

## Seasonal Variation of the Impact of Mining Activities on Ga-Selati River in Limpopo Province, South Africa

**Authors :** Joshua N. Edokpayi, John O. Odiyo, Patience P. Shikwambana

**Abstract :** Water is a very rare natural resource in South Africa. Ga-Selati River is used for both domestic and industrial purposes. This study was carried out in order to assess the quality of Ga-Selati River in a mining area of Limpopo Province-Phalaborwa. The pH, Electrical Conductivity (EC) and Total Dissolved Solids (TDS) were determined using a Crinson multimeter while turbidity was measured using a Labcon Turbidimeter. The concentrations of Al, Ca, Cd, Cr, Fe, K, Mg, Mn, Na and Pb were analysed in triplicate using a Varian 520 flame atomic absorption spectrometer (AAS) supplied by PerkinElmer, after acid digestion with nitric acid in a fume cupboard. The average pH of the river from eight different sampling sites was 8.00 and 9.38 in wet and dry season respectively. Higher EC values were determined in the dry season (138.7 mS/m) than in the wet season (96.93 mS/m). Similarly, TDS values were higher in dry (929.29 mg/L) than in the wet season (640.72 mg/L) season. These values exceeded the recommended guideline of South Africa Department of Water Affairs and Forestry (DWAF) for domestic water use (70 mS/m) and that of the World Health Organization (WHO) (600 mS/m), respectively. Turbidity varied between 1.78-5.20 and 0.95-2.37 NTU in both wet and dry seasons. Total hardness of 312.50 mg/L and 297.75 mg/L as the concentration of CaCO<sub>3</sub> was computed for the river in both the wet and the dry seasons and the river water was categorised as very hard. Mean concentration of the metals studied in both the wet and the dry seasons are: Na (94.06 mg/L and 196.3 mg/L), K (11.79 mg/L and 13.62 mg/L), Ca (45.60 mg/L and 41.30 mg/L), Mg (48.41 mg/L and 44.71 mg/L), Al (0.31 mg/L and 0.38 mg/L), Cd (0.01 mg/L and 0.01 mg/L), Cr (0.02 mg/L and 0.09 mg/L), Pb (0.05 mg/L and 0.06 mg/L), Mn (0.31 mg/L and 0.11 mg/L) and Fe (0.76 mg/L and 0.69 mg/L). Results from this study reveal that most of the metals were present in concentrations higher than the recommended guidelines of DWAF and WHO for domestic use and the protection of aquatic life.

**Keywords :** contamination, mining activities, surface water, trace metals

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