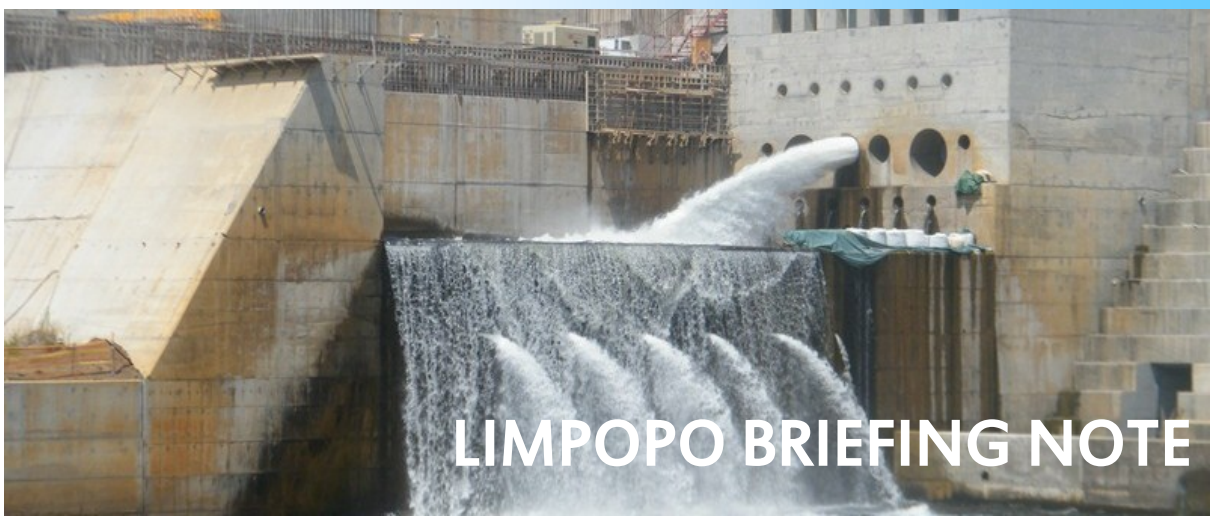
WATER QUALITY



LIMPOPO BRIEFING NOTE

Effluents Treatment: Giving Back to the River

Rapid economic growth in the South African part of the Limpopo river basin has produced better livelihood opportunities for the region's growing population, but growing villages and towns, expanding agriculture and mining operations use an increasing quantity of water. Much of this water is used to carry sewage, fertilizer residue and mine effluents back into the ground water and rivers of the region, including the Limpopo River itself.

Water treatment plants for sewage are managed by local authorities, usually municipalities, under South Africa's National Water Act. Limpopo municipalities own and operate 62 small, medium, large and macro-sized wastewater treatment works (WWTWs). In recent years, government reviews have found that a significant number of sewage treatment plants are not properly operated and maintained and discharge poor quality effluent to streams and rivers. This affects downstream water users, the quality of natural waters and the cost and availability of potable water and its treatment. Causes of the problem include received flows greater than the hydraulic design capacity of the treatment plants, inadequate monitoring of effluent quality as compared to legal discharge standards, and poor technical and health and safety skills and compliance to legal requirements. the water. Runoff from agricultural operations can result in increased nutrient loading of nitrogen and phosphorus, leading to accelerated and exaggerated growth of plant life and algae in the water.

