

Joint Defra / EA Flood and Coastal Erosion Risk Management R&D programme

Background to R&D project

Flood warnings, if issued in time (and with sufficient accuracy and reliability), can allow people to evacuate properties, and to take mitigating actions to reduce flooding impacts (e.g. by installing temporary defences, and washland and reservoir operations). Flood forecasts form an important component of the overall flood warning process, but are subject to uncertainties arising from measurement errors, model calibration and initial conditions, as well as other factors, such as rainfall forecasts.

Probabilistic flood forecasting techniques attempt to reflect these uncertainties, and international research suggests that they should provide stakeholders such as local authorities, the emergency services, and Environment Agency staff with better information for managing flood events as they develop. This will allow a more risk-based approach to decision making; for example, on the need to evacuate properties, operate flow control structures, or close rail or road links.

In England and Wales, the main authority responsible for issuing flood warnings on rivers and coastlines is the Environment Agency. The introduction of Probabilistic Flood Forecasting into Environment Agency operational practice will be a major system development over the next few years and, as part of the joint Defra/Environment Agency programme of research, this study was commissioned to investigate international approaches to ensemble/probabilistic flood forecasting, and to consider some of the issues associated with the introduction of these techniques.

The project was performed in parallel with the following two related Environment Agency research studies which started at a similar time:

- Use of Probability Forecasts – Met Office
- Hydrological Modelling with Convective Scale Rainfall – WL/Delft Hydraulics

To maximise collaboration, all three projects were overseen by a joint Project Board with representatives from the Environment Agency, the Met Office, Atkins and WL/Delft Hydraulics.

Results of R&D project

The aim of the project was to assess the current state of knowledge and direction of developments in probabilistic flood forecasting in consultation with external researchers and to discuss requirements with end-users in order to scope a long term development programme for the introduction of probabilistic forecasting into operational use.



The project considered both fluvial and coastal forecasting, and related areas, such as pluvial forecasting in urban areas, including some of the main operational implications in terms of training, decision support systems, presentation of information etc (with a key aim being to identify research needs and other follow-on projects). The project also considered experience gained by other organisations which are considering including probabilistic information in operational forecasts

Wide ranging consultations were also held with flood warning, flood forecasting, policy and other staff on questions such as:

- What is a realistic rate of implementation for probabilistic forecasting techniques, and what are the main priorities?
- What opportunities are there for learning from work already underway internationally?
- What research, system, process and policy developments may be required?
- How widely should probabilistic forecasts be disseminated?
- What are the likely Public Awareness Campaign and Training requirements?

The initial findings from these consultations were presented at a project workshop on 13 February 2007 which was attended by flood forecasting staff from all Environment Agency Regions, and Flood Warning staff from several Area teams.

R&D Outputs and their Use

The main findings from the reviews and consultations appear in the Technical Report for the project. The report covers sources of uncertainty in the flood forecasting process, current approaches within the Environment Agency to assessing uncertainty in flood forecasts, international research on ensemble flood forecasting techniques, possible applications of decision support systems, and risk based forecasting techniques in other (non-water) sectors.

The outputs from this project will help to inform Defra and the Environment Agency in developing a plan for bringing this important development into operational use over the next few years.

This R&D Technical Summary relates to R&D Project FD2901 and the following R&D output:

R&D Technical Report FD2901/TR1 – Probabilistic Flood Forecasting Scoping Study. Published Sept 2007.

Publication Internal Status: Released Internally

External Status: Released to Public Domain

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The above outputs may be downloaded from the Defra/EA Joint R&D FCERM Programme website (www.defra.gov.uk/envIRON/fcd/research). Copies are also available via the Environment Agency's science publications catalogue (<http://publications.environment-agency.gov.uk/epages/eapublications.storefront>) on a print-on-demand basis.

PB 12776 TS

Further copies are available from:
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