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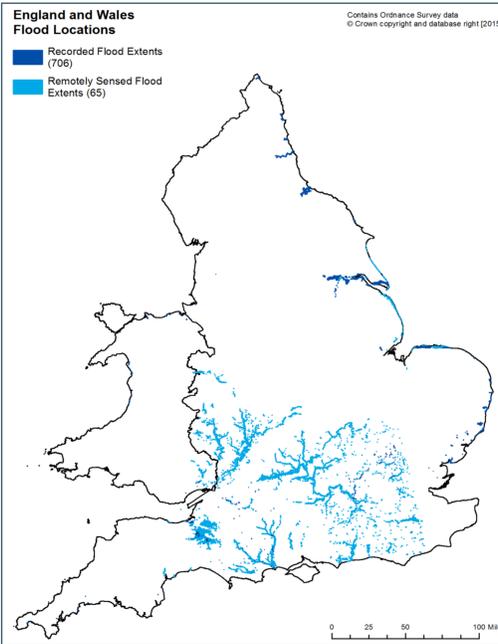
This poster summarises the approach used by RPA, Joe Morris, John Chatterton and Royal HaskoningDHV to estimate the costs and impacts of the 2013/14 winter floods and the recommendations made by the study. The study was funded by the Environment Agency and Defra.

## 2013/14 winter floods

Between December 2013 and March 2014, the UK witnessed heavy and prolonged rainfall. This was the wettest January on record in some parts of the country and accounted for around 200% of the monthly rainfall averages in other locations. The East Coast was also affected by the worst coastal surge since 1953. These events resulted in major coastal damage and prolonged fluvial and groundwater flooding. During these four months many properties, crucial transport infrastructure, farmland and wildlife sites were affected.



Flooding in Fowey, Cornwall, February 2014



Extent of flooding in 2013 to 2014

## Impact categories

- Residential properties
- Businesses
- Temporary accommodation
- Motor vehicles, boats, caravans
- Local authorities and local government infrastructure
- Emergency services
- Flood risk management infrastructure and service
- Utilities
- Transport
- Other communications
- Public health and welfare, including caring services (non-emergency)
- Education
- Agriculture
- Wildlife sites
- Heritage sites
- Tourism and recreation

Tewkesbury Abbey surrounded by floodwater from the River Swilgate, January 2014. © Copyright Philip Halling. Licensed under the Creative Commons Attribution-Share Alike 2.0 Generic Licence.



## Why was the study needed?

The purpose of the study was to establish the range of impacts and to calculate the financial and economic damages resulting from the flooding in England and Wales during winter 2013 to 2014. The study also assessed the damages which were avoided.

This assessment was also an opportunity to revisit and build on the methodologies developed as part of the summer 2007 flood cost estimate project and the rapid flood cost calculator devised by the Environment Agency in 2012.

The characteristics of 2013/14 floods differed in many ways from those of the 2007 floods, and so their impacts and damages were different. These differences made it necessary to carry out an in-depth review of the impacts of the 2013/14 floods to better understand their unique characteristics. In particular, a better assessment was needed of the impacts resulting from:

- Coastal surge and extreme waves
- Long duration floods
- Damage to transport and energy supply networks
- Damage to water treatment works
- Damage to wildlife sites

## Assessment process



## Extrapolation

Extrapolation was used to estimate damages where there are data on the number (length and area) of assets affected but no damage data.

First, average (mean) damages per asset are estimated by dividing the damages by the numbers affected to calculate an average 'unit' cost under each category where both data are available for any one LLFA. This average 'unit' cost is then used to estimate the costs or damages for other areas where only data on the number of assets (that is, number of residential properties, number of businesses, area of agricultural land and so on) affected by flooding has been identified.

## Uncertainty

Colour coding was used to reflect the level of uncertainty associated with data based on its quality and availability, and assumptions associated with these data. A traffic-light colour system was used to represent the level of uncertainty. This approach to uncertainty was used as a basis for estimating the range around the best estimates (costs or damages) for each impact category (e.g. Low = ±10%, Moderate = ±20%, High = ±30%).

As well as the uncertainty associated with the amount of data obtained to inform the damage estimates, there is also uncertainty associated with the data themselves and the assumptions necessary to be able to use them. The main uncertainties are:

- Data definitions
- Identification of relevant data
- Double counting
- Extrapolation

Data	Data quality			Assumptions
Data availability	LOW: Data have been validated/ cross-checked externally	MODERATE: Data have been validated/ cross-checked internally	HIGH: No opportunity for cross-checking	Basis for assumption
LOW: Data on damages available	L	ML	M	LOW: Damage-cost function developed
MODERATE: Data on number of assets affected available	ML	M	MH	MODERATE: Extrapolation
HIGH: Qualitative data/descriptions only	M	MH	H	HIGH: Expert judgement
Factors underlying assumption	LOW: Data from similar area or same type of impact	MODERATE: Data from different area or impact	HIGH: No or very limited data, or from generic damages (for example, MCM)	Assumptions

## Approach to data collection

To estimate the costs of the winter 2013/14 floods, data were collected from a wide range of sources through two approaches – a national level assessment and a local level assessment. Data were collected through Internet searches to identify readily available information on the floods. The findings were supplemented by data and data sources provided by the Environment Agency and data requests sent to crucial organisations and data holders. Over 600 organisations were contacted for information and over 500 data sources (reports, presentations, spreadsheets and spatial data) were reviewed.



Flooded A490 after the River Severn has burst its banks near Cilcewydd, February 2014. © Copyright Stephen McKay. Licensed under the Creative Commons Attribution-Share Alike 2.0 Generic Licence.

## Recommendations

For future assessments, there are a number of actions that would improve the robustness of the damage estimates and thereby reduce the uncertainty. These actions need to focus on reducing the uncertainty in the data and also improving the basis for assumptions. It is recommended that this can be done by:

- Data and knowledge sharing, especially with the insurance sector, to improve primary data on flood damage costs
- Ground truthing map and geographical information system (GIS) data
- Carrying out studies to determine the extent to which damages are likely to be transfers (where other areas of the country benefit due to people visiting there rather than the affected areas)
- Detailed studies of major impacts to assess exposure to flood risk and evaluate measures taken to reduce damage and increase resilience
- Support to private and public organisations to enable better assessments of vulnerability to flooding
- Carrying out further studies into how the damages avoided could be assessed in a robust and reliable manner

**National level assessment:** collection of information from organisations at a national level, including damages estimated at the national scale as well as databases and datasets of national data composed by aggregating local datasets

**Local level assessment:** collection of data for local flood events, including from Lead Local Flood Authorities (LLFAs), national and local organisations and other sources where these data were provided at a local scale

