLANDS RESTORATION	INNER MURCHISON BAY DISSOLVED OXYGEN
Domestic	Industrial		
30%	80%	60%	85.6%
60%	40%	60%	85.3%
90%	0%	60%	85.2%
90%	0%	70%	85.9%

Table 5-3: Policy Option 2 - Reaching ~85% Dissolved Oxygen with no more than 20% Wetland Restoration in 2040 (Under Climate Change)

LOADING REDUCTION		WETLANDS RESTORATION	INNER MURCHISON BAY DISSOLVED OXYGEN
Domestic	Industrial		
90%	0%	20%	82.4%
60%	40%	20%	82.4%
30%	80%	20%	82.7%
70%	30%	20%	88.2%
40%	70%	20%	88.8%
80%	20%	20%	94.1%
50%	60%	20%	94.9%
20%	100%	20%	95.0%

The recommended policy goal for improving water quality in the IMB based on multi-stakeholder choice is reducing domestic and industrial loading by 30% and 80% respectively, and restoring 20% of the degraded wetlands in the IMB catchment.

5.3.2 Reducing Peak Flows by about 40% in 2040

Table 5-4 presents policy options for reducing flooding by about 40% in 2040. Further reduction in flood peaks would require investment in blue-green infrastructure.

Table 5-4: Reaching 40% Peak Flow Reduction

FOREST CONVERSION & RESTORATION	WETLAND RESTORATION	PEAK FLOW REDUCTION
0%	80%	38%
9%	70%	39%
9%	80%	42%
12%	60%	36%
12%	70%	40%
15%	60%	37%
15%	70%	42%
18%	60%	38%

The recommended policy goal for reducing flooding based on multi-stakeholder choice is converting 12% of developed land into forests (tree cover) and rehabilitating and/or restoring 70% of the degraded wetland ecosystems.

5.3.3 Reduce WASH-related healthcare spending by 50% by 2030

Policy options for reducing avoidable health care spending on Water Sanitation and Hygiene (WASH) related diseases by 50% by 2030 are presented in Table 5-5.

Table 5-5: Reducing Avoidable Healthcare Spending by 50% by 2030

CLOSURE OF SANITATION COVERAGE GAP	CLOSURE OF WATER SUPPLY COVERAGE GAP	% REDUCTION
3-High (75%)	1-Low (25%)	41.4%
1-Low (25%)	2-Med (50%)	41.8%
4-Full (100%)	1-Low (25%)	49.5%
2-Med (50%)	2-Med (50%)	50.0%
0-None (0%)	3-High (75%)	50.5%
3-High (75%)	2-Med (50%)	58.2%
1-Low (25%)	3-High (75%)	58.6%

The recommended policy goal for reducing healthcare spending on WASH-related diseases based on multi-stakeholder choice is closing the sanitation coverage gap and water supply coverage gap by 50% each by 2030.

5.4 Strategic Goals and Objectives

The journey to a more water-secure state requires incremental, reflective and adaptive developments which in turn call for clear goals and priorities while conceiving and establishing infrastructural investments and projects. During implementation, the priorities ought to be reassessed and revised against the overarching objectives.

The WSAIP sets six (6) strategic goals to support the realisation of a water-secure future in the short (2030) to medium (2040) term. These six goals should be included in national and sector development plans, and used to inform subsequent financing and budget allocation. The goals are based on stakeholder consensus aligned to sector, institutional and political goals, and backed by evidence generated in the scenario planning tool.

5.4.1 Strategic Goal 1

TO INSTITUTIONALISE WATER SECURITY AND ITS DECISION SUPPORT TOOLS

This involves embedding the concept and processes of water security into institutions at local and national level; sector-wide goals, strategies and policies; and into the society. The objective of institutionalisation is to transform water security from a concept into practice.

Specific actions (2020 – 2025):

- (a) Formulate a Water Security Task Force/Working Group (WSTF/WG) to oversee the formation of an inter-governmental structure to support implementation of the WSAIP as well as facilitate dialogue on water security at national level.
- (b) Establish an ad hoc inter-institutional Water Security Technical Unit (WSTU) of about 10 personnel across GKMA stakeholders to coordinate implementation of WSAIP actions at institutional level and to develop proficiency in the use and application of the decision support tools.
- (c) Invest in capacity building for the WSTU and local analysts through a six-month training on water security and its decision-support tools.
- (d) Establish a bi-annual Water Security Forum which seeks to foster dialogue among GKMA stakeholders, decision-makers, and development partners.
- (e) Establish a multi-stakeholder Water Security Investment Committee (WSIC), to work with the WSTU, and supported by the Water Security Investment Model (WaSIM) to facilitate the design, funding and implementation of a set of priority projects from the thirteen projects identified in the WSAIP process.
- (f) Empower stakeholders to collect data and information on water security risks as well as the application and utilisation of decision support tools to inform investment decisions.

5.4.2 Strategic Goal 2

TO REDUCE POLLUTION LOADINGS ENTERING INNER MURCHISON BAY

While the primary objective of this goal is to reduce the amount of pollution loadings entering Inner Murchison Bay (IMB), this in turn prompts the goal to increase Dissolved Oxygen concentrations in the bay by 85% by 2040.

Specific actions:

- (a) 30% reduction in domestic pollution loadings into IMB. Reducing domestic loadings would require doubling sewer network connections, extending the sewer network, and increasing access to faecal sludge treatment services for on-site systems.
- (b) 80% reduction in industrial pollution loadings into IMB.
- (c) 20% increase in wetland extent in the IMB catchment.

5.4.3 Strategic Goal 3

TO INCREASE SOLID WASTE DISPOSAL AND RECYCLING BY 50% BY 2030

The objective of this goal is to reduce the volume of unsafe solid waste entering the environment.

Specific actions:

- (a) 50% increase in solid waste collection and disposal services in the metropolitan.
- (b) Doubling existing solid waste recycling efforts.

5.4.4 Strategic Goal 4

TO DAMPEN FLOOD PEAK FLOWS IN HOTSPOT AREAS BY 40% BY 2040 THROUGH SUSTAINED INVESTMENT IN BLUE-GREEN INFRASTRUCTURE

The objective of this goal is to reduce the frequency and impact of urban flooding across the metropolitan.

Specific actions:

- (a) Conservation of existing wetland ecosystems and rehabilitation of 70% of the degraded wetland hotspots to reclaim wetland extent relative to that of 1996.
- (b) Conversion of 12% of urban land into forest land – increase tree/forest coverage across the metropolitan.
- (c) Investment in blue-green infrastructure to increase storm water capture and retention.
- (d) Promotion of integrated urban planning and development to control growth of informal settlements.

5.4.5 Strategic Goal 5

TO INCREASE WATER SUPPLY AND SANITATION COVERAGE IN POORLY SERVED AREAS BY 50% BY 2030

The objective of this goal is to improve the quality of public health by providing adequate supply of safe water and access to essential sanitation services particularly in poorly served areas.

Specific actions:

- (a) 50% increase in sanitation coverage to enable access to over 142,048 and 394,702 unserved urban dwellers in 2019 and 2040 respectively. This would reduce healthcare costs on diarrhoeal diseases by about US\$ 1.1 million per annum in 2040.
- (b) 50% increase in water supply services across the metropolitan to provide access to about 580,501 and 709,021 unserved urban dwellers in 2019 and 2040 respectively. This would reduce healthcare costs on diarrhoeal diseases by about US\$ 2.2 million per annum in 2040.

5.4.6 Strategic Goal 6

TO STRENGTHEN THE INSTITUTIONAL FRAMEWORK TO ENABLE MULTI-SECTORAL INTER-INSTITUTIONAL COLLABORATION TO ADDRESS WATER SECURITY RISKS AT THE HYDROLOGIC/ENVIRONMENTAL SYSTEMS SCALE.

