

Flood Prediction Strategy benefits from Science

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Summer 2008 will be remembered as a damp squib. A continuing 'La Niña' in the Pacific again altered the flow of the jet stream to bring rain from the Atlantic that in a sunnier summer would have otherwise troubled Iceland. But while Northern Ireland and eastern Scotland have seen extensive flash flooding this year, nothing has quite matched summer 2007 for either the intensity or the cumulative impact of the rain that fell.

Then, the total June and July rainfall for England and Wales broke records going as far back as 1766. Flooding occurred on an unprecedented scale with events later described as the UK's largest peacetime emergency since World War II. An estimated £3bn was paid out by the insurance industry with a further £2bn worth of damage being shouldered by a combination of central government, local public bodies, businesses and private individuals.

This autumn Hilary Benn will set out the future for flood risk management in England and Wales, building on the lessons learnt by Sir Michael Pitt's year long review. One of the key recommendations he will be considering is a joint flood forecasting centre making best use of Met Office and Environment Agency expertise. This mirrors the solution to a previous lack of joined up working identified in France in the wake of devastating floods in 2002 and 2003.

This may have resonance across the UK given the impact of unusually intense rainfall on saturated ground and urban streets in towns as far apart as Boscastle, Sheffield and Kirkcaldy. The resulting surface water floods have often occurred well away from swollen rivers, with flash flooding exacerbated by overwhelmed drains and urban development. Flooding in Hull, which bore the brunt of damage to homes and property last summer, was caused not by the Humber bursting its banks, but by excess rain with nowhere to go.

Pitt praised the accuracy of the weather forecasts issued in the days before the worst of the floods, and

with its 24 hour operational capability, the Met Office was identified in Sir Michael's report as the natural starting point for multi-agency assessment and response to severe weather impacts.

But he also acknowledged the scientific problems associated with pinpointing summer rainfall and matching those forecasts with hydrological warning models. In response the Met Office accelerated its ongoing research programme and this summer has successfully delivered extreme rainfall forecasts a further day in advance (up to three days from two) with probabilistic forecasting and pinpointing of storms within 30 square kilometres' accuracy. These are now being communicated as extreme rainfall alerts under the auspices of a pilot service for emergency responders from a joint Environment Agency-Met Office team based in the Met Office Operations Centre. The response from the resilience community has been positive and a number of flash floods have been successfully anticipated.

This significant breakthrough has happened thanks to developments in computer modelling and the extrapolation of radar data in a way that more closely replicates the life cycle of convective rainstorms. But it is also down to enhanced computer technology. The Met Office has proven the potential benefits of increased supercomputer resolution on extreme rainfall forecasts and this is one area where existing scientific advances could be readily translated into day-to-day operational capability. From 2009 the Met Office will be able to run 1.5 km resolution forecast models that could underpin severe rainfall and flood forecasts for an area beyond thirty square kilometres. With future enhancements to resolution even more localised forecasts will be achievable.

It has been widely suggested that last summer's events were insufficiently anticipated by a system that historically separated the Met Office's focus on extreme weather from the Environment Agency's focus on monitoring its impact on our rivers and coasts – with neither agency



having responsibility for guarding against or forecasting flooding resulting directly from heavy rain.

The Environment Agency has since been granted overview of contingency planning against all types of floods. And it has also developed 'hotspots' mapping, plotting the topography of England and Wales to within six inches of accuracy. This expertise fully integrated with detailed weather prediction offers an opportunity for providing the consistency that emergency responders say they badly need.

If the French experience is anything to go by the benefits of a joint centre could extend far beyond better warnings. A pooled approach could also provide a focus for fully integrating meteorological and hydrological research for improved flood forecast modelling. Since the creation of the French single centre (SCHAPI) in 2003 a number of technical and scientific innovations have served to provide what is widely regarded as the best flood risk management system in Europe. These include interactive 'vigilance maps' providing river flow probabilities directly to the public as well as soil saturation assessments combined with topographical data and weather forecasts to produce predictions for the risk of surface water flooding.

By working more closely together, responsible agencies here could achieve an effective pooling of existing expertise within 12 months. With integration, emergency responders and operators of critical national infrastructure in the UK could be served by a system that is more fully aligned with our own world-beating science.