



## **Assessing the hydrological impacts of landuse and climate change in a wet humid tropical catchment in India**

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The changes in watershed hydrology are influenced mainly by two factors i.e landuse/landcover and climate variability. Hence, quantitative assessment of the effects of landuse/landcover and climate change is imperative for water resources management at river basin-scale. In the present work, a distributed hydrologic model SHETRAN is utilized to assess the relative impacts of landuse change and variability in climate on hydrology (streamflow and evapotranspiration) of a small wet tropical humid catchment (Vamanapuram river basin having an area of 787 sq.km) in Southern part of India. The past landuse changes within the river basin were identified using landuse maps for the years 1985, 1995 and 2005. In order to analyze the effect on streamflow and evapotranspiration of the river basin, three scenarios were generated in the study which included assessing i) the effect of only landuse change under a constant climate, ii) the effect of varying climate while maintaining constant landuse and iii) integrated effect of both varying climate and landuse change.

The values of statistical indices such as Nash–Sutcliffe efficiency (NSE), ratio of root mean square error to measured standard deviation (RSR) and Percent bias (PBIAS) along with the visual comparison of observed and simulated streamflow indicated the capability of SHETRAN model in evaluating hydrological changes within the analyzed catchment. The main changes from 1985 -2005 were: increase in built up land by 97%, increase in grassland by 28%, decrease in mixed forest by 8%, and decrease in cropland by 12%. Due to landuse landcover change, the streamflow increased by 30.5mm/yr (3%) whereas the actual evapotranspiration decreased by 29mm/yr (2.4%). The variation in climate increased streamflow by 113mm/yr (10.7%) and increased evapotranspiration by 19mm/yr (1.56%). Combined effect of climate and landuse change increased streamflow by 139mm/yr (13%) and decreased evapotranspiration by 9mm/yr (0.8%). The influence of climate variation on hydrology of the river basin was more pronounced compared to the landuse change during 1985-2005 in Vamanapuram river basin.