

Research Brief 3

Responses and Adaptation to Rapid Environmental Change

From the ESRC's New Opportunities Research Programme on
ENVIRONMENT AND HUMAN BEHAVIOUR (EHB)

environment and
human behaviour
esrc new opportunities programme



INTRODUCTION

The possibility of rapid climate change is receiving increasing attention in scientific circles, and in public discussion. The three projects from the EHB Programme featured in this Research Brief focused on three possible results of rapid climate change – rapid warming, rapid cooling, extensive flooding – in order to gain insights into how people, institutions and society generally might react, and seek to adapt, to these phenomena.

THE MAIN RESULTS

The adaptation of individuals, organisations and policy to environmental change in the past seem to have been dependent on a complex mix of contextual, behavioural and environmental factors. Factors of particular significance appear to be:

- the magnitude of the environmental crisis, and its impact;
- the availability of technology, knowledge and information at the time of any environmental change;
- the socio-economic, political and governance structures in place; and
- the dominant attitudes, beliefs and values towards the environment.

For *individuals*, four broad public attitudes to rapid climate change were identified:

- (I) Concern — associated with a belief that climate change is real and something must be done;
- (II) Scepticism — a belief that evidence of change is still lacking;
- (III) Action — stressing the urgent need for action; and
- (IV) Apprehension — a lack of faith in the ability of institutions and individuals to respond positively and to act accordingly.

When confronted with scenarios of rapid warming and cooling, Concern was seen to increase quite quickly, suggesting behavioural impact at comparatively low thresholds. Scepticism decreased across the scenarios, being replaced by worry. Calls for Action also increased across the scenarios with a particular emphasis on the impact of change on infrastructure. Levels of Apprehension also increased markedly, with such a threshold effect having worrying implications for social adaptation.

In *organisations*, capacity to adapt is greatly influenced by internal social relationships. Institutional architecture - ranging from formal guidance to non-formalised culture and values - shapes relationships and potential for innovation, learning and adaptation. The dominant view, that social relationships should be controlled by formal rules, might not always be helpful. In an uncertain future, unmanaged knowledge and networks represent a resource for adaptation, and, during crises when the coping capacity of formal systems is exceeded, non-formal networks and knowledge could add breadth and flexibility to response capacity. Empirical study uncovered the influence of institutions and the role of interpersonal relations in facilitating the flow of information and physical resources at times of change and crisis. The social resources that enabled adaptation in these organisations are generic and can enhance adaptive capacity to other stressors including climate change.

For *policy* adaptation to environmental change, contextual, behavioural and environmental factors were all found to be important, and major change events can act as catalysts for accelerating, and in some cases 'toughening', policy. However, much of this policy change remains reactive to environmental change - responsive as opposed to adaptive. Thus, whilst environmental changes remain important stimuli for policy change, the changes which actually materialise are very much dependent on the dominant contextual and behavioural factors at the time, not the least significant of which are the knowledge, ideas, values and beliefs of key actors.

Predicting Thresholds of Social Behavioral Responses to Rapid Climate Change

This project was set against a background of a lack of research concerning actual human adaptation and critical thresholds across which social systems might respond to climate change. The focus was 'rapid' (as fast as 10-20 years) climate change related to changes in thermohaline circulation in the North Atlantic producing climatic fluctuations in the UK and western Europe.

To engage with individual conceptualisations of the risks, four scenarios were constructed, using a single dependent variable (temperature) with other associated changes (sunshine, rainfall and winds). Temperature was selected as the dimension of climate change with which most people identify. Three scenarios involved changes in average annual temperature over ten years: +2.5°C (*Warming*) and +5°C (*Heating*), and also -2.5°C (*Cooling*) following from the hypothesis that cooling involves a qualitatively different set of adaptive responses and challenges. The fourth scenario was the Status Quo to provide a comparative baseline. The scenarios were oriented to the West Midlands so as to engage people in consideration of the 'local' – arguably the locus that will spark behavioural change. To provoke a response the scenarios represented comparatively large changes compared with those currently being projected by the Intergovernmental Panel on Climate Change (IPCC).

A well-established approach for exploring subjectivity, Q-method, was adapted to the research. A set of 23 statements related to environmental, social, economic, and institutional dimensions of climate change was drawn from preliminary interviews. Twenty-nine participants were then interviewed and surveyed in relation to the four scenarios. Surveys included ranking nine public policies and providing Q-sorts of the 23 statements.

Four factors were extracted, capturing the salient features of people's beliefs and attitudes. Factor I - Concern - represented the dominant position associated with a belief in the reality and negative implications of climate change. Both individuals and government were identified as playing an important role in addressing impacts. Factor II (Scepticism) was associated with a belief that there is insufficient information to clearly demonstrate climate change. The third factor (Action) indicated the opposite position — that climate change is a real and occurring phenomenon with immediate action an imperative. Factor IV – Apprehension - while the smallest, is possibly the most important as it implies significant adaptation problems where the behaviour of individuals is strongly correlated to issues of trust: i.e. the 'Apprehension' related to the ability of institutions and people to respond positively. This marked lack of faith in the 'system' is a concern so far as it could lend itself to maladaptive behaviour.

