How to integrate knowledge for managing future climate extremes

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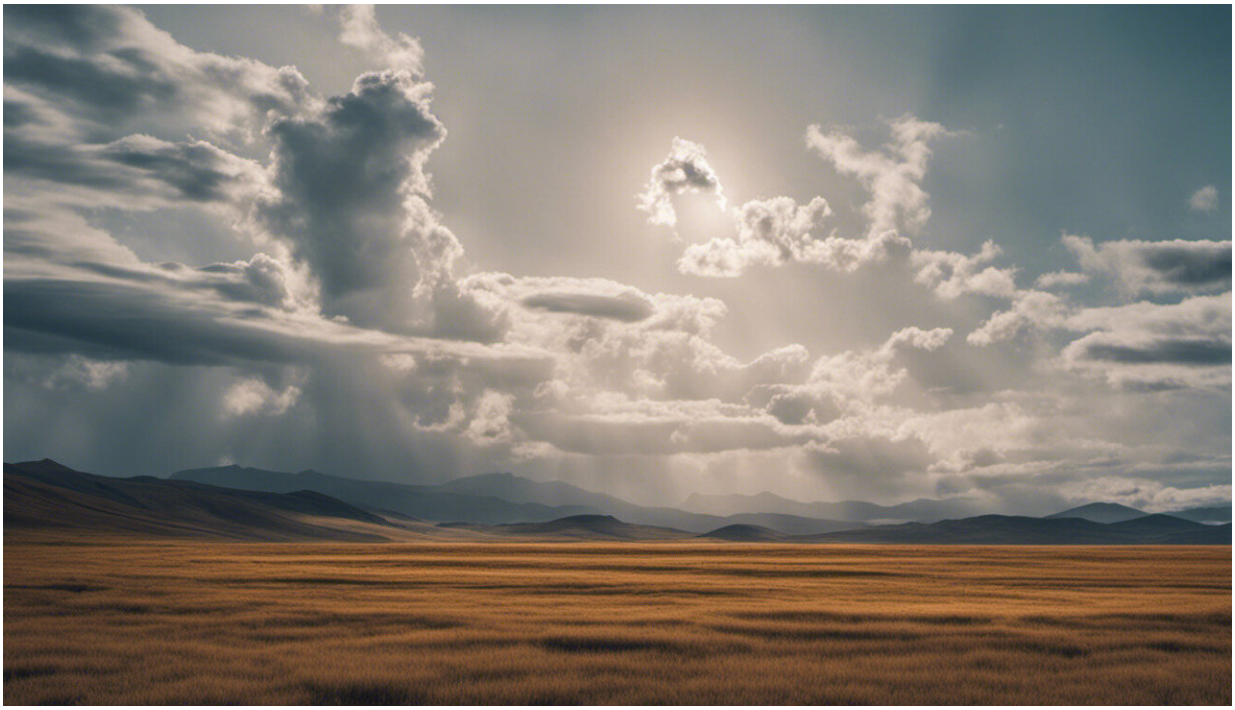

Credit: AI-generated image (disclaimer)

With the rising frequency of water-related natural-hazard events such as floods and droughts, policymakers are increasingly focusing on risk management and adaptation strategies. These require not only a better understanding and use of forecasts of extreme hydrological events, but also the involvement of stakeholders in the decision-making process.

The EU-funded IMPREX project has been just doing that, combining different forms of data with high-power climate models to predict and prepare for the impact of hydro-meteorological conditions.

A news item on the project website explains: "Interdisciplinary knowledge integration is an essential element for climate services provision as it deals with the process of condensing multiple knowledge sources (climate models, economic models, hydrological models, etc) into a conjoint model that can be used to support science-based user decisions."

To achieve this, IMPREX uses a participatory system dynamics modelling approach that involves end users from the very beginning in the model creation process. Project partners believe that "knowledge, data and the priorities of stakeholders have a real impact on model development in terms of setting model assumptions and parameters."

As part of this approach, IMPREX first develops a qualitative model together with end users. "The subsequent step deals with quantitative model development in which different modelling components are integrated and adapted to the particularities of a region and the needs of end-users for decision support."

Stakeholder involvement

On the same website, a video shows an example of how IMPREX uses system dynamic modelling, combining hydrological, economic and climate model data components. It refers to a case study that involves the Júcar River Basin where drought and flood episodes are highly recurrent. The primary goal of this case study is "to define a way to improve the inflow forecasting mechanisms currently used and apply them in real-life operation."

This case study is important for IMPREX "due to the high degree of cooperation between the existing authorities for drought management, which is an example of how stakeholder involvement can make a difference in water resources management." The project will evaluate how improved forecasting of hydrological extremes can increase the efficiency of the water system operation against drought events, taking into consideration hydropower and agriculture. "The lessons learnt from this case study in terms of stakeholder involvement, cooperation, and integration of forecasting of extreme events in decision-making can be exported to other European river basins in order to solve future challenges."

Fires and predictions

The rationale behind IMPREX which involves "learning from today to anticipate tomorrow" is also relevant for various studies partially supported by the project. One recent example is an article published in the 'Nature Communications' journal. The authors wrote: "The overarching goals of this study are to develop empirical predictive relationships between fire and climate variables for the entire globe and to explore the performance of an integrated climate-BA [burned areas] model that combines empirical fire-climate models with global climate seasonal forecasts, to obtain seasonal predictions of fire activity worldwide."

The ongoing IMPREX (IMproving PRedictions and management of hydrological EXtremes) was designed to "improve forecast skill of meteorological and hydrological extremes in Europe and their impacts, by applying dynamic model ensembles, process studies, new data assimilation techniques and high resolution modeling," as summarised on CORDIS.

More information: IMPREX project website: www.imprex.eu/

Provided by CORDIS