

Dry season pre-impoundment water quality and the effects of anthropogenic activities: The case of Tokwe river, Zimbabwe

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ABSTRACT

Damming of rivers and the subsequent increase in human activities bring adverse changes to aquatic systems both downstream and upstream of the impoundment. Changes in physicochemical water quality are one such adverse change usually associated with impoundments, but, in Africa, no prior characterisation of the water body is usually done to provide baseline data. A pre-impoundment study was carried between July 2013 and July 2015 to assess the water quality of Tokwe River, Zimbabwe, in the cold dry and hot dry seasons. The study also aimed at assessing the effects of anthropogenic activities along the river on water quality and make inferences on the suitability of the water for freshwater aquatic life. Selected physicochemical parameters were assessed in situ using digital meters and in the laboratory using standard methods. There were spatiotemporal differences in water quality attributable to changes in water volume and anthropogenic activities. Except for sulphates and phosphates, there were no significant differences in water quality parameters amongst zones. Sulphates and phosphates were significantly higher in upstream than in inundated and downstream reaches ($p < 0.05$) whereas TDS, salinity and conductivity were relatively higher upstream than in inundated and downstream zones. Ammonia was higher in upstream and downstream reaches whereas pH was high in inundated area. There were significant ($p < 0.05$) seasonal changes in temperature, pH, total dissolved solids, salinity, conductivity and ammonia between seasons presumably because of local variations in input from runoff and anthropogenic activities. Major anthropogenic activities observed were agriculture, bathing, laundry, cattle grazing, and to some extent, mining and veld-fires used in land clearing for farming. The results of this study showed that water quality of Tokwe River was comparable to other rivers and within levels of good quality prior to impoundment and efforts should be maintained to keep it in good health.