

Abstract

There is growing concern however, regarding land degradation in the Mara River Basin in Kenya, particularly deforestation in the headwaters; that is affecting the natural resource base and the river flows. Scientific studies are required to advise on policy issues, and to plan appropriate mitigation measures in the basin. This study utilized remote sensing and geographical information system (GIS) tools, and hydrological and ground-truth studies to determine the magnitude of the land-use/cover changes in the Mara River Basin, and the effects of these changes on the river flows over the last 30 years. The results of the studies indicate that land-use/cover changes have occurred in the basin. In 1973, for example, rangelands (savannah, grasslands and shrub lands) covered 10,989 km² (79%) of the total basin area. The rangelands have now been reduced to 7,245 km² (52%) by 2000. The forest areas have been reduced by 32% over the same period. These changes have been attributed to the encroachment of agriculture, which has more than doubled (203%) its land area over the same period. To investigate the effects of land cover change on river flow, stream flow was generated from derived land cover thematic maps of 1973 and 2000 using the same rainfall and evaporation data of 1983 to 1992 period. The other model input datasets for topography and soils were held constant during the two runs. The differences in the generated hydrographs could only be associated to the changes in land cover, which was the only variable. The percentage difference between the mean annual stream flows of the two hydrographs was negligible at 0.01%. This study therefore concludes that land cover changes in the basin have changed the day to day flow characteristics of the Mara river but the annual flow volumes remain unaffected. There is need for urgent action to stem the land degradation of the Mara River Basin, including planning and implementing appropriate mitigation measures.