

# **HYDROLOGICAL SIMULATION OF MAHANADI RIVER BASIN AND IMPACT OF LAND USE / LAND COVER CHANGE ON SURFACE RUNOFF USING A MACRO SCALE HYDROLOGICAL MODEL**

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## **ABSTRACT:**

In the present study Variable Infiltration Capacity (VIC) a macro-scale hydrological model was used to simulate the hydrology of Mahanadi river basin of India (80030' to 86050' East longitudes and 19020' to 23035' North latitudes, Basin area= 1,41,600 sq.km.) and analysis were carried out of the impact of land use/ land cover (LULC) changes on stream flow pattern. The LULC was derived using LANDSAT MSS for 1972, NOAA AVHRR for 1985, and AWiFs for 2003. Analysis of the LULC changes revealed that the total forest cover area has been reduced by 5.71% from 1972 to 2003. There is an increase in areas of built up land (0.22%) and agriculture (5.55%). Major changes were from forest to agriculture and built up land. MODIS LAI and ALBEDO was used for the year 2003. Surface runoff was simulated for the year 1972, 1985 and 2003 to look for the changes that have taken place due to change in LULC. Only the vegetation related parameters were changed during simulation, forcing was kept same to avoid the effects of climate change. An increase by 4.53% (3514.2 million cubic meters) in the annual streamflow is predicted at Mundali outlet of the Mahanadi basin from 1972 to 2003. This is attributed to decrease in forest cover by 5.71% . VIC model performance was found good and a close agreement between the observed and simulated values was obtained with the Nash-Sutcliffe coefficient of 0.821 and relative error of 0.085 at the basin outlet at Mundali.

**TOPIC:** Remote sensing applications

**ALTERNATIVE TOPIC:** Change detection and process modelling