



Hydrological Response of Semi-arid Degraded Catchments in Tigray, Northern Ethiopia

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To address water scarcity in the arid and semi-arid part of developing countries, accurate estimation of surface runoff is an essential task. In semi-arid catchments runoff data are scarce and therefore runoff estimation using hydrological models becomes an alternative. This research was initiated in order to characterize runoff response of semi-arid catchments in Tigray, North Ethiopia to evaluate SCS-CN for various catchments. Ten sub-catchments were selected in different river basins and rainfall and runoff were measured with automatic hydro-monitoring equipments for 2-3 years. The Curve Number was estimated for each Hydrological Response Unit (HRU) in the sub-catchments and runoff was modeled using the SCS-CN method at $\lambda = 0.05$ and $\lambda = 0.20$. The result showed a significant difference between the two abstraction ratios ($P = 0.05$, $df = 1$, $n = 132$) and reasonable good result was obtained for predicted runoff at $\lambda = 0.05$ ($NSE = -0.69$; $PBIAS = 18.1\%$). When using the CN values from literature runoff was overestimated compared to the measured value ($e = -11.53$). This research showed the importance of using measured runoff data to characterize semi-arid catchments and accurately estimate the scarce water resource.

Key words: Hydrological response, rainfall-runoff, degraded environments, semi-arid, Ethiopia, Tigray