

Hydrologic model SWAT Setup to Predict Flash Flood in the Northeast Haor Regions of Bangladesh

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Abstract

Due to the topographical condition the northeast region of Bangladesh is most vulnerable to flash flood during the premonsoon season (March-May). Only 36,200 sq km of the total drainage area of the Meghna (802,000 sq. km) lies in Bangladesh. As the meghna river system originates and propagates through the hilly areas of India of complex hydrologic characteristics, small amount of heavy rainfall on this part may cause catastrophic flood situation in the northeast regions of Bangladesh. Agriculture system especially Boro crop cultivation have to face huge loss due to this flash flood. The Haor Infrastructure and Livelihood Improvement Project (HILIP) is working to develop the livelihood condition of the people living in Sunamgonj, Kishoregonj, Netrokona, Habigonj and Brahmanbaria district of the northeast regions of Bangladesh. A part of this project also introduce a Flash Flood Early Warning System (FFEWS) which will find out flows at 25 flash flood warning points. Semi-distributed hydrological model SWAT has been extensively applied for assessment of the basin flows in many regions including the Brahmaputra and Ganges. However, despite its many advantages over some other open source hydrological models such as HEC-HMS, it has never been applied for flood forecasting in this regions. This study has taken an attempt to setup SWAT over the upper Meghna basin to forecast flash flood. Using the 30 m SRTM DEM, GlobCover 2009 global land cover map, FAO soil map the watershed, subbasin and hydrological response unit (HRU) have been delineated for hydrological modeling. Considering Bhairab Bazar (BWDB -SW273) as the outlet for the Meghna basin having 6505740 ha area. The whole basin has been divided into 2375 sub-basins and 11521 HRUs based on the slope, land use and soil profile of the study area. Surface runoff is forecasted for daily rainfall using SCS curve number. TRMM daily precipitation and ERA interim daily temperature each having 0.25 degree resolution was used as weather input to derive the model. Model has been calibrated and validated for the period 2000-2016. Initial results shows that SWAT can be a viable alternative tool for flash flood forecasting of a large and complex watershed like Meghna basin.

Key words: Flash flood, Haor, Hydrological modelling, Northeast Bangladesh, SWAT

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