UK flood risk management
Policy recommendations

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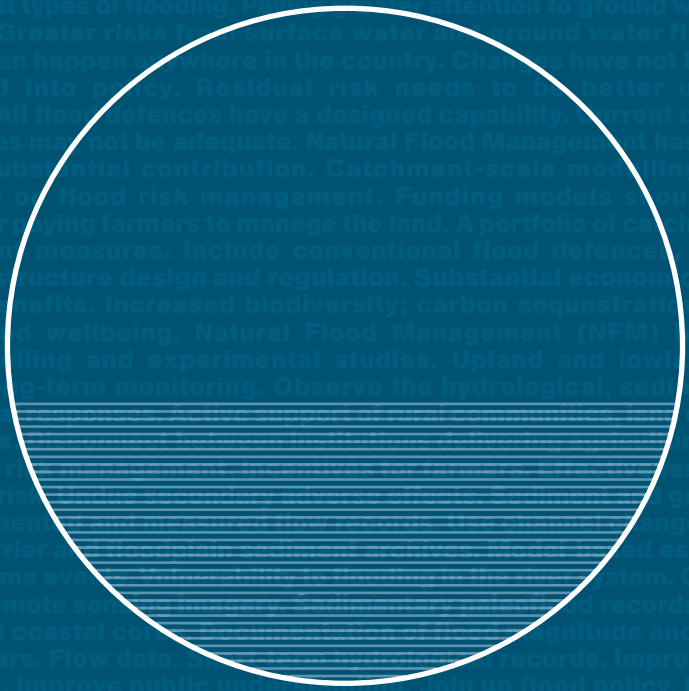
Advancing geography and geographical learning



Introduction

The Government has recognised flooding as one of the most severe challenges facing the United Kingdom, a threat which is projected to increase as the climate changes. Major flooding events in recent years, including the 2015-16 winter floods following the wettest December ever recorded in the UK, mean that the Government's response to flooding is under review. It is in this context that the Royal Geographical Society (with the Institute of British Geographers) has produced these recommendations. In May 2016, the Society convened a round-table bringing together researchers and practitioners representing the breadth of geography – spanning physical and social science – and the significant expertise on flooding which exists within the community. These recommendations, to inform the development of flood risk management policy, are the result of this round-table meeting and subsequent work.

The contribution of geographical research and practice to flood risk management

Flood 3 July 2011 © Henry Lake

- Geographers offer a holistic oversight of flood risk management. This is an essential requirement of effective management, given the complexity in the number and the interdependencies of physical and human influences on flood risk and flooding. This extends to identifying conflicts and synergies, where these exist, between different areas of government policy that may affect flood risk, directly and indirectly.

- Geographical research specialisms offer important, in depth, evidence across the physical and social sciences that can be used to inform the development of policy, and in particular spatially-based policy. These specialisms range from hydrology, fluvial geomorphology, land management and quaternary environmental changes to the impacts of planning policy and community responses.

- Geographers also play a significant role in synthesising and critiquing evidence, communicating this to policy-makers and to the public. The Royal Geographical Society (with the Institute of British Geographers), as the UK's learned society and professional body for geography, has an important role to play in the exchange of knowledge between the academic, practice and policy communities.

Policy recommendations

1. Implementing sustainable flood risk management

Recommendation 1

Government should draw on the available evidence to inform its policies for adopting a more cost-effective and sustainable flood risk management approach in the UK; and invest selectively to fill key research gaps.

The tools, science (physical, economic and social) and expert knowledge that we have available are sufficient to inform the development of evidence-based policy by Government to address future flooding risks and to build resilience, albeit with some further focused research. The challenge now is for Government to draw on this evidence to inform its policies for adopting and implementing a more cost effective and sustainable flood risk management approach in the UK, and to invest selectively to fill key research gaps.

2. New geographies of flooding

Recommendation 2

Review and adapt policies given the changing nature of flooding:

2.1 **Take a broader view of the geographies of flooding, spatially and temporally, to reflect the changing pattern of flooding in winter and summer; and,**

2.2 **Differentiate between different types of flooding and understand the linkages between them (in particular, paying greater attention to ground-water and surface water flooding).**

The nature and geography of flooding in the UK appears to be changing, with greater risks from surface water and groundwater flooding now that the main

flood plains have been protected by investment over many years. Due to its often very long duration, groundwater flooding has a significant and widespread economic impact. Surface water flooding can happen anywhere in the country, not simply on floodplains, and is a function of existing drainage capacities; these are not designed to cope with the high magnitudes and intensities of rainfall that the UK is now experiencing. These changes have not been recognised or incorporated into policy and practice or understood by the public.

