COUPLING OF 1D AND 2D MODELS FOR FLOOD SIMULATION IN *NILWALA* RIVER BASIN

L.S.B. Dhanapala and M.H.J.P. Gunarathna

Department of Agricultural Engineering and Soil Science, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka

Flooding is a frequent occurrence with destructive consequences in some areas of Sri Lanka due to the higher tendency for extreme rainfall events. The *Nilwala* river basin is prone to floods during the southwest monsoon and first inter-monsoon periods. Hydrologic and hydraulic models can be used to simulate floods and are considered as essential tools that can assist in evacuation, rescue efforts, and the control of flood prevention structures. Coupling 1D and 2D models has been recommended by several studies for flood modeling as it provides sufficient descriptive information of the floodplain with high computational efficiency. This study aims to couple a 1D hydrological model with a 2D hydraulic model to simulate flooding in the *Nilwala* basin. Hydrologic Engineering Centre-Hydrologic Modeling System (HEC-HMS) was used to simulate flow in the upper region of the basin. It was coupled with the Nays2D Flood solver in International River Interface Cooperative (iRIC), a hydraulic model to simulate inundation in *Matara* city. Hourly rainfall and streamflow data of three flood events were collected from the Department of Irrigation and the Department of Meteorology and used for calibration and validation of HEC-HMS. The model performed well in terms of the Nash-Sutcliffe coefficient, percent bias, and root mean square error with 0.927, -8.33, and 0.3, respectively, during validation. The May 2017 flood event was simulated on iRIC using the streamflow hydrographs modeled by HEC-HMS. An 81.5% overall accuracy was attained when the simulated extent was compared to the flood extent surveyed by the Department of Irrigation. Thus, the coupling of HEC-HMS and iRIC models provide an accurate estimate of the flood extent. Further research should be carried out to validate the accuracy of the simulated flood depth. However, the coupled model can be adopted for hydrological forecasts of flooding on a regional scale.

Keywords: Coupled flood modeling, HEC-HMS, iRIC, Early, *Nilwala* river basin, warning system