The objective of this goal is to promote the integrated management of land, water and ecosystems across the metropolitan area.

Specific actions:

- (a) Establish and operationalise the Inner Murchison Bay Catchment Water Quality Management Organisation by 2025.
- (b) Establish at least one multi-stakeholder partnership each year to address water security threats (.org, .gov & .com).

BOX 5-1. SUMMARY ON INVESTMENT OPTIONS FOR A WATER-SECURE FUTURE

Investing in water security is not a one-off expenditure but rather an ongoing commitment requiring stakeholders to continuously identify and prioritise investments based on the magnitude of water security risks. The Scenario Planning Tool provides different combinations of actions from which stakeholders can choose to achieve a certain goal/target.

The six investment goals identified by stakeholders include:

**Goal
01**

To institutionalise water security and its decision support tools.

**Goal
02**

To reduce pollution loadings entering Inner Murchison Bay, so as to increase Dissolved Oxygen concentrations by 85% by 2040.

**Goal
03**

To increase solid waste collection and recycling by 50% by 2030.

**Goal
04**

To dampen peak flows in flood hotspot areas by 40% by 2040, through sustained investment in blue-green infrastructure.

**Goal
05**

To increase water supply and sanitation coverage in poorly served areas by 50% by 2030.

**Goal
06**

To strengthen the institutional framework to enable multi-sectoral inter-institutional collaboration to address water security risks at the hydrologic/environmental systems scale.



6. IMPLEMENTATION

This section summarises the implementation of the WSAIP. This includes a pipeline of investment actions, proposed governance structure, financing, monitoring and evaluation strategies.

6.1 Recap - The Water Security Action and Investment Plan

The Water Security Action and Investment Plan (WSAIP) provides a framework of approaches and tools to support short and long-term planning for water security, the evidence to catalyse investments, and a prioritised pipeline of well-developed water security investment opportunities to address water security challenges facing Greater Kampala Metropolitan Area (GKMA).

It comprises a series of actions and investments to enable stakeholders collectively address and monitor water security risks at local and metropolitan scale. Focus is on water risks and opportunities, and specific actions meant to mitigate their negative effects and/or realise their positive effects.

The WSAIP is not intended to replace other planning documents or initiatives of the Government of Uganda such as NDP III, sub national district or urban plans in the GKMA. Neither is it meant to stand alone as ‘another plan’. Rather, it is intended to feed established plans with well-grounded and stakeholder-led diagnostics and analysis; specific goals and strategies; prioritised actions; and tools to help guide decision-making. It has adopted a participatory approach given the complexity, uncertainties, diverse stakeholder groups, multiple objectives, and combinations of solutions needed. It provides Decision Support Tools (SPT and the WaSIM) to help define and visualise the potential consequences of combined actions over many plausible scenarios (Section 5).

The successful institutionalisation of the WSAIP into an established planning process will require the coordination

and leadership of an array of Ministries, Departments and Agencies (MDA) at national and local levels, as well as the support of the private sector and civil society. This will be essential to align policies, actions and investments.

Coordination and governance around water security and related social needs in GKMA have been a challenge in the past with disjointed investments and programmes that do not harness and optimise economic, environment and water synergies. To resolve this, the WSAIP proposes a coordination mechanism which should be incorporated into the NDP process. However, whilst good coordination will better enable the WSAIP to be institutionalised and integrated into existing national and regional planning processes, the ambitions laid out will not be achieved unless they are adequately funded.

There is a variety of financial instruments available to better link water security investments to the projected socio-economic benefits but it is the development of financial management capacity at multiple levels of government that will play a key role in responding to these opportunities. The WSAIP outlines the multiple socio-economic benefits of water security (Section 3) and provides a framework to enable decision-makers understand the opportunities and trade-offs of investing in one area versus another (Section 4). However, allocating adequate resources to the priorities outlined in the WSAIP under the existing national financing and budgeting framework may not be possible, therefore harnessing private sector investment will be central to its implementation.

6.2 Pipeline of Investment Opportunities

To realise a water-secure future in the GKMA requires investment estimated to amount to US\$ 4.3 billion. However, investing in water security is not a once-off expenditure but an ongoing commitment. The WSAIP adopts a project-based approach to investment planning using the Water Security Action and Investment Framework.

The selection of high priority projects from numerous options should be evidence-driven, efficient and streamlined. The World Bank has developed one such approach, called the Infrastructure Prioritisation Framework (IPF), to support governments select investment projects using minimum

relevant information given the limited institutional and/or technical capacity to undertake full social and economic benefit assessments (Marcelo et al., 2016). The process utilises partial project-level information; known project costs; and information on social, environmental and other risks. In order to move investment planning for water security from the ad hoc approach currently used at institutional and sector levels, towards a more evidence-driven, integrative approach, the IPF was adopted. The following subsection summarises the selection process and presents a consolidated list of investment actions.

6.2.1 Screening and Selection of Investment Actions

To select holistic, socially acceptable, economically viable and impactful solutions that address multiple threats to water security, a systematic process was followed. This involved formulation of a long list of project ideas, screening of the long list to form a short list using multi-criteria analysis, and consolidation of the short list. Figure 6-1 summarises how the long list of investment ideas was generated through multiple stakeholder ideation meetings and review of institutional plans and strategies. Project ideas were rated by stakeholders and independent experts assigned to each of the four criteria.

marises how the long list of investment ideas was generated through multiple stakeholder ideation meetings and review of institutional plans and strategies. Project ideas were rated by stakeholders and independent experts assigned to each of the four criteria.

Figure 6-1: Ideation Process - Long List of Project Ideas



The evaluation criteria utilised consisted of four main factors: environmental quality improvement, socio-economic benefits, public health improvement and project characteristics and sustainability.

Generated project scores were subjected to average weights to obtain weighted scores. Table 6-1 summarises the criteria weights used, that is, the measure of importance stakeholders attached to each criterion.

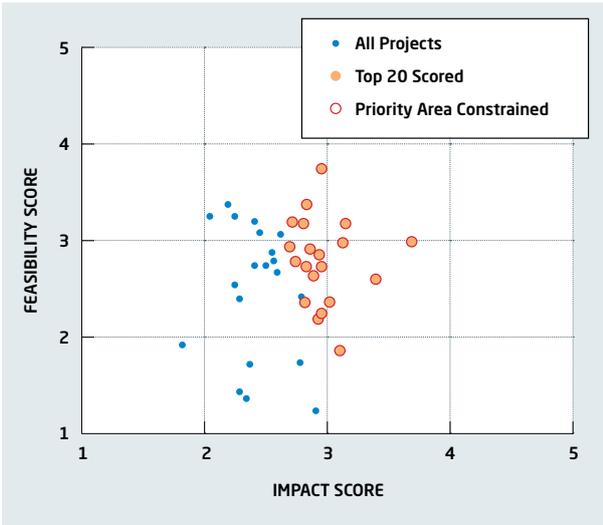
Table 6-1: Importance Attached to each Evaluation Criterion

CRITERION	INDIVIDUAL STAKEHOLDER WEIGHTS						MULTI-STAKEHOLDER WEIGHTS
	CSOS	MwE (MDAS)	KCCA (LGS)	UMA	NWSC	OVERALL	
Environmental Quality Improvement	37%	32%	27%	32%	40%	33%	32%
Socio-economic Benefits	16%	23%	25%	28%	15%	22%	36%
Public Health Improvement	19%	25%	37%	21%	23%	25%	12%
Project Characteristics and Sustainability	28%	20%	12%	20%	22%	20%	19%

The results of the scoring exercise were combined and used to select a short list of 20 investment ideas.

