J1.17 The Role of Vegetation in the Mountainous Regions of the Central Himalayas

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The role of vegetation in the hydrology of regions of strong altitudinal gradients is investigated using a distributed hydrologic model with dynamic vegetation in Central Nepal. The region of study is characterized by the presence of four major ecotones over a distance of only a few kilometers. These ecotones are in turn associated with strong gradients in annual precipitation amounts as well as temperature. At high elevations (> 4,000) up to 40 per cent of all precipitation falls during the winter months as snow, whereas at lower elevations all precipitation (about 400 cm per year) occurs during the summer monsoon as rainfall. In this work, we first characterize the differences in the hydrologic regimes of catchments with different vegetation cover focusing on the simulation of both water and energy cycles for a period of three years (1999-2001). Next, we investigate the association between precipitation regime and watershed ecohydrology, and between watershed ecohydrology and rainfall-runoff dynamics. A conceptual model is proposed to generalize our findings to larger areas and over longer time-scales.

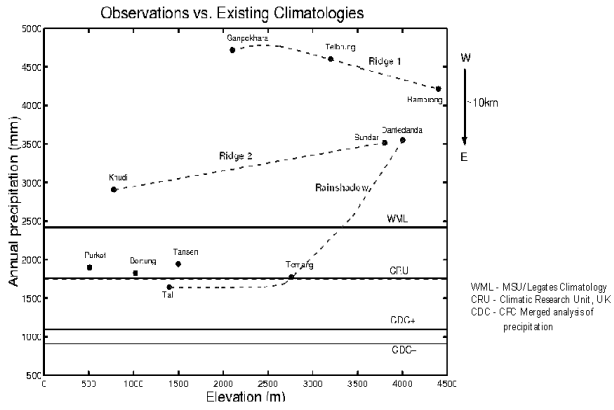

Figure 1. Annual precipitation distribution within the Upper Marsyandi river basin. Note the large spatial variability in annual precipitation over the area. Precipitation decreases by as much as 1.5 m between adjacent ridges going west to east and again by an equivalent amount in the rainshadow are

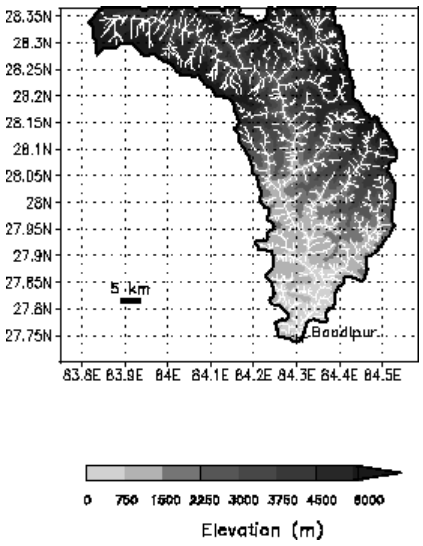

Figure 2. DEM and stream network of the Upper Marsyandi river basin delineated at Bandipur (~2,762 km^2).

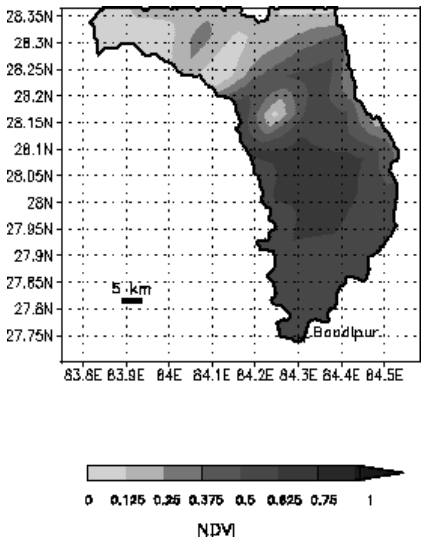

Figure 3. 10-day AVHRR NDVI during 01-10 June 2000.

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e-mail: barros@deas.harvard.edu.