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## Flood area simulation of Attanagalu Oya basin

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Simulation of flood events is a significant tool for giving early warnings of extreme flood events to reduce vulnerability. Therefore, the objective of the present study was to simulate river flow variation and flood prone areas of Attanagalu Oya basin for the period of 2016-2018, using Hydrologic Engineering Center, Hydrologic Modeling System and River Analysis System, respectively (HEC-HMS and HEC-RAS). HEC-HMS model was calibrated using meteorological variables namely daily rainfall (mm) at the Henarathgoda rain-gauging station and daily evaporation (mm) at the Colombo agro-meteorology station. Soil Conservation Service-Curve Number (SCS-CN) loss model, SCS Unit Hydrograph transform model and Muskingum-Cunge routing model were selected to calculate runoff volume, direct runoff of the excess rainfall on the basin and outflow and storage flow of the channel, respectively. Daily water discharge rates were simulated at the upper-stream and the Dunamale gauging station. The optimized model parameters (hourly time of concentration: 99.76, SCS curve number: 92.82, hourly storage coefficient: 25.133) were obtained using model optimization, which minimize residuals of observed and simulated. Then, the model was validated for 2018 using the above optimized parameters. Model performance of HEC-HMS for the validity period stated that Nash-Sutcliffe Efficiency (0.760), percentage bias (13.21%), and root mean square error observation-standard deviation ratio (0.5). Simulated hydrograph in HEC-HMS for the upper-stream was input to HEC-RAS to simulate the flood area for May-July, 2018. Simulated flood area was compared with the actual flood map which was obtained from the Department of Irrigation. ArcGIS was used for georeferencing and measuring the overlapped flood areas. Overlapping area performances were evaluated by hit ratio (0.7160) where the best performance is given by 1, false alarm ratio (0.3290) where the best performance is shown by 0, critical success index (0.5387) where the best performance is given by 1, and bias (0.0262) where the best performance is shown by 0. According to the hit ratio flood maps were overlapped with 71.6 %. According to the results, it is recommended to use HEC-HMS and HEC-RAS with improved input variables and other model parameters to optimize the above performance indicators further, to simulate future flood in the basin.

**Keywords:** Attanagalu Oya, flood, HEC-HMS, HEC-RAS

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