For each project, both an impact score and feasibility score were generated. Projects with “high impact and high practicality” were considered as most effective selections (circled in orange in Figure 6-2).

Figure 6-2: Scoring Array for Investment Ideas



However, often in decision-making, there are additional factors beyond highest expected benefits or feasibility scores,

that constrain project choice. Stakeholders in some cases desired a project or portfolio of projects that addressed specific threats in identified hydrological hotspots, for example, pollution control in Inner Murchison Bay (IMB).

The list of 20 highest-scoring projects was further consolidated using feedback from stakeholders; taking into consideration complementarity and intended outcomes to maximise impact and encourage multi-stakeholder partnerships in project planning and implementation.

Table 6-2 presents the final list of 13 consolidated projects. These constitute the pipeline of investment actions.

The projects cut across water supply and sanitation, water resources management, catchment and ecosystem management, pollution control, community empowerment and land use planning. Together, they promote an integrated approach to address water security threats at a metropolitan scale, and contribute towards the achievement of the six strategic goals of the WSAIP.

Further refinement – prioritisation (STEP 2) – using the Water Security Investment Model (WaSIM) to generate a priority list of integrated actions enabling stakeholders to implement the most impactful projects first, will be undertaken during the first phase of implementation. Further description of the project selection and prioritisation process using WaSIM, and full project concept notes, are found in the WSAIP Technical Report (2019).

GREATER KAMPALA INTEGRATED URBAN CATCHMENT MANAGEMENT PROJECT

THEMATIC AREA
LAND USE AND WATER RESOURCES MANAGEMENT

DURATION
5 YRS

PROPOSED LEAD PARTNER | **Ministry of Water and Environment** in collaboration with with all stakeholders.

LOCATION | **Catchments:** Nakivubo, Lubigi, Nalukolongo, Kansanga, Mayanja, Kinawataka, Nalubega, Walufumbe and Mayanja North.
Lake fronts: Sissa and Ggaba.

PROJECT OBJECTIVE | To promote integrated planning for management of urban water and environment resources at a catchment scale.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE | The degradation of urban catchments around Lake Victoria has contributed to deterioration of surface water quality in the Inner Murchison Bay, a main abstraction point for Kampala and surrounding areas. This is exacerbated by silo planning that has contributed to the uncoordinated development of land and water resources in Greater Kampala. Hence there is need for promotion of an integrated approach for sustainable planning and resource use, if a water-secure future is to be achieved in GKMA.

THEORY OF CHANGE | Promotion of evidence-based integrated water resource management and planning approach as opposed to ad hoc and silo planning.

PROJECT COMPONENTS

- 1** Development of eight catchment management plans and operationalisation of catchment management institutions in at least two catchments.
- 2** Livelihood enhancement through development and management of urban water resources: Developing lakefront tourism and management of lake buffer zones; revamping Kabaka's lake as an eco-tourism site; establishment of agricultural zones around urban municipalities; promoting aquaculture innovations and improving fish landing sites; and setting up a revolving fund to support alternative livelihood opportunities for the urban poor.

PROJECT BENEFITS | Targeted to directly and indirectly benefit 4.8 million people in and around the selected 8 catchments with:

- 1** Improved knowledge base for ecosystem asset management in GKMA.
- 2** Increased investments in natural resources e.g., for tourism.
- 3** Increased income from identified priority investment projects.
- 4** Creation of approximately 2,129 jobs.

PROJECT COST (USD)
23,153,781 (+/-)

NET PRESENT VALUE (USD)
78,380,000 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO
5.49 : 1

02

SCALING UP SOLID WASTE MANAGEMENT OPTIONS IN GREATER KAMPALA

THEMATIC AREA

SOLID WASTE MANAGEMENT

DURATION

5 YRS

PROPOSED LEAD PARTNER

National Environment Management Authority in collaboration with Kampala Capital City Authority and Local Governments.

LOCATION

Kitezi, Nkumba, Entebbe, Makindye-Ssabagabo, Menvu, Nansana, Kira, Kasangati, Kakoola, Kawempe, Nakawa, Makindye, Wakiso TC, Mukono, Kyengeru and Kajjansi.

PROJECT OBJECTIVE

To reduce the volume of solid waste permeating the environment.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Currently only 50% of the 4000 tonnes of waste generated per day is collected and disposed of safely. Uncollected solid waste ends up in drainage channels, streams, lakes, rivers and wetlands of GKMA; becoming detrimental to public health and causing flooding. Thus, improving solid waste management is of significant benefit to both water quality and flood control in GKMA.

THEORY OF CHANGE

Upscaling of circular economy solutions through public-private partnerships, to improve efficiency and effectiveness of municipal solid waste management systems in GKMA.

PROJECT COMPONENTS

- 1** Cultivating the efficiency and effectiveness of municipal solid waste management systems in GKMA through; constructing and operationalising four satellite sites as primary stations for collection, sorting and transfer of organised waste; equipping the municipalities with collection and transportation tools while supporting effective management of collection centres; and implementing behavioural change campaigns.
- 2** Strengthening an enabling environment for public-private partnerships through; development of legal and institutional instruments to deliver sustainable solid waste management services under the private, public and civil society partnerships; and developing of a GKMA-wide solid waste management strategy.
- 3** Upscaling implementation of circular economy solutions by: developing innovation hubs for plastics and organic recycling; piloting and promotion of community waste banks including models managed by Community-Based organisations (CBOs); championing public-private business models for waste reuse and recycling for particularly e-waste and plastics; and promoting industrial symbiosis.

PROJECT BENEFITS

Targeted to directly and indirectly benefit 2 million people around GKMA with:

- 1** Improved enabling environment for private sector participation in solid waste management.
- 2** Reduced flooding and environmental pollution from solid waste.
- 3** Creation of approximately 6,444 jobs.

PROJECT COST (USD)

70,224,657 (+/-)

NET PRESENT VALUE (USD)

5,800,000 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

1.16 : 1

03

ACCELERATING ACCESS TO ADEQUATE AND EQUITABLE WATER SUPPLY

THEMATIC AREA

WATER SUPPLY AND SANITATION

DURATION

10 YRS

PROPOSED LEAD PARTNER

National Water and Sewerage Corporation in collaboration with the Ministry of Water and Environment and Local Governments.

LOCATION

Geo-political boundaries: Kasanje Subcounty, Kyengerera TC, Kajjansi TC, Bunamwaya, Ndejje, Kat-abi, Wakiso TC, Mukono Municipality, Nama Subcounty, Nabweru, Gombe, Kawempe, Lubaga, Nansana, Kira, Kasangati, Makindye Ssabagabo and Nakawa.
Intakes: Entebbe, Katosi and/or Gabba.

PROJECT OBJECTIVE

To increase access to safe water in GKMA.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Nearly 1.2 million people have no access to clean and safe water in different areas around GKMA. Safe water supply is threatened by water quality concerns and limited access to infrastructure. Increasing investment in integrated water supply is critical to ensuring adequate quantities and acceptable quality of water to the growing population and economy of GKMA.

THEORY OF CHANGE

Promotion of integrated water supply systems together with coordinated ventures between NWSC and Central Umbrella of Water and Sanitation (CUWS).

