

# Evaluation of WRF and WRF-Hydro Models in Simulating Heavy Rainfall and Streamflow in the Talomo Watershed: A Baseline Study for the Development of a Hydro–Meteorological Flood Forecasting System for Davao City

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Flooding in Davao City, Philippines due to strong streamflow is mainly induced by heavy or long rainfall events which cause strong streamflow along the city's river systems. The increasing occurrence of river flooding in Davao City brings up the need for a hydro-meteorological forecasting system within the Davao City's watershed area. This study aims to evaluate the performance of the Weather and Research Forecasting (WRF), and the WRF-Hydrological (WRF-Hydro) models in simulating heavy rainfall and streamflow events in Davao City, respectively. The models were configured to simulate the observed intense precipitation and streamflow event in the Talomo River in 01 August 2015.

A set of numerical experiments and sensitivity tests with model validation were performed to determine the optimal model setup for Davao City rainfall. The experiment with the highest horizontal resolution and both WRF 1 and WRF 4 of WRF outperforms other test simulations. Output from WRF 1 and WRF 4 were then utilized as forcing to the hydrological model to simulate streamflow and forecast possible flood events within the city. Results from WRF-Hydro simulations show the capability of the model to recreate the observed hourly pattern of strong streamflow in the Talomo River during the first 24 hours of the simulations but had difficulty in modeling the forecasts. Further tuning of the meteorological and hydrological models is needed to improve the accuracy of the output. Nevertheless, this study introduces numerical tools and baseline results to be used in developing a hydro-meteorological flood forecasting system among the major rivers of Davao City. An initial algorithm, the NWP-based Ready Assessment Flood Tool (N-RAFT), was developed to automate flood forecasting over Davao City.