



BASIN

# IMPROVING WATER QUALITY In lake victoria basin

### WASTE MANAGEMENT

Improving water quality in the Lake Victoria Basin (LVB) requires a long-term, comprehensive, holistic, coordinated, multi-donor, and multistakeholder approach.

This approach includes:

**1. Waste Management** (including industrial effluents);

**2.** Sustainable Land and Water Management and

**3.** Social and Livelihood Development.

This Note summarizes Interventions to minimize waste disposal into water bodies in the LVB.<sup>1</sup>



Lake Victoria basin. Image credit: World Bank Geo Watershed Generator

## POLLUTION SOURCES AND INTERVENTON OPTIONS

#### Sources

Sediment from land degradation and erosion from upstream forest and agricultural areas, *fecal*, *liquid*, *and solid waste and untreated industrial effluents* from urban areas around the lake and upstream are the main sources of pollution in the LVB. The effects of this pollution (e.g., increase in water hyacinth, pollution of groundwater, con-tamination of domestic water supply, destruction of wetlands) ultimately *worsen water quality in the lake and rivers feeding into the lake* (increasing BOD, COD, fecal coliform, nitrogen, phosphorous, heavy metals, sediment, turbidity, etc.). Worsening water quality contributes to *reduced fish stocks and biodiversity in the lake*, *diminished lake-based livelihoods* (e.g., fishing,

<sup>1</sup> Strategy Note on Improving Water Quality in the Lake Victoria Basin, Great Lakes Water Quality Advisory Services and Analytics (P172554), Washington DC: World Bank, May 2021. This study (2021) looked into the causes of degradation of water quality in Lake Victoria and explored potential engagement areas to improve it. The study documented global and regional lake restoration lessons and recommended a long-term, multi-country strategy for the Lake Victoria Basin, in the following areas: catchment management, sanitation, industrial pollution management, and water quality monitoring, with livelihood support, gender equity, and social inclusion mainstreamed in this work.

selling fish, navigation), worsened health impacts (e.g., increasing water-borne diseases), increased conflicts (e.g., over fishing areas and between pastoralists and farmers), increased climate risk (e.g., flooding of lake-side settlements), displaced people from floods and droughts, and increased drivers of vulnerability (migration, poverty, food security, fragility, violence, and gender discrimination and social exclusion), all of which increase vulnerability to climate change.

#### **Options**

Waste management options include *reducing industrial pollution*, building *grey-green infrastructure*, adopting associated *sanitation and waste management services*, *improving household water supply*, and *improving lake water quality monitoring*, all within a *community-based*, *gender-sensitive*, *and socially equitable implementation framework*. (See schematic diagram and details of intervention options below.)



#### Waste management interventions

- Innovative approaches to sanitation that can also help solve other development challenges: Closing the cycle regarding the N and P in wastewater by safely reusing treated effluents in agriculture as a natural fertilizer - will help solve the pressing sanitation, public health, and environmental challenges of inadequate sanitation systems and counter unsustainable agricultural practices. Adequately treated/composted sludge from wastewater treatment plants and from fecal sludge/ septage treatment plants could also be used as soil conditioner to help mitigate the ongoing erosion of the Basin's fertile and valuable topsoil.
- Conventional capital-intensive sewer-based sanitation systems are necessary but not sufficient: Most global urban centers rely on sewers to carry human excreta from houses, apartment complexes, hotels, offices, hospitals, and other establishments to a centralized sewage treatment plant (STP) and wastewater from these sources to a wastewater treatment plant (WWTP). Investing in such capitalintensive infrastructure, which also needs regular, effective maintenance and last-mile management to ensure that treated wastes are safe for eventual

disposal, may be cost-effective when it covers a large proportion of urban areas but may not be feasible for all parts of town.

