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Flooding in the Built Environment: The Roles of Social Responsibility and Risk Perception in Extreme Event Decision Making

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Abstract

The inextricable link between people, their built environment and its relationship with flooding has been demonstrated within the academic literature which indicates that human activity is having a large, detrimental effect upon the environment, increasing climate change and thereby increasing the likelihood of extreme weather events, such as severe flooding. Despite well-documented evidence of the potential physical impacts of flooding, the research has so far neglected to fully investigate the manner by which decision making at community level could influence the extent of damage and the resilience to flooding. This paper attempts to investigate this gap in knowledge by exploring ways in which a better understanding of the concepts of social responsibility and risk perception could potentially increase community resilience. There is particular emphasis upon the interrelationships between the social responsibility, risk perception and the decision making process. These relationships may affect people's attitudes and behaviour towards the issues of climate change and extreme weather events. This paper also provides an argument for future research approaches to better understand resilience at the level of the community by exploring the individual and interconnected decision making of householders, small businesses and policy makers. The arguments presented here will be of interest to community leaders and provide considerations for built environment professionals embarking on the development of resilience measures, with considerations suggested for future research within this field.

Keywords: Climate Change, Community Resilience, Risk Perception, Social Responsibility, Decision Making

1. Introduction

When flooding occurs in the built environment, people are not only affected by the flooding but can in turn also have an effect upon the event. The better prepared people within a built environment are, the smaller the impact the flooding is able to have. This inextricable link between people, their built environment and its relationship with flooding has been demonstrated within the academic literature which indicates that human activity is having a large, detrimental effect upon the environment, increasing climate change and thereby increasing the likelihood of extreme weather events (EWEs), such as severe flooding (IPCC, 2001). In modern times, our built environments have become increasingly merged with the natural environment, making both more susceptible to extreme events. EWEs have not only become more frequent and more severe, but also society has become more vulnerable to their effects. Flooding is of particular concern within the UK and in 2007 there was widespread flooding which caused an enormous amount of damage as again our fragile infrastructure was not able to cope with such extreme weather.

Flooding related failings can be found with climate models which are not currently able to predict with a good degree of accuracy regional differences in rising sea levels (Lonsdale et al., 2008). In 1953, an extreme flood in the Thames estuary and East coast region flooded 240,000 houses and killed over 300 people. Severe flooding, such as that seen in the 2007 summer floods throughout the UK, is on the increase and a tidal surge within the same area nowadays would cause damages of £80-100 billion to homes, businesses and economic activity, affecting 1.25 million people living within the tidal surge area (Parker, 2002). By 2016, Greater London is predicted to have a population increase from 7.5 million to 8.1 million and development plans will also create 120,000 new houses and 180,000 new jobs from new businesses. This approximated expansion, driven by an ever increasing population, is reflected in all major locations throughout the UK. These planned expansions provide an example of the dangerous relationship that exists between people, their built environment and flooding. While expansions in particular locations may help to accommodate the increasing population and decrease overcrowding, it also increases a community's vulnerability to flooding. As the population continues to grow denser on floodplains across the UK then the vulnerability to flooding rises and the consequences of such events grow more severe.

The quest to protect our built environment from flooding has never been of such great importance and above all the forecasts and technologies of the modern age, it is argued that the people remain the key to a successful defence. Following the extreme flooding event in 2007, the Pitt review (2008) acknowledged the importance of building resilience at local community level, and provided tangible evidences of how this resilience could limit the damages from flooding. However research has so far neglected to fully investigate this area within the built environment with which we are most familiar and is most salient to our needs, our own community. This paper reports an investigation to enhance understanding of decision making process and interrelationships between three key community groups (policy makers, householders and small businesses) in order to improve the resilience of the local community. A conceptual framework was developed through an in-depth literature review on individual's risk perception and social responsibility. The framework suggests that better understanding of risk perception, social responsibility, decision making process, and interrelationships amongst members of community will help joined-up thinking and optimise the selection of adaptation and mitigation strategies to EWE. Firstly this paper discusses resilience and decision making at

the level of the community, before exploring barriers to resilience that people create by looking in more depth at two of the main issues, social responsibility and risk perception. The paper concludes with considerations for further research in this area.