PROJECT COMPONENTS

- 1** Increasing access to potable water by: laying 180 Km of distribution pipes and installing 1500 new connections in unserved areas of 13 sub-counties/divisions of GKMA; laying 220 km of transmission and distribution pipe network with installation of 700 new connections in 11 poorly served areas of GKMA (especially informal settlements); and establishment of a phone-based payment system to increase affordable access.
- 2** Increasing reliability of water supply in dry zones by: boosting water production at Ggaba by 35,000 m³/day and Entebbe by 10,000 m³/day; retooling Central Umbrella of Water and Sanitation (CUWS) with water-loss detection equipment, basic equipment for plumbing, ICT enhancement, network mapping, and spare-parts management.
- 3** Enhancing catchment management and source protection for reliable water supply through development and implementation of plans to conserve and protect at least two (2) intakes.

PROJECT BENEFITS

Targeted to directly and indirectly benefit 2.1 million people around GKMA with:

- 1** Reduced cost of water; from UGX 300 – 1000 to UGX 50 per jerrican.
- 2** Less prevalence of water-related illness and down time.
- 3** Increased safe water supply from an average of 8-12 hours to 24 hours per day.
- 4** Creation of approximately 17,864 jobs.

PROJECT COST (USD)

151,789,054 (+/-)

NET PRESENT VALUE (USD)

869,944,536 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

2.7 : 1

GREATER KAMPALA URBAN FOREST ECOSYSTEM MANAGEMENT

THEMATIC AREA

LAND AND WATER RESOURCES MANAGEMENT

DURATION

5 YRS

PROPOSED LEAD PARTNER

National Forestry Authority in collaboration with Ministry of Water and Environment, and Local Governments.

LOCATION

Busukuma, Mpanga, Kampiringisa, Kira, Kasanje, Koome, Bweyogerere Division A, Goma Division, Kajjansi TC, Katabi TC, Kiringente, Kyengerera TC, Nama, Ndejje, Mukono, Nansana, Bunamwaya, Kasangati, and Makindye Ssabagabo.

PROJECT OBJECTIVE

To promote sustainable utilisation of forest resources while reducing storm water and surface runoff.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Destabilised soil and increased runoff, erosion, siltation and flooding in the low-lying areas result majorly from massive deforestation and the emergence of impervious surfaces on hill tops and slopes due to expanding urban developments in GKMA. Over the years, forested land area in Kampala has reduced from 7.6% to 0.4%, which has reduced its ecological functioning for runoff control. Thus, increasing urban forested land to at least 12% will significantly reduce runoff and, eventually, urban flooding.

THEORY OF CHANGE

Promotion of blue-green investments to minimise flooding.

PROJECT COMPONENTS

- 1** Promotion of holistic sustainable management of forest landscapes at the catchment and sub-catchment levels by: demarcating 115 km of forest boundary; conserving 1000 Ha of forest; earmarking 200 Ha for forest development; and implementation of new forest management approaches such as promotion of eco-tourism in government forest reserves.
- 2** Promoting urban forest eco-tourism through development of forest parks and recreation centres in three selected forest reserves.
- 3** Promoting private forest management through: establishment of 1000 Ha of private forest; designing an incentive mechanism and contract to attract private sector investment in tree planting; and establishment of 29 green avenue road reserves totalling 250km.

PROJECT BENEFITS

The impact of this project will include:

- 1** 15% tree cover of urban land.
- 2** Increased sustainable urban drainage land cover and at least 20% reduction in drainage silting, dredging and runoff.
- 3** Creation of approximately 1,806 jobs.

PROJECT COST (USD)

12,430,573 (+/-)

NET PRESENT VALUE (USD)

83,272,000 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

10.61

05

PUBLIC-PRIVATE PARTNERSHIPS FOR FAECAL SLUDGE MANAGEMENT (FSM)

THEMATIC AREA

WATER SUPPLY AND SANITATION

DURATION

10 YRS

PROPOSED LEAD PARTNER

National Water and Sewerage Corporation in collaboration with Kampala Capital City Authority, Municipal Councils and private emptiers' associations.

LOCATION

Mukono, Entebbe, Kira, Makindye-Ssabagabo, Kasangati, Nansana and Wakiso Division.

PROJECT OBJECTIVE

To promote inclusive Faecal Sludge Management (FSM) for reduced domestic faecal pollution loadings and associated public health risks.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Over 92% of the population in GKMA have access to basic sanitation (a toilet). However, safe handling and treatment of faecal sludge remains a challenge particularly in low-income areas. In Kampala, only 53% of faecal sludge generated daily is emptied and safely managed; the rest ends up in open drains, contaminating water sources. The municipalities in the GKMA cannot meet the FSM needs of their residents due to insufficient resources and technical capacity signifying the need for private sector involvement.

THEORY OF CHANGE

Faecal Sludge Management at or closest to the point of generation, while improving livelihoods through creating and safeguarding jobs, and stimulating private sector investments.

PROJECT COMPONENTS

- 1** Leveraging private sector investments in scaling up FSM services and promoting livelihood opportunities across the FSM value chain by: formalising and regulating 60% of the existing faecal sludge collection and transport (FSC&T) service providers in GKMA; increasing the current asset base for eligible private emptiers by 50% using a low interest credit facility; setting up two (2) transfer stations for every 6 municipalities of GKMA; aggregating the market through scheduled emptying programmes to leverage the resultant economies of scale for lower emptying costs and confirmed market; and scaling up three (3) full cost recovery business models for FSM.
- 2** Developing a functioning decentralised FSM system for treatment and disposal that will include: constructing a support network of three (3) small decentralised treatment plants in Kira, Nansana and Seeta; and constructing 12 model public sanitation facilities in the identified municipalities to demonstrate solid waste and grey water treatment and disposal in addition to proper FSM and sanitation behaviour.
- 3** Strengthening the institutional and legal framework for enhanced compliance to on-site sanitation standards and awareness of FSM through development of ordinances to regulate FSM services in the municipalities of Mukono, Entebbe, Kira, Makindye and Nansana; and community sensitisation and training in FSM.

PROJECT BENEFITS

Targeted to benefit 3 million people in the low-income/slum areas relying on unsewered sanitation services, with:

- 1** Reduced incidence of diarrhoeal diseases and related healthcare costs, and reduced faecal pollution loading.
- 2** Increased private sector involvement and investments in FSM; approximately 9,064 jobs will be created.

PROJECT COST (USD)

98,774,011 (+/-)

NET PRESENT VALUE (USD)

869,944,536 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

2.7 : 1

06

GREATER KAMPALA WASTEWATER MANAGEMENT PROJECT

THEMATIC AREA
EFFLUENT MANAGEMENT

DURATION
5 YRS

PROPOSED LEAD PARTNER

National Water and Sewerage Corporation in collaboration with Kampala Capital City Authority, Mukono and Kira town councils.

LOCATION

Geo-political boundaries: Kira Municipality, Kamwokya, Mulago, Katanga, Bwaise, Mukono, Nansana, Entebbe and Namanve.

Catchments: Nakivubo, Lubigi, Kinawataka and Bumbubumbu (Namanve).

PROJECT OBJECTIVE

To increase the volume of treated effluent for reduced surface water pollution.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Only about 10% of the population in Kampala is served by the existing public sewer system; the rest depend on on-site sanitation facilities with limited capacity and infrastructure to manage faecal sludge. On the other hand, most industries have low compliance to wastewater discharge standards; they discharge untreated and partially treated effluent directly into surface water bodies especially within the IMB. All this contributes to the decreasing water quality in the IMB; thus reducing domestic and industrial loading is critical to improving water quality for GKMA.

THEORY OF CHANGE

Promotion of decentralised wastewater treatment while upgrading existing plants.

