# KENYA MARINE AND FISHERIES RESEARCH INSTITUTE

## FRESH WATER SYSTEMS

# FACT SHEET

**TECHNICAL REPORT ON CHARACTERIZATION OF CURRENT POLLUTANT DRIVERS OF ONE SELECTED URBAN RIVER MOLO THAT FLOW INTO ONE MAJOR KENYAN LAKE (BARINGO)**



**TECHNICAL REPORT: KMF/GoK/2025-2026/C82_41(i)**

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# BACKGROUND INFORMATION

- Globally, fresh water quality continuous to deteriorate and be depleted by each day.
- This has been closely associated with intensive anthropogenic activities exacerbated mainly by the ever-increasing human population.
- The situation is, however, wanting in third world countries of Africa, Asia and the Latin America where worsening scenarios have been documented since 1990.
- Although global studies have been undertaken on urbanization and its effects on rivers' water quality, many have just focused on single pollutants neglecting the multiple pollution effect that is often associated with urbanization.
- Hence, the aim of this study, therefore, was to characterize and assess the current drivers of urban River Molo in Lake Baringo Basin (LBB) to inform management.

# MATERIALS AND METHODS

## Study area

This study was conducted longitudinally along rivers Molo and Perkerra (Figure 1).

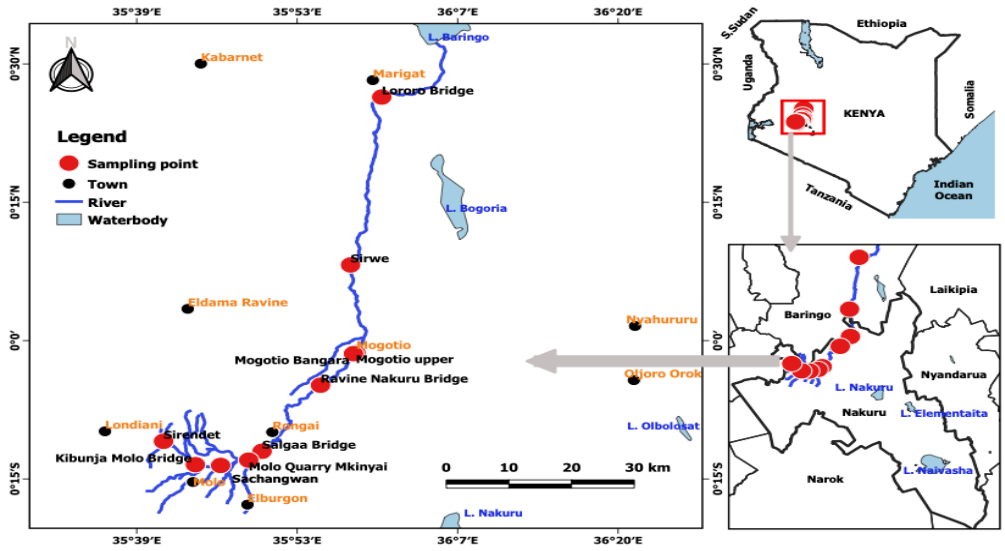



**Figure 1**. Map of the study area showing the sampling stations.

## Data collection

- Organized surveys were conducted to map point and non-point sources of pollution.
- Water quality (physico-chemical) and fisheries data were collected using standard methods.

## Data analysis

Data was presented as means. Descriptive statistics was used to present data in terms of graphs and tables. All the analysis were done in Excel 2010 Version.

