

Diagnostic Assessment of Groundwater Hydrodynamics and Hydrostratigraphy of Kisumu Aquifer for Sustained Urban Water Supply

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Japhet Kanoti, *Daniel Olago, Nobert Opiyo-Akech, Christopher Nyamai

Department of Geology
University of Nairobi
P.O Box 30197 – 00100
Nairobi
Kenya

These authors contributed equally to this work.

*Author to whom correspondence should be addressed; E-Mail: dolago@yahoo.co.uk
Tel:+254-20-4442015 ext 2095

Abstract

The paper presents a diagnostic assessment of groundwater hydrodynamics and hydrostratigraphy of Kisumu aquifer in Kenya. The aquifer is located in the Kavirondo rift. Geologically, the study area is underlain by a large diversity of rock types ranging in age from Recent to Archean. It is evident from the study that the variation of rock types, ages, post-depositional alteration, and weathering influence the hydraulic properties of the rocks in the area and consequently the water yields and quality. The surfaces of the weathered layers are usually clayey and range in thickness from 5 to 50 meters. Most hand dug wells are located in this zone. Between the weathered layer and the fresh bedrock, partly altered rock material occurs. This zone has a higher porosity and

permeability, and the thickness ranges from 80 to 150 m in the topographically lower areas. This layer is very thin on steep slopes and hill tops. This horizon has relatively low groundwater yields. Beyond 200m, aquifers are quite productive. The study concludes that groundwater hydrodynamics in the study area is controlled by the rock history and deformation: structural deformation over time has resulted in a large number of linear structures which are co-located with high yielding water points. Chemical analyses of water samples confirm that the water is generally suitable for human and animal consumption, domestic and industrial use, and for irrigation purposes. However, the deeper boreholes contain fluoride higher than the recommended limits and the shallow wells are contaminated by faecal contaminants.

Keywords: Kisumu, groundwater, hydrostratigraphy, hydrodynamics