2. Community Level Resilience

There has been research conducted on a number of aspects of extreme events and climate change, such as resilience, adaptive capacity and vulnerability at the national, regional and sector levels (e.g. Gallopin, 2006), but there has been very little research conducted within the heart of our built environments, at the local community level. A localised approach will provide a better context for understanding the decisions of members of the community who fail to engage in resilience promoting actions. Lorenzoni and Pidgeon (2006) support this view, stating that although there is concern regarding climate change present in Europe and the USA; it is not a high enough concern to change behaviours in daily lives and therefore saliency of risk must be increased by concentrating communication of risk at the community level. The National Risk Register within the UK contains details of the risks faced by the UK and EWEs, such as flooding, are labelled as 'hazards'. This is one way to know that the risks we face are increasing and that the failings of previous resilience measures and the damage caused by recent EWEs indicate that we have not yet found a sufficient way to counter this risk. This is because although the government has been attempting to adapt to new risks since the new millennium, it has done so through the creation of new legislation and implementation of new civil protection measures, the majority of which have been built around an already stretched communication network and rely upon already stretched resources.

It is important to note that it is not necessary to precisely define the exact boundaries of what constitutes a community because the term 'community resilience' has evolved into a concept that people collectively understand as being the link between individual and national resilience, where the individual resilience levels of people, businesses and policy makers within any given area combine to produce an overall level of community resilience. As a conceptual framework though it is helpful to understand a community in geographical terms as the members of these communities not only share the resources of that area but also have a shared risk of hazards. Furthermore if members of these communities share common resources and hazards it may be easier to identify the differences between individuals that possess different levels of engagement with the issue of climate change.

There are four main stages to the resilience process. The first stage is mitigation where there is a general process of increasing a community's ability to cope with a flooding event, for example by not building on flood plains or by better protecting buildings. The decisions associated with this stage are the planning and preparation decisions made before the flooding occurs, such as training staff, which provide a basis for community resilience to the extreme event. The second stage is preparedness where communities anticipate potential flooding events and develop plans to deal with the hazard. The third stage is the response stage which related to the actions taken by members of a community during and immediately after a flooding event.

The fourth stage is the recovery stage where a community restores, learns and adapts to the extreme event. Collectively these four stages are known as the social resilience cycle (Maguire & Hagan, 2007). The first stage is arguably the most crucial stage in determining the degree of resilience that a community will have to a flood as it can also affect the capabilities of the later stages. The first stage is also the phase where perceptions, beliefs and other human barriers can create the most diversity of behaviour, as trying to convey the dangers of a flood which has not yet occurred is infinitely more difficult than pointing out the danger and destruction that surrounds people in the later stages. Therefore, these potential barriers to resilience need to be better understood.

2.1. Barriers to Resilience: The People Problem

The decision making process associated with the issue of EWEs is one of the most important decisions that a person can make. This is because it not only affects their own level of resilience, but also that of their community. In the US, personal responsibility is recognised by the Federal Emergency Management Agency as being the key to building a resilient community. However there are almost as many different perceptions of the risks posed by EWEs as there are people. The many views on how much of a threat climate change poses are indicated by some people suggesting that immediate action should be taken, others suggesting that the scientific evidence is unreliable, or given the uncertainty nothing should be done until there is more reliable evidence, or simply not believing that climate change affects their lives in any way (Lorenzoni & Pidgeon, 2006). Therefore, how much people believe they are at risk of flooding will determine their behaviour in preparing against such a disaster. This makes the issue of flooding a particularly complicated concern for people making decisions as individuals, organisations, communities and society as a whole. This creates many obstacles, such as how to work effectively as a team and overcoming other more emotive issues, such as trust. Given that modern society contains masses of interdependencies to function efficiently it will require an appreciation of further interconnectedness, in the form of joined-up-thinking between key community groups, to efficiently increase community resilience.

This need for integration is reflected in community resilience models (e.g. Paton, 2007) which have stressed the importance of participation and the need to integrate stakeholders. This is further emphasised by the need to integrate community groups within climate change education. Top down information (policy makers telling people what should be done) does not appear to be working and therefore bottom up information (community groups integrating information together) is suggested to improve risk communication and community resilience (Dufty, 2008). Several main activities of Local Resilience Forums in the UK regions are to raise awareness of flooding risks, to enhance flood warnings before flooding, and to provide information of welfare needs once flooding has receded, at local community level (Pitt, 2008). However there are many emotional and psychological obstacles combined which hamper interconnected decision making and resilience measures. These support the overall view that it is the decisions we make about our behaviour, whether it be as individuals or as part of a team, which creates the largest obstacle to successful measures to deal with flooding. The decision

making process of individuals is recognised as being a vital part of community resilience. However, a number of factors can negatively affect the decision to positively engage with the issue. Therefore it is imperative that research identifies the most important of these factors and attempts to combat their negative effects upon the decision making process so that improved non-technical resilience measures can be proposed. We will now explore two factors that contain the potential to affect the decision making process, social responsibility and risk perception.