PROJECT COMPONENTS

- 1** Improvement of sanitation facilities in congested and densely populated informal settlements by laying 40 km of communal sewer network to serve 40,000 residents; and establishment of 1500 sewer connections to serve about 8,000 households.
- 2** Expansion of wastewater treatment plants and construction of combined sewers in selected regions. This will involve: upgrading the Entebbe wastewater treatment plant to serve about 70,000 people; and construction of a combined wastewater and faecal sludge treatment plant at Mukono and Kira municipalities to serve about 700,000 people.
- 3** Extension of the sewer network and increasing community connections. This will encompass: densification of the sewer mains, laying 25 km of sewers, and creating demand for and/or enforcing sewer connection services through awareness campaigns with a target of reaching out to about 1,500,000 people.
- 4** Promotion of satellite wastewater treatment systems to support industrial parks and housing estates, and development of wastewater guidelines for satellite systems.

PROJECT BENEFITS

Targeted to benefit about 2.3 million people in low and unsewered areas of Kampala, and urban centres of Entebbe, Mukono, Nansana and Kira municipality, with:

- 1** Reduction of wastewater by over 3 tonnes per day of industrial pollution loading, and reducing incidents of diarrhoeal diseases and related healthcare costs.
- 2** Creation of approximately 5,877 jobs.

PROJECT COST (USD)
50,000,000 (+/-)

NET PRESENT VALUE (USD)
99,860,317 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO
1.54:1

07

SUSTAINABLE MANAGEMENT OF URBAN WETLAND SYSTEMS

THEMATIC AREA

LAND AND WATER RESOURCES MANAGEMENT

DURATION

5 YRS

PROPOSED LEAD PARTNER

Ministry of Water and Environment in collaboration with National Environment Management Authority and Local Governments.

LOCATION

Geo-political boundaries: Makindye-Ssabagabo, Lufuuka, Kajjansi TC, Makindye Division, Nakawa Division, Kawooya, Kasokoso, Butabiika and Kasanje TC.

Wetlands: Lubigi, Mabamba, Lutembe, Sezibwa, Butabika, Kyetinda Kaliddubi and Namanve.

PROJECT OBJECTIVE

To enhance ecological health of wetlands for flood control and pollutant assimilation while improving livelihoods.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

As a result of urban developments, wetland coverage in GKMA has reduced by 48% to just over 100 square kilometres from 194 square kilometres in 1996. This has reduced natural wetland ecosystem buffers that support flood control and pollution assimilation ecological functions. Thus, flooding is common in catchments with severe wetland loss such as Nalubega, Nakivubo, Mayanja, Lubigi and Nalukolongo draining areas of Nakawa, Makindye, Kawempe, Nansana, Kyengera TC, Nabweru, Central Business District and Masajja. Investment in rehabilitation of wetlands in these flooding hotspots is critical to reducing related public health and economic losses.

THEORY OF CHANGE

Promotion of nature-based solutions to flood management.

PROJECT COMPONENTS

- 1** Conservation and restoration of degraded wetlands (critical) in Kampala, Mukono and Wakiso districts, through: demarcation, restoration and conservation of 19,611 Ha covering seven (7) wetlands; and development and implementation of five (5) Wetland Management Plans while building capacity for their operationalisation at different levels.
- 2** Promotion and support of prudent use of wetlands through establishment of sustainable livelihood initiatives in and around four (4) selected wetlands. This will also include development of eco-tourism sites for recreation and aesthetics.

PROJECT BENEFITS

Targeted to directly and indirectly benefit about 2.8 million people around GKMA with:

- 1** Improved urban wetland coverage by 4000 Ha across the GKMA, in terms of expanse and biodiversity.
- 2** Reduced flood risk and vulnerability of people and investments to the impact of flooding.
- 3** Improved ecosystem functioning as a result of flood control.
- 4** Creation of approximately 5,097 jobs.

PROJECT COST (USD)

81,961,081 (+/-)

NET PRESENT VALUE (USD)

49,061,815 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

1.68:1

08

STRENGTHENING INDUSTRIAL COMPLIANCE TO SET LAWS, REGULATIONS AND STANDARDS

THEMATIC AREA

EFFLUENT MANAGEMENT

DURATION

5 YRS

PROPOSED LEAD PARTNER

Ministry of Water and Environment in collaboration with the Kampala Pollution Control Task Force (institutions), Mukono and Kira town councils.

LOCATION

Catchments: Nakivubo, Kinawataka, and Namanve.

PROJECT OBJECTIVE

To reduce surface water pollution related to industrial loading.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Inadequate enforcement support and lack of technical capacity for the private sector to invest in cleaner production and compliance, has undermined compliance to laws, regulations and standards within GKMA industrial zones. This has led to increased industrial pollution loads that subsequently pose a bigger threat to water quality within the IMB. It is thus imperative to strengthen compliance within the industrial zones for a water-secure future.

THEORY OF CHANGE

Bottom-up/top-down collaborative approach to industrial compliance.

PROJECT COMPONENTS

- 1** Developing an integrated industry-specific pollution monitoring system including: an evaluation and rating system; pollution load and monitoring system; and a permit and license tracking system.
- 2** Increasing resource use and productivity in industries through: implementing resource efficient and cleaner production; promoting industrial symbiosis; developing an online application to facilitate the symbiotic practices; and facilitating relationship agreements among industries.
- 3** Promoting learning and knowledge exchange initiatives which shall include: development of a communication strategy and materials together with information dissemination and awareness campaigns to promote dialogue, industrial compliance and cleaner production; development of a tailor-made curriculum on pollution prevention and control, and a programme to deliver it; establishment of a rewards and recognition plan; and reformation and/or support to existing pollution control task forces.

PROJECT BENEFITS

Targeted to benefit about 2 million people and 150 industries directly and indirectly around GKMA, with:

- 1** A reduction of more than 80% in pollution load of at least 50 industries.
- 2** Reduced cost of water production and increased profit margin on water sales.
- 3** Creation of approximately 343 jobs.

PROJECT COST (USD)

8,504,555 (+/-)

NET PRESENT VALUE (USD)

145,587,456 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

20:01

09

RETROFITTING INFORMAL SETTLEMENTS TO ENHANCE WATER SECURITY

THEMATIC AREA

LAND AND WATER RESOURCES MANAGEMENT

DURATION

5 YRS

PROPOSED LEAD PARTNER

Ministry of Lands, Housing and Urban Development - Directorate of Urban Development.

LOCATION

Kazo-Angola, Kitintale and Kasenyi (Mukono Municipality).

PROJECT OBJECTIVE

To transform selected informal settlements for enhanced livelihoods and resilience to water security threats.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Over 70% of the urban population in GKMA reside in informal settlements with inadequate access to safe water and improved sanitation services. This largely results from a combination of poverty and poor planning within these settlements. Additionally, most of them are located in fragile ecosystems, which most slum improvement projects have not had the capacity to manage. Thus, slum transformation mechanisms are needed if these settlements in GKMA are to be water secure.

THEORY OF CHANGE

Integrated transformation of informal settlements.

PROJECT COMPONENTS

- 1 Undertaking integrated physical development planning and enhancing access to water supply and sanitation services. This includes: developing plans for three selected informal settlements; constructing 150 low-cost housing units in one informal settlement; and establishing communal initiatives for improved housing (upgrading), water supply and sanitation services.
- 2 Improving livelihoods for slum dwellers in three informal settlements through: establishment of saving cooperatives; provision of training and mentorship in enterprise development and management; establishment of a revolving fund to support community enterprises; and promotion of solid waste management business opportunities.

PROJECT BENEFITS

Targeted to benefit about 250,000 people mainly living in select informal settlements and 1,000,000 indirect beneficiaries extending beyond the metropolitan area with:

- 1 Improved public health and livelihood for slum dwellers.
- 2 Reduced domestic pollution loading from informal settlements.
- 3 Creation of approximately 1,731 jobs.