When ranked as a government policy issue, rapid climate change varied significantly depending on the scenario, becoming the most significant (compared to other issues such as health, education etc) under *Heating*, with *Cooling* the next most important (i.e. the two extremes). Concern increased with climate change, particularly between *Status Quo* and *Warming* scenarios with people demanding collective action but also willing to 'do their bit'. This suggests a comparatively low behavioural threshold. However, the analysis suggests some 'priming effect' where individuals anticipate warming which, once confirmed, gives rise to demand for action. Scepticism (II) decreased between scenarios, being replaced by Concern for the *Heating* scenario. Calls for Action increased with climate change, with a particular emphasis on impacts on infrastructure (roads, rail, flood defence etc). Levels of Apprehension (IV) increased most dramatically between *Warming* and *Heating*. This suggests a threshold-effect with significant implications for social adaptation where an increasing number of people lose faith in the ability of institutions to address change and of individuals to act positively at a time when the implications would be particularly damaging. Importantly *Cooling* appeared to invoke different responses, particularly strong reactions coming from those surprised by the scenario: i.e. not primed for cooling.

Rapid Climate Change in the UK: Towards an Institutional Theory of Adaptation

This project undertook a review and synthesis of research on adaptation to climate change and sought to integrate this with theory from management science and institutional economics. The goal was to scope the influence of non-formal social interaction within organisations and assess the contribution of non-formal space to an organisation's capacity to learn and adapt to environmental stress. Theoretical findings were empirically grounded through discussions with

stakeholders in the UK rural economy. To achieve this a framework was developed for the analysis of the institutional elements of adaptation within organisations.

Adaptive capacity can be both specific to a particular stressor or generic. Specific and generic adaptive capacities are interdependent. The specific stressor used in the study was a climate change scenario built on the assumption of continued

warming for 20 years, bringing the UK climate close to that of southern France, followed by a collapse in the thermohaline circulation in the north Atlantic triggering cooling and taking the UK's climate close to that of southern Norway over the subsequent 10 years. Participants were asked to reflect on the ways they and their organisations would detect and respond to such a threat (or bundle of threats) and also to use past crisis events to exemplify the influence of

formal and non-formal institutions on information flow, learning and the subsequent adaptation of organisational practice or objectives.

Workshop discussion and individual semi-structured interviews were used to encourage participants to reflect on the role of formal and non-formal institutions in shaping adaptation. Respondents were drawn from national actors within DEFRA, regional actors from the Welsh Assembly and local actors within a dairy farmer collective called Grasshoppers.

Dominant management practice seeks to control or deny the existence of non-formal systems. But adaptation may be better served by embracing the non-formal social interaction of

individuals and communities of practice within an organisation. This will require the building of trust.

Evidence from Grasshoppers and the Welsh Assembly showed informal networks and knowledges were critical in responding to past crises, including foot-and-mouth and flooding. This experience had built trust between actors, strengthening their generic adaptive capacity. The point(s) at which individual learning transformed into organisational learning was identified as a transitional space from non-formal to formal control. Where non-formal spaces for information exchange, learning and adaptation were accepted within a trusting organisational context adaptive capacity grew. Under these

circumstances idiosyncratic non-formal social relations generated unplanned for connections facilitating innovation and learning, broadened options for and made more rapid information transfer, and enabled wider participation in decision-making.

It is important not to idealise non-formal space. Examples were found of newcomers being excluded or purposefully selected for inclusion in non-formal networks. The distribution of access to and control of non-formal space and the ability to use this space to influence formal policy and practice was not equal between or within the organisations studied. This in turn led to inequalities in access to the adaptive benefits of non-formal space, and raised the possibility of conflicts of interest.

Crises as Catalysts for Adaptation: Human Responses to Major Floods

This project investigated the policy responses to four major floods in England and Wales, in 1947, 1953, 1998 and 2000. All four floods investigated resulted in changes in policy towards flooding in England and Wales. In all but one example, (the Storm Tide Warning System that emerged from the 1953 flood), these changes did not reflect any 'new' policy ideas, or fundamental changes in policy direction. Rather, the floods served as a catalyst for increasing the rate at which a policy idea, already under consideration prior to the crisis, was given prominence and acted upon. In addition, it is not just the major floods investigated that have acted as catalysts for changing policy; some minor floods have also been influential in this respect.

The research findings provide further illustration of the importance of context in any evaluation of policy responses as a result of crisis events, in four important ways. Firstly, the flood characteristics are important variables in determining the range of policy issues negotiated. Secondly, the availability of technology, information, and knowledge at the time of each flood significantly influenced the

policy ideas that existed for managing the flood risk. Thirdly, the values, beliefs and attitudes of the dominant actors influenced which of the available policy ideas were engaged as policy change options in the agenda-setting process, although many other factors affected which of these were prioritised and implemented. Finally, the socio-economic, institutional and political contexts were key factors in determining policy response.