# RESULTS

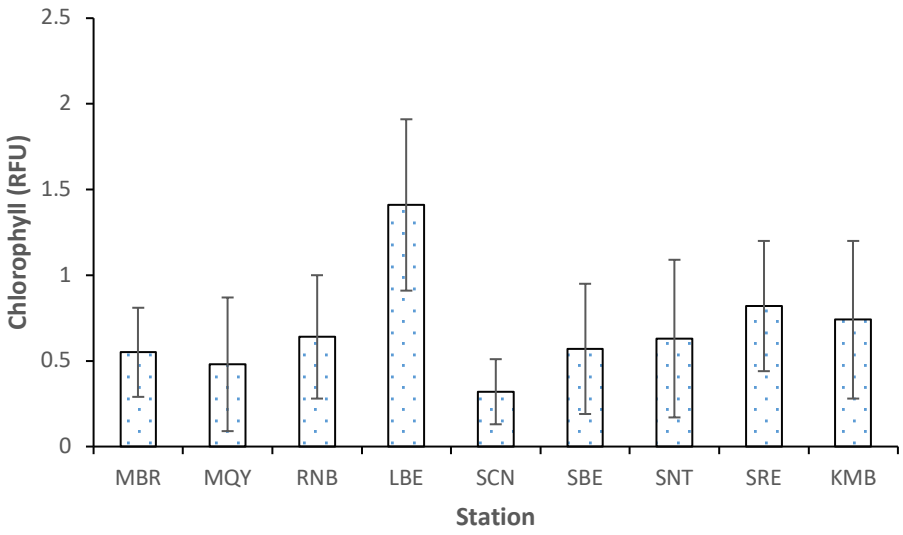



Figure 2. Chlorophyll levels along the sampled stations of R. Molo. LBE: Lororo Bridge; SRE: Sirwe; MBR: Mogotio Upper; RNB: Ravine Nakuru Bridge; SBE: Salgaa Bridge; SCN: Sachagwan; MQY: Molo Quarry; KMB: Kibunja Molo Bridge; SNT: Sirindet.

According to Hofstra, & Vermeulen (2016), high levels of conductivity in downstream stations of rivers is influenced by increased human population, urbanization and agricultural activities.

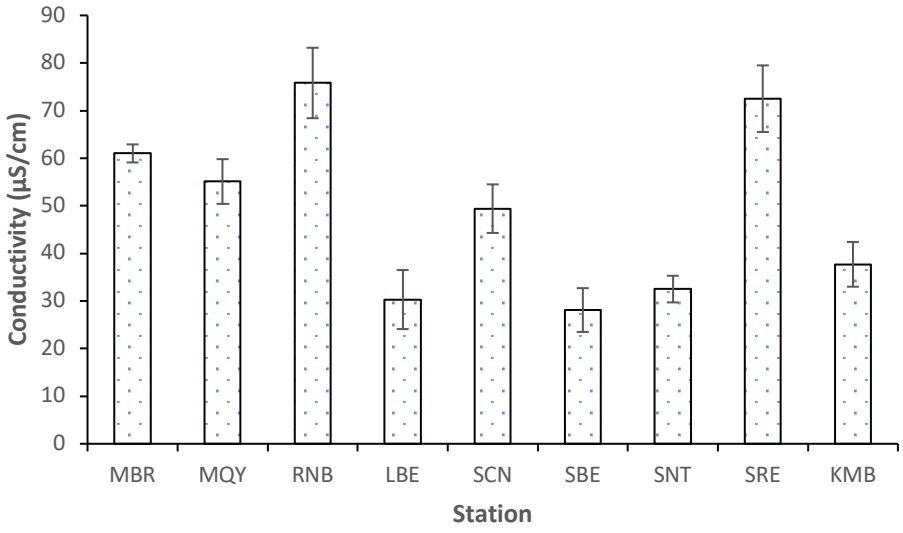



Figure 3. Conductivity levels recorded along the sampled stations of R. Molo. LBE: Lororo Bridge; SRE: Sirwe; MBR: Mogotio Upper; RNB: Ravine Nakuru Bridge; SBE: Salgaa Bridge; SCN: Sachagwan; MQY: Molo Quarry; KMB: Kibunja Molo Bridge; SNT: Sirindet.

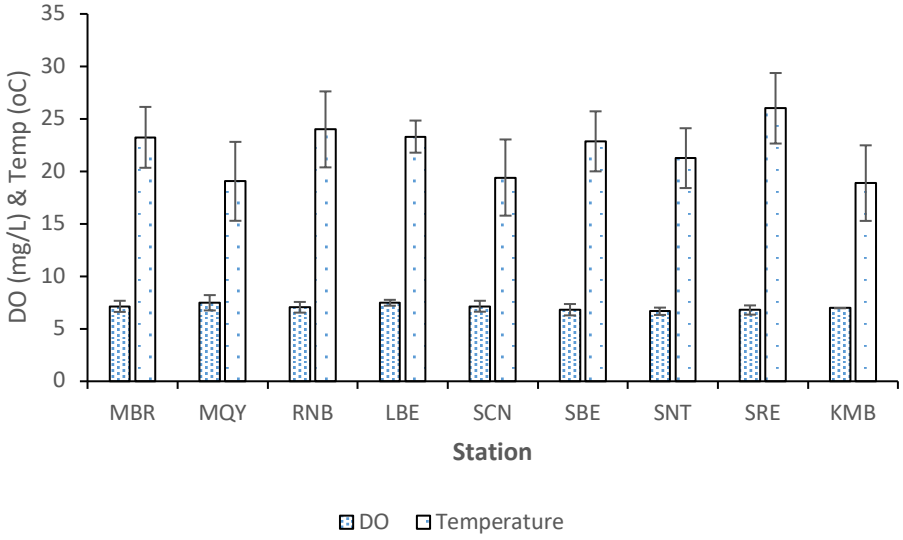



Figure 4. Dissolved oxygen and temperature levels along the sampled stations of R. Molo. LBE: Lororo Bridge; SRE: Sirwe; MBR: Mogotio Upper; RNB: Ravine Nakuru Bridge; SBE: Salgaa Bridge; SCN: Sachagwan; MQY: Molo Quarry; KMB: Kibunja Molo Bridge; SNT: Sirindet.

