

Climate change, justice and vulnerability

Findings
Informing change

November 2011

Climate change is expected to increase the frequency and intensity of extreme weather-related events in the UK, such as floods and heatwaves. This study provides a framework for analysing 'social vulnerability' to the impacts of climate change. It demonstrates how we can learn from past floods and heatwaves to map patterns of 'climate disadvantage' across the UK and shows how social justice can be integrated into climate adaptation planning.

Key points

- Existing climate change policy does not adequately address many aspects of well-being that are adversely affected by climate-related hazards.
- Personal, environmental and social factors influence how climate-related events affect well-being. Adaptation policy has focused on personal factors (such as health and age) and environmental features (such as flood prevention) but also needs to address social factors (such as income inequalities, the existence of social networks and the social characteristics of neighbourhoods).
- How disadvantaged an individual or group will be by climate change depends not only on the likelihood and degree of their exposure to events such as flooding and heatwaves, but also by the potential for losses in their well-being as a result of these events. 'Social vulnerability' is a matter of how external events convert into losses in well-being.
- The most socially vulnerable neighbourhoods in the UK tend to be in urban or coastal locations. There is a North-South divide in extreme socially derived flood-vulnerability in England, while nearly a quarter of London neighbourhoods are classed as extremely socially heat-vulnerable.
- Yorkshire and Humberside is estimated to be the most flood-disadvantaged English region.
- Around two-thirds of the most extremely socially flood-vulnerable places in the UK are also extremely socially heat-vulnerable. Many socially deprived neighbourhoods are also socially vulnerable to climate events.

The research

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Introduction

This study is about justice in the distribution of the impacts of climate change on people's well-being in the UK. It develops and applies a framework for understanding climate-related social vulnerability and disadvantage. This framework emphasises aspects of social vulnerability that are intended to assist decision-makers in addressing current inequalities.

Understanding the impacts of climate change on well-being

Many of the dimensions of well-being that are affected by climate-related hazards are not adequately captured by existing approaches to climate change. *Climate disadvantage* is determined not just by the likelihood and degree of an individual or group being exposed to a hazard but also by their social vulnerability to such hazards. *Vulnerability* is a matter of how external events convert into changes in well-being. An individual or group is more vulnerable if they are less able to respond to stresses placed on their well-being.

Measuring vulnerability requires a full account of the dimensions of well-being that are adversely affected by climate change, and of the personal, environmental and social factors involved in converting weather events into losses in well-being. Traditional resource-based measures of well-being (Box 1) used by economists, for example in terms of loss of income or property values, do not capture the full extent of these losses. Resources are a means to an end, and convert differentially into changes in well-being. Subjective approaches to well-being (psychological states of

Box 1: Well-being, vulnerability and climate disadvantage – key terms

Resource-metric: Losses and gains in well-being measured in terms of losses and gains of resources, such as income or property values.

Subjective welfare: Well-being conceived in terms of psychological states, such as feelings of happiness.

Capabilities and functionings: Well-being characterised in terms of capabilities to achieve central human functionings.

- *Functionings:* the valuable states and activities a person can be or do e.g. being healthy, being housed, having close personal relationships.
- *Capabilities:* freedoms or opportunities to achieve particular functionings.
- *Achieved functionings:* the valuable states and activities that a person actually realises.

Vulnerability: An individual's or group's vulnerability is characterised by the degree to which an external event converts into losses in their well-being.

Conversion factors: The personal, environmental and social factors that determine how positive or negative events are converted into gains and losses in well-being.

- *Personal:* Features of the individual such as disability, age and health, which affect the way resources and hazards have different impacts on well-being.
- *Environmental:* Features of the physical environment, such as availability of green space, quality of housing stock, elevation of buildings and access to public space, which affect the way resources and hazards influence well-being.
- *Social:* Features of the social and institutional context and situation, such as strength of social networks, cohesion of neighbourhoods, institutional regimes in nursing homes, and levels of inequality and income, which affect the way resources and hazards have different impacts on well-being

Socio-spatial vulnerability: Socio-spatial vulnerability brings together aspects of place and time with personal, social and environmental factors. This results in the geographical expression of how far an external event has the potential to convert into well-being losses.

Climate disadvantage: Climate disadvantage is a function of (a) the likelihood and degree of exposure to a hazard and (b) individual or group vulnerability to such hazards.

happiness – see Box 1) are not well-suited to measuring inequalities. Psychological states tend to adapt to adverse situations, so these measures are liable to underestimate the losses in the well-being of the most deprived people.

