

Resource efficient cleaner production in sugar factory

Kisumu, Kenya

water scarcity impact

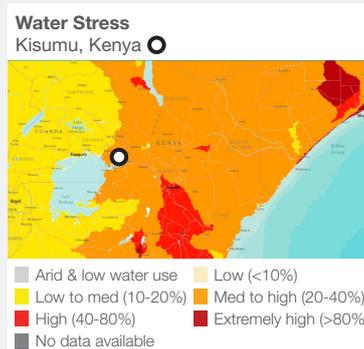


Reduced withdrawal	
Reduced consumption	
Improved water quality	●
Increased productivity	●
Net basin benefit	

volumetric impact
120 000 m³/yr

capital cost
\$7,000

estimated unit cost of water
5 ¢/m³



Water Stress Map:
F. Gassert, P. Reig, T. Shiao, M. Luck and M. Landis, 2015. "Aquaduct Global Maps 2.1."

Confidence level
● Low ● Medium ● High

Water Scarcity Impact Key
● Main ● Minor

Credits
We would like to acknowledge Janet Nyamusi of the Kenya National Cleaner Production Centre for her input in the preparation of this case study.

Project Overview

The Lake Victoria Basin spans across five countries in East Africa and at its centre is the largest lake in Africa; Lake Victoria. Major environmental concerns threaten the economies and livelihoods that depend on the natural resources of the basin as well as the ecosystems that occupy it.

The Lake Victoria Environmental Management Project (LVEMP) is a cross border initiative funded by the World Bank designed to rehabilitate some of the major environmental concerns present in the Lake Victoria Basin.

One of the pollution hot spots targeted under the program was the Kibos Sugar and Allied Industries factory (KSAI) in Kisumu, Kenya. Under a resource efficient and cleaner production project, the factory reduced pollutant loads of its effluent discharge by 70%. This was achieved through a series of process efficiency measures including metering & controlling, leakage repair, water reuse and improved wastewater treatment.

Key Elements

- Multilateral trans-boundary programme to address environmental degradation of the Lake Victoria Basin.
- Pressure from environmental regulator to meet national discharge standards.
- Implementation of energy and production efficiency measures, metering and control systems, leak repair and wastewater treatment measures.

Key Outcomes

- Reduction in effluent BOD pollutant loads from 112 mg per litre to 28 mg per litre.
- Reduction in effluent COD pollutant loads from 242 mg per litre to 67 mg per litre.
- Increase in productivity of 0.58 m³ per ton of crushed cane to 0.37 m³ per ton of crushed cane.



Kisumu, Kenya

Intervention Features

- Improvement in water quality
- Industrial leakage detection and repair
- Water audits

Project Levers

(1) Trans boundary collaboration

The LVEMP is a multi-lateral funded project that looks to foster collaborative management of trans-boundary resources and improve environmental management of targeted pollution hotspots under the Cleaner Production Project. This project looks to improve competitiveness and productivity of local industries. The project provided the collaborative environment and technical assessments that facilitated improvements at the sugar factory.

(2) Independent Audit and Advice

The Kenya National Cleaner Production Centre (KNPC), funded under the LVEMP, conducted a resource efficiency audit on the factory to assess potential options for reducing water and energy use and for reducing water and air pollution generated from the factory. The audit recommended a suite of interventions that resulted in increased output and reduced operational costs for the factory. These savings facilitated a focus on implementing wastewater treatment.

(3) Regulation enforcement

The KSAI Sugar Factory has historically faced legal battles with the Environmental Management Authority (EMA), Kenya's environmental regulator, over breaches in waste management legislation. These allegations from the EMA were supported by the local community who are adversely affected by pollution of local water sources. The ongoing legal costs associated with suits brought against KSAI by the EMA provided the driver for the factory to implement adequate wastewater treatment to achieve National Standards for discharge to the environment.

Outcomes and Challenges

By implementing enhanced aerobic wastewater treatment, where previously there was no wastewater treatment, the sugar factory was able to improve the quality of its effluent by a factor of 3. This has improved downstream water quality which in turn improves downstream water availability. The volumetric impact of this is estimated to be 120,000m³/year.

The implementation of wastewater treatment in the factory has ensured that BOD levels of effluent discharge are in line with National Standards, although challenges remain with respect to COD levels.

The interventions have increased the productivity of water use, however in conjunction with this the factory has significantly expanded and subsequently increased its water withdrawals and so its overall impact on the catchment water balance is limited.



Above: Kibos Sugar Factory wastewater treatment facility