

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

Background to R&D project

Flooding from rivers, estuaries and the sea poses a risk to people as well as causing significant economic impacts. In 1953 the North Sea floods caused approximately 2500 deaths across the UK and northern Europe, and concentrations of fatalities have been associated with flash floods such as Lynmouth in Devon (1952, over 30 deaths) and Vaison-la-Romaine in France (1992, 38 deaths). In the UK there were a number of fatalities associated with the Easter 1998 and Autumn 2000 floods. In August 2004, a major airborne rescue operation was required to rescue victims of the Boscastle flood and in January 2005 the media reported 3 fatalities in flooding in Carlisle and surrounding areas.

Over the last 50 years a wide range of flood risk management measures have reduced the risks to people in the UK. Flood risks cannot be completely eliminated, but by identifying hot spots where people are at greatest risk and prioritising effort, Government aims for flood risk management can be supported. At present there is no method in use to estimate and map the risks to people in the UK. The “Risks to People- Phase 2” (FD2321) has developed and demonstrated a method for assessing and mapping serious injury or fatalities from flooding during, or in the immediate aftermath, of a flood event. This Phase built on Phase 1 (FD2317) and links with other existing Defra and Environment Agency R&D projects. The Risks to People (R2P) method is nested within a ‘Source - Pathway - Receptor’ (S-P-R) model, predominately dealing with a key component of the receptors.

Results of R&D project

Flood Risk is combination of probabilities and consequences. Considering the R2P method, probability is associated with flood event due to high water levels and the failure of a flood defence system. The consequences included are serious harm or fatality during or within the week following a flood event.

The magnitudes of consequences are given as “number of serious injuries and fatalities”. Estimation of the probability of the consequences has three components:

- the probability of the hazard occurrence and its characteristics
- the probability of the area and receptors being exposed to the hazard
- the probability of harm resulting from exposure and vulnerability to the hazard.

The R2P method is a form of multi-criteria assessment based on the concepts of flood hazard rating and scores of both area vulnerability and people vulnerability. Scores are combined for several Flood Hazard Zones of the floodplain in order to estimate the annual average individual or societal risk. Zones within the floodplain are characterised by different degrees of flood hazard depending on parameters such as distance from the source.



The method was tested using seven case studies, including the flooding in Carlisle in 2005. These examples demonstrated that the method works well, providing sensible estimates of the fatalities and injuries for a range of different fluvial and tidal flood events. This study demonstrated that this can be mapped as a parameter in its own right. The risks to people method produces average annual risk estimates in quantitative terms. The research recommends that at least 5 events should be considered to estimate annual average risks. However, these numbers may be associated with large uncertainties and it is necessary to express and communicate the flood risk maps in qualitative terms.

The project carried out in-depth review and extensive consultation with many interested groups to explore how the method can be used to support a range of decisions. Based on these stakeholders' needs, a number of best practice guidance were developed. This guidance explains how the method can be applied in different flood risk assessment and management activities.

R&D Outputs and their Use

The outputs of Phase 2 are presented in three reports as well as several conference papers and refereed journals (forthcoming).

- **FD2321/TR1** describes the Risks to People Methodology, describes the key concepts, provides an overview of how the method was developed and shows a number of example applications.
- **FD2321/TR2** is a guidance document that explains how the overall method or its component parts can be applied in flood risk management for land use planning, the management of flood defences, measures for responding to flooding and finally, in ongoing and new research projects.
- **FD2321/PR** – the Project Record includes the outputs of consultation, workshops and detailed background research.

The research has a wide range of potential applications from raising awareness of the dangers of flood water, targeting flood warning, emergency planning, development control and flood mapping. It will certainly be extremely useful for identifying 'hot spots' and for steering the development of risk management measures. The approaches developed can make use of information from other projects, such as the National Flood Risks Assessment (NaFRA) and be incorporated into the overall RASP framework as well supporting Catchment Flood Management Plans and more local initiatives to understand manage flood risks.

This R&D Technical Summary relates to R&D Project FD2321 and the following R&D outputs:

R&D Technical Report FD2321/TR1 –Risks to people – phase 2. Published March 2006.

R&D Technical Report FD2321/TR2 –Risks to people – phase 2. Published March 2006.

R&D Technical Report FD2321/PR1 –Risks to people – phase 2. Published March 2006.

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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.

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Further copies are available from:
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