A 'capabilities' approach to welfare (Box 1) is better able to include the different dimensions of well-being at stake in heatwaves and flooding. Well-being is defined in terms of the opportunities (*capabilities*) people have to achieve the valuable things they can do or be (*functionings*). While opportunities or capabilities are important, adaptation policy needs to focus on the functionings a person actually achieves rather than only on opportunities. Opportunities are more difficult to measure than achievements. Some central functionings, such as achieved literacy, social networks and secure housing, are a condition of exercising further opportunities.

This capabilities approach offers a fuller account of the extent of the losses in well-being caused by climate-related events. Measures of the impacts of climate events (e.g. flooding and heatwaves) tend to focus on loss of life, damage to physical health and loss of income and property, but a focus on these alone seriously underestimates the losses in well-being involved. Impacts of floods include living in temporary accommodation, disruption of children's education, and loss of control over daily routines. These do not just matter for their impacts on health and livelihood – they are important losses in central functionings in themselves.

Incorporating the social dimensions of vulnerability

The social dimensions of vulnerability have not been sufficiently recognised in climate adaptation policy. A variety of personal, environmental and social factors are involved in converting external stresses into losses in well-being.

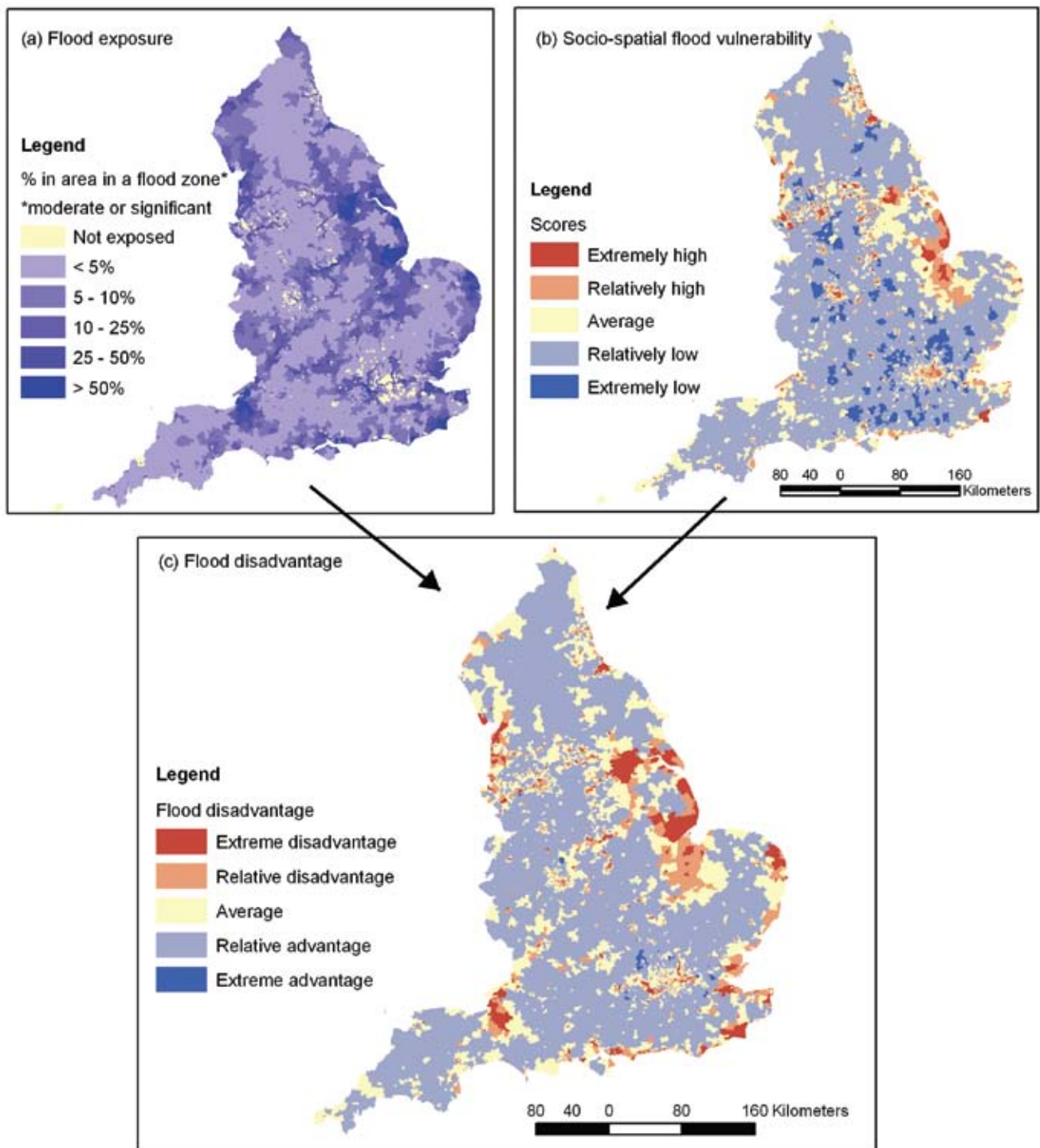
Adaptation policy often focuses on personal and environmental factors. In heatwaves and floods, personal conversion factors include sensitivities associated with age and health. Environmental factors include the physical attributes of the neighbourhood, such as green space, and characteristics of housing, such as the elevations of residential buildings. However, while these are important, adaptation policy also needs to address social conversion factors that are less often raised in discussion of climate policy. These include income inequalities, social networks and social characteristics of neighbourhoods. In the case of heatwaves, social factors include: social isolation; loss of public spaces; fear of crime, which leaves people unwilling to leave their homes or open their windows; and inflexible institutional regimes and the lack of personal independence in nursing homes.

