



The Environmental Virtual Observatory (EVO) local exemplar: A cloud based local landscape learning visualisation tool for communicating flood risk to catchment stakeholders

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Today's world is dominated by a wide range of informatics tools that are readily available to a wide range of stakeholders. There is growing recognition that the appropriate involvement of local communities in land and water management decisions can result in multiple environmental, economic and social benefits. Therefore, local stakeholder groups are increasingly being asked to participate in decision making alongside policy makers, government agencies and scientists. As such, addressing flooding issues requires new ways of engaging with the catchment and its inhabitants at a local level. To support this, new tools and approaches are required. The growth of cloud based technologies offers new novel ways to facilitate this process of exchange of information in earth sciences.

The Environmental Virtual Observatory Pilot project (EVOp) is a new initiative from the UK Natural Environment Research Council (NERC) designed to deliver proof of concept for new tools and approaches to support the challenges as outlined above (<http://www.evo-uk.org/>). The long term vision of the Environmental Virtual Observatory is to:

- Make environmental data more visible and accessible to a wide range of potential users including public good applications;
- Provide tools to facilitate the integrated analysis of data, greater access to added knowledge and expert analysis and visualisation of the results;
- Develop new, added-value knowledge from public and private sector data assets to help tackle environmental challenges.

As part of the EVO pilot, an interactive cloud based tool has been developed with local stakeholders. The Local Landscape Visualisation Tool attempts to communicate flood risk in local impacted communities. The tool has been developed iteratively to reflect the needs, interests and capabilities of a wide range of stakeholders. This tool (assessable via a web portal) combines numerous cloud based tools and services, local catchment datasets, hydrological models and novel visualisation techniques. This pilot tool has been developed by engaging with different stakeholder groups in three catchments in the UK; the Afon Dyfi (Wales), the River Tarland (Scotland) and the River Eden (England). Stakeholders were interested in accessing live data in their catchments and looking at different land use change scenarios on flood peaks. Visualisation tools have been created which offer access to real time data (such as river level, rainfall and webcam images). Other tools allow land owners to use cloud based models (example presented here uses Topmodel, a rainfall-runoff model, on a custom virtual machine image on Amazon web services) and local datasets to explore future land use scenarios, allowing them to understand the associated flood risk. Different ways to communicate model uncertainty are currently being investigated and discussed with stakeholders.

In summary the pilot project has had positive feedback and has evolved into two unique parts; a web based map tool and a model interface tool. Users can view live data from different sources, combine different data types together (data mash-up), develop local scenarios for land use and flood risk and exploit the dynamic, elastic cloud modelling capability. This local toolkit will reside within a wider EVO platform that will include national and global datasets, models and state of the art cloud computer systems.