3. Social Responsibility

3.1. Key Community Groups

One of the main areas to emerge from the discussion of resilience is the idea of individuals being more socially responsible and accepting a greater level of individual responsibility for community resilience. The US government has recognised that personal responsibility for behaviour is important to increase resilience and understanding how people perceive themselves and each other in relation to a particular aspect is often a useful way of investigating that aspect itself. Therefore exploring perceptions of social responsibility for EWEs will provide an excellent platform from which to investigate barriers and drivers to community resilience.

The continued successful resilience of the community in the short to medium term relies upon the groups which make up that community, such as the householders, small and medium-sized enterprises (SMEs) and policy makers. Communities are made up of individuals, each of whom can have an effect upon their personal level of resilience to EWEs, which in turn will have an effect upon their community resilience. Individuals have a responsibility then to increase their resilience and they can do so through their lifestyle choices and the decisions they make about being aware of the risks faced by their community. Unfortunately, many people are unaware or are in denial about the risks they live with each day. It is these counterproductive attitudes and flawed decision making which needs to be changed in order to increase resilience. In order to instigate the necessary changes, researchers need to firstly understand how and why people reach the decisions they do about the risk of EWEs, as well as understanding how the interdependencies within the community and societal infrastructure as a whole can affect these decisions. For example, why do local policy makers make the decision to build houses on flood plains when they know that this decreases their community resilience to an extreme flooding event? Why do householders and businesses make the decision to occupy buildings on flood plains when they know that this decreases their personal resilience to an extreme flooding event?

The example above indicates that there is a lack of understanding of individual and social responsibility being taken for actions that can affect personal, community and national resilience to EWEs, and tension between competing actors influencing decisions. We may live

in a modern blame culture but there appears to be a lack of accountability for the tragedies that occur when the effects of disasters are increased because individuals have to make less than optimum decisions that have decreased their resilience to such events. Is it the fault of householders who choose to live there or the fault of policy makers who allow people to build there? Too often EWEs are blamed on being an 'act of God' when in fact a clear pathway of poor decisions made over a long period of time have contributed to the final damage caused by these events. Furthermore the over reliance upon others that is fostered through our modern interdependent lifestyles can also contribute to attitudes, decisions, expectations and behaviours which are detrimental to our resilience. The over reliance upon the emergency services can leave vulnerable situations throughout the community. Therefore, it is time then for individuals to play a greater role in increasing both their personal and community resilience to ensure that in the future communities will be better protected against these events.

3.2. Understanding Individual Roles in Resilience

Existing resilience models, while emphasising that understanding interdependencies between community groups will be beneficial, also note that generic models of community resilience can identify areas for intervention (such as trust and the need for integration) (Paton, 2008). However, these have so far failed to specify the content of such interventions, knowledge that will be required to positively affect resilience factors. Therefore, while social responsibility has been highlighted as a potentially key factor for affecting community resilience, it is yet to be explored in enough depth to provide contextual information towards understanding how and why these affects occur. In order for people to understand how and why they must be more socially responsible, they must first understand what resilience is.

There have been many definitions of resilience proposed by researchers. Many describe communities dealing with the effects of an EWE and then returning to their normal functioning prior to the event. However, if a community returns to its previous state then it may have bounced back from the event but it has not actually increased its resilience to similar events. Instead, resilience must be thought of as containing elements of learning and adaptation to events so that community resilience can be increased. The resilience of a community is determined by the interconnected system's ability to absorb disturbance, self-organise and contain the capacity to learn and adapt (Walker & Salt, 2006). It is the attitudes, perceptions and behaviours that members of a community adopt or display prior to an EWE that can determine the ability of that community to absorb the disturbance. Furthermore, these aspects also determine their motivation and ability for self-organisation during the event and how much they are willing to learn from the event in order to change their perceptions and behaviours.

4. Risk Perception

Risk perception is widely recognised as being the perceived probability of negative consequences to individuals or society from environmental phenomenon (e.g. flooding). There

are a broad range of personal and social reasons related to the difficulties involved with flooding as a risk issue, such as experience or prior knowledge, personal and community beliefs and the level of trust. While it has been noted by numerous researchers that the link between perceptions and behaviour is an important area of study (e.g. Adelekan & Gragegesin, 2005), these perceptions have not yet been fully investigated (Grothmann & Patt, 2005). In particular perceptions of the risk of climate change has been highlighted as one of the most important, yet understudied, areas of research (Wolfsegger et al., 2008). Viscusi & Zechhauser, (2006) indicate that households, SMEs and policy makers have a tendency to underestimate risks that appear distant or global, or which others do not appear to be concerned about. Public support for measures to reduce climate change and its impacts often falters due to the uncertain nature of climate change and the inability of people to relate these aspects to their day-to-day lives. Therefore, a better understanding of the reasons behind these failures is required in order to improve future measures and decision making.

