

Geochemical controls and health implications of water chemistry in Benoue River Basin, North Cameroon: Insights from Major ions

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Increase population growth in the north region of Cameroon coupled with rapid urbanisation has led to the widespread of informal settlements in urban areas. Multivariate statistics and hydrochemical diagrams were used to investigate the groundwater chemistry, usability and the impact of urbanisation on water resource quality. The purposive random technique was used to sample and collect 86 water samples from 34 boreholes, 37 wells, 14 rivers and 1 spring during the month of January, 2017. Major ions were analyzed using an Ion Chromatography. The results revealed that, water pH ranged from slightly acidic to basic meanwhile the water types varied from Ca-Cl in wells, Na-HCO₃ in springs and CaMg-HCO₃ in boreholes and rivers. Water sources did not meet WHO, 2006 quality standard with respect to pH (60.5% <7 & >8.5), EC (58.1% >250 μ S/cm) and NO₃⁻ (60.5% >10mg/l). The Wilcox and USSL diagrams for irrigational uses showed that the water sources are of low to moderate salinity and low alkalinity hazard and thus excellent for use in irrigation. Increase concentrations of NO₃⁻ and Cl⁻ from 8.0mg/l to 198.4mg/l and from 2.0mg/l to 59.4mg/l in 1997 and 2017 (20yrs) respectively could be linked to increase population, poor waste disposal and pollution from agricultural fields. While anthropogenic activities are main provenance of NO₃⁻ and Cl⁻, the population is equally affected by fluorosis from lithogenic fluoride and is at risk to nitrate. It is recommended that a monitoring and evaluation system for ground water sources with respect to their quantity and quality be put in place to ensure sustainable management by policy makers.

Keywords: Hydrochemistry, Water resources, Fluorosis, Urbanization, Cameroon