

Land use management to reduce flooding in the Greater Kampala Metropolitan Area, Uganda



Photo: Flooding in Kampala at the clock tower junction along Kampala – Entebbe Road (credits: BusinessFocusReporter, 2019)¹

In the last two decades, Uganda's Greater Kampala Metropolitan Area (GKMA) has undergone severe land use and land cover changes. Hill slopes have seen increased impermeable surfaces (road networks, buildings, and courtyards), reducing water infiltration and increasing runoff generation. On the other hand, the natural drainage systems (including wetlands) in the low-lying areas have been converted to a different land use, for instance farmland, settlements, industries, etc.

A 2022 study by Makerere University, part of a water security project² conducted in East Africa and funded by LASER PULSE, found that the Murchison Bay Watershed, which has a total area of 3,911 hectares, experienced an increase in built-up land by 652 hectares (48%), water bodies and flooded areas by 28 hectares (560%) between 2005 and 2020. The watershed further experienced a decrease in bare land by 50 hectares (15%), wetland cover decreased by 71 hectares (84%), and agricultural land by 978 hectares (52%) in the same period. The study found that surface runoff increased by nearly 37 billion litres (28%) from 2005 to 2020, and sediment loading (amount of soil

- If no action is taken, **flooding will increase by 180 percent** on average by 2040 with the resultant **spike in economic costs** associated with floods. **Water quality will further deteriorate**, rendering the **Inner Murchison Bay unlivable** for aquatic life including fish.

ACTIONS NEEDED

- **Invest in research and data acquisition** to support evidence-based planning.
- **Establish a data center and analysis** unit to serve as a center of excellence providing open access to relevant data and information.
- **Strengthen and integrate appropriate legal and fiscal tools** to enable the implementation of measures that reduce or manage the runoff at source.
- **Promote environmental education and communication** initiatives to increase public awareness and participation on relevant environmental regulations.

Key Takeaways

¹ <https://businessfocus.co.ug/floods-mps-want-all-buildings-erected-in-wetlands-around-kampala-demolished/>

² See Acknowledgements at end of project information.

carried in running water) increased by 300 grammes for every 20 litres (33%), while groundwater replenishment decreased by at least 15 billion litres (5%).

Reduced infiltration capacity of the ground in the hilly areas leads to increased generation of runoff water that quickly flows into the low-lying areas, increasingly overtopping the drainage network and increasing the occurrence of flash floods. The destruction of wetlands has caused them to lose their functionality to control floods, filter effluents and purify water before being discharged into Lake Victoria. Unsurprisingly, the GKMA faces destructive flooding and flash-flood episodes that have posed severe socio-economic challenges to both businesses and residents. Kampala Capital City alone suffers US\$ 49.6 million in annual average damage to buildings with the number of people frequently affected by floods exceeding 170,000, according to 2021 estimates by the World Bank.³

According to the Ministry of Water and Environment 2020 Water Security Action and Investment Plan⁴ for the GKMA, if no action is taken, the risk of flooding will increase by 180 percent on average by 2040, with the resultant spike in economic costs associated with floods. Further, water quality will continue to deteriorate resulting in a 142% increase in biochemical oxygen demand (amount of oxygen needed by bacteria to decompose organic matter, thereby reducing the oxygen available for other organisms living in the water). This will render the Inner Murchison Bay inhabitable for aquatic life, including fish, and increase the cost of treating water to make it potable resulting in a rise in the water tariff by the National Water and Sewerage Corporation.

Flood management in the GKMA needs an integrated approach that considers upstream-downstream relations, integrates surface runoff generation into land use plans, and aims to restore natural drainage systems such as wetlands.

Investment in research and data acquisition is critical to support evidence-based planning. This will provide an understanding of natural resources and services in the urban area, including their rate of change, the extent of demand, and effects of land use change on the resources and services. The Ministry of Water and Environment needs to survey, map, and demarcate the boundaries of natural resources in the GKMA, such as wetlands and forests and locate sediment, runoff generation and flooding hotspots. This will strengthen environmental legislation based on the statistical data and maps generated to guide the enactment of by-laws and compliance enforcement. It will also set the stage for effective environmental management and development of environmental guidelines to facilitate city, district, and/or local-level reviews within the GKMA.

