Runoff simulation by using Wetspa model and GIS in Garmabrood watershed of Mazandaran province.

Abstract

Modeling the process of rainfall-runoff in a chatchment, have especial importance in water resources management, river engineering and flood control and storage dams.WetSpa is a GIS-based distributed hydrological model, that operates on catchment scale and developed for flood prediction and watershed management. The model is physically based and simulates hydrological processes of precipitation, snowmelt, interception, depression, surface runoff, infiltration, evapotranspiration, interflow, groundwater flow, etc. continuously both in time and space, for which the water and energy balance are maintained on each raster cell. The model combines topography, landuse and soil maps, and observed daily meteorological time series to predict discharge hydrographs and the spatial distribution of hydrological parameters in the catchment. The area of the catchment is about۱۱۳۳ km۲ and elevations in the catchment range from ۲۱۳ to ۳۱۳٦ m at the outlet, with average slope of ۲۵.۷۷ %. The digital maps of topography, land use and soil type are ۳ base maps used in the model in GIS form using ۹۰×۹۰m cell size. Results of the simulations show a good agreement between calculated and measured hydrographs at the outlet of the basin. The model predicts the daily hydrographs with a good accuracy, between ۵۲.۲٤ to ۵۹.٦۸ % according to the Nash-Sutcliff criteria. Simulation results indicate that the model has been able to estimate the distributed hydrological parameters as well as water balance, and can be used for daily flow estimating.

Keywords: Watershed modelling, WetSpa, GIS, Runoff, Flood prediction

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