

THEME: Hazards, Disasters and Climate

Changes of Inundation Patterns of the Tropical Cyclone ‘Roanu’ Using Online Coupled Delft3D and SWAN Model Under Different Sea Level Rise Conditions

Probal Saha*¹ and A.K.M Saiful Islam²

¹*Research Assistant, Institute of Water and Flood Management, BUET, Bangladesh,
e-mail: Probal1421@gmail.com*

²*Professor, Institute of Water and Flood Management, BUET, Bangladesh,
e-mail: akmsaifulislam@iwfm.buet.ac.bd*

ABSTRACT

Bangladesh is one of the most disaster-prone country in the south Asian region. Almost every year, the country experiences disasters such as tropical cyclones, storm surges, coastal erosion and floods. Tropical cyclones, the most common and devastating extreme weather events has become a major concern in Bangladesh. Almost every year, it originates from North Indian Ocean and causes devastating flood inundations. Very recently, Tropical cyclone Roanu have caused large amount of devastation across this country. It reached northwest of Chittagong on 21 May, 2016 and caused dangerous flooding in parts of Bangladesh, eastern India, and Myanmar. The India Meteorological Department estimated Roanu's maximum sustained winds were 50-55 mph at landfall, while the U.S. Joint Typhoon Warning Center estimated slightly higher at 60-65 mph. Tropical cyclone Roanu turning very deadly, with wind damages reported in the city of Chittagong, destroyed coastal embankments and at least one landslide was triggered from heavy rain. Although cyclonic storm Roanu was a relatively weak tropical cyclone, it caused severe flooding in Bangladesh and Srilanka. Roanu originated from a low pressure area formed at south of Sri Lanka, which gradually drifted north and intensified into a cyclonic storm on 19 May. However, wind shear and land interaction caused it to weaken slightly, before re-intensifying it accelerated towards the coast of Bangladesh. The flood caused by surge of such cyclones has aggravated the disaster situation greatly. Hence, it is very important to learn the flood inundation patterns for such storm surge in future when sea level will rise due to global warming. To know the changes of inundation patterns with probable sea level rise conditions in future, a widely used hydro-morphological model, Delft3D has been applied and validated for storm surge Roanu in the southern coast of Bangladesh. Delft3D model has been coupled online with a third generation wave model, SWAN to capture the wave propagation by the cyclonic wind. For storm surge simulation the tropical cyclone toolbox of Delft Dashboard is used on the platform of Delft3D flow module. The validated model has been run to produce inundation maps for Roanu Cyclone for different sea level rise scenarios at the coastal regions of Bangladesh.

Keywords: Bay of Bengal, Cyclone, Coastal region, Delft3D, Sea level rise, Storm surge.