



Spatial and temporal variability of groundwater recharge in Gidabo Basin, southern Main Ethiopian Rift: Towards an optimal management of groundwater resources

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The amount of water that may be extracted from an aquifer without causing depletion is primarily dependent upon the ground water recharge. Thus, a quantitative evaluation of the spatial and temporal distribution of ground water recharge is a pre-requisite for operating ground water resources system in an optimal manner. By applying the semi-distributed hydrological model SWAT (Soil and Water Assessment Tool), groundwater recharge is estimated at a sub-basin level by combining climate, land use, soil and slope characteristics for the Gidabo River Basin, southern Main Ethiopian Rift.

Hydrographs from four tributaries of the Gidabo River are used to calibrate and validate the model which is then used to estimate groundwater recharge for the whole basin. The recharge distribution exhibits strong spatial and temporal variations within the available time frame of more than ten years. For instance, a decrease in recharge is observed from plateau towards the rift center across the basin because of the spatially changing climate conditions and vegetation cover. Recharge also varies temporally with noticeable inter-annual difference over the investigated period as well as distinct seasonal patterns. The highest values are found slightly delayed to the regular rainy seasons, which last from April to May and from September to October. Further research is essential to understand the recharge mechanism and to assess the sustainability of development activities relying upon groundwater in the region.