3. Flood defences and residual risk

Recommendation 3

Residual risk needs to be better understood and communicated.

3.1 **Research is needed into the nature and extent of the residual risk that communities face where they are 'protected' by engineering and other schemes.**

3.2 **People in those communities need to be more aware of the idea of residual risk and their exposure to it.**

All flood defences have a designed capability. The flooding events of 2013/14 and 2015/16 have demonstrated this in that flood defences were overtopped. Current design standards for flood defences may not be adequate, particularly with respect to withstanding repeated flood/storm events occurring over a short period of time and the increased risks of flooding posed by climate change. How best to communicate and mitigate the residual risk to communities should be explored.

4. Natural Flood Management

Recommendation 4

Natural Flood Management (NFM) has the potential to make a more substantial contribution to flood risk management in the UK if used as part of a portfolio of measures and, as an approach, is integrated across Government.

4.1 **To inform NFM there is a need for more catchment-scale modelling to upscale from smaller NFM treatments to larger scales, with carefully designed catchment experiments.**

4.2 **The departments / institutions delivering initiatives on agriculture and on flood risk management should be expected to work more closely together to maximise impact and to avoid conflicting outcomes.**

4.3 **Existing funding models should be explored as a way of compensating or paying farmers to manage the land for the benefit of local residents and other catchment users downstream in the event of a flood.**

NFM has the potential to make a greater contribution than presently to flood risk management in the UK, when used as part of a portfolio of catchment-wide flood risk management measures. These should include conventional flood defences, sound planning decisions, infrastructure design and regulation, tailored to the geography of the catchment. Substantial economic, environmental and social co-benefits will accrue through investment in NFM measures, for example: increased biodiversity; carbon sequestration; water quality; public health and wellbeing.

The relatively limited available evidence (from small catchment monitoring and modelling studies) suggests that NFM has some value, at least in small catchments (up to 100 kilometres square) and for less severe, high frequency flood events. A key question that remains to be answered is what scale and type of NFM can deliver measurable impacts in larger catchments and for more severe, high magnitude / low frequency flood events. To answer this, integrated modelling and experimental studies are required for representative upland and lowland catchments. This requires an investment in long-term monitoring, for at least 10-years, to observe the hydrological, sediment, debris and geomorphological responses to NFM in larger catchments.

At both policy and implementation levels there are disconnects between different sectors that hamper progress (policy level is commented on in recommendation nine of this document). In the majority of UK catchments, implementation of catchment-wide and river/ floodplain scale initiatives requires the active support of rural communities, land owners / managers and

most crucially, farmers. Yet there remains a sectoral disconnect between institutions delivering agricultural policy and the delivery of flood risk management. In particular, the incentives for farmers to deliver NFM are improving but are still poor.

5. Dredging

Recommendation 5

The evidence base for the effectiveness of dredging in mitigating flood risk should be systematically reviewed.

The questions as to when, where and how dredging might be useful in mitigating flood risk without undue secondary adverse effects, both at the site and elsewhere, are under-researched and need greater attention.

6. Historical records of flooding

Recommendation 6

Better, careful use could be made of sediment and geomorphological evidence of former high magnitude flooding events, to complement and extend documented and measured flow records.

6.1 **The UK Government and flood risk management authorities should explore how best to use channel change maps and lake, coastal back barrier and floodplain sediment archives to improve our model-based estimation of flood frequency and especially extreme events.**

Integrating remotely-sensed geomorphological evidence and sediment-based records within the flood risk management process has the potential to improve, significantly, flood risk assessment of extreme events. For example, historical channels represent points of vulnerability to flooding in the river system today and such channel changes can be mapped using remote sensing imagery.

Sedimentary paleoflood records, as captured from lake, swamp and coastal cores, can provide detailed documentation of flood magnitude and frequency over thousands of years.

Both approaches can aid in calibrating flood risk and in modelling, as complementary to, rather than a substitute for, recorded flow data. These approaches are the only

way to extend the records of flooding over timescales that include magnitudes of change not seen in short-term hydrological records. They are widely used in some other countries but have seen limited take-up by flood protection authorities in the UK to date.

The tools and parameters governing the integration of these data sets need further development, together with a careful assessment of the changing contexts of climate, land use and other anthropogenic factors for the paleo records.

7. Access to data

Recommendation 7

Improve the access to data on flooding to the public and researchers.

In the spirit of the open data agenda, there is an opportunity to improve public understanding and the use of data by researchers, for both modelling and forecasting, by making data more readily available and, for the public, carefully interpreted. Much data on flooding are not open-source and are therefore inaccessible.

