

The spatio-temporal changes in the land cover states of the Nyando Basin were investigated for auxiliary hydrological impact assessment. The predominant land cover types whose conversions could influence the hydrological response of the region were selected. Six Landsat images for 1973, 1986, and 2000 were processed to discern the changes based on a methodology that employs a hybrid of supervised and unsupervised classification schemes. The accuracy of the classifications were assessed using reference datasets processed in a GIS with the help of ground-based information obtained through participatory mapping techniques. To assess the possible hydrological effect of the detected changes during storm events, a physically based lumped approach for infiltration loss estimation was employed within five selected sub-basins. The results obtained indicated that forests in the basin declined by 20% while agricultural fields expanded by 16% during the entire period of study. Apparent from the land cover conversion matrices was that the majority of the forest decline was a consequence of agricultural expansion. The model results revealed decreased infiltration amounts by between 6% and 15%. The headwater regions with the vast deforestation were noted to be more vulnerable to the land cover change effects. Despite the haphazard land use patterns and uncertainties related to poor data quality for environmental monitoring and assessment, the study exposed the vast degradation and hence the need for sustainable land use planning for enhanced catchment management purposes.