Strengthening and integration of appropriate legal and fiscal tools would be needed to compel and incentivise owners or managers of public, industrial, and residential buildings to implement measures that reduce the runoff leaving their property. The research by Makerere University, earlier referred to in this brief, found that a combination of grassed waterways, vegetated filter strips, and detention ponds reduced surface runoff and sediment load in the Murchison Bay watershed by 79% and 68%, respectively. Appropriate legal and fiscal reforms would enable wide-scale implementation of such measures, for instance 1) inclusion of an appropriate surface runoff management system as a prerequisite for approval of architectural designs, 2) (property) tax rebates to property owners who install and maintain surface runoff management systems beyond the mandatory capacity, 3) 'storm water' fees assessed in proportion to the amount or extent of impervious surface with the goal being to encourage entities to incorporate impermeable or green surfaces on their sites, among others.

³ World Bank (2021) Concept Stage Program Information Document (PID) - Greater Kampala Metropolitan Area Urban Development Program - P175660 (English). World Bank Group, Washington, D.C. <http://documents.worldbank.org/curated/en/347361620652837273/Concept-Stage-Program-Information-Documents-PID-Greater-Kampala-Metropolitan-Area-Urban-Development-Program-P175660>

⁴ MWE (2020) The Water Security Action and Investment Plan for Greater Kampala Metropolitan Area. Ministry of Water and Environment, Kampala.

Establish a data center and analysis unit. Such a unit would serve as a *Center of Excellence for Water Security*, providing open-access to related data and information, supporting evidence-based planning, providing guidance for monitoring and data collection, and developing the infrastructure and human resources need to support the center and water resources planning and management in general.

Promote environmental education and communication initiatives to increase public awareness and participation in relevant environmental regulations. Communities play a pivotal role in environmental sustainability. Public education and communication initiatives will sensitize communities on the benefits of environmental conservation within the urban environment—such as with green infrastructure, and highlight direct positive impacts that accrue to them as communities, which will go a long way in strengthening good practices for sustainability.

Notwithstanding a few gaps, the existing legal framework sets the stage for responsible land use management and development that does not come at the expense of the environment, for instance:

- The *Constitution of the Republic of Uganda 1995* (as amended) requires the State to “protect important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda.”
- The *Policy on Conservation and Management of Wetland Resources (1995)* aims to sustain wetlands’ “value for present and future well-being of the people”. Incorporated in this policy is the requirement to carry out environmental impact assessment where planned developments have the potential to impact wetlands.
- The *Water Act Cap 152 (1997)* advocates for the involvement of all stakeholders in planning for the utilization, development, and management of water resources.
- The *Physical Planning Act, 2010 (as Amended)* aims at orderly and progressive development of rural and urban areas. The Act encourages local governments to prepare development plans in a participatory manner.
- The *Kampala Drainage Master Plan 2016* recommends “structural measures (such as construction of new drains and crossings) and non-structural measures (such as improving solid waste management and promoting use green/ pervious compounds for new developments) etc”⁵. As part of the preparation of the Master Plan, a stormwater management policy was drafted; however, it focusses on silt management not stormwater itself.
- The *Kampala Climate Change Action Strategy 2016* identifies the drivers of vulnerability to heavy rains and flooding, including land use (housing on hilltops and settlements in wetlands), drainage network issues, poor solid waste management practices, and limited rainwater harvesting. Several of the interventions set out in the strategy are relevant to flood mitigation from a land use management perspective, for example inclusion of water harvesting plans as part of the approval requirements for new buildings, developing integrated green neighbours, tree growing, and wetland restoration, among others.
- The *National Environment Act (2019)* provides principles for environmental management that include, among others: “maintaining stable functioning relations between the living and nonliving parts of the environment” and “... restoring lost or damaged ecosystems where possible and reversing the degradation of the environment and natural resources”.
- Still under scrutiny for compliance to The Constitution, the *Kampala Capital City (Green Infrastructure) Ordinance 2019*, seeks to, among others, provide for measures to promote environmentally sustainable infrastructure development in Kampala City. It requires the inclusion

⁵ State of Flooding in Kampala. Statement by the Minister for Kampala Capital City and Metropolitan Affairs

of detailed landscape drawings as a requirement for approval of drawings for developments. A similar ordinance would be needed for other constituent areas of the GKMA.

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Authors:

James W. Kisekka,^a Nicholas Kiggundu,^b David Mugenyi^b

^a Aid Environment (RAIN), james@aidenvironment.org, eastafrika@aidenvironment.org

^b Makerere University

