

River water quality in the northern sugarcane-producing regions of South Africa and implications for irrigation: A scoping study

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Abstract

Sustainable cultivation of crops under irrigation requires water of appropriate quality, especially with regards to salinity and sodicity. Agriculture can impact negatively on water quality, often through the export of nutrients (particularly nitrogen (N) and phosphorus (P)) from the root zone, resulting in eutrophication of surface water and pollution of groundwater. Sugarcane is the major irrigated crop with regards to area cultivated in the Crocodile, Komati-Lomati and Pongola River catchments. Increasing demand for and use of water resources in these catchments has led to concerns about deterioration in water quality. In this study, chemical water quality data obtained from the South African Department of Water Affairs was used to assess the quality of river water in the above catchments. Electrical conductivity (EC) data show an increase in salt concentration along the river course as a result of various anthropogenic activities in the catchment. Irrigators located further downstream will therefore generally have to pay more attention to the quality of their irrigation water and on-farm salinity management. For the lower parts of the Komati-Lomati and Pongola River catchments, hazards due to sodicity will also need attention. Interestingly, acidifying effects of mine water drainage are potentially being countered by high salt input from agricultural return flow. Nutrient enrichment was evident at many of the river sampling points. Increasing salt, sodicity, N and P over time for most of the rivers studied is also a concern that requires action to ensure the sustainability of irrigation activities in these catchments. More intensive monitoring, including measurement of organic N and P fractions, is recommended to improve understanding of the contribution of different anthropogenic activities to river water pollution and to develop effective mitigation strategies.

Keywords: salinity, sodicity, nitrogen, phosphorus, Crocodile, Komati-Lomati, Pongola River catchments