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Building the Flood Early Warning System in Guyana at the National scale, with real-time forecast of inundated areas for selected flood prone communities.

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Within the framework of the project "Strengthening Disaster Management Capacity of Women in Guyana and Dominica", the National Flood Early Warning System (NFEWS) for Guyana is currently under development. The technical component of the system aims at implementing an operational flood forecasting modelling chain linking meteorological, hydrological and inundation models to provide timely early warnings and predicted flood scenarios, allowing the decision maker to take prevention actions and reduce the impacts of the forecasted event.

The objective is to implement, together with the Hydromet Service of Guyana, a technical tool able to provide daily forecasts of extreme flood events 1 to seven 7 days in advance, up to the local scale of inundation maps for selected locations.

The forecasting chain implemented is composed of five (5) main components: i) the weather forecasts, using the limited area WRF model executed twice a day at Hydromet; ii) observational inputs preparation, in particular rain maps through conditional merging between local ground stations and satellite information; iii) rainfall downscaling in several equiprobable scenarios using RAINFARM stochastic model; iv) the distributed hydrological model CONTINUUM, able to estimate river discharge and soil moisture conditions from the meteorological inputs (observation and forecasts), and v)the hydraulic model HYDRA-2D, that using a simplification of the shallow water equations allows fast and reliable inundation mapping.

At four (4) selected locations, corresponding to relevant flood-prone communities in Guyana, an innovative coupling between the hydrological and the inundation models allows to trigger an operational execution of several hydraulic simulations, resulting in real-time probabilistic forecast of inundation maps. The outflow volumes, derived from CONTINUUM hydrological routing, for different rainfall scenarios are used as inflow inputs for HYDRA-2D. Scalability between hydrological (1.5km) and hydraulic (12m) scales has been achieved through detailed field data collection, that was also used, together with local knowledge, to calibrate the inundation model.

Through the complete flood forecasting chain set up for Guyana, probability of exceeding

significant water depths can be provided in advance to involved stakeholders, triggering early actions and thus enhancing flood resilience at the local scale.

The hydrological component of the forecasting chain has been implemented at the national level for the whole country, at a feasible spatial and temporal resolution based on a balance between input data availability and expected response time for civil defense activities.

Being developed using an open source model, as for all the other elements of the forecasting system, the hydraulic modelling component can be, in future, extended and replicated in other areas of interests.