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Geographical contextualize and quantify flood risk using global precipitation data and GIS

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Effective flood warning systems are essential in risk reduction by allowing communities to prepare for prioritize actions. Extreme precipitations is one of the primary causes of flooding, therefore the accuracy of monitoring and forecasting of extreme meteorological conditions is a key component in the production and dissemination of reliable flood warning, especially in flash flood prone areas. In most developing countries warning systems largely rely on open source global precipitation datasets whose resolution limits the accuracy of alerts for prioritizing actions at both regional and local scale. Moreover information delivered by Numerical Prediction Models or Satellite derived precipitation estimates is often not meaningful for risk managers who have to identify exposed assets, vulnerability and quantify risk. On the other hand, importance of Geographical Information Systems (GIS), which provide essential spatial analysis capabilities for the identification of areas and main assets at risk, is more evident in disaster risk management.
This paper presents an early warning methodology based on the integration of predicted and estimated extreme precipitation warnings with geographical reference data-sets using Q-GIS and GeoNode functionalities. This methodology, developed as a risk management tool for the Government of Malawi in the framework of the Shire River Basin Management Program (SRBMP), has been operationally applied for the forecasting and near-real time assessment of extreme precipitation that occurred over southern Malawi in January 2015, affecting more than 230,000 people. Alerts generated by the system, including potential impacts on population and households, are compared with the results of the post-disaster assessment conducted by local authorities and humanitarian organizations. Results of this comparison show that the proposed methodology enables a flexible and quick integration of extreme precipitation alerts with rapid mapping capabilities leading to a flexible, easy to understand geographical visualization of exposed assets and to an easier assessment of risk in areas most prone to flooding.