QUANTIFICATION OF HYDROLOGICAL RESPONSES TO LANDUSE CHANGES USING REMOTE SENSING AND GIS TECHNIQUES

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Abstract

Pristine forests rich in flora and fauna are being cleared especially in the tropical areas to keep up with the general development of civilizations, economies and increasing populations. This has given rise to concerns about landuse/landcover changes with the realization that land processes influence climate. Studies have further indicated its impact on the hydrological cycle and thus the water budget of a region. The present study is an attempt to quantify the hydrological components using Sharavathi river basin as a case study and to determine its changes over time using remote sensing and GIS. Western Ghats region is species rich with a fair degree of endemism in both flora and fauna. A dam was put across the Sharavathi River in 1964 for harnessing electricity. Over the years there have been changes in the landuse/landcover owing partly due to unplanned anthropogenic activities subsequent to setting up of the dam. This study

explores and quantifies the hydrological parameters that have altered due to large scale land use and land cover changes. In this regard, satellite data has offered excellent inputs to monitor dynamic changes through repetitive, synoptic and accurate information of the changes in a river basin. It also provided a means of observing hydrological state variables over large areas, which was useful in parameter estimation of hydrologic models. GIS offered means for merging various spatial themes (data layers) that was useful in interpretation, analysis and change detection of spatial structures and objects. Studies reveal the linkages among variables such as land use, hydrology and ecology. Regions with significant forest cover and low anthropogenic activities resulted in lesser runoff, higher recharge and thus higher yield to stream resulting in perennial streams whereas regions with poor forest cover and higher anthropogenic activities showed higher runoff, significant reduction of recharge and thus lower yield to streams resulting in ephemeral streams.