PROJECT COST (USD)

30,140,000 (+/-)

NET PRESENT VALUE (USD)

9,936,432 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

1.43:1

10

INTEGRATED URBAN FLOOD RISK MANAGEMENT

THEMATIC AREA

LAND AND WATER RESOURCES MANAGEMENT

DURATION

5 YRS

PROPOSED LEAD PARTNER

Ministry of Water and Environment in collaboration with Local Governments.

LOCATION

Geo-political boundaries: Nakawa, Makindye, Kawempe, Nansana, Kyengera Town Council, Nabweru, Central Business District and Masajja.

Catchments: Nalubega, Nakivubo, Mayanja, Lubigi and Nalukolongo.

PROJECT OBJECTIVE

To enhance flood resilience and control in urban communities.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Flooding typically leads to loss of property and life; it causes physical damage to vehicles and disruption to traffic around various flooding hotspots in GKMA. The increased flooding frequency can be attributed to drainage networks being often blocked with solid waste, structures developed in productive wetlands, and sediments or collapsed drainage channels. Therefore, investing in blue-green infrastructure to minimise the impact of flooding and improve livelihoods, is key if a water-secure future is to be attained.

THEORY OF CHANGE

Blue-green infrastructure for flood management.

PROJECT COMPONENTS

- 1** Improving flood forecasting; developing an online tool for flood risk assessment and real time forecasting.
- 2** Establishing structural and non-structural measures for flood risk reduction and integration of flood management into sustainable urban development principles. This includes investing in sustainable urban drainage systems (SUDs) and blue-green infrastructure; revising existing codes of practice for mainstream urban flood management; and developing a flood risk management strategy for GKMA.
- 3** Promoting community-led integrated urban flood management initiatives such as: establishing a rapid response team that unclogs inlets and clears garbage screens on a routine basis; organising community drainage clean up campaigns; and enlightening communities on resilience to flood shocks and stresses.

PROJECT BENEFITS

Targeted to benefit about 1.5 million people both directly and indirectly, extending beyond the metropolitan area, with:

- 1** Reduction in property and economic losses resulting from flooding.
- 2** Increased income and business employment opportunities through community-led initiatives.
- 3** Improved sanitation for ~300,000 urban poor communities currently living in flood-prone areas in GKMA.
- 4** Creation of approximately 2,385 jobs.

PROJECT COST (USD)

84,121,983 (+/-)

NET PRESENT VALUE (USD)

365,180,000 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

7.1:1

11

GREATER KAMPALA WATER SECURITY OBSERVATORY

THEMATIC AREA

CROSS-CUTTING (ENABLING PROJECTS)

DURATION

5 YRS

PROPOSED LEAD PARTNER

Makerere University in collaboration with the Ministry of Water and Environment, and other government agencies.

LOCATION

Greater Kampala Metropolitan Area.

PROJECT OBJECTIVE

To strengthen evidence base for water security at local, city and metropolitan scale.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

GKMA is characterised with limited coordination in the collection and use of water security information to guide integrated investments; the requisite infrastructure to collect water security data is lacking, just as there are no tools to enable institutions assess the impact of investment initiatives. Also, there are no mechanisms for pursuing joint research that would enhance data and knowledge sharing and improve decision-making on water security investments. This lack of scientifically backed information to guide investments is a detriment towards water security; it has led to haphazard developments and duplication of efforts. Thus, the need to establish a one-stop centre to collect water security-related data, analyse it and provide guidance on investment decisions.

THEORY OF CHANGE

Integrated evidence-based decision-making.

PROJECT COMPONENTS

- 1 Designing and establishing a water security observatory structure; equipping and operationalising core functional units; developing a water security dashboard; upgrading and updating the WSAIP-Scenario planning tool and water security investment framework; and developing a functional supervisory control and data acquisition (SCADA) system for real time information collection.
- 2 Promoting joint research and data sharing by establishing a knowledge management centre.

PROJECT BENEFITS

The impact of this project will include:

- 1 Improved research capacity for up to 50 Masters' students, five PhD students and 30 staff from 10 public universities.
- 2 Improved collaboration between water security stakeholders.
- 3 An enabling environment for institutionalisation of water security risks.
- 4 Creation of approximately 1,351 jobs.

PROJECT COST (USD)

12,404,323 (+/-)

NET PRESENT VALUE (USD)

45,514,807 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

4.89:1

CITIZENS ENVIRONMENTAL MONITORING AND REPORTING APP – SPOT IT? SAY IT!

THEMATIC AREA

CROSS-CUTTING (ENABLING PROJECTS)

DURATION

5 YRS

PROPOSED LEAD PARTNER

National Environment Management Authority in collaboration with Ministry of Water and Environment, and other relevant government agencies.

LOCATION

Greater Kampala Metropolitan Area.

PROJECT OBJECTIVE

To improve environmental monitoring and compliance.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

Despite increasing industrialisation and urbanisation in GKMA, its urban dwellers are faced with various water-related public health risks and socio-economic losses, ultimately affecting the quality of life and welfare of residents within the metropolitan area. The various water security threats are aggravated by a non-inclusive and inefficient environment management and surveillance system; there is minimal involvement of residents and the private sector in environmental monitoring and compliance. Thus, the relevance for investing in a monitoring system.

THEORY OF CHANGE

Combined bottom-up/ top-down approach to environmental monitoring.

PROJECT COMPONENTS

- 1** Development and operationalisation of an information system/app to enhance citizens engagement in environmental monitoring and enforcement that shall involve: creation and operationalisation of a cross-platform app; crowdsourced approach to generation of data and information through instant messaging and relaying information on a platform report to relevant authorities and the community; and empowering urban residents to embrace the application.
- 2** Strengthening institutional structures to ensure real time action towards environmental monitoring, compliance and enforcement through engagements and capacity-building arrangements to ensure system uptake and usage.

PROJECT BENEFITS

Targeted to benefit at least 2 million people in the GKMA. However, there is high potential for influencing decision-making and rolling out to national level. Its impact will include:

- 1** Reduction in instances of environmentally damaging activities.
- 2** Reduction in the cost of generating information for monitoring of environmental degradation in GKMA.
- 3** Creation of approximately 572 jobs.

PROJECT COST (USD)

6,224,315 (+/-)

NET PRESENT VALUE (USD)

10,233,006 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

3.171:1

OPERATIONALISING PAYMENT FOR ECOSYSTEM SERVICES IN URBAN SETTINGS

THEMATIC AREA

CROSS-CUTTING (ENABLING PROJECTS)

DURATION

5 YRS

PROPOSED LEAD PARTNER

National Environment Management Authority in collaboration with Ministry of Water and Environment and Local Governments.

LOCATION

Catchments: Nakivubo as a pilot.

PROJECT OBJECTIVE

To enhance mainstreaming of ecosystem benefits in urban development.

PROJECT DESCRIPTION: WATER SECURITY CHALLENGE

The cumulative effects of urbanisation have increased the magnitude of loss in quality of the ecosystem and subsequently increased inequality across vulnerable groups. This calls for holistic action to engage all stakeholders and create sustainable means of financing ecosystem conservation and creating ways for responsible enjoyment of the ecosystem services. Operationalisation of Payment for Ecosystem Services (PES) delivers a market-based approach for internalisation of externalities or spill over impacts resulting from different developments within ecosystems, hence providing an enabling environment for protecting further degradation of the remaining ecosystem, reducing major drivers for water security threats in GKMA.

THEORY OF CHANGE

Promotion of market-based approaches to internalisation of water security risks in addition to the existing command and control mechanism.

PROJECT COMPONENTS

- 1 Development and operationalising of specific PES options (supply side) for one catchment as a pilot.
- 2 Development of incentives for the private sector to increase investment in ecosystem conservation projects including development of payment agreements and enabling environment/regulations/guidelines for PES; and creation of transaction infrastructure (broker/marketplace) and support to ecosystem providers upstream.

