

# DEVELOPING AN UNDERSTANDING OF THE FACTORS AFFECTING THE COMPLEX PROCESS OF FLOOD COPING STRATEGIES IN THE HOUSEHOLD SECTOR

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In the context of anticipated climate change outcomes, there is a need to improve the resilience of the householder population in areas of the UK known to be at risk of flooding. Community resilience requires both physical and societal changes, but the adoption of practical coping strategies (such as flood resilient construction) is not a simple purchasing decision: complex psychological and sociological factors are involved. Thus, the majority of the at-risk population do not display adaptation behaviours until they have experienced one or more flood events; only a small proportion (of the order of 6% to 9%) undertake anticipatory adaptation. A literature review, covering both flood resilience strategies and relevant psychological theory, is presented towards gaining a clearer understanding of the factors affecting the process of strategy selection in the household sector. The psychological construct of the 'locus of control' of individuals is found to be relevant in aiding understanding of adaptation behaviours and could, potentially, permit tailoring and targeting of information for use with different household groups, in order to promote resilience to flooding. It is concluded that research is needed into the characteristics of those households that have responded positively to resilience messages, with the aim of identifying appropriate capability indicators.

Keywords: adaptation, capability, flood, locus of control, resilience.

## INTRODUCTION

Floods are not a new phenomenon in the UK, but the past is not a reliable guide to the future, especially as extreme weather events may be increasing as indicated by the Foresight Project on climate change (Evans *et al.* 2004) and the work of the UK Climate Impacts Programme (2009). In this context there is a need to improve the resilience of the householder population in those areas of the UK known to be at risk of flooding. The purpose of this paper is to review the literature on resilience to flooding, including the related concepts of vulnerability, capability and adaptation. Some of the factors known to influence coping strategy adoption will then be discussed, including those drawing upon sociological and psychological principles.

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## **BACKGROUND TO POLICY AND PRACTICE**

For many years, management of fluvial and coastal flooding in the UK has been via the construction of hard-engineered flood alleviation schemes, such as the Thames Barrier (Environment Agency 2008a). Any physical barrier may, however, be overwhelmed by a flood event that exceeds the design specification, an issue known as residual risk. This is, however, poorly understood by the general public for whom 'flood defences' imply protection regardless of the magnitude of the event, as described by Borrows (2007).

The UK Government's publication 'Making Space for Water' (Defra 2004), formalised the policy that floods cannot be prevented but flood risk can be managed, leading to the expectation that individuals will accept some responsibility for proactive protection of homes and businesses. A similar policy shift is in progress in the Netherlands, but Terpstra and Gutteling (2008) found that 73% of the households continue to believe that the government has primary responsibility for protection against flood damage. Thus, although policy-makers may adopt a new approach, there are barriers which must be overcome before community-level resilience can be achieved.

## **RESILIENCE, VULNERABILITY AND CAPABILITY**

Resilience can be defined in a multitude of ways, but Few (2008), in accordance with social-environmental science usage, suggests 'The ability to prevent, withstand and recover from the impacts (of extreme weather hazards)'. For householders in a flood-risk area, therefore, prevention of impacts might be achieved by taking out flood insurance, participating in a flood-warning scheme, or by installing flood-resilient fixtures and furnishings, enabling rapid drying-out of the property (Environment Agency 2009).

Resilience may be improved by enhancing the capacity (or capability) of a population to deal with adversity, but it must be recognised that some individuals or groups within society may also need additional measures to reduce their susceptibility (or vulnerability) (Adeola, 2003). Not all people and communities are equally vulnerable to floods even within the same hazard zone: Brilly and Polic (2005) identified differential vulnerability in specific groups within a population, whilst Marchand (2008) found that the less advantaged sections of society were most susceptible to floods, both in the USA and India. Studies within the UK support these findings including Werritty *et al.* (2007) and Tapsell and Tunstall (2008). Those who have limited social networks may also find themselves disadvantaged in terms of emotional, as well as practical, support (Green and Penning-Rowsell 2004) and this can affect long term recovery.

Enhancements to resilience will need to encompass not only practical, but also sociological and psychological adjustments; these approaches have been described as improvements to 'adaptive capacity' Klein *et al.* (2004).

## **ADAPTATION STRATEGIES**

Seymoar (2007), in examining mechanisms for strengthening community resilience in Canada, concluded that strategies need to incorporate an understanding of the human response to threats, as well as the factors that can motivate behavioural changes. Halpern *et al.* (2004) indicates that the UK government began to examine the issue some years ago; more recently the Environment Agency acknowledged the

importance of the social sciences in relation to its work on flood risk (Henton 2008). Dufty (2008) reports a pilot study of a new flood education programme in Australia found that promoting community participation from the outset lead to the population taking ‘ownership’ of the problem, rather than being passive recipients of instructions from the authorities. Similarly, Borrows (2007) recommends a partnership approach between flood risk professionals and those at risk, for example by developing and using intermediaries from amongst the at-risk communities. This type of approach can also help dispel the belief that flood protection is, or should be, the responsibility of the Government, or local authorities, rather than householders (Brilly and Polic 2005; Norwich Union 2008).

