THE HYDROGEOCHEMISTRY AND WATER QUALITY OF TIMBOROA-AINABKOI AREA

by

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A thesis submitted in partial fulfilment for the
degree of Master of Science in the University of Nairobi

1990

This Thesis is the original work of the author and it has not been submitted in any other University.

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ABSTRACT

The area of Investigation is Timboroa - Ainabkoi area which is approximately bounded by the Equator and 0° 15'N Latitude and Longitudes 35° 30' and 35° 35'E. It is an intensive potato growing area where by phosphate fertilizers and other agricultural chemicals are used. The geology of the area consists of Tertiary Volcanics and sediments together with Quarternary tuffs.

The quality of the waters has mainly been determined from the concentraction of selected trace elements. The trace elements analysed for are cadmium, iron, lead, copper, zinc, manganese, barium, mercury and fluoride. The quality of the water has generally been found to be poor due to the presence of mercury in concentrations higher than those recommended for drinking water and deficiency in the essential trace elements such as zinc, copper and manganese.

The quantity of the total dissolved solids has also been used to indicate the water quality. Other parameters used in quality determination are the concentration of sodium, calcium and magnesium in the waters. In addition, silicon and aluminium have been determined, as have total suspended solids, pH, field temperatures and flow rates of some streams. The total suspended solids have been found to range from 0.4 to 169.7 ppm. The pH ranges 5.6 to 7.6. The field temperatures range from 12 to $28^{\circ}C$ and the flow rates range from 0.008 to $0.25M^{3}S^{-1}$.

The waters are very dilute as indicates by low values of TDS. TDS has been shown to depend largely on the concentration of calcium in the waters.

In the caltivated areas, cadmium, iron, lead, copper, zinc, manganese, barium, mercury, fluoride, calcium, magnesium, sodium, potassium, aluminium and silica range from /0.001 to

/0.0126ppm. /0.005 to 2.52ppm, /0.05 to 0.16ppm, /0.002 to 0.05ppm, /0.001 to 0.018ppm, /0.02 to 0.082ppm, /0.008 to 0.169ppm, 0.005 to 0.066ppm, 0.27 to 0.67ppm, 0.425 to 4.9ppm, 0.17 to 2.38ppm, 1.4 to 13.6ppm, 0.75 to 12.5ppm, /0.02 to 3.2ppm, and 4.2 to 16.8ppm respectively . In the uncultivated areas their concentration ranges are /0.001 to 0.0084ppm, /0.005 to 1.04ppm, /0.05 to 0.16ppm, /0.002 to 0.05ppm, /0.001 to 0.018ppm, /0-02 to 0.23ppm, /0.008 to 0.113ppm, 0.011 to 0.059ppm, 0.3 to 0.55ppm, 0.44 to 3.75ppm, 0.32 to 2.29ppm, 1.25 to 15.4ppm, 1.35 to 4.1ppm, /0.02 to 2.3ppm and 4.5 to 25.8ppm.

Conductivity has a range of 0.02 to 0.13mha cm^{-1} in ground water from cultivated areas while it is 0.02 to 0.06mhocm^{-1} in the uncultivated areas. TDS has a range of 17 to 255ppm in the ground water from the cultivated areas while it is 19 to 154ppm in the uncultivated areas.

This indicates that agricultural activities have a significant impact on the chemistry of the waters.