

Hydrochemical and isotopic evidence of recharge, apparent age, and flow of groundwater in Mayo Tsanaga River Basin, Cameroon.

Wilson Yetoh Fantong[1]; Hiroshi Satake[2]; Kazuyoshi Asai[3]

[1] Environmental Biology and Chemistry, Toyama Univ.; [2] Environ. Chem., Toyama Univ.; [3] Geo science lab

Potential effects from unplanned exploitation, lithogenic and human-induced contamination of groundwater constitute emerging water-related threats in MayoTsanaga River Basin. Shallow groundwater from weathered crystalline and Quaternary sedimentary aquifers, together with rain, lake and surface waters were chemically and isotopically investigated to trace its source, recharge mechanisms, age, and flow direction. From the preliminary results, the groundwaters' susceptibility to natural / human-induced contamination and the basin's stage of salinization were inferred. The monsoon rain recharged the groundwater preferentially, while the surface waters recharged the groundwater upon evaporation.

Prior to recharge, evaporation during surface runoff and infiltration caused the rainwater to fractionate annually by -3.5permil for DELTA18O and -22.13permil for DELTAD, accounting for about 32% losses of annually supplied water volume. Although recharge occurs in the plain (328-600m a.s.l), discernable recharge altitude ranges from 655-840 m a.s.l, and occurs at an average rate of 87.8 mm/a. The groundwater shows apparent age ranging from 2 years to 58 years, getting older towards the margin of the basin and coevally becoming enriched in Na⁺ and F⁻ ions due to rock dissolution and depleted in NO₃⁻, and Cl⁻, due to dilution during mixing. Accordingly, younger groundwaters in recharge zones are more susceptible to human-induced contamination, and older groundwaters are sinks of lithogenic fluoride. Positive correlation between groundwater age and electrical conductivity indicates that the basin is at an early stage of salinization. Spatial translation of this result may provide a tool for planning a monitoring scheme of groundwater in the basin.