4.1. Psychological Barriers

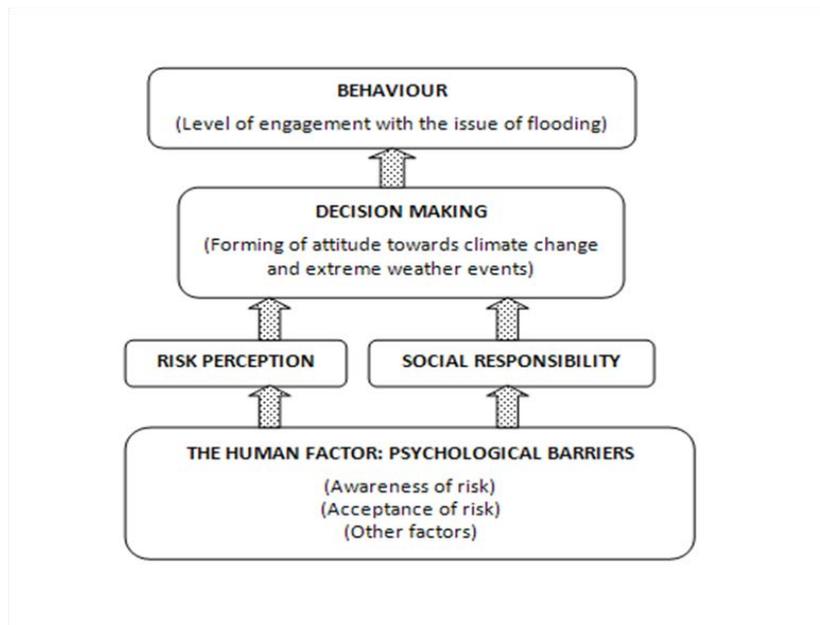
There have been a number of psychological aspects suggested as to why actions to increase resilience to EWEs have been so difficult to conceptualise and implement. Much of the psychological research has focused upon a broad spectrum of cognitive heuristics and biases. In line with the conclusions drawn from the previous section, the majority of these avenues of research are based around the level of risk that each person perceives climate change to have, either upon the world, society or their personal lives. It is from an understanding of these perceptions of risk that counter measures to the threat of flooding in the built environment may be found. Jaeger et al. (1998) found that people do not act in a rational manner when weighing up potential risks, but instead take a large amount of information from a broad range of factors into consideration. Soetanto and Dainty (2009) illustrated this phenomenon through a conceptual model of risk perception of future events. These factors can include previous experience, personal beliefs or the expected outcome of any risk related actions, which can account for the variety in perceptions of the risk posed by climate change. A conceptual framework to illustrate this is presented in Figure 1.

These factors also mirror the issues described earlier with decision making, teamwork and human behaviour and attitudes towards this subject in general. Understanding the origins of these influencing aspects may lead to methods to alter them, creating a more desirable mindset, which would then filter upwards from being a psychological process, to a perception being held, to a decision made and eventually to a behaviour being adopted.

One of the most common cognitive heuristics is the notion that people select which new information they acknowledge based upon continuation and consistency of their already held beliefs and biases to maintain an 'attitudinal certainty' (Eiser, 1994; Greenwald, 1980). This means that people will base their future decisions on the outcome of past decisions. This in turn means that much of the new information relating to climate change can be omitted or overly emphasised according to existing opinions, meaning that opinions become polarised into either

viewing climate change and the associated EWEs as being extremely important or completely unimportant (Langford et al., 1999). These opinions, both positive and negative, can be perpetuated and influenced by the media, especially as a large amount of information regarding climate change is uncertain (see Bate, 1997). These outside influences and individual biases can be detrimental to the effectiveness of environmental educational programmes as people are uncertain about the validity of new information, acknowledging only the aspects that support their already held beliefs (Kempton, 1997). This is why persuading people to perceive climate change as a threat and recognising the need to respond to the threat has even been compared to requiring an act of faith (van Dommelen, 1999).

Figure 1: Risk Perception and Social Responsibility in the Decision Making Process



The psychological analysis has demonstrated the two main barriers that can affect risk perception are lack of awareness of risk and non-acceptance of the risks involved with climate change. Through the upward filtering process that has been discussed throughout this paper this will eventually affect the resilience level that people within a built environment will have to flooding. All the issues encountered at the higher levels of this process have been shown to have their roots at deeper psychological levels. These issues, such as trust, personal beliefs, past experience, all combine to create the fundamental basis of human involvement with the issue of flooding in the built environment, known here as the human factor.

