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An extended real-time flood impact forecasting system for the Chapare watershed in Bolivia

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All over the world a lot of cities are located in flood-prone areas and million of people are exposed to inundation risk. To cope with that the social safety demands efficient civil protection structures able to reduce flood risk by issuing warnings. This task requires civil protection organisms to adopt systems able to support their activities in predicting floods and rainfall impacts. For this reason flood early warning systems, based on rainfall observations and predictions, has become very useful because they are able to provide in advance a quantitative evaluation of possible effects in term of discharge and peak flow.
Traditionally those forecasting systems use hydrologic models coupled with meteorological models to forecast discharge in relevant river sections and are called hydro-meteorological chains. In order to have a better representation of the flood dynamics, these hydro-meteorological chains can be expanded to include bi-dimensional hydraulic models where the level exposure is high or flow singularities (e.g. junctions, deltas, etc.) require more accurate investigation. That information allows the generation of real-time inundation scenarios that can be used by civil protection and authorities to estimate impact on population and take counter-measures.
The new real-time flood impact forecasting chain consists of a suite of hydrometeorological tools that combines meteorological models, a disaggregation tool and a fully distributed hydrological model and a bidimensional hydraulic model that produces inundation scenarios in the most exposed river segments of the flood plain and a scenario tool that allows the assessment of assets involved.
The complete modelling chain has been implemented in the Chapare watershed in Bolivia and it is managed by the Dewetra platform, which since 2013 is used by the Civil Defense and National Meteorological service as the main national Early Warning supporting tool.