UNISDR
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UK Flood Forecasting Centre - Giving emergency responders more time to act

The problem

'The Environment Agency and Met Office should work together, through a joint centre, to improve their technical capability to forecast, model and warn against all sources of flooding.' Pitt Review, key recommendation 6.

A review into the summer flooding of 2007 in the UK when 55,000 properties flooded, 13 lives were lost, 7,000 people were rescued and there were £4.5 billion damages[1]. The post-flood review identified a need to better join up the flooding and weather expertise of the Environment Agency and Met Office. Together the information would help emergency responders understand potential flood risk better. By integrating this guidance longer lead times could be given to enable them to make key planning and resource decisions as they prepared to respond to the forecast flooding. The information would also inform emergency response activities during flooding and throughout recovery.

The science

Fluvial flood forecasting draws on two scientific disciplines with distinct backgrounds. Rainfall is predicted using the methods of meteorology embodied in computer models that are either global or span a large part of the Earth's surface[2]. The equations of atmospheric dynamics are chaotic, with characteristic predictability times reducing from several days for continental scale disturbances down to tens of minutes for a tornado. By contrast, flood forecasting is usually focussed on individual river basins. The motion of the water as it crosses the land surface is unpredictable, but the mean fluxes are well approximated by simplified models that are widely applied. The two scientific disciplines use different languages and concepts, which can cause difficulties at the interface when the meteorologist hands over the rainfall forecast to the hydrologist.

Dawlish, Devon – February 2014

Following its creation, the Flood Forecasting Centre (FFC) used rainfall forecasts from the Met Office's Unified Model in its regional UK configuration[3] (initially on a 4km grid and more recently on a 1.5km grid) which were fed into a distributed gridded rainfall-runoff model covering England and Wales[4]. At these resolutions it has been found that calibration of the rainfall forecasts is not required prior to their use in the rainfall-runoff model.

Initially, forecasts were interpreted separately by meteorologists and hydrologists drawn from the two organisations, and sitting alongside each other. However, it has subsequently been found that improved understanding and communication of the flooding implications of heavy rain are obtained by combining the two skills in a new operational hydro-meteorologist role. A structured and assessed technical development framework was established to provide skills assurance for this new role.

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FFC hydro-meteorologists interpret the output of the computer models to generate 24/7 national-scale guidance products that are cascaded down to Category 1 and 2 emergency responders and government departments across England and Wales. The main tool used for this is the Flood Guidance Statement which summarises the expected flooding from coast, river, groundwater and surface water in daily steps for the next five days. The spatial specification is broad, covering counties (typically 50-100km across) although more local detail is provided when appropriate.

Hydrometeorologists at the Flood Forecasting Centre

The application to policy and practice

Operational since April 2009, the Flood Forecasting Centre was initially a pilot but has subsequently been accepted as an essential and permanent part of the flood warning process in England and Wales.

Governance is a key issue, ensuring that both parent organisations preserve their integrity and that of their products. For the Met Office, the centre dovetails with its integrated and centralised forecast production process while for the Environment Agency it links with the local knowledge, community connections and customer engagement experience at the network of local offices.

For the responder community, the principal benefits are consistency and lead time. By using a joint decision-making framework for flood and weather warnings we speak with one voice, providing clarity for customers and building our joint authority.

Lead time is gained by using an extended version of the Met Office's global ensemble weather forecasts[5] to drive the rainfall-runoff model and then interpreting the results for the likelihood of flooding, particularly in situations when there is a low probability of an exceptional flood. Improved 3 to 5 day flood forecasting helps customers plan and resource for an extended response if necessary. Linking together all the organisations involved in warning and informing through our integrated flood forecasting helps to manage risks and avoid loss of life and livelihoods.

With the centre as a catalyst, working relationships across the two organisations have flourished, connecting relevant teams and joining-up communications leading to more efficient use of limited resources. As well as focusing on the technical and operational aspects of the partnership it was essential for the parent organisations to make sure that support services were geared up to facilitate a smooth transition to the new arrangements. This included human resources, training and development, IT, finance, legal and procurement teams allowing the new team to focus on delivery without unnecessary distractions.

Did it make a difference?

The successful partnership between two key public sector agencies has seen the Flood Forecasting Centre quickly grow to be a trusted adviser. For example, during the repeated flooding of 2012 and 2013/14 (the wettest winter for over 250 years in England and Wales[6,7]) our products and services extended the preparation and planning time from hours to days.

The centre also attracts great interest from across the world with other countries learning from our experience and knowledge.

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