Sustainable Wastewater Treatment Solutions

Partner: Lilongwe City Council and Lilongwe Water Board Contact Person: Mr B Masina bmasina@must.ac.mw	Schedule: September - December 2024

Project background

Lilongwe City in Malawi faces significant water security and sanitation challenges, exacerbated by its reliance on the Lilongwe River as the sole water source. The river's variability, coupled with inadequate storage capacity, has led to water shortages during dry periods. Additionally, the city's water treatment plants operate below capacity, resulting in unaccounted-for water and an inability to meet growing demand.

Sanitation is also a major concern, with only a small percentage of the population served by a sewer system. Most residents rely on onsite sanitation systems, leading to environmental pollution due to inadequate treatment and disposal of sewage. Lack of investment in sanitation infrastructure has resulted in poor health outcomes and economic losses.

Recent incidents of drinking water contamination have highlighted the urgent need for sustainable wastewater treatment solutions in Lilongwe. Addressing these challenges requires integrated planning, investment in infrastructure, and regulatory measures to ensure safe and reliable water and sanitation services for all residents. Implementing sustainable wastewater treatment solutions will not only improve public health and environmental quality but also contribute to economic development and resilience in the face of climate change.

Tasks

The main objective of this project is to develop sustainable wastewater treatment solutions for Lilongwe City that address water security challenges, reduce environmental pollution, and improve public health outcomes. By focusing on key areas such as water supply management, sewage contamination prevention, organic waste utilization, and renewable energy generation, the project aims to enhance the city's resilience to water scarcity, promote sustainable development, and safeguard the well-being of its residents. The students will

- analyze treatment works' performance.
- identify priority areas for sewage contamination.
- investigate organic waste utilization solutions.

- explore methane capture from wastewater.
- develop integrated sanitation plan**s.**

Knowledge, **skills and competences to be acquired by the end of the study (expected Learning Outcomes)**

At the end of this activity, students will:

- demonstrate a comprehensive understanding of water quality assessment methods and flow dynamics in river systems.
- evaluate the operational efficiency of water storage infrastructure, such as Kamuzu Dams.
- apply treatment plant performance assessments and water treatment technologies.
- identify areas at risk of sewage contamination within the pipe distribution network.
- apply knowledge of sustainable waste management practices, including the utilization of organic waste for agricultural purposes.
- apply knowledge of methane capture technologies and their role in promoting renewable energy solutions.
- develop integrated sanitation plans aimed at addressing urban sanitation challenges effectively.

Mentoring plan

- Introduction to the tasks and briefing by MUST staff and PBL Coordinator (September 2024)
- Weekly mentoring by MUST supervisors from September to December
- Field trip to Lilongwe for sewage treatment plant visit (October)
- Monthly progress report presentation of work done by the students
- Final report and power point presentation (December 2024)

Supervisor(s)

Dr Richard Nkhoma
Mr Blessings Masina
Mrs Ellasy Gulule Chimimba
Mr Edward Matengele

Evaluation plan

The course is graded from 1 (lowest grade) to 5 (highest grade). Grading is done both at personal and group level. The following will be evaluated:

- Oral presentation, Project report, Peer and self-evaluation