A variety of social factors affect the capacity of households to prepare for, respond to and recover from flooding. Low-income households are less able to make their property resilient, and to respond to and recover from the impacts of floods. The ability to relocate is affected by wealth; so also is the ability to take out insurance against flood damage. Social networks affect the ability of residents to respond to flooding – for example, through providing social supports.

Once social dimensions of vulnerability are recognised, climate adaptation policy needs to address a broader range of concerns and include areas of social policy not normally associated with climate change. For example, care of elderly people, quality of neighbourhoods and levels of income inequality are all important for climate adaptation. Heatwaves and floods often reveal wider inequalities in the distribution of social vulnerability. It is also particularly important to foster functionings such as being in effective social networks and being able to participate in public decision-making, since these are not only important dimensions of well-being in themselves but are also important in supporting other dimensions of well-being

An increased likelihood of flood exposure increases the potential for losses in functionings over and above the direct consequences of the flooding itself. It makes individual functionings significantly insecure, and this insecurity can undermine well-being in a variety of ways. Insecure functionings cause stress and anxiety; they lead to a loss of the ability to plan for significant life events. The UK's risk-differentiated insurance regime makes loss of insurance and prohibitively high premiums and excesses a source of insecurity for those threatened by flood. Policy on insurance has particular urgency as the current agreement between the Government and insurance industry expires in 2013. There are two broad models for insurance: a market-based, risk-differentiated model advocated by many in the insurance industry; and a more solidaristic pooled insurance model advocated by some flood action groups. There is a strong case for a more solidaristic scheme of pooled insurance that protects the most disadvantaged.

Figure 1: Relative flood disadvantage in England as a composite of (a) flood exposure and (b) socio-spatial flood vulnerability



Sources: Full data acknowledgements are provided in the main report accompanying this Findings summary. Data mapped using EDINA UKBorders, source: 2001 Census, Output Area Boundaries. Crown copyright 2003. Measures of flood exposure are derived from Environment Agency NaFRA 09/10 Spatial FLC Grid product data under Special Licence – Non-Commercial Ref: A1539

Mapping vulnerability and climate disadvantage

Social vulnerability and climate disadvantage are linked to place. Measures of the various factors can be used to construct an evidence base to assist decision-makers.

Socio-spatial vulnerability brings in aspects of place and time with personal, social and environmental factors – resulting in the geographical expression of the degree to which an external event might convert into losses in well-being. Maps of socio-spatial vulnerability can be combined with maps of hazard-exposure (such as the potential for flood – see Figure 1) to assess which UK neighbourhoods currently experience greatest climate disadvantage.

Socio-spatial vulnerability comprises five dimensions, each of which relate to conversion factors and functionings. Relative scores allow the extent of vulnerability to be assessed across national, regional and local scales. Neighbourhood-specific ‘signatures’ help explain which factors drive social vulnerability in particular localities and allow a picture of the factors adding to (and detracting from) the potential for harm. These five dimensions are:

- sensitivity – characteristics linked to personal factors, e.g. age and health;
- enhanced exposure – characteristics of physical environments that tend to enhance or offset exposure;
- ability to prepare – characteristics that tend to encourage or discourage anticipatory actions being taken;
- ability to respond – characteristics that explain the extent to which action can be taken to avoid harm during an event; and
- ability to recover – characteristics that help or prevent the process of returning to normal afterwards.

