



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Groundwater Dynamics in Hardrock-dominated Headwaters Regions of Paschimi Nayar River, Mid-Himalaya through Assessment of Stream Flow, Spring flow and borehole data

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SHORT ABSTRACT

Small basin research has contributed significantly to the process based understanding of internal functioning of the catchments. In this study, two microwatersheds of area $< 10\text{km}^2$ and a small hydrological response unit (HRU) ($< 0.4\text{km}^2$) nested within one of experimental microwatershed are being investigated through hydrological instrumentation in terms of rain gauges, water level recorders at the outlet for continuous stream gauging as well groundwater level measurements in shallow and deep fractured bedrock aquifers in the smallest HRU to better understand the hydrological functioning in the headwater regions of Paschimi Nayar Basins. The precipitation variability of ISM during 2009 to 2018 period showed inter-annual variability with drought, intermittent multiple deficient rainfall periods and normal monsoon rainfall years. Analysis of long-term records of spring flow through flow duration curve indicates a significant reduction in lowflows as well as high flow periods. Recession curve analysis using single non-linear and two exponential linear reservoir models for the recession period indicate an overall non-linearity in storage-discharge relationship. A parallel offset was observed between years in yearly-prolonged post-monsoon recession curve in $-dQ/dt$ verses Q plot indicating the control of antecedent storage over rate of outflow. Shallow piezometer (< 4 m) and deep borewell (< 80 m) monitored over two monsoon period indicate a rapid response to any rainfall amount exceeding 5mm. The episodic recharge and water level fluctuation method indicate a monsoonal recharge of 4% to 24% for a low specific yield value (1 to 5%). The study also highlight that effectiveness of recharge is controlled by the rainfall intensity.

