

**MODELING THE INFLUENCE OF LAND USE CHANGES ON WATER AND
SEDIMENT YIELD IN THE THIKA RIVER CATCHMENT
USING SWAT MODEL**

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ABSTRACT

The Thika River catchment has undergone tremendous changes in land use and land cover in the recent past. These changes are suspected to have impacted negatively on the hydrology and soil conservation of the catchment. In order to make recommendation for the management of the Catchment, a study was undertaken to assess the impact of the changes in land use and land cover on water and sediment yield on Thika River Catchment, whereby land cover changes from the satellite images of 1987 and 2000 were analysed. Weather and stream flow data for the years 1979-1984 were used to simulate streamflow and sediment yield using Soil and Water Assessment Tool (SWAT) model.

Remote sensing and GIS techniques using Idrisi Kilimanjaro software were used in evaluating land use and cover changes.

The results revealed that the forest cover in the Thika River catchment decreased by 36%, the area under horticultural crops increased by 32% while the built up area expanded by a whopping 141%. Deforestation is mostly occurring on the highlands forests whereas opening of land for agriculture is in the upper midland and along the river channels.

The calibrated SWAT model accurately predicted the streamflow in the Thika River under different land use and land cover scenarios with an R^2 of 82%. The scenario studies indicated that increasing forest cover would substantially reduce sediment yield and modulate stream flow. A 100% forest cover would decrease the current sediment yield by 30%, while a decrease in forest cover of 20% would increase sediment yield by 40%.

It is therefore recommended that planting of trees and agro forestry should be undertaken to increase the forest cover of the catchment and consequently reduce sediment yield.