A RECONSTRUCTION OF THE AUGUST 2012 SOUTHWEST MONSOON FLOODING IN MARIKINA RIVER, PHILIPPINES THROUGH THE USE OF OPTICAL AND SAR IMAGES IN FLOOD MODEL PARAMETERIZATION AND ACCURACY ASSESSMENT

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Abstract: The *August 2012 Philippine Floods*, informally known as *Habagat* or southwest monsoon, was an eight-day period of torrential rain and thunderstorms in the Philippines from August 1 to August 8, 2012 brought about by the strong movement of the Southwest Monsoon. The intense, nonstop rains caused the Marikina River in Metro Manila and Rizal province to overflow and brought damages to places near the banks of the river. In this paper, we reconstructed the *Habagat* flooding in Marikina River through the use of a HEC RAS flood model. The model was prepared using geometry data gathered from river bathymetric surveys and cross-section measurements. Flood plain surface roughness coefficients needed to parameterize the model were extracted from a land-cover map resulting from the analysis of a 10-m spatial resolution ALOS AVNIR-2 optical satellite image. Here, the optical image was analyzed through Maximum Likelihood classification, with an overall classification accuracy of 92.3%, and Producer's and User's Accuracies greater than 85% for all land-cover classes. The land-cover map was converted to a surface roughness coefficients map by using a look-up table of Manning's roughness coefficients for each class in the land-cover map. After preparing the model, water level data recorded by the EFCOS Water Level Monitoring Stations *MONTALBAN, STO. NINO,* and *ROSARIO JS* during and 4 days after the *Habagat* event (Aug. 1-12, 2012) was utilized as model boundary conditions in a simulation of the flooding that have taken place. Flood depths and extents, at 10-minute intervals, were then generated from the model simulation. To verify the accuracy of the flood extents predicted by the model, actual flood extent information present in a synthetic aperture (SAR) image of the flooding acquired by the RADARSAT-2 sensor on August 10, 2012 was used as comparison. The actual flood extent was extracted from the SAR image through Mahalanobis classification of a layer-stack of image texture features. The comparison of the predicted-versus-actual flood extent showed an 84.42% predicted flood extent accuracy. This means that the model has modest accuracy in reconstructing the *Habagat* flooding event given that it has been parameterized using information from an ALOS-AVNIR2 image and inputted with recorded water level data. This study has showed an important application of remote sensing in flood reconstruction. The use of flood models (whose parameterization and output evaluation have been aided by remote sensing) provides an alternative way of identifying areas that have been affected by the flooding, which could then be used in preparing flood hazard zonation maps.