



Value assessment of a global hydrological forecasting system

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The inter-annual variability in streamflow presents risks and opportunities in the management of water resources systems. Reliable hydrological forecasts, effective communication and proper response allow several sectors to make more informed management decisions. In many developing regions of the world, there are no efficient hydrological forecasting systems. A global forecasting system which indicates increased probabilities of streamflow excesses or shortages over long lead-times can be of great value for these regions.

FEWS-World system is developed for this purpose. It is based on the Delft-FEWS (flood early warning system) developed by Deltares and incorporates the global hydrological model PCR-GLOBWB. This study investigates the skill and value of FEWS-World. Skill is defined as the ability of the system to forecast discharge extremes; and value as its usefulness for possible users and ultimately for affected populations.

Skill is assessed in historical simulation mode as well as retroactive forecasting mode. For the assessment in historical simulation mode a meteorological forcing based on observations from the Climate Research Unit of the University of East Anglia and the ERA-40 reanalysis of the European Center for Medium-Range Weather Forecasts (ECMWF) was used. For the assessment in retroactive forecasting mode the model was forced with ensemble forecasts from the seasonal forecast archives of ECMWF. The eventual goal is to transfer FEWS-World to operational forecasting mode, where the system will use operational seasonal forecasts from ECMWF. The results will be disseminated on the internet, and hopefully provide information that is valuable for users in data and model-poor regions of the world.

The results of the preliminary assessment show that although forecasting skill decreases with increasing lead time, the value of forecasts does not necessarily decrease. The forecast requirements and response options of several water related sectors was investigated over lead times from short-range through medium-range to monthly and seasonal. These sectors are disaster management agencies and aid organizations, dam operators, hydro-power companies, irrigation agencies and agricultural sector, water supply companies, tourism sector and wildlife agencies, navigation sector, insurance companies. Most sectors benefit from seasonal forecasts in managing the risks and opportunities brought by the inter-annual variability of streamflow. Many sectors need forecasts on a lead time of several months to prepare for appropriate response, and others can make use of seasonal hydrological forecasts for planning purposes.

A global forecasting system would be valuable for those parts of the world where there are no available local systems, provided that information on forecast reliability is properly communicated. The availability of a forecast along with an indication of its reliability offers water managers the choice of using the forecasts in decision-making. The real value of a forecast is specific to the user. It is to be determined on the basis of the user's requirements, and by evaluating the benefits and costs of possible actions that can be taken in response to the forecast.