Comprehensive planning with a mix of appropriate sanitation systems will be necessary: Alternative onsite sanitation options (including pit latrines, leach pit toilets, toilets connected to biogas digesters, septic tanks, and urine-diverting dehydration toilets) may be more appropriate for poorer, dense population clusters and those in unfavorable terrain (including urban slums and informal peri-urban and lake-shore settlements) where sewage is not feasible. Setting up Fecal Sludge Treatment Plants (FSTPs) to treat waste from septic tanks and pit latrines will thus be a necessary part of sanitation investments in hotspots such as Winam Gulf (Kisumu, Kenya), Inner Murchison Bay (Kampala, Uganda), Napolean Gulf (Jinja, Uganda), and Mwanza Gulf (Mwanza, Tanzania). Matching appropriate sanitation options to different types of human settlements (including central business districts, planned urban and periurban areas, slums, and informal settlements) to riparian fishing communities and islands around the lake will require accurate and up-to-date data and information on the types and scale of human settlements.



- Wastewater can be treated with green technology options: Discharges from sewers and open drains and treated effluents from WWTPs, STPs and FSTPs can be run through a constructed wetland before discharge.<sup>2</sup> While a pilot was constructed under LVEMP II in Kampala, another is planned under the KfW and European Union (EU)—supported IWRM Project of LVBC.<sup>3</sup> This versatile technology can be used to treat wastewater from households (as in Costa Rica), apartment and institutional complexes (as in India), and large open drains (as in Uganda), while floating wetlands can also be used directly on the lake. Other green technological options may be relevant and effective.
- Solid waste collection and treatment is perhaps best with private-public partnerships: Several city corporations have contracted private agencies for waste collection and waged awareness campaigns for waste segregation in houses before collection, but disposal is usually a problem: high temperature incinerators are expensive to install and maintain, while waste-to-energy plants have not always lived up to their potential in developing countries.
- A mix of support and regulations will be necessary for water polluting industries: While larger industries may undertake effluent treatment, fearing adverse publicity if they are reported for non-compliance, small and medium enterprises (SMEs) may be reluctant to put money into 'dead investments' or face other constraints such as lack of cost-effective treatment options. The LVEMP experience has shown that providing financial information and policy support to the private sector to undertake 'end-of-pipe' treatment and a shift to a cleaner production process (for cases where treatment options are not available or cost-effective) can produce better compliance.

#### **Promising approaches**

Inclusive Sanitation: The concept of inclusive sanitation implies that everyone, especially the poor, benefits from safe sanitation along the entire sanitation service chain from containment and emptying to transportation, treatment and disposal. In urban areas, the term Citywide Inclusive Sanitation (CWIS) has been widely adopted by development partners such as the World Bank to ensure that all city residents are served by sanitation, regardless of their income or location (www.worldbank.org/cwis).

- Complementary private sector initiatives: Regional and national projects such as Lake Victoria Water and Sanitation (LVWatSan), and LVEMP II, supporting infrastructure investment in sewered sanitation systems, are complemented by smaller private sector and NGO investments in non-sewered systems, and in generating household-level demand for sanitation, especially in towns bordering Lake Victoria. Investments have come from the Umande Trust, Sanergy, Water for People (WfP), and FINISH Mondial.
- Water and sanitation services for the poor and socially excluded: New approaches to factor in challenges and specific needs of special population groups, including women, include Water and Sanitation for the Urban Poor, a private sector model that considers the needs and challenges of the poor (https://www.wsup.com/approach/); the Bank's diagnostic on inequalities (including a focus on vulnerable populations (https://openknowledge. worldbank.org/handle/10986/27831), and other online resources.<sup>4</sup>
- Good practice among Bank-funded projects in Latin America: Rich lessons regarding the impact of the urban poor on water quality, and of water quality on the urban poor, are available from the Bank's Water Pollution Control projects in Brazil; the Matanza-Riachuelo River Basin project in Buenos Aires, Argentina; and the Rio Bogota operation in Colombia.
- Regional initiatives to promote sanitation: The Africa Sanitation Policy Guidelines of 2021 from the African Ministers Council on Water (AMCOW) provide useful transnational guidance for creating a sanitation policy framework that brings different countries together with an agreed set of principles for regulating, funding, monitoring, and evaluating sanitation interventions across basins.<sup>5</sup>