The final three dimensions are all directly associated with specifically social conversion factors and with facets of what can be called *social adaptive capacity*.

The geography of vulnerability and climate disadvantage

This study highlights extremes in climate-related social vulnerability in the UK. Most extremely socially vulnerable neighbourhoods are in large urban centres. There is also a strong coastal component to the geography of socio-spatial vulnerability, which is most marked in Wales, where over half of the most socially vulnerable top 10 per cent of neighbourhoods are within 1km of the coast.

London neighbourhoods have the highest average (mean) socio-spatial heat vulnerability scores in England and almost 25 per cent of London neighbourhoods have extreme heat-related social vulnerability. A similar picture emerges in the rest of the UK with Glasgow, Belfast and Cardiff ranking at the top for mean socio-spatial heat vulnerability scores.

There is evidence of joint climate-related social vulnerability to both heat and flood in UK neighbourhoods. Around two-thirds of the most extremely socially flood-vulnerable in the UK are also extremely socially heat-vulnerable. There are also similar joint patterns in neighbourhoods with extremely low climate-related social vulnerability too. In Wales, 80 per cent of extremely low-scoring neighbourhoods have extremely low scores for both flood and heat.

The research reveals a distinct North-South divide in terms of socio-spatial flood vulnerability in England. The North West and the Yorkshire and the Humber regions have the highest proportions of neighbourhoods classed as extremely socially flood-vulnerable. Average (mean) social-spatial flood vulnerability is lowest in the East of England and South East. This North-South divide also exists for socio-spatial heat vulnerability if London is discounted. However, temperatures tend to be higher in the South so this tends to redress the balance.

The North-South divide in England's socio-spatial flood vulnerability is also seen to some extent with patterns of flood disadvantage. Yorkshire and the Humber is estimated to have the highest average flood disadvantage

plus the largest proportion of its neighbourhoods classed as being extremely flood disadvantaged. The East Midlands shows a similar pattern. The North West, North East and London all have average flood disadvantage scores that are above the English mean. Although neighbourhoods in the South East are generally 'advantaged', 10 per cent of all neighbourhoods there are classed as extremely flood-disadvantaged.

Socially vulnerable groups

A number of socially vulnerable groups emerge as key determinants of the geography of social vulnerability in the UK. Although there are some place-specific variations, the following appear to have a major role:

- *poverty and deprivation* – strongly associated with existing social deprivation;
- *new residents* – whether associated with new arrivals more generally (as in Scotland and Northern Ireland) or with a component of new overseas arrivals (as in England and Wales);
- *mobility and access* – the ability to respond to events and recover from them is a function of personal mobility and accessibility of services;
- *sensitivity* – a number of the determinants of climate sensitivity were grouped, allowing for the identification of areas with high proportions of young children or elderly people. In Wales and Scotland, age and ill-health were linked, and in Scotland and Northern Ireland age and household composition were linked;
- *enhanced exposure* – some neighbourhood groups were identified through environmental indicators. In Northern Ireland the proportion of residents in high-rise housing was identified as a distinct measure of socio-spatial vulnerability in its own right.

Conclusion

The social dimensions of vulnerability to climate change have not yet been sufficiently recognised in adaptation policy. Nor have they received sufficient attention in existing assessments of the impacts of climate change on people and communities. This study reveals the importance of developing a wider appreciation of the dimensions of vulnerability. The results also demonstrate how quantitative assessment can complement and extend evidence collected using qualitative techniques for the purposes of informing the development of just adaptation responses.

About the project

This study has developed an integrated framework centred on justice, vulnerability and climate change. It has also applied an associated methodology, which provides a first look at climate disadvantage in the UK.

For further information

This Findings is part of a programme of work on Climate change and social justice.

See www.jrf.org.uk/work/workarea/climate-change-and-social-justice

The full report, **Climate change, justice and vulnerability** by Sarah Lindley, John O'Neill, Joseph Kandeh, Nigel Lawson, Richard Christian and Martin O'Neill, is available as a free download from www.jrf.org.uk

Published by the Joseph Rowntree Foundation, The Homestead, 40 Water End, York YO30 6WP. This project is part of the JRF's research and development programme. These findings, however, are those of the authors and not necessarily those of the Foundation. ISSN 0958-3084

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