L - 60

Landscape dynamics, Rainfall and Stream Flow: Linkages

Anindita Dasgupta and T. V. Ramachandra

Energy & Wetlands Research Group, Centre for Ecological Sciences,
Indian Institute of Science
Bangalore – 560 012, INDIA

Email: anindita_dasgupta@ces.iisc.ernet.in, cestvr@ces.iisc.ernet.in
http://ces.iisc.ernet.in/energy

Land use Land cover (LULC) and rainfall are critical for ecological stability of watersheds. The role of LULC on hydrological processes is crucial in many ways because they maintain catchment's water balance through interception and transpiration. Forests are important for hydrological systems as they aid in increasing rainfall and runoff, regulate water flow, reduce erosion and improve water quality. Soil with vegetation cover acts as a reservoir that store vast quantity of water used by plants and trees or released into streams and rivers. Increased reforestation on unstable land and around lakes, rivers and streams help to increase the water-retention capacity of land and improve water quality. However in recent times human activities have led to serious LULC changes, vegetation degradation, natural resource exploitation and wetland disappearance. To a large extent, afforestation and deforestation are major human activities responsible for these enormous environmental changes. Indiscriminate cutting of trees have decreased the storage of ground water sponge, leading to water shortages during dry seasons and, in wet seasons, to brief destructive floods, during which very little water is absorbed by the soil. Large productive land, where annual rainfall is relatively high, becomes desert when vegetation cover is removed. Therefore, there is a need to study the linkages between LULC, forest fragmentation, rainfall and stream flow (seasonal and perennial). In this context, remote sensing data coupled with other primary data such as rainfall, amount of green cover, type of forest, and other ground level information, etc. can be used to analyse this relationship in watersheds. In this study, we attempt to study the Kali river basin in Uttara Kannada district, Karnataka state, India. The river basin is divided into ten small subbasins to study dynamics of LULC change and establish a relationship between stream flow and other parameters. Land use analysis (agriculture, evergreen forest, plantation, built up, waste land and water bodies) is done basin wise and forest fragmentation is computed to assess the amount of patch, transitional, edge, perforated and interior forest. Finally a mathematical relationship is established between the number of streams as a function of LULC, rainfall and forest fragmentation to identify the important parameters that play a pivotal role in deciding the water retaining capacity of the streams (seasonal or perennial).

Keywords: *Land use land Cover, forest fragmentation, Kali river basin, deforestation, stream flow*