In each of the floods, two or three actors, who were not necessarily previously engaged in the flood policy domain, played prominent roles in ensuring that certain policy ideas dominated the agenda. This did not represent a radical shift in policy thinking. Rather, these individuals were able to develop their policy ideas within a receptive environment: they were able to influence which policies 'germinated' from the policy 'seed-bed'. In this way, the research illustrates the importance of key actors in influencing which ideas influence policy change, but this influence can only be achieved where there is general consensus about the legitimacy of these ideas in the first place.

Finally, policy towards flooding in England and Wales has evolved both incrementally and catalytically over the past 50 years. This research has highlighted the importance of understanding 'the incremental' if any understanding of potential changes in response to rapid climate change events is to be achieved. Key influencing factors in this process appear to be a combination of drivers: contextual (information, knowledge, technology, social, political, economic), behavioural (values, attitudes, beliefs) and environmental (scientific knowledge-base, extreme events). Within this complexity, detecting generic signals of change in any of these factors, which might lead to changing policy in the future, is challenging: the signals are weak and the surrounding 'noise' is all-pervading. However, monitoring change in those drivers seen as critical in the past can provide a more informed understanding of the type of ideas which, in the event of a crisis, might lead to changing policy in the future.

AVENUES FOR FURTHER RESEARCH

All these projects have shown a vital role for interdisciplinary research – combining social science and environmental (and especially climate) science disciplines.

In the 'Predicting thresholds' project, the Q methodology produced coherent and useful results and showed the value of a mixed (quantitative and qualitative) method. Certainly a larger study is warranted, including a larger population and parallel studies in different geographic areas, where the physical impacts of rapid climate change will vary (e.g. coastal areas versus inland, rural versus urban, etc). The development of more sophisticated rapid climate change scenarios could be achieved in conjunction with parallel studies of the physical impacts. There is also a need to build more social and economic characteristics into the scenarios – as it was evident that people had difficulty visualising what it would be like to live under the changed conditions. This might also suggest a role for testing other methods – such as use of a web-interface – to depict climate change scenarios.

Further basic and applied research is also needed on the role of institutions (rules of law, working cultures etc.) in shaping human behaviour and adaptive capacity. This will strengthen existing knowledge on human behaviour

outcomes – for example, on the relative merits of adaptations in terms of mitigating climate change impacts. There is also a need to examine decision-making frameworks for organisation and policy planning under uncertainty. This would complement the burgeoning literature and policy experience on crisis and risk management.

Collating good practice of social and management systems that enable learning and adaptation within and between organisations is also needed, including the interplay between social systems and policies aimed at building generic and hazard specific adaptive capacity.

Because adaptation is local it encourages devolution of decision-making power. The opportunities this opens for participatory development and the challenges for economic efficiency and geographical equity deserve attention. Social resources are likely to rise in prominence and require greater policy and research attention as risk reduction and uncertainty management become mainstream considerations within economic development.

A greater understanding of the relationship between the environment, context and human behaviour could

be gained by more in-depth studies of how and why changes in beliefs, values and policy in respect of the environment occur in response to major environmental events, such as large floods. This would, in turn, assist in providing an understanding of the factors, which have influenced such changes in policy approach as, for floods, the transition in the dominance of belief coalitions from land drainage to flood defence to flood risk management. Understanding what influences the demise in the dominance of one coalition in favour of another was not possible in the small project on floods in the EHB Programme. Such knowledge is, however, critical if we are to understand changing approaches to flood hazard adaptation over time.

Secondly, an important output from the project on major floods is the analytical model of the impact of floods on long-term policy transition. This provides an important new mechanism for thinking about and mapping, in advance of a crisis, what will be the likely policy responses if a major flood was to occur. This model now needs to be applied, tested and developed using a range of environment-human behaviour contexts, not least of which are the potential crises associated with rapid climate change.

FURTHER INFORMATION ABOUT THE PROJECTS AND RESEARCHERS

Crises as Catalysts for Adaptation: Human Responses to Major Floods
Dr Clare Johnson, Sylvia Tunstall, Professor Edmund Penning-Rowsell
Flood Hazard Research Centre, School of Health and Social Science
Middlesex University, Queensway, Enfield, EN3 4SF
C.Johnson@mdx.ac.uk

Rapid Climate Change in the UK: Towards an Institutional Theory of Adaptation

Dr Mark Pelling, Chris High
Department of Geography, King's College London, Strand, London WC2R 2LS
mark.pelling@kcl.ac.uk
<http://www.rcc.rures.net>

Predicting Thresholds of Social Behavioral Responses to Rapid Climate Change

Professor Judith Petts, Simon Niemeyer, Kersty Hobson, Glenn McGregor
Centre for Environmental Research and Training
University of Birmingham, Edgbaston, Birmingham B15 2TT
j.i.petts@bham.ac.uk

FURTHER INFORMATION ABOUT THE EHB PROGRAMME

Professor Paul Ekins
Programme Academic Co-ordinator
Policy Studies Institute, 100 Park Village East, London NW1 3SR
p.ekins@psi.org.uk
www.psi.org.uk/ehb