Journal of Hydrogeology & Hydrologic Engineering

Commentary

A SCITECHNOL JOURNAL

Hydrometeorology

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Received date: April 09, 2021; **Accepted date:** April 23, 2021; **Published date:** April 30, 2021

Description

Hydrometeorology presents an introduction to relevant topics within the interdisciplinary fields of hydrology and meteorology. This book is one among the few books getting to provide a balance between aspects of meteorological and hydrological processes. The transfer of energy and water between the land surface and lower atmosphere within the hydrological cycle is addressed followed by an outline of the character of precipitation, and the way it's formed. Forecasting precipitation is reviewed on all scales, and therefore the range of rainfall-runoff models and coastal surge models and forecasts (including tsunamis) which are, and are being, used are discussed.

The mechanisms of snow, ice (glacier, sea and tundra), evaporation and transpiration, how drought occurs and therefore the representation of wind are described. How rainfall (including radar measurements) and river flow information is gathered and analyzed (including, frequency analysis, Probable Maximum Precipitation and Flood) are presented. Satellite measurements of precipitation are discussed. samples of major past floods and droughts are given.

The project site falls within the Abbey basin. The geomorphology of the study area comprises a part of Abbey river plateau composed of Tertiary volcanic unit, dominantly basalt, bounded within the west by deep Mugher River gorges. Mesozoic sedimentary units are exposed within the deep gorges. The formation and hydro-geological conditions of the world are a function of geomorphology. the overall hydro-geological found out of the world is governed by the lithological stratigraphy of the world and tectonics. The recharge condition, groundwater flow and aquifer parameters within the plains of the study area is very governed by the overall bedding of the sedimentary formation underlying the volcanic unit (at reconnaissance level it's confirmed to be in south and southeast direction), the tectonic condition and therefore the hydraulic properties of the various volcanic units that outcrop within the study area.

The study conducted by WWDSE, 2007 has revealed that direction of the regional groundwater flow direction is especially north-south direction and has identified aquifer configurations of the world, the recharge and discharge mechanism and aquifers properties. Accordingly, the scoraceous basalt formation may be a multi-layered aquifer where it's separated by variety of paleo sols and large basalts. The yield of the boreholes and therefore the static water level increases because the well depth increases.

This is the main aquifer within the study area, which features a wide distribution and consists of Tertiary Tarmaber volcanic unit, which is dominantly scoraceous basalt and Amba Aiba basalt. These Tertiary basalt formations occupy a serious a part of the plains within the study area. Tarmaber and Amba Aiba basalt formations are considered together hydrogeological unit. The recent mapping wells drilled at Segno Gebeya and Chancho proved this fact. for instance, at Segno Gebeya the depth up to 250m was scoraceous basalt intercalated with minor massive basalt and therefore the remaining depth up to 273 m was the sedimentary unit. the entire drilled depth at Chancho site was scoraceous basalt with thin massive basalt intercalations. The static water level varies from 0 to 70 m. The yield of boreholes is bigger than 2 l/s. The water quality is fresh.

The water table elevation relief map is ready using the springs and shallow wells data to construct the shallowest zone of the main aquifer within the study area (Fig. 4.23). The map shows that shallow groundwater flows mainly within the south direction, and this might be the most reason that there are springs emerging from the basalt formation on the plain (Plateau) but not at the contact zones of the sedimentary formation within the Mugher gorges. The recharge estimation made by different methods by different researchers varies from 100 mm/year to 250 mm/year (WWDSE 2007, Debebe M.2005, Nigussie K. 2005, et. al) within the study area. Accordingly, the entire annually recharge of the main aquifer within the study area is estimated from 49 Mm3 /year to 123 Mm3 /year. so as to not overestimate the recharge, the minimum recharge 49 Mm3 /year is taken into account to be the entire recharge within the study area of about 400 km2. If we consider that fifty of the recharge is discharged as base flow through springs and seepage zone, the minimum net groundwater recharge might be quite 25 Mm3 /year.

Citation: Jialun L. *(2021). Hydrometeorology. J Hydrogeol Hydrol Eng 10:4.*