

In this study, land cover changes in the Nyando River basin (3500 km²) of Kenya were analyzed and their impact of floods quantified. Three Landsat satellite images for 1973, 1986 and 2000 were acquired, processed and classified based on seven major land cover classes prevalent in the basin using a hybrid of supervised and non supervised classification procedures. The detected land cover changes, together with a DEM and a soil map of the basin, were then used to estimate physically based parameters for the selected hydrological models. The models were then used to estimate local and flood peak discharges and volumes arising from selected storm events for each state of the classified land cover dataset. To further understand how changes in the land cover may impact on the flood hydrology, three scenarios that represent quite extreme alternatives were formulated to study the possible bandwidth during floods. Land cover classification results revealed immense land degradation over the span of study. Forests reduced by an area of 488 km² representing a 20% decline, while agricultural fields expanded by 581 km² representing a 16% increase over the same period of time (1973-2000). Hydrological modeling results indicated that the basin underwent significant increase in the peak discharge value. The flood peak discharges in the whole basin were noted to have increased by at least 16% over the period of 1973 -2000. Flood volumes were also noted to have increased by at least 10% over the same period of time. (author)