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SUBDIVISION EFFECT OF WATERSHED ON SURFACE RUNOFF AND SEDIMENT YIELD—A SWAT MODEL SIMULATION

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ABSTRACT : Present investigation aims to evaluate the effect of watershed subdivision on simulated surface runoff and sediment yield using adequately tested Soil and Water Assessment Tool (SWAT) model for the Nagwan watershed in eastern India. Observed meteorological and hydrological data including daily rainfall, temperature, runoff and sediment yield for the years 1995 to 1998 have been used in this study. The watershed and sub-watershed boundaries, slope and soil texture maps were generated by using GIS. Supervised classification method was used for land use/cover classification from satellite imagery of 1996. In order to study the effect of watershed subdivision, the watershed was spatially defined under four decomposition schemes, *viz.*, single watershed (1 WS), four sub-watershed (4 SWS), eight sub-watershed (8 SWS) and twelve sub-watersheds (12 SWS). Results of the study showed that the number and size of sub-watersheds do not appreciably affect monthly surface runoff. However, an upper limit of sub-watershed size is required for adequate simulation of the sediment yield produced from upland areas of the watershed. On the other side the surface runoff indicated negligible variation among all the four cases and variations in sediment yields among three cases including 1 WS, 4 SWS and 8 SWS. The 12 SWS has been found to be appropriate because it has non significant effect on simulated sediment yield as compared to observed sediment yield. Thus, it can be concluded that the watershed subdivision had negligible effect on surface runoff. Additionally, the lesser number of watershed subdivisions had significant effect on monthly sediment yields if simulated by the SWAT model.

Key Words: GIS, Remote sensing, Runoff, Sediment yield, Sub-watershed, SWAT model.