Nandoni Dam, spill way

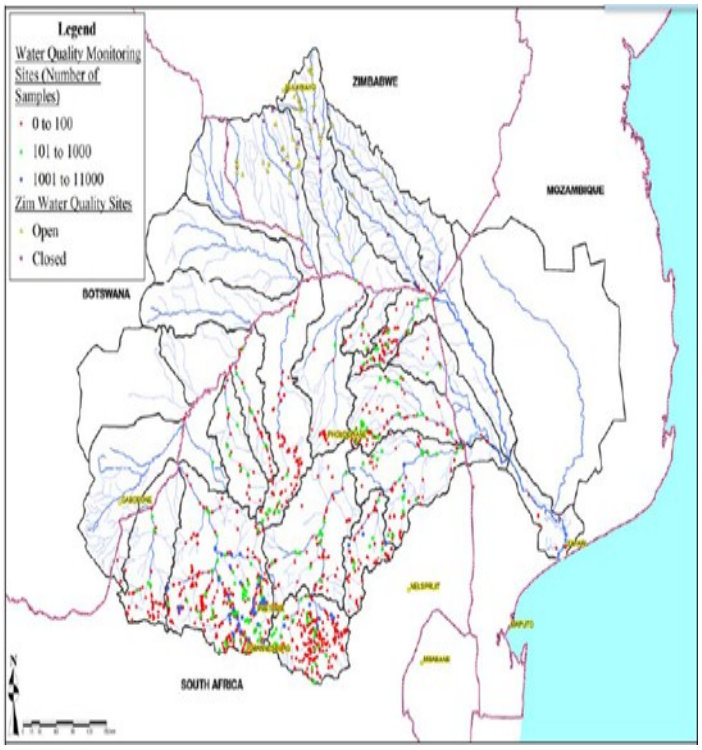
Most of the sub-basins of the Limpopo River basin experience some impacts from commercial and subsistence agriculture, with the sub-basins of the South African and lower Limpopo River also experiencing high impacts from intensive irrigation agriculture in the Crocodile and Marico sub-basins.

There are approximately 1900 active and 1700 inactive mines in the South African portion of the Limpopo basin. Mining operations have an impact on natural water systems through both the process of removing minerals from the earth and from use of water in processing extracted minerals. These impacts are the result of discharge of effluents and seepage from solid waste and tailings dams that contaminate surface and ground waters, alteration of ground water flows by pollution control activities, alteration of river channels and flows. Heavy metals, sulphates and radioactivity from mines are finding their way into the Limpopo river system and are being discovered downstream in Mozambique.

IMPACTS OF POLLUTION

- Lower pH values – altered chemical equilibria
- Increased metal concentrations – potential toxicity to aquatic organisms and human users
- Increased total dissolved salts – salinisation problems for agriculture and sensitive users
- Unsightly / toxic precipitates in streams
- Increased sediment loads – loss of habitat
- Increased water treatment costs to other users
- Corrosion problems in distribution systems
- Public health threats

The Science behind the Issue



Water quality monitoring stations in SA Limpopo Province (Limpopo Scoping Study)

Salinisation of ground water is recognised as a major threat to water quality. Salinity refers to the total dissolved inorganic compounds in the water and is measured by total dissolved solids (TDS). Contributions to salinity due to human intervention includes: discharge of municipal and industrial effluent; irrigation return water; urban storm-water; runoff; surface mobilisation of pollutants from mining and industrial operations and seepage from waste disposal sites, mining and industrial operations. Effects of increased salinity include salinisation of irrigated soils; reduction in crop yields; increased scale formation and corrosion in domestic and industrial water conveyance systems, increased requirement for pre-treatment of selected industrial water uses, and changes in biota.

The Crocodile River offers examples of a variety of water quality issues: the lower river has elevated salinity and phosphate concentrations from irrigated agriculture and the upper river is polluted by effluents from gold mining activities and effluents from wastewater treatment works. The trophic state – that is quantities of nitrogen, phosphorus, and other biologically useful nutrients --of virtually all the dams in the Crocodile River catchment is very high, and overgrowth of algae is common.

Water treatment plants use chemical neutralisation, softening and clarification of wastewater. A portion of the clarified water is then desalinated through a process of filtration and reverse osmosis to lower the total dissolved solids levels of the final plant product water. The reverse osmosis waste is passed through evaporators that super-concentrate the brine for disposal in evaporation ponds.

Once cleaned, the waste water can be re-used in industrial processes or returned to the river in a state that will not adversely affect the river's water quality.

The USAID RESILIM Program supports the LIMPOPO Watercourse Commission (LIMCOM) in helping the people and ecosystems of the Limpopo River Basin to adapt to climate change through effective transboundary water management.

LIMCOM's Integrated Water Resources Management plan has identified Water Quality as a key challenge in the Limpopo Basin.

This work is supported by LIMCOM international cooperation partners

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