8. Adaptation to climate change

Recommendation 8

Climate change needs to be fully integrated into flood risk management alongside all other risk drivers, recognising the interlinkages between them.

8.1 **Adaptation to climate change should be built into flood risk management through the implementation of flexible, 'no regrets' measures.**

8.2 **More research is recommended to address the understanding of changing flood risk as a result of climate change, and how effective different flood management methods are likely to be in this context.**

Adaptation to climate change must be built into decisions taken now, for the future, but questions remain regarding how adaptive pathways can best be built into flood risk management and institutions. There are also questions as to whether current guidelines for incorporating climate change into the estimation of flood risk

need to be revised in the light of recent experience. To take account of climate change, flood risk management should incorporate flexible, 'no regrets' measures that can evolve as more information about the impacts of climate change becomes available.

There is a significant gap in our understanding of how climatic variability and change affects relevant dimensions of flood risk in the UK. How this varies across catchment types and flood exposures to affect the spatial and temporal distribution of risk is also uncertain.

9. Roles and responsibilities

Recommendation 9

Structural changes to better join up flood policy across different actors, and integrate this better across Government, should be given full consideration.

Changes made to flood and water management resulting from the Pitt Review have not been entirely successful in clarifying flood risk management roles and responsibilities, or in addressing conflicts between different Government policy areas. The Environment Agency takes on higher level catchment planning and oversight but is largely uninvolved on measures away from 'Main Rivers', on 'Ordinary Watercourses': these can significantly affect flood risk and are essential in NFM. The Agency's holistic overview is further weakened by the current Government policy to give local communities a greater say in flood risk management. This can lead to greater support for those who are the most vocal but not necessarily in the greatest need.

Flood risk and management are impacted by decisions taken across, and within, Whitehall departments and in the devolved administrations. Decisions on planning and drainage policy for new developments (Department for Communities and Local Government) and transport infrastructure (Department for Transport) will impact flood risk. The Department for Environment, Food and Rural Affairs (Defra) review of food and farming has been conducted with little reference to how land use practices affect flood potential. How can the cross-sectoral

nature of flooding be better reflected across Government? Can lessons be learned from approaches taken in Scotland?

Local authorities require greater support and resources to fulfil their flood risk management responsibilities. Staff with the technical experience to take a holistic view of different land use / management / planning practices within a catchment may be lacking or else have too heavy a workload. Partnerships between universities and local authorities could prove beneficial.

10. Scale and spatial planning

Recommendation 10

Address inadequacies in the strategic and implementation aspects of the current planning system.

10.1 **The UK should move to a more strategic assessment of land use priorities at national and sub-national scales to influence the development of property and infrastructure.**

10.2 **A new methodology should be developed, and applied throughout England and Wales, to ensure systematic follow-up on the compliance of new developments with planning conditions in relation to flood risk.**

The effectiveness of the current spatial planning system for controlling built development on flood plains is questionable: there would be significant advantages to sub-national or national level oversight. The compliance of new developments with planning conditions is not routinely assessed in England, in contrast to Scotland. Research should be undertaken to examine such compliance as these inadequacies can impede an understanding and mitigation of the flood risk facing new-build homes and infrastructure. This could usefully be complemented by in-depth case-studies of land use development within flood risk areas over the past 30-50 years.

11. Financial aspects of flood risk management

Recommendation 11

An independent cost-benefit analysis of extreme flood events is needed in order to evaluate how effective investments have been. Without this, along with clear, evidence-based aims and objectives for flood risk management, it is not possible to judge whether the Government's financial commitments to future flood defence spending match the levels of protection required.

Questions remain regarding whether there is a significant gap between the Government's commitment to future flood defence spending and the required levels of protection. A further question is whether the Government is spending its funding appropriately to meet the requirements of the National Flood Resilience Review, the 25-year plan for the Natural Environment and the Cumbrian Floods Partnership. In addition, further clarity is required regarding the assumptions behind the additional £700 million for flood protection announced in the March 2016 Budget.

12. Awareness and understanding among public, media and Parliamentarians

Recommendation 12

A systematic programme to raise awareness of flooding and flood risk management is needed for UK Parliamentarians, the media and the public, together with the ability to harness local knowledge.

12.1 **More could be made of public engagement methodologies and community modelling tools that are being developed by human geographers.**

12.2 **A national programme of public education should be funded, and delivered independently of Government, by relevant professional organisations.**

The promotion of flood risk awareness is challenging but ways must be found to

facilitate greater public understanding, fundamental to enhancing resilience. Individuals and businesses need to be provided with information about flood mitigation options that they can enact themselves. Appropriate incentives and support to take action must be put in place, such as reduced insurance premiums.

