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Cloud-based flood risk learning tool engages multiple stakeholders

A pilot cloud-based learning platform that brings together multiple datasets, models and visualisation tools has been developed with the engagement of numerous stakeholders throughout the design process. This tool could lead to informed decisions about flood risk at the local level. These types of tools and frameworks are effective ways of facilitating better decision making.

Europe is currently experiencing a relatively flood-rich period with a spate of major floods across the continent over the last decade. In part this is due to greater agricultural activity, which raises flooding risk by increasing runoff into catchment areas. This highlights the importance of local-scale decisions when it comes to flood management and mitigation. However, many tools that can help make decisions are only accessible and available to scientists and engineers, instead of local communities or even individual farmers. In recent years there has been a push to include a wider range of stakeholders in the assessment of flood risk and in the creation of tools that help to make flood-related decisions.

A prototype called the Local Environmental Virtual Observatory Flooding Tool (LEFT) was developed, using a multi-pronged approach. LEFT was the local-scale exemplar of the Environmental Virtual Observatory (EVO) pilot, which was funded by the UK Natural Environment Research Council (NERC). The aim was to combine multiple datasets on flood information and land use scenarios with multiple hydrological models into a cloud-based tool. This format would make the data and models readily available to anyone with Internet access while ensuring the possibility for future updates of models and data.

This study focused on three rural river systems in the UK: the Dyfi (Wales), Dee (Scotland) and Eden (England). Approximately 200 relevant local stakeholders, including villagers, farmers, catchment managers, town council members, environmental policymakers and scientists, were consulted at different meetings during the two year study.

Initial meetings introduced the idea of a tool, discovered what the stakeholders believed an effective tool should include, and fostered feedback about how to move the tool forward. Researchers guided stakeholders through the development process using a storyboard format to address the needs of potential end users. The stakeholders developed questions such as 'How do I decide when my property is at risk from flooding?' or 'How should I act given all of this information?'. In the course of the development process, stakeholders tested prototypes and were given an evaluation survey.

The resulting cloud-based tool allowed individuals to assess flood risk in their area and also see the possible effects of land use changes (through scenarios such as 'intensive farming' or 'increased woodland'). The researchers emphasise that cloud-based tools allow scientists and stakeholders to access multiple datasets and to present flexible, legible visualisations anywhere with Internet access. A cloud-based system can also provide far more computing power than a desktop computer, allowing sophisticated simulation models to be run.

Due to the project being aimed at a range of potential users, the interface has been carefully designed to enable users with various levels of computer literacy to use it effectively, incorporating on-screen help, predefined scenarios, and a dynamic map interface.

As this pilot project took place over only two years, there were still levels of uncertainty with the data used and the ability of the stakeholders to use the information. However, evaluation events involving the stakeholders received an overall positive response, particularly when asked about the tool's usefulness and ease of use. The researchers suggest more work should focus on local catchments and their stakeholders in this bottom-up approach to assessing flood risk with learning tools. They say the concept of EVO highlights the ambition for holistic thinking between scientists, policymakers, practitioners and the general public in order to solve environmental issues, and the potential of EVO technologies for management of multiple ecosystem services.