PROJECT BENEFITS

Targeted to initially benefit 1 million people both directly and indirectly, with:

- 1 Development of a legal framework for the payment of ecosystem services in GKMA and countrywide.
- 2 Reduction in cost of treating water in Kampala due to better ecosystem health.
- 3 Assurance that providers and beneficiaries equally share benefits from ecosystem services.
- 4 Creation of approximately 1,680 jobs.

PROJECT COST (USD)

15,613,900 (+/-)

NET PRESENT VALUE (USD)

351,000,000 (+/-)

NON DISCOUNTED BENEFIT-COST RATIO

30.15:1

6.3 Governance Structure for WSAIP Implementation

Governance and coordination of the WSAIP will take a multi-sectoral approach recognising the need to transform planning for and implementation of water security interventions from administrative boundaries to hydrological/environmental system boundaries; and considering the current and future Greater Kampala-wide strategic development plans, such as the **Greater Kampala Economic Development Strategy (2017/2025)**.

Implementation of the plan will take a catchment approach because of the understanding that water security threats do not strictly align to administrative boundaries. Decisions to establish catchment structures shall be informed by the **Scenario Planning Tool (SPT)** that sums up the current and future state of water security risks in each catchment. The SPT defines 15 catchments. Priority will be given to sub-catchments flowing into the Inner Murchison Bay (IMB). Establishment and operationalisation of catchment structures will follow existing guidelines namely the Uganda Catchment Management Guidelines (MWE, 2019a) and Catchment Organisation Procedures Manual (MWE, 2019b), taking into consideration the need for modifications to suit the urban context and challenges. Whilst, all stakeholders will be represented at sub-catchment level, a strong communication mechanism will be established to ensure that goals and plans of various administrative institutions align to the water security agenda promoted at catchment level. Functions of catchment organisations shall include among others: acting as a platform to rally multi-stakeholder action for water security at catchment level; and ensuring that planning, development and implementation of water security actions takes into consideration upstream/downstream interactions and effects.

To ensure continued investment in water security, a multi-stakeholder **Water Security Investment Committee (WSIC)** on project incubation is proposed. The WSIC shall be responsible for identifying potential financing sources, provision of strategic guidance on development of bankable projects, as well as ensuring existence of projects. Supported by the **Water Security Technical Unit (WSTU)** and the **Water Security Investment Model (WaSIM)**, the WSIC will facilitate the design, funding and implementation of prioritised investment projects.

Recognising challenges posed by inadequate data and information, and the absence of information systems to support stakeholders in monitoring the changing water security landscape, a **Water Security Observatory (WSO)** is proposed. The WSO will serve as a data centre and analysis unit to provide open access to information related to water security; provide guidance for monitoring and data

collection; and develop the infrastructure and human capital resource to function as a centre of excellence to support evidence-based Water Security Planning. The observatory would draw from the water security analysis expertise that exists in government, academia, private sector and civil society organisations. The WSO shall not replace but rather strengthen existing efforts at institutional level.

However, since the development of a WSO is a long process, it is proposed that an ad hoc **Water Security Data Centre (WSDC)** is set up to start the process of gathering existing data, establishing inter-stakeholder data-sharing protocols, and identifying information gaps and data needs.

Operationalising the water security observatory will be supported by an ad hoc **Water Security Technical Unit (WSTU)** consisting of 5-10 experts (drawn from institutions involved in the development of the WSAIP decision support tool) that will develop proficiency in the use and application of the SPT and WaSIM, to serve the needs of the stakeholders. The WSTU shall participate in an intensive six-month training activity to have mastery over the concepts and tools of the SPT and WaSIM as well as interaction with decision-makers to inform key investment questions and data needs.

The **Water Security Taskforce (WSTF)** will provide the overall strategic oversight and policy guidance on the implementation of the plan. The mandate of the WSTF shall include: operationalise the Water Security Investment Plan and proposed governance structures; serve as a liaison at national level on all matters regarding the WSAIP and the water security agenda for Greater Kampala Metropolitan Area and convey recommendations from WSAIP flagship projects to facilitate policy change; and explore the formation of a permanent inter-governmental governance secretariat dedicated to ensuring a water-secure Greater Kampala Metropolitan Area.

The WSTF shall comprise at least 10 members drawn from:

- (a) **Government ministries, departments and agencies**, namely, Ministry of Water and Environment, Ministry of Lands Housing and Urban Development, National Environment Management Authority, and National Forest Authority among others.
- (b) **Government Parastatals**, namely, National Water and Sewerage Cooperation.
- (c) **Local Governments, City Authorities and Municipal Councils**, namely, Kampala Capital City Authority, Wakiso District Local Government, and Mukono District Local Government.

(d) **The Academia** represented by Makerere University Kampala.

(e) **Private Sector** represented by Uganda Manufacturers Association and/or Private Sector Foundation Uganda.

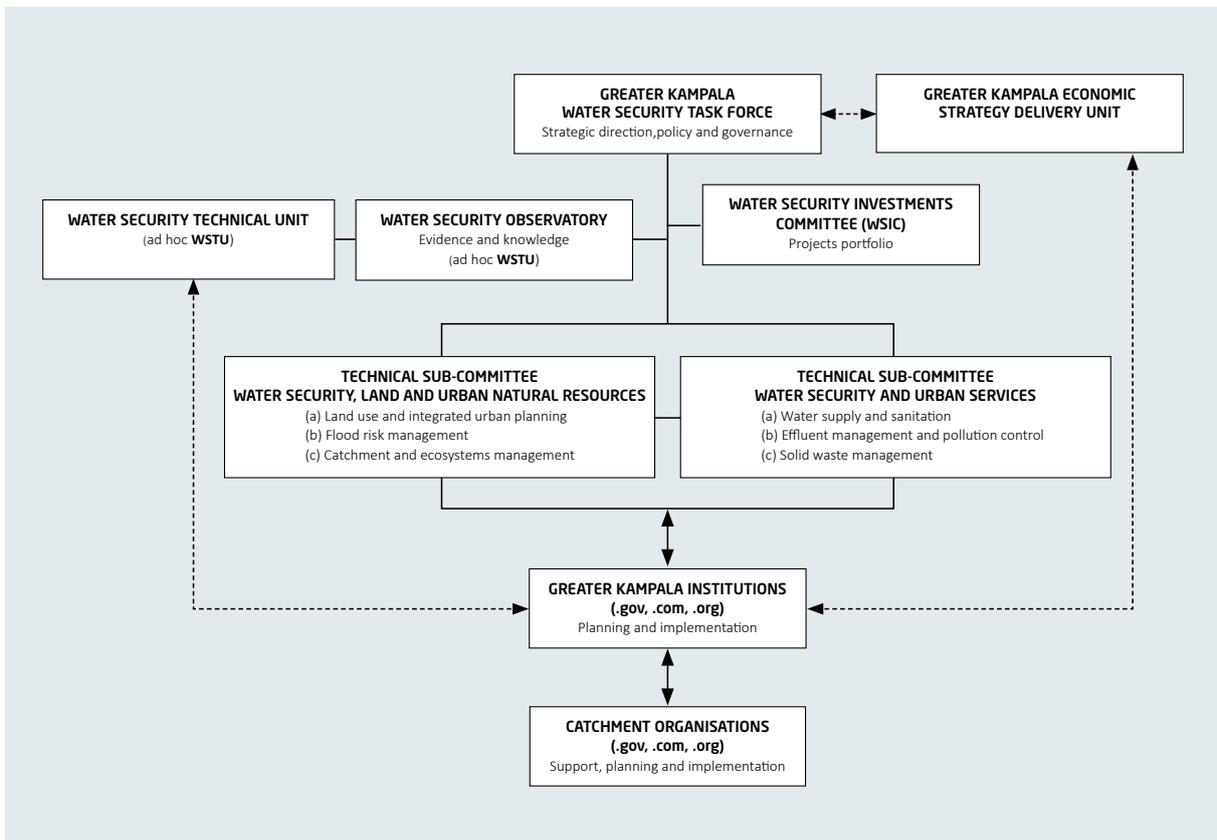
(f) **Non-governmental Organisations and/or CSO Networks**, such as UWASNET and ENR-CSO Network.

