



Effects of Rural Land Management on Flood Risk

New simulation methods to quantify local and catchment scale impacts

FRMRC2 has produced:

New methods to map where in a catchment rural land use and land management change will have the biggest impact on flood flows.

Intended readership:

- Policy makers
- Practitioners
- Researchers

Where to find more information:

- www.floodrisk.org.uk
- <http://www3.imperial.ac.uk/ewre>

Summary

There has been growing awareness of the potential impacts of changing land use and land management on flood risk, but a lack of data and methods to quantify historical effects or the potential role of rural land management in flood risk mitigation.



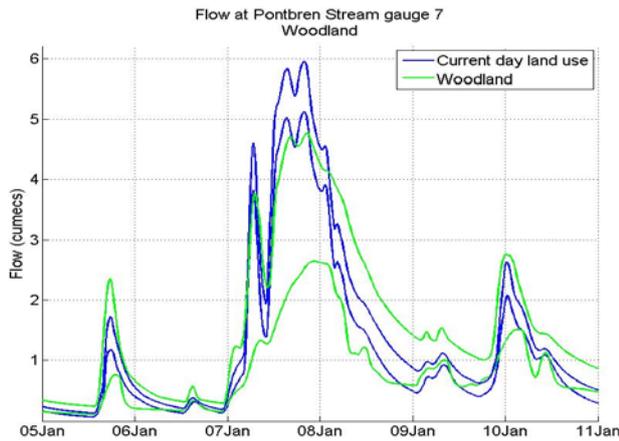
FRMRC1 established a multi-scale experiment at Pontbren in Wales to study upland land management intensification and provide the data to support a new modelling procedure.

FRMRC2 built on this work and developed detailed physics-based models to quantify local-scale impacts. These were used to train simpler 'meta-models' to simulate catchment-scale effects of reduced grazing and tree shelter belts.

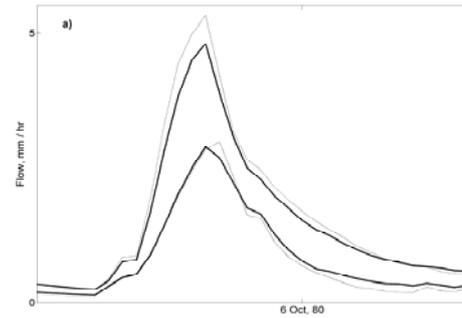
For this study, detailed models have been developed to simulate peatland management and afforestation. However, for many applications, data are limited, and

hence new methods have also been developed to simulate land management effects based on nationally available soils data.

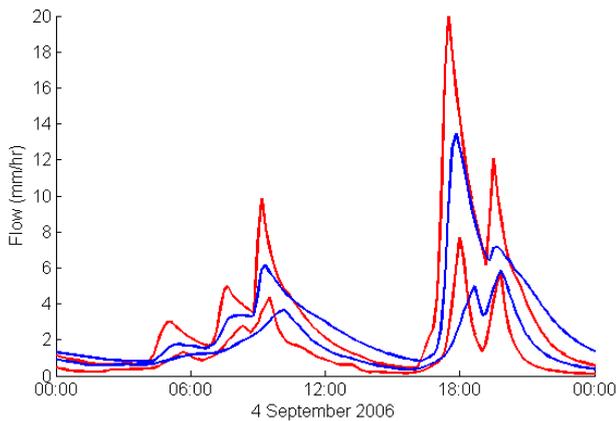
The models have been combined in a new Source-Pathway-Receptor modelling framework that allows spatial analysis of the sensitivity of flood response to land management interventions. Current applications include the Hodder, Upper Severn and Eden catchments.



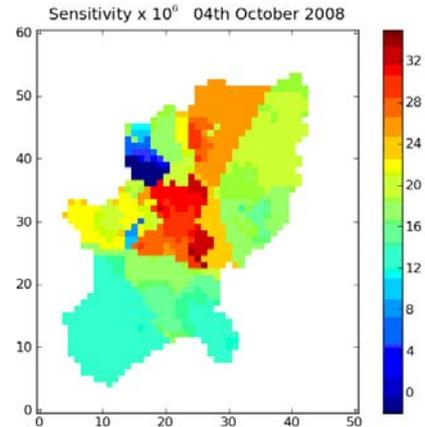
Multi-scale modelling at Pontbren – uncertainty bounds for scenario predictions comparing reduced grazing with full woodland cover for an extreme rainfall event.



Predictions of land use change for the Plynlimon Severn catchment, Wales, using soils data. Black lines represent 95% confidence intervals for the existing (mainly forest) land use, grey lines the same for a grassland scenario.



Physics-based local scale modelling for peatlands - 95% confidence intervals from intact (blue) and drained (red) upland peat.



A catchment map showing the spatial distribution of sensitivity to land use management change for a flood event on the Hodder catchment.

Research Team

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- Department of Environment, Food and Rural Affairs/Environment Agency Joint Research Programme
- United Kingdom Water Industry Research
- Office of Public Works Dublin
- Northern Ireland Rivers Agency

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