Flood Hazard Mapping Assessment for El-Awali River Catchment-Lebanon

Rouya Hdeib (1), Chadi Abdallah (1), Roger Moussa (2), and Samar Hijazi (3)

(1) CNRS-Beirut-Lebanon, (2) INRA- Montpellier- France, (3) Ministry of Energy and Water-Beirut-Lebanon

River flooding prediction and flood forecasting has become an essential stage in the major flood mitigation plans worldwide. Delineation of floodplains resulting from a river flooding event requires coupling between a Hydrological rainfall-runoff model to calculate the resulting outflows of the catchment and a hydraulic model to calculate the corresponding water surface profiles along the river main course. In this study several methods were applied to predict the flood discharge of El-Awali River using the available historical data and gauging records and by conducting several site visits. The HEC-HMS Rainfall-Runoff model was built and applied to calculate the flood hydrographs along several outlets on El-Awali River and calibrated using the storm that took place on January 2013 and caused flooding of the major Lebanese rivers and by conducting additional site visits to calculate proper river sections and record witnesses of the locals. The Hydraulic HEC-RAS model was then applied to calculate the corresponding water surface profiles along El-Awali River main reach. Floodplain delineation and Hazard mapping for 10,50 and 100 years return periods was performed using the Watershed Modeling System WMS. The results first show an underestimation of the flood discharge recorded by the operating gauge stations on El-Awali River, whereas, the discharge of the 100 years flood may reach up to 506 m3/s compared by lower values calculated using the traditional discharge estimation methods. Second any flooding of El-Awali River may be catastrophic especially to the coastal part of the catchment and can cause tragic losses in agricultural lands and properties. Last a major floodplain was noticed in Marj Bisri village this floodplain can reach more than 200 meters in width. Overall, performance was good and the Rainfall-Runoff model can provide valuable information about flows especially on ungauged points and can perform a great aid for the floodplain delineation and flood prediction methods in poorly gauged basins, but further model updates and calibration is always required to compensate the weaknesses in such model and attain better results.