



From Experts to Providers of Humanitarian Actions: Developing Flood Forecast Models for Forecast-based Financing

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Flood impacts differ distinctly between the Global North and the Global South; although tangible flood damage occurs directly and indirectly in both hemispheres, intangible flood damage – such as loss of life, spread of waterborne disease and contamination of drinking water – prevails in the Global South. Key Priority 4 of the Sendai Framework for Disaster Risk Reduction highlights the need for enhancing disaster preparedness through anticipatory response. Forecast-based financing is a novel financial mechanism facilitating humanitarian actions prior to anticipated natural disasters, particularly reducing the number of casualties and people affected in the Global South. Currently limited to pilot projects, the mechanism has demonstrated potential in more than 15 countries. However, to enhance the global effect, forecast-based financing needs wide-spread implementation and upscaling; one contribution to meeting this need, is the development of flood forecasting models for operational use based on transferable methodologies and globally available data. The process-based distributed hydrological model, wlfow_sbm, was set up, calibrated and forced using globally available data for a case study on forecast-based financing in Togo, West-Africa. The model was benchmarked against data-driven models (machine learning techniques) with increasing model complexity. A model suitability matrix for forecast-based financing was defined to include contingencies at end-user level in the final model evaluation. Quantitative scores were given on the following criteria: forecast skill, lead time, computational efficiency, flexibility, robustness, uncertainty, requirements of technical expertise and potential methodological transferability. Consistent score assignment was ensured with the use of a decision tree. While the highest forecast skill was obtained with neural networks, the most flexible and robust model was wlfow_sbm; this model was also the highest degree set up based on a potentially transferable methodology. The model suitability matrix allows for stakeholders to value the criteria according to local specificities. The results demonstrate that a quantitative, holistic model evaluation targeted to the specific application of forecast-based financing substantially alters the conclusions about relative model performance; this points to the need for closer interaction between experts and providers of humanitarian actions in the underpinning of wide-spread implementation and upscaling of forecast-based financing.