<sup>2</sup> A layered rectangular reed bed with layers of sand, gravel, and stones that filters wastewater (vertically) that enters from an inlet at one end before releasing the filtered water through an outlet at the other end) – to clean wastewater to acceptable standards. For more details see https://www.susana.org/en/knowledge-hub/resources-and-publications/library/details/930

<sup>3</sup> SWECO (2016) Feasibility Study of the High Priority Investment in Kampala Nakivubo Channel Constructed Wetland, for the Lake Victoria Basin Integrated Water Resource Management Program supported by KfW & EU.

**<sup>4</sup>** See, for instance, https://ppp.worldbank.org/public-private-partnership/ppp-sector/gender-impacts-ppps/mainstreaming-gender-sector-specific-materials/water/mainstreaming-ge.

<sup>5</sup> https://amcow-online.org/index.php/initiatives/african-sanitation-policy-guidelines-aspg



Africa Ahead's Community Health Clubs is another promising approach based on empowering local communities in the fields of health, income generation, environmental guardianship, and water, sanitation, and hygiene improvements, which has demonstrated its transformational approach to the sustainable development of local communities in the DRC, Kenya, Rwanda, Tanzania, and Uganda.

- Government and non-government initiatives for solid waste collection and treatment: There are few global examples of financially viable and ecologically-sustainable solid waste management - including a small municipality-run system integrating composting, fecal sludge collection and treatment, and plastic, paper, metal, and paper collection and recycling (in Balangoda, Sri Lanka), and elaborate solid waste collection (using solarpowered vehicles), biogas-generation (using dung from cattle fed with food waste), and sale of products made using recycled solid waste (in Coimbatore, India).<sup>6</sup> But other interventions could also consider combined fecal sludge and solid waste composting plants, partnerships with the local private sector for solid waste collection and fecal sludge management services, and a formalization and regularization of the informal/unregulated private sector that usually provide these services (using a mix of manual and mechanical emptiers) - to improve the conditions of sanitation workers and avoid illegal dumping of fecal sludge/septage in waterways and on lands that drain to the lake.
- Harmonizing standards for effluent discharge: LVBC has attempted to harmonize standards for effluent discharge around Lake Victoria by adopting East Africa Standards (EAS). While an essential first step, wide variations still exist between national standards of each EAC Member State. Under the new Bank-supported Nile Cooperation for Climate Resilience (NCCR) Project, LVBC is working with EAC states to harmonize policies related to water quality management.
- Resource-Efficient Technologies and Cleaner Production Centers: Since 1995, UNIDO and UNEP have supported a joint initiative to set up National Cleaner Production Centers (NCPC) in 5 EAC countries aimed at preventing the generation of waste and emissions. The first 30 enterprises in Kenya, Tanzania, and Uganda invested around USD\$81 million to achieve annual savings of USD\$14.5 million. LVEMP II included a regional Resource Efficient Cleaner Production (RECP) component covering Burundi, Kenya, Rwanda, Tanzania, and Uganda. The World Bank supported an initiative, 'Engaging Private Sector for Green Growth in the Lake Victoria Basin,' (2017 - 2020) aimed at increasing the use of, and investment in, RECP technologies by private enterprises.
- Understanding the climate threat to urban WASH infrastructure: Under the auspices of the Future Climate For Africa (FCFA) research and development program, an international consortium of research

<sup>6</sup> See FINISH (2017) Learning Guide on Waste Management, The Hague: Financial Inclusion Improves Sanitation and Health, WASTE, NL.

institutions (e.g. Leeds University, Makerere University), local authorities, and meteorological agencies have developed the HyCRISTAL<sup>7</sup> project, which seeks to understand the impacts of climate change on urban WASH systems, identify how long-term climate information can inform decisionmaking around sanitation infrastructure, and provide an evidence base to support collective action.