The WSTF will be chaired by the Directorate of Water Resources Management on behalf of the Ministry of Water and Environment. It will be supported by two multi-disciplinary multi-sectoral technical expert committees on **Wa-**

ter Security, Land and Urban Natural Resources (WSLUNR) and **Water Security and Urban Services (WSUS)** from GKMA institutions engaged in planning and implementation of water security actions.

Figure 6-3 provides a structural overview of the proposed governance and coordination structure. A WSAIP action document to operationalise the proposed governance structure and the WSAIP including terms of reference for each committee, shall be developed by WSTF upon launching of the plan.

Figure 6-3: Proposed GKMA Water Security Governance Structure



6.4 Resource Needs and Financing Mechanisms

Operationalising the plan requires approximately **US\$ 3 million** over a period of 1-2 years to facilitate setting up a permanent inter-governmental governance structure and the ad hoc water security data centre; and build the capacity of proposed committees and the water security technical unit. Implementation of the selected investment actions necessitates about **US\$ 645.3 million**.

One of the underlying reasons for developing the WSAIP is to optimise limited financial, physical and human resource available in the GKMA to achieve water security alongside more sustainable and resilient development. The WSAIP and investment actions identified need to mature to a level where there is no disconnect between the plan and its financing needs. There are three principal areas of financing required for the implementation of the WSAIP: infrastructure, non-infrastructure activities and management actions of the proposed governance structure.

Funding of projects will rely primarily on public sector financing although stimulating private sector investment will be a crucial component in realising water security in GKMA. International funding will also be an important source of finance, especially with regards to pilots and scaling the targeted actions identified in the WSAIP.

Finances and resources for the WSAIP will come from four broad sources:

Government/public spending (i.e., income, property, sales, and corporate taxes paid by the public): These can be capital investments for infrastructure construction or subsidies

such as governmental budget allocations to water utilities or agencies, as well as tax relief (waived taxes from credits and deductions).

User tariffs and fees: These are paid by customers to service providers for delivery of water and sewerage services (connection and meter charges); and charges for abstraction, effluent release, or recreational permits (e.g., boating and fishing).

International aid transfers (e.g., loans, grants, and donations from multilateral and bilateral donor organisations): These are often used as capital for large construction projects.

Private (commercial and philanthropic) investments: These can be a significant source of funding for infrastructure, technology, and services, but investors will expect returns on investment (e.g., profits or branding benefits).

It is envisaged that financing may face the following risks and challenges:

- (a) Limited allocation of national budget to investments in water and environmental resources,
- (b) Inadequate financial management capacity at multiple levels of government, and
- (c) Limited capacity to implement multi-sectoral inter-institutional collaborative projects.

To mitigate the above risks, it is necessary to establish a framework for the funding as well as develop the financial management capacities in various stakeholder institutions.

6.5 Monitoring and Evaluation

The WSAIP will be evaluated every five years to enable consistent planning and alignment to sectoral and national level planning cycles. The outputs of the WSAIP planning process shall be integrated into the sectoral and national planning documents and a specific Monitoring and Evaluation (M&E) Plan will be developed to monitor the progress of its implementation. The M&E Plan will also include a schedule for reporting on the progress of specific pipeline projects. It will

consider the monitoring and evaluation requirements from the different stakeholders engaged in the implementation of the WSAIP as well as identify inherent risks and opportunities. The M&E Plan will also identify the criteria by which success, progress, quality and value-for-money is monitored and evaluated for each action and project included in the WSAIP.

6.6 Lessons Learned

01

The stewardship approach employed during the development of the plan resulted in innovative thinking; promoted a culture of collective responsibility; encouraged collective planning and action as advocated for in the NPD III; created common understanding of water security risks; and brought about co-generation of holistic solutions.

02

Political economy and water resource governance requires institutional transformation, a long-term process.

03

Brokers of water stewardship multi-sectoral partnerships ought to have solution-oriented mindsets.

04

Engagement of top executives/management eases streamlining of programmes into institutional activities and allows engagement of more people within the institution.

BOX 6-1. PROPOSALS FOR IMPLEMENTATION OF THE WSAIP

Governance and implementation of the WSAIP will take on a multi-sectoral and catchment approach as water security threats do not strictly align to administrative boundaries. This calls for the establishment of committees and units that will work across such boundaries.

The WSAIP proposes:

01

A Water Security Investment Committee that will be responsible for identifying potential financing sources, provision of strategic guidance on development of bankable projects and ensuring existence of projects.

02

A Water Security Observatory to collect, store, analyse and provide open access to information on water security.

03

An ad hoc Water Security Data Centre to start the process of gathering existing data and identifying information gaps and data needs.

04

An ad hoc Water Security Technical Unit of experts that will support stakeholders in the use and application of the SPT and WaSIM.

05

A Water Security Task Force that will provide the overall strategic oversight and policy guidance on the implementation of the plan.



7. CONCLUSION AND RECOMMENDATIONS

Urbanisation, economic development and industrialisation do not have to result in a decline of water security in the Greater Kampala Metropolitan Area if policymakers can implement appropriate policies and suitable strategies to prevent any undesirable consequences. It is possible for GKMA to have an appropriate response and the blueprint for that response is the Water Security Action and Investment Plan.

A set of recommendations and immediate next steps have been developed based on the findings of the WSAIP along with the knowledge gained during the comprehensive WSAIP process. This synthesis is presented as follows:

01. Explore the formation of a permanent inter-governmental governance secretariat dedicated to ensuring a water-secure Greater Kampala Metropolitan Area.
02. Establish a Water Security Observatory to serve as a data centre and analysis unit to provide open-access to information related to water security; provide guidance for monitoring and data collection; as well as develop the infrastructure and human capital resources to function as a centre of excellence to support evidence-based water security planning.
03. Invest in research and data acquisition to understand the rate of change of and demand for urban natural resources and services, and effects of urbanisation on water security beyond 2040, to support evidence-based planning.

The implementation of these recommendations will require extensive dialogue among stakeholders and potential changes in institutional and policy frameworks. Five actionable steps to act as starting points in operationalising the WSAIP (as stakeholders negotiate and formulate structures to support the long-term implementation of the WSAIP) include:

01. Operationalise the proposed multi-sectoral water security governance structure consisting of the following committees: Water Security Task Force, Water Security Investment Committee, ad hoc Water Security Technical Unit, ad hoc Water Security Data Centre that will later become a Water Security Observatory, and two multi-sectoral multi-disciplinary technical expert committees on Water Security and Urban Natural Resources and Water Security and Urban Services.
02. Establish a framework for the funding and implementation of multi-stakeholder water security investment actions and projects.
03. Invest in the enhancement and expansion of the Water Security Decision Support Tools under the coordination of the Water Security Technical Unit.
04. Invest in capacity building for the Water Security Technical Unit and local analysts in an intensive six-month training on water security and Water Security Decision Support Tools.
05. Establish a bi-annual Water Security Forum which seeks to foster dialogue among GKMA stakeholders, decision-makers, and development partners.



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