

Geochemical Assessment of the Impact of Artisanal Mining on Groundwater Quality of Awo and Ede, Southwestern Nigeria

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Artisanal mining is a major contributor to environmental pollution including groundwater contamination. Thus, groundwater quality is usually at risk in areas where artisanal mining activities are being carried out. Few studies have been carried out to assess the impacts of artisanal mining on the groundwater quality in Nigeria. This study therefore aims at assessing the possible impacts of the artisanal mining of pegmatites of Awo area on the geochemical quality of the groundwater of the mining district and its possible dispersal across neighbouring areas like Ede.

Fifty-nine (59) groundwater samples from the mining district and its environs were collected and analysed for their major ions and heavy metals (Pb, Cd, Cr, Mn, Cd, Zn and Cu).

Results showed that the groundwater has modified its chemistry mainly from the weathered materials derived from the underlying bedrocks. The concentrations of the heavy metals were all below the WHO permissible limit in ground water thus making the water portable for drinking. Whereas seven (7) samples had concentrations of Mg greater than the required local NSDQW limits. Irrigation quality assessment using the indices of Magnesium Ratio, Sodium Adsorption Ratio, Kelly Ratio, Permeability Index, Residual Sodium Carbonate, and Electrical Conductivity also revealed that the groundwater of the study area is generally good for irrigation except for some cases of high magnesium recorded in about half of the samples which can hamper irrigation. The average values of physical parameters like pH, EC and TDS, and average concentrations of the ions and heavy metals of the groundwater samples from the mining districts in Awo area and its environs showed no significant difference from the average ionic concentrations of samples from the other parts of the study area. However, bicarbonate ion got significantly introduced into the groundwater system during transportation due to ion dissociation resulting from CO₂ charge-recharge to produce bicarbonate ions.

Most ion concentrations thus show that the groundwater of Ede and Awo is low mineralized, chemically potable, within WHO standards and suitable for irrigation. Artisanal mining has not adversely impacted the groundwater in the area.