5. Human Factors and Community Groups

Researchers must understand that many human factors may not be distinct from each other and may influence and affect each other, as well as the overall decision making process. This can be seen where a better understanding of perceived social responsibilities would provide a context for exploring perceptions of risk. If we take one key community group, householders, as an

example, then if an individual did not believe that the risk of EWEs was great then they may not engage in any resilience improving actions. However, simply stating that there is a linear relationship between perceptions of risk and engagement in resilience improving action does not provide a full enough picture to inform future resilience measures. Instead, understanding how that individual perceives the level of involvement that householders currently have with these issues and the responsibilities they have as a community group in relation to these issues requires further exploration. What resilience actions do householders believe they should be engaging in, or are able to engage in? This then raises questions of how do these three key community groups view each other's roles and responsibilities and are there any gaps between expectations of others and understanding of one's own role? These gaps would be potential barriers to increasing community resilience.

Acceptance of new risk information and practices regarding flooding may be dependent upon existing perceptions of risk, creating a circular process of information acceptance. If the information is already consistent with current perceptions then it will be easily acknowledged and accepted. It is when the information is in conflict with these perceptions then this may cause psychological discomfort at the lowest stage of the process. This discomfort, known as cognitive dissonance, can create varied, persistent beliefs. Evidence supporting this variation belief affecting coping strategies based around perception of risk of flooding was provided by Stoll-Kleeman et al. (2001). They found that denial was used to justify lack of action on climate change, with a reluctance to change their favoured behaviours. Personal beliefs that their sacrifice would have little positive effect for others and displacement of the responsibility to authority figures and new technology were all being used as therapeutic coping strategies. It is this denial, disinterest and general doubting within community groups that represents human factors that can lead to lack of awareness and acceptance of the risks they face and is of vital concern to future research in this field.

6. Conclusions

This paper has highlighted that EWEs represent a serious threat to UK communities, particularly the risk of flooding. In order to better protect ourselves we need to understand barriers and drivers for resilience at the level of the community. Community resilience is largely affected by the decision making of its key community groups and therefore a better understanding of factors affecting the decision making process is required. Two main areas that research has highlighted as containing the potential to affect decision making are risk perception and perceptions of social responsibility. However there are a number of considerations to be taken into account by researchers in these areas.

The research is exploring perceptions of social responsibility within and between the key community groups of householders, small business and policy makers. In addition to the importance of social responsibility discussed within this paper it is also of particular relevance to the current UK climate. In early 2009 the UK was hit by severe snow storms which tested the resilience of many communities. What was highlighted by the storms was that there were major

discrepancies between what householders believed the council were responsible for and what the council believed they were responsible for. An example of this can be seen when as the snowfall became heavier the council began prioritising main roads, meeting what they believed to be their responsibility to the community. However in doing so they left many householders isolated and feeling that the council were not meeting their responsibility to the community. During this period over six million people were not able to make it to work and many schools and businesses were closed. The resilience of many communities across the UK had been undermined by gaps in people's expectations of their own and other community group's social responsibilities.

As we have seen, the gaps in perceptions of social responsibility between community groups are indicative of barriers to community resilience. These gaps are brought about by a lack of integration and joined-up decision making between householders, local businesses and policy makers in creating community level resilience measures. Householders were not aware of the decisions being made by the council to only grit main roads and were also unaware of resilience procedures which stated that grit bins would only be provided to members of the community upon request. The council believed they were attending to the needs of the whole community as resilience measures were in place; however the rest of the community were not aware of these measures and believed the council had failed them. It could also be argued though that, in the eyes of the council staff, the householders had failed to meet their own expectations of social responsibility by failing to request grit and maintain their own resilience levels. This makes perceptions of social responsibility within and between key community groups of vital importance to resilience research.

The study will use four versions of a Perceptions of Social Responsibility Questionnaire, one containing questions about the self, one relating to householders, one to SMEs and one to policy makers, with each community group completing three of the four questionnaires. Interviews will then be conducted and the responses used to create a cognitive map of perceptions of social responsibility within and between the three community groups. The gaps between the expectations a community group has of meeting its own social responsibilities and the expectations other groups have of that group will be indicative of barriers to resilience. This is because either social responsibilities are not being met by that group or are being wrongly attributed to that group within the perceptions held by the other groups. The results will provide a deeper insight into the affect that different perceptions of social responsibility may have upon the wider issue of community resilience. It is believed that the findings will further highlight the need for integration between community groups and will be of use to community decision makers to make better decisions regarding community resilience measures.

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