Eastern Nile Flood Preparedness and Early Warning

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Abstract

The Eastern Nile Flood Preparedness and Early Warning (FPEW) project is one of many projects under ENSAP programs implemented by the Eastern Nile Technical Regional Office (ENTRO). The EN Flood Monitoring Program is one of the activities implemented by ENTRO in the management of floodplain areas; flood mitigation planning; flood forecast and early warning; and emergency responses and preparedness at regional, national and local community levels in EN countries.

The EN Flood Monitoring Program is the processes of flood forecasting and modeling systems and implemented in Lake Tana sub-basin, Blue and Main Nile, and Baro-Akobo-Sobat pilot flood prone areas that are affected by both flash and fluvial floods. This program is aimed to save life by allowing people to have early warning information and provide emergency services to prepare for flooding then to reduce the human sufferings from flooding and its damages. Some of the flood events, for instance, were the 1998 floods in Sudan caused USD 24.3million the direct damages, the 2006 floods in Ethiopia caused many to die and hundreds to displaced, and the recent flood events (2013 and 2014) both in South Sudan and Sudan. Thus, ENTRO create a platform for EN countries, FPEW program which is an ongoing program, to collaborate and deal with flooding to reduce flood devastation for about 2.2 million people in the EN region.

FPEW is adopted flood modeling and forecasting systems as a methodology for each flood floodplains (Lake Tana, Blue Nile and Main Nile, Gamebela and Pibor) to produce flood forecast information every flood season. The flood modeling system for Lake Tana was used rainfall from WRF weather model as an input in the configured Hydrologic model (HEC-HMS) and generate the runoff. The Hydraulic model (HEC-RAS) utilized the runoff (as an upstream boundary condition) and Lake Tana water level (as a downstream boundary condition) to route the river flood flows. The simulated results from HEC-RAS are then used to produce flood depths using HEC-GeoRAS mapping. Likewise, the flood forecast for Blue andMain Nile, the estimated average rainfall data obtained from RFE, USGS, TRMM and CMORPH satellites, daily Eddeim and other river gauging stations are used to update the states of hydrologic model component in the Sudan FEWS. Then, the HEC-RAS component in the Sudan FEWS was run to route the flows from Eddeim to Khartoum downstream. Similarly, BAS flood forecast uses hydrological and hydraulic models to generate flood forecast information. Once, the forecast results such as, rainfall forecasts, peak runoff flows, flood inundation maps for 3 days lead-time are obtained using numerical weather model and flood models, they are interpreted and summarized into forecast information. This flood forecast information are then disseminated to different users at different levels using the ENTRO web portal, Email, mobile SMS communication modes.

Generally, as a success story, the EN countries benefit a lot from the EN flood early warnings services to save life and properties since the FPEW program has been operationalized in 2010. There are about 150,000 flood vulnerable communities in Ethiopia, 100,000 people in South Sudan and 700,000 in Sudan benefits from it directly, and nearly 2 million people benefits indirectly in the EN basin. In 2012 flood season, for example, there are about 400 households in Lake Tana flood vulnerable communities were affected by flooding: two deaths, relocation of live-stocks and many hectares of farmlands were impacted. However, the impacts since 2013 to current flood seasons are decreased as a result of increasing of awareness and responses of the local communities to flooding and getting much better and better. However, many challenges such as data sharing and exchange, real-time data acquisition under possible scenarios of current and future climate projections to address flash flooding among others. In the future such challenges should be addressed to produce good information and raise the confidence of citizens in the Nile system. The citizens can then better understand and prepare for flooding, and the FPEW continues to evolve to decline the flood devastations.

Key words: Numerical weather model, Flood models, Flood inundation maps, Sudan FEWS, Eastern Nile countries, ENTRO