Shihmen Reservoir located at north Taiwan serves as the main water supply for irrigation and domestic use. The objective of this study was to develop a real-time flood forecasting system to estimate the upstream inflow of the Shihmen watershed for reservoir operation during rainstorms. The flood forecasting system has coupled a runoff simulation model with an ensemble rainfall prediction which has 15 members using Weather Research and Forecasting model (WRF model) for next 72 hrs rainfall predicting.

In considering the spatial variation of rainfall in this region, the watershed was separated into 7 subwatersheds and 19 lateral-inflow areas. A kinematic-wave-based geomorphologic IUH model was used to simulate the rainfall-runoff processes in the subwatersheds, and a single-overland-plane model using kinematic-wave approximation was applied to simulate the runoff in the lateral-inflow areas. The Muskingum-Cunge method was then used to collect flows from the 26 subareas and to simulate the flood wave transport to downstream along the main stream. Hydrological records from Typhoon Fanapi were collected for model verification. Simulated hydrographs generated from the hydrological model using the ensemble rainfall prediction data were analyzed detailed. The upstream inflow information provide by the flow forecasting system can be a good reference for the operation of Shihmen Reservoir during storms.