

Abstract

The hydrological response of catchment areas to rainfall depends on the interplay between climatic, geological and land use variables. Understanding how land use activities and climatic factors influence stream flow enables planners to formulate policies towards minimizing undesirable effects of future land-use changes on stream flow patterns. This study determined the relationship between rainfall amounts, temperature patterns, land use and land cover changes on stream flow regime in River Gucha Catchment. Land use and land cover, rainfall, temperature and stream flow annual data of the study area for the years 1976, 1993 and 2010 were computed. Regression scatter diagrams were computed and coefficient of temperatures and area percentages of land use and land cover types against total annual stream flow for the period between 1976 and 2010 produced. Total stream flow versus land use and land cover showed strong relationship with a coefficient of determination (R^2) of 0.8440. Correlation between rainfall and temperature with stream flow showed moderate (R^2) of 0.4595 and 0.5564 respectively. The higher correlation of land use and land cover with total stream flow was either due to expansion of agriculture and reduction of forest covers hence reducing evapotranspiration which caused soils to be wetter and therefore more responsive to rainfall or lack of good land husbandry which reduced infiltrability of the soil surface. If all other variables like rainfall and temperature were held constant, a significant increase in stream flow was expected as a consequence of expansion of agriculture and reduction of forest cover. This could lead to increased soil erosion and flooding in the lower parts of the catchment. Control measures against increased runoff need to be applied, where agricultural land has to be given priority with emphasis on proper farming practices and planting trees suited to the area.