### **Programming principles**

- Waste management: Long-term, basin-wide, comprehensive, and phased approach: The sheer volume of the wastes discharged into Lake Victoria, from both lake-rim settlements and elsewhere in the Basin, which are brought by rivers and streams, necessitates a comprehensive approach to reduce discharge of pollutants into the lake. This will, of course, build on global, regional, and local experiences and 'best practices' from pilots, projects, and programs. While infrastructure building typically takes time, increasing community awareness (e.g., on the benefits of using toilets) and achieving and sustaining behavior change (e.g., safe disposal of solid wastes and human excreta) require not only time but also continued political, financial, and other support. This warrants a comprehensive, long-term and phased approach, aiming to systematically address waste generation and discharge, moving from hotspots to other areas.
- Household water supply and sanitation: Stakeholder engagement and support to put beneficiaries center-stage: Community engagement throughout the planning cycle and intensive stakeholder consultation and inclusive planning and management, are vital to sustain success. Equally important is the need to ensure that gender and social inclusion are mainstreamed throughout the project cycle. This, however, has several challenges: maintaining effective interventions, especially at the household level, requires user contributions--a challenging proposition in contexts of chronic and multi-dimensional poverty, particularly for women and other vulnerable populations who tend to face greater challenges in accessing jobs and other financial resources. Therefore, designing effective stakeholder mapping and consultation processes, designed separately for men, women, boys, and girls, and alternative livelihood programs, especially for women and girls, are a prerequisite for sustainable sanitation behavior in the LVB.

- Household sanitation: Financial and social incentives for communities to build and use toilets: Incentives to build toilets are lower when, as in the land bordering Lake Victoria, the government owns the land and residents are therefore encroachers without ownership rights. Given this, negotiating rights for women and men to build household toilets may be a critical first step to address the rampant open defecation in these settlements, while encouraging the government to build community toilets may be a second. However, the placement of small-scale WASH facilities and the ability to pay have gender implications: women frequently are unable to afford access and have specific needs about the location and type of facilities that are provided, including in schools.
- Use different measures to help industries reduce industrial waste pollution: Addressing industrial pollution may require a judicious mix of policies, laws, and regulations, depending on the context, including end-of-pipe and cleaner technology solutions, punitive command-and-control measures (e.g., fines and other punishments) to enforce pollution laws and regulations, 'softer' measures (e.g., name and shame campaigns, providing information on potential benefits, expert advice on technical options, and trouble-shooting services), and proven and easily available technologies and customized solutions for small- and large-scale operators in each highly polluting industry, including mining.<sup>8</sup>
- Build institutional and individual capacities of government officials: Training programs, exchange visits, study tours, conferences, seminars, workshops, awards, and recognitions help build not only the capacity of government officials but also can increase motivation and reduce staff attrition. Capacitybuilding should include a focus on understanding gender differences such that government officials are equipped to factor in and address gender inequalities throughout the project cycle.
- Women-centered approaches should be mainstreamed: Women are frequently excluded from decision-making processes about sanitation and have specific needs and concerns, e.g., safety and menstrual health. Women also face challenges paying for sanitation services. Special efforts therefore need to be made to ensure that women and other socially excluded populations are given the opportunity and space to participate in all aspects of project activity, from decision-making and planning to implementation, monitoring, capacity-building, and skill trainings (e.g., for alternative livelihoods).

<sup>7</sup> https://futureclimateafrica.org/project/hycristal/

<sup>8</sup> Gold mining, for instance, causes 'land degradation around mines and water pollution far beyond the mine. This poses a threat to the Lake and its flora and fauna if it is not carried out in a responsible manner.' Similarly, the heavy metal mercury, mainly used by small-scale miners to process gold, 'accumulates in the food chain and may be dangerous once the amounts accumulated are high and widespread' (LVBC, 2012, Basin Wide Strategy for Sustainable Land Management in the Lake Victoria Basin. Kisumu: Lake Victoria Basin Commission, Kisumu).



#### FOR MORE INFORMATION:

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