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Determining the groundwater potential for agricultural use in Ethiopian Highlands

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The Ethiopian government has declared the Lake Tana - Beles region as a growth corridor. Irrigation development is one of the priorities. Groundwater has the greatest potential for increasing irrigation. However there is lack of information on ground water availability and rates of recharge and thus rates of sustainable withdrawals. Therefore the objective of this research is to determine the groundwater recharge. The study was conducted in Robit-Bata, an experimental watershed of 911 ha, located at the south-eastern edge of Lake Tana. More than 300 hand dug wells are used for domestic use and irrigation of Chat mainly in the watershed. Fifty wells were selected for water table observations starting from April, 2014. Daily Precipitation was recorded for the same period. The annual recharge was estimated using the water – level fluctuation method. Specific yield was defined as the difference of porosity and field capacity of the subsurface formation. We found that annual average areal groundwater recharge was 640 mm/year, which is 41% of the rainfall and ranged from 50 mm to 390 mm per week for the various locations in the watershed. The greatest recharge amounts were found in the plains at the foot of the hills and river course areas consisting mostly weathered basalt rock. At those locations the groundwater rose steadily during the rainy monsoon phase. Smaller amount of recharge occurred both near the top of the hills with tough rock formation and in the, flat areas near to stream with sandy and clay deposits and groundwater at, shallow well depth. Our study indicates that the current use of the groundwater seems sustainable. Further research is required for optimized utilization of the limited groundwater resources for irrigation development to meet the food security of the community.

Key words:Recharge, Shallow groundwater, water level fluctuation, Robit – Bata, Ethiopian highlands