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Perils of prediction

Anna Bawden

Technology may have advanced, but the localised nature of surface water flooding means it remains difficult to forecast accurately

On October 15 1987 weatherman Michael Fish famously dismissed the possibility of a hurricane. "Earlier on today, apparently, a lady rang the BBC and said she heard that there was a hurricane on the way. Well don't worry, if you're watching, there isn't," he said. That night strong winds - at times over 70mph - swept parts of the country. Although his remarks referred to a storm in Florida, Fish's words have been immortalised as the Met Office's most embarrassing slip-up.

It had forecast severe weather four or five days previously, but stormy conditions were only predicted along the south coast of England.

Forecasting has come a long way since then: new technology has made it easier to monitor and predict severe weather with greater accuracy, but the frequency of flooding is still a surprise.

The government's 2004 Foresight study of flooding estimated 25% more rain in winter and greater flooding flows; now it calculates much warmer, wetter winters, resulting in possibly 40% more rainfall and warmer, but not so dry, summers. Summer rain is likely to be shorter and more intense, like that common in Mediterranean climates.

While we have greater knowledge of the likelihood of severe weather generally, we are a long way from being able to forecast accurately, and a long way in advance, the risk of flooding on a city basis - let alone for individual properties.

Last year's floods were caused by surface water flooding that followed heavy rainfall in a very short time. John Harmer, the Met Office chief adviser to the government, says the challenges with forecasting this sort of flash flooding (pluvial) as opposed to river flooding (fluvial) are very different.

"Fluvial flooding is easier to predict in advance, as it is possible to extrapolate from rising river levels when and where the water will breach its banks," he says. "Pluvial flooding, in contrast, is more of a headache: the location and extent of flooding depends on heaviness and duration of rainfall, as well as the robustness of drainage systems. Lead times for warnings are also much shorter."

This makes communicating warnings difficult. The Met Office is responsible for issuing severe weather warnings, while the Environment Agency is responsible for warning specifically about flood risk.

Sir Michael Pitt's review of the 2007 floods recommended more personal flood alerts. People can already sign up to receive text message, phone or fax warnings from the Environment Agency and Phil Rothwell, head of flood risk policy at the agency, says it may pre-register everybody who lives on a flood plain.

This may not be much help for pluvial floods. National severe weather warnings can be issued five days in advance and modified as weather patterns alter, but they are only suitable for larger weather fronts. The localised heavy rainfall that characterised last summer's floods is more volatile and therefore harder to provide accurate forecasts about. "We can predict a showery airstream days in advance," says Harmer, "but to predict exactly where the showers will fall is much more difficult."

As a result, calculating the probability of pluvial flooding in advance is still a matter of guesswork. "It is very difficult to know whether Bolton will flood or Bury when trying to predict surface water flooding caused by big rainfall events in urban areas," says Rothwell.

Even if the Met Office could forecast rainfall on a street-by-street basis, it would still be difficult to predict flooding with any degree of certainty: rain is only one of the factors that causes pluvial flooding.

Justin Butler of the environmental risk management firm Ambiental says: "80% of the multi-billion dollar loss in New Orleans was due to damage caused by stagnant water."

And there are no guarantees which streets will flood. "It's very difficult to extrapolate where water is going to run," says Glenn Dobson, development team manager, IT, at Hull city council.

Some towns have inefficient drainage systems that are unable to cope with high levels of rain. "Urban situations are very difficult," says Rothwell. "Even something so seemingly minor as a skip parked over a drain or shopping trolleys in culverts can have a big influence on whether the street might flood or not."

This is compounded by the lack of accountability for drainage. Local authorities, water companies, the Highways Agency and British Waterways are all responsible for aspects of drainage, but no single body is accountable for overall water management.

This makes it hard for individuals and businesses who might be at risk of flooding to prepare. "We would like better water forecasting from the Met Office," says David Southwell at the Energy Networks Association, the trade

body for electricity and gas suppliers. "We need to have good quality national information so we can identify what is the potential risk, depth and scale of flooding and the modifications required."

Some progress is being made. Ordnance Survey, the British Geological Survey, the Centre for Ecology and Hydrology, the Environment Agency, the Met Office and the UK Hydrographic Office are working together to agree standards to improve flood modelling and forecasting.

This will combine data on the terrain and river network with information on geology, estimated river flood flows, coastal data and the location of individual properties. "This makes it possible to assess the impact of different depths of flooding, surface type for surface run-off and speed and volumes of flow, thus allowing better prediction and forecasting of flood events in future," says James Brayshaw, director of Ordnance Survey.

The Met Office is trialling a service with local authorities, the emergency services and energy providers, so they receive more precise information about where heavy rain will fall further in advance.