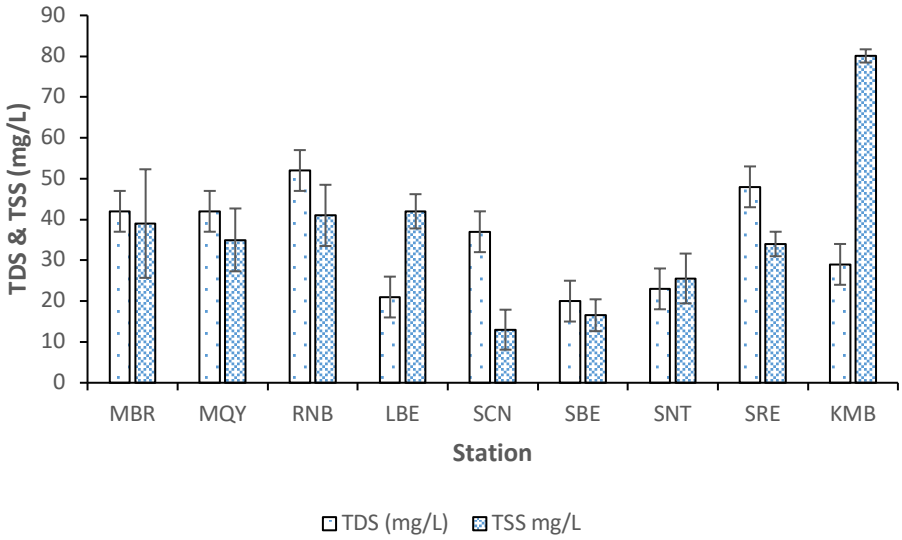



Figure 5. TDS and TSS levels along the sampled stations of R. Molo. LBE: Lororo Bridge; SRE: Sirwe; MBR: Mogotio Upper; RNB: Ravine Nakuru Bridge; SBE: Salgaa Bridge; SCN: Sachagwan; MQY: Molo Quarry; KMB: Kibunja Molo Bridge; SNT: Sirindet.

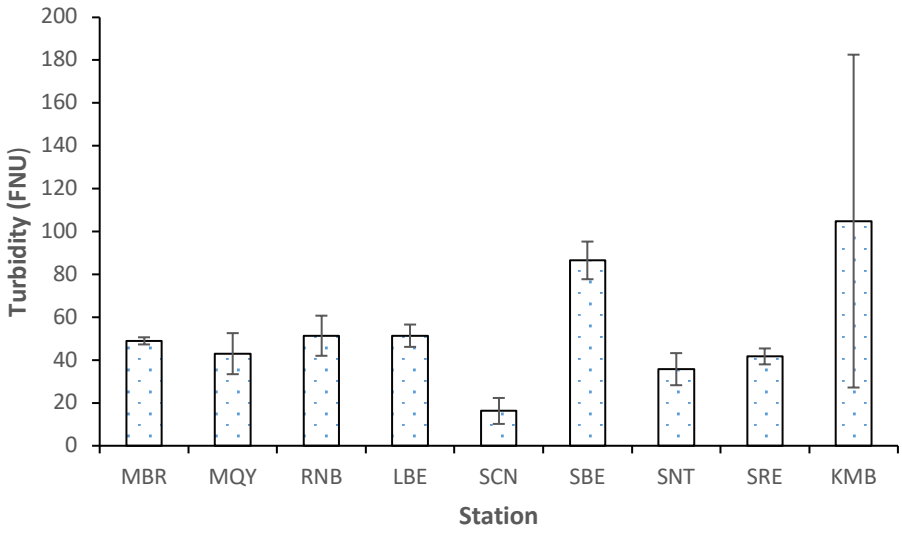



Figure 6. Turbidity levels along the sampled stations of R. Molo. LBE: Lororo Bridge; SRE: Sirwe; MBR: Mogotio Upper; RNB: Ravine Nakuru Bridge; SBE: Salgaa Bridge; SCN: Sachagwan; MQY: Molo Quarry; KMB: Kibunja Molo Bridge; SNT: Sirindet.