Local knowledge can play a valuable and important role in improving flood risk modelling in particular catchments. Projects such as 'Slowing the Flow' in Pickering demonstrate the importance of community engagement with flood risk management but scalable, less resource-intensive ways of rolling out such approaches should be found.

13. Resilience and recovery

Recommendation 13

Much more could be done with the money spent during recovery and response to ensure that flooding events become catalysts for change and an opportunity to build resilience, rather than return to the status quo.

13.1 **This includes better communication of the short-term nature of subsidies offered through Flood Re. This is particularly important for vulnerable communities, improving their understanding of how they might act to reduce their risk.**

Geographical research highlights the propensity to 'return to normal' approaches following significant flood events, rather than encouraging householders and others involved to build resilience for the future. Insurers have an important role to play in incentivising companies – hired by them to install good quality flood mitigation measures in properties post-flood – to build resilience. The industry could usefully develop accreditation for such installations to drive up skills, expertise and standards.

The Government's Grant-in-Aid model of spending on flood risk management is contradicted by approaches that step in, post flood event in certain areas, with a 'blank cheque'. This sends mixed messages to individuals, communities,

businesses and local flood risk management authorities regarding their own responsibilities to invest in developing resilience.

Perverse incentives must not undermine individuals' willingness to improve the resilience of their property. People must be informed clearly that Flood Re, that subsidises those at risk of flooding, is short-term and that they must ultimately take responsibility for building their own resilience. There needs to be a stronger appreciation and more work done to ensure that people can genuinely live with floods, with institutions in place to enable a return to a functioning state as quickly as possible when flooding occurs.

14. Co-ordination and funding for future research

Recommendation 14

Establish a UK-wide, interdisciplinary flood research and co-ordination centre that has the support and involvement of the research, policy and business communities.

Flooding research is a national and an international priority. Greater interdisciplinary and multidisciplinary research, national co-ordination of it and its applications, is required, including social sciences and humanities. In this way, Britain will: build on existing skills and knowledge; use limited resources efficiently; and seek to become a world leader in understanding and managing flooding and in promoting resilient communities and landscapes.

A 'Flooding and Environment Centre' should be established in the UK, with a physical base and a distributed network of researchers and practitioners across universities, the public and private sectors. This would integrate the expertise and perspectives from the natural sciences, social sciences and humanities, and interface and broker effective relationships with and between Government, Agencies, UK Research and Innovation, learned societies and professional bodies, consultancies and industrial partners.

Acknowledgements and further information

These recommendations are the result of a round table meeting held at the RGS-IBG in May 2016, and subsequent discussions, bringing together a working group of expert geographers from research, policy and practice, along with contributors from cognate disciplines. Participants in the round table were:
Professor Nigel Arnell (University of Reading) • Professor Phil Ashworth (University of Brighton) • Dr Catherine Butler (University of Exeter) • Professor Sir Ron Cooke (University of York) • Professor Tom Coulthard (University of Hull) • Professor David Demeritt (King's College London) • Matt Foote (Argo Global) • Nick Haigh (Department for Environment, Food and Rural Affairs) • Dr Tim Harries (Kingston University) • Ian Heijne (Atkins) • James Heptonstall (Peter Brett Associates) • Daniel Johns (Adaptation Sub-Committee, Committee on Climate Change) • Gary Kass (Natural England) • Professor Mark Macklin (University of Lincoln) • Professor Tim O'Riordan (University of East Anglia) • Professor Dennis Parker (Middlesex University) • Professor Edmund Penning-Rowsell (Middlesex University) • Dr John Phillips (Chartered Geographer) • Dr Sally Priest (Middlesex University) • Professor Dame Judith Rees (London School of Economics and RGS-IBG; Chair) • Professor David Sear (University of Southampton) • Dr Swenja Surminski (London School of Economics) • Professor Colin Thorne (University of Nottingham) • Dr Christophe Viavattene (Middlesex University) Professor Alan Werritty (University of Dundee) • Professor Sarah Whatmore (University of Oxford).

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Further reading

A list of references and further reading material can be found on the Society's website **W** www.rgs.org/policy

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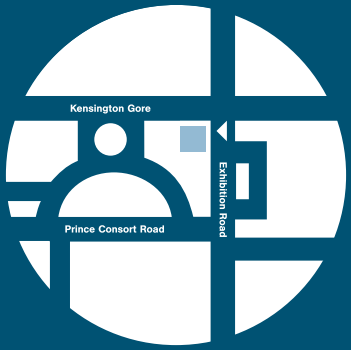

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