

The Impact of Mining Activities on the Surface Water Quality: A Case Study of the Kaap River in Barberton, Mpumalanga

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Abstract : Mining activities are identified as the most significant source of heavy metal contamination in river basins, due to inadequate disposal of mining waste thus resulting in acid mine drainage. Waste materials generated from gold mining and processing have severe and widespread impacts on water resources. Therefore, a total of 30 water samples were collected from Fig Tree Creek, Kaapriver, Sheba mine stream & Suid kaap river to investigate the impact of gold mines on the Kaap River system. Physicochemical parameters (pH, EC and TDS) were taken using a BANTE 900P portable water quality meter. The concentration of Fe, Cu, Co, and SO_4^{2-} in water samples were analysed using Inductively Coupled Plasma-Mass spectrophotometry (ICP-MS) at 0.01 mg/L. The results were compared to the regulatory guideline of the World Health Organization (WHO) and the South Africa National Standards (SANS). It was found that Fe, Cu and Co were below the guideline values while SO_4^{2-} detected in Sheba mine stream exceeded the 250 mg/L limit for both seasons, attributed by mine wastewater. SO_4^{2-} was higher in wet season due to high evaporation rates and greater interaction between rocks and water. The pH of all the streams was within the limit (≥ 5 to ≤ 9.7), however EC of the Sheba mine stream, Suid Kaap River & where the tributary connects with the Fig Tree Creek exceeded 1700 uS/m, due to dissolved material. The TDS of Sheba mine stream exceeded 1000 mg/L, attributed by high SO_4^{2-} concentration. While the tributary connecting to the Fig Tree Creek exceed the value due to pollution from household waste, runoff from agriculture etc. In conclusion, the water from all sampled streams were safe for consumption due to low concentrations of physicochemical parameters. However, elevated concentration of SO_4^{2-} should be monitored and managed to avoid water quality deterioration in the Kaap River system.

Keywords : Kaap river system, mines, heavy metals, sulphate

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