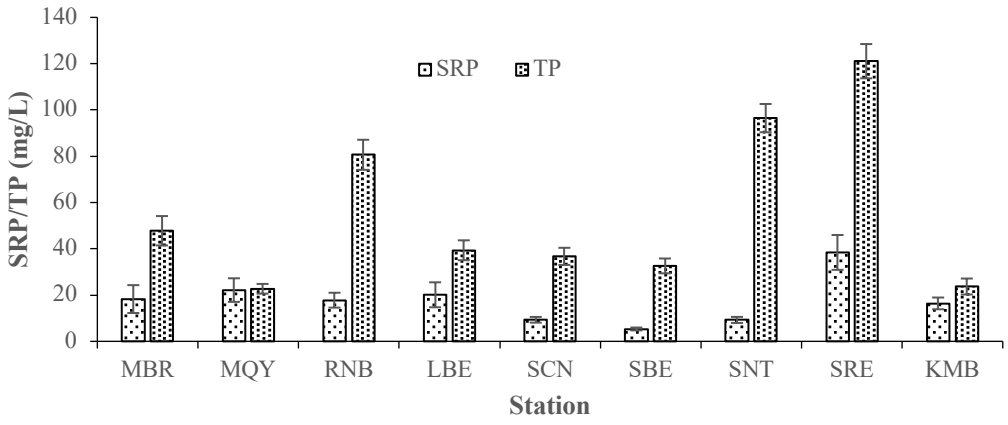



Figure 7. SRP and TP levels along the sampled stations of R. Molo. LBE: Lororo Bridge; SRE: Sirwe; MBR: Mogotio Upper; RNB: Ravine Nakuru Bridge; SBE: Salgaa Bridge; SCN: Sachagwan; MQY: Molo Quarry; KMB: Kibunja Molo Bridge; SNT: Sirindet.

## RESULT'S INTERPRETATION

The study established that anthropogenic activities within the river catchment are the major contributors to declining water quality and ecological integrity of River Molo. Rapid urbanization, inadequate wastewater management, agricultural runoff, solid waste disposal, soil erosion, and untreated effluents from domestic, commercial, and small-scale industrial activities were identified as the principal pollution drivers affecting the river system. The findings revealed spatial variations in pollution levels, with elevated concentrations of nutrients, suspended solids, organic matter, and other contaminants being more pronounced near densely populated urban centers and during rainy seasons due to increased surface runoff. The deterioration of water quality poses significant risks to aquatic biodiversity, public health, fisheries, livestock watering, irrigation, and the general sustainability of downstream ecosystems within Lake Baringo.

## RECOMMENDATION

i. There is need for the strengthening of wastewater management systems. County governments and relevant agencies should improve sewerage infrastructure and ensure proper treatment of domestic and industrial wastewater before discharge into the river.

ii. Provision of enhanced solid waste management. Urban centers within the catchment should establish efficient waste collection, recycling, and disposal systems to minimize illegal dumping along riverbanks and drainage channels.

iii. There is an urgent need to promote sustainable agricultural practices. Farmers within the catchment should be encouraged to adopt environmentally friendly farming methods such as controlled fertilizer application, integrated pest management, contour farming, and vegetative buffer strips to reduce nutrient and sediment runoff.

iv. Further, the restoration and protect ion of riparian zones is hereby emphasized. Riparian buffer zones along the river should be rehabilitated through afforestation, controlled grazing, and restriction of human encroachment to reduce erosion and filter pollutants before they enter the river.

v. There is need for strengthened environmental regulation and enforcement. Relevant institutions including National Environment Management Authority should intensify monitoring, compliance inspections, and enforcement of environmental laws governing effluent discharge and land-use activities.

vi. Establish continuous water quality monitoring programs. Long-term monitoring frameworks should be implemented to track changes in water quality, identify emerging pollutants, and support evidence-based management decisions.

vii. Additionally, increase public awareness and community participation need to be enhanced. Environmental education and community engagement initiatives should be enhanced to promote stewardship of the river ecosystem and encourage local participation in pollution control measures.

viii. There is also the need to adopt integrated catchment management approaches in the basin. Collaboration among government agencies, researchers, local communities, non-governmental organizations, and private stakeholders should be strengthened to ensure coordinated management of the river basin and protection of Lake Baringo.

ix. Lastly, we recommend for continuous support in further research. Additional studies should investigate sediment contamination, heavy metals, pesticides, microbial pollution, ecological health indicators, and the long-term impacts of climate variability on the river-lake system cannot be overemphasized.