For policy-makers to bring about successful adaptation at householder level a deeper understanding of the human behaviours involved in risk perception and response is needed.

## FLOOD RISK PERCEPTION AND RESPONSE

Harries (2007) provides an illustration of risk response as a linear process, thus indicating the points at which behavioural modifications might be attempted (refer Figure 1). A discussion of this process follows below.

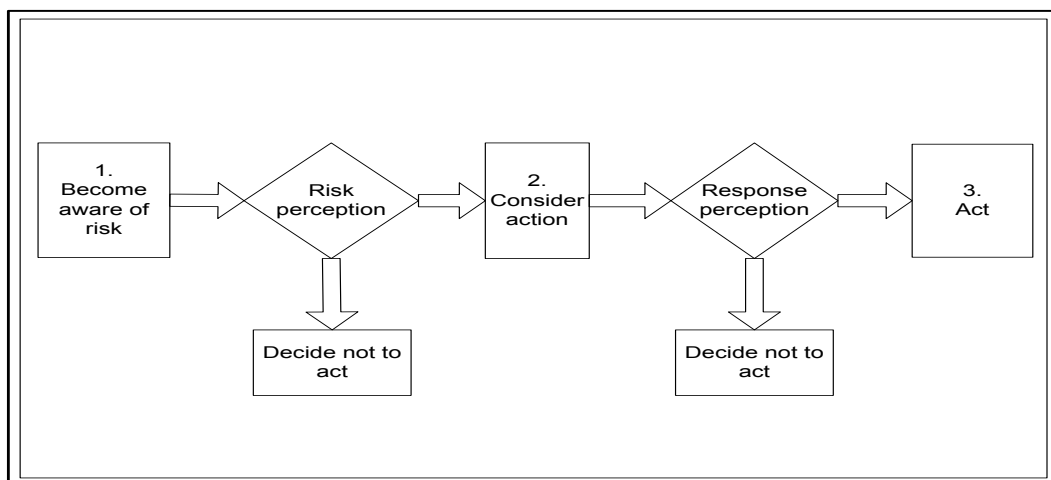


Figure 1 Representation of risk response as a linear process (after Harries 2007)

### Stage 1: Becoming aware of risk

The risk communication must be received, and understood, before the first decision point can be reached; the choice is to move towards consideration of some kind of action or to ‘decide not to act’. An analogy can be seen in that the adverse consequences of smoking have been known since the 1960s but, despite being aware of this, some people choose to continue to smoke tobacco, hence deciding ‘not to act’ to reduce their disease risk, whilst others consider the cessation options available. The way in which risk messages are constructed are most important, in that over-emphasising the fear element can prove counter-productive: Seymour (2007) found that stressing the choices available, rather than ‘scary messages about death’ had the greatest positive influence in persuading smokers to give up.

In the UK an annual flood awareness campaign has been in place since 2001, utilising a wide variety of media (Bonner 2006) yet Harries (2007) found that only 60% of at-risk residents of England and Wales were aware they lived in a flood risk area, whilst

even fewer (17%) had knowledge of how to protect their homes. Paton (2003) demonstrates that awareness does not lead to preparedness, and this is confirmed in a variety of disaster scenarios internationally: volcanic hazard preparedness in New Zealand (Paton *et al.* 2000); wildfire preparedness in Australia (McGee and Russell 2003); earthquakes in New Zealand (McClure 2006) and flash flooding in the USA (Knocke and Kolivras 2007). The way individuals appraise risk information is thus a complex issue, and the preferred option of ‘deciding not to act’ poses an important barrier to resilience.

### **Stage 2: Considering action**

Having reached the second stage of the process further issues arise: potential hazards are typically described by the policy maker group in probabilistic terms, yet the concept of an event having a 1% chance of occurring in a given year may be difficult for some groups of people to grasp (Bye and Horner 1998, Association of British Insurers 2009). This apparent lack of certainty can also engender doubt and disbelief amongst the target audience (Mileti 1995). Plapp and Werner (2006) describe examples from Germany wherein natural hazards (flood, windstorm, earthquakes) were regarded as inevitable and thus perceived as impossible to prepare for. Similarly, Paton (2003) found that the unpredictable and uncontrollable nature of such hazards serve to raise anxiety and thereby reduce the motivation to prepare. These findings go some way towards explaining the decision not to act at the second decision point. Acceptance of the existence of such risks may also threaten a fundamental human need to feel secure, a phenomenon known as ‘ontological security’ (Laing, 1960). Originally developed in a medical context, it was subsequently adopted elsewhere, for example the concept of the home as a secure base within a world that is threatening and uncontrollable (Dupuis and Thorns 1998). Harries (2007) utilises this concept to explain the reluctance to prepare for flood hazards, as essentially an anxiety avoidance behaviour; this does not, however, provide a way forward to improve resilience.

A lack of action, however, is not necessarily maladaptive: the ‘decision not to act’ can be harnessed as a positive force, if policy-makers adopt an appropriate psychological approach. The following example is based on a behaviour pattern called inaction inertia (Tykocinski and Pittman 1998). Currently residents of England and Wales are required to opt in to receive flood warnings by telephone, but only 41% of those eligible had registered for the service by 2007 (Pitt 2007). By reversing the approach, such that telephone numbers were automatically included on the scheme, unless residents chose to opt out, a pilot study found that only 2% of the sample declined the warning service (Environment Agency 2008a). This takes advantage of the default human behaviour of ‘deciding not to act’, which, in this instance, leads to a positive resilience outcome.

### **Stage 3: Acting to reduce risk**

At-risk residents need to be able to access information on the strategies available and select those most appropriate to their individual situations. Promotion of appropriate adaptation measures takes place at a macro-level, by policy-makers seeking to act upon or influence householders as a group; response to these messages, however, is enacted at an individual household level and members of the public are not a heterogeneous group. The Environment Agency’s website, and that of the Scottish Environmental Protection Agency (SEPA), both recommend a range of options, some of which do not require any financial outlay and are, thus, accessible to a wide range of people. Others options, such as the purchase of flood doors and air-brick covers, are

necessarily income dependent, as is flood insurance: in the UK, however, the insurance industry does not routinely support resilient repair techniques and Sims *et al.* (2008) note that this issue currently acts to reproduce vulnerability. A recent report indicates, however, that this position may change if customer demand can be demonstrated (Association of British Insurers 2009).

Accepting water ingress and enhancing the recovery process would be the method most appropriate to long-term, sustainable resilience in the light of the residual risk issues. A pilot study by Defra (2008), in which government grants were made available for the installation of property-specific adaptation measures, found that the preferred methods were overwhelmingly those designed to keep the water out (flood-resistant solutions), rather than those enabling a property to recover more rapidly from inundation (flood resilient solutions). Aesthetic and emotional aspects also affect the decision making process: Norwich Union (2008) found 46% of those affected by the summer 2007 floods chose not to make any changes to their property in the repair phase because they “wanted their home put back exactly as it was before”. This is consistent with the ontological security concept in that fitting any form of visible flood protection measures to the home could constitute an acknowledgement that normality may again be disrupted in future. Despite the ready availability of information on resilience in the UK, the proportion of the at-risk population who take measures to protect their homes, without having first experienced a flood event, is small: 6% in the case of the sample re-examined by Harries (2007), and 9% in a study by Lamond (2008). The choices made by the at-risk population appear to be consistent with the anxiety-reduction issues mentioned previously: Proverbs and Lamond (2008) note that individuals can achieve peace of mind by one of two methods, ignoring the risk of flooding or taking action against flood risk, and inaction inertia could explain the prevalence of the former. Further examination of the motivations driving successful behavioural responses and, in particular, the characteristics of the group of people who demonstrate anticipatory adaptation, may therefore be of benefit in the interests of promoting resilience.

## **A WAY FORWARD**

Psychological and sociological concepts can be seen to aid understanding of the behaviour of the householder group, and thus offer some techniques to promote resilience to flooding. Qualitative techniques do not, however, lend themselves to effective monitoring of behavioural changes over time, which is needed by the policy-maker group in order to tailor and target information optimally. Psychometric tests, long used as predictive tools in the recruitment field, may now have a role to play in predicting the behaviour of different population sectors in this context. Utilisation of these quantitative techniques, by the policy maker group, could assist in the overall aim of enhancing resilience within the at-risk population.

One potential tool is the construct of locus of control, initially developed by Rotter (1982) to describe human belief systems. Baumann and Sims (1978) found positive correlation between the locus of control scores obtained and the purchase, or non-purchase, of flood insurance in Texas; they suggested that personality, rather than rationality, provided a key to coping behaviours. In New Zealand, McClure *et al.* (1999) found that ‘internals’ (those who believe that their destinies are within their own control, i.e. self-determined) display preparedness for earthquakes, whilst ‘externals’ (who believe that their fate is determined by outside forces, such as fate or a religious entity) tended to passivity in the face of the same hazard. In two further

New Zealand studies, Spittal *et al.* (2008), found correlations between internality and the tendency to take mitigating action, whilst McClure (2006) noted that externals are most likely to blame the government, or chance, for disasters.

As an initial step therefore, an investigation into a UK at-risk population's locus of control profile, to identify any correlation with adaptation behaviours, could usefully be pursued. An additional advantage of this measure is that locus of control is not a fixed characteristic: an individual's score can change over time and due to circumstances. This therefore may provide quantitative data of the baseline characteristics of a population, (a capability indicator) as well as a means of monitoring changes following interventions, or attitudinal changes following experience of flood events.

## CONCLUSIONS

This review has highlighted some of the complex interactions between the factors affecting resilience of the householder population to flood events. Coping strategies include not only actions of a purely practical nature (including physical modifications to homes and participation in flood warning schemes), and those operated via financial mechanisms (such as flood insurance cover) but also more complex issues arising from psychological and emotional factors. Adaptations at policy-maker level may therefore be required in order to provide optimal benefit to the householder group. An understanding of differential vulnerability, together with the barriers and drivers involved in building capacity, will also be needed if the resilience of UK communities is to be enhanced sufficiently to meet the challenges posed by climate change.

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