

## Which places are disadvantaged?

There are uneven distributions of climate disadvantaged neighbourhoods across the UK

### 1. What are we concerned about?

**1.1 Some people and groups are more susceptible to the negative impacts of climate-related hazards due to their different abilities to deal with them.** There are many studies of *social vulnerability*<sup>1</sup> and many causes which have been identified. Some of the factors affecting the potential for different impacts between people and places as a result of flooding and heat waves are listed in Table 1<sup>2</sup>. Studies have also been carried out for particular parts of the UK<sup>3</sup> and for different types of climate-related events<sup>4,5</sup>.

**1.2 This website provides new maps to show practitioners how different people and places are likely to be affected by flooding and high temperatures.** Social vulnerability maps show places where the current characteristics of people and communities could result in negative impacts on their wellbeing from flooding or high temperatures. These maps are combined with others showing the potential to be exposed to flooding (in the present day) and high temperatures (in the 2050s). Combined maps - flood disadvantage and heat disadvantage - show how the likelihood of being affected compares with the potential for severe impacts on wellbeing in an area.

**1.3 Maps have been created from the existing evidence base using a new mapping framework applied to local neighbourhoods.** Neighbourhoods are quite large – in the region of 7,800 people on average in 2011 – therefore some areas are not as well represented as others. These might include rural areas where the geographical zones are disproportionately large, or places where there are distinct contrasts in population or physical characteristics over relatively small areas. The map framework can be adapted and extended to suit local circumstances and data availability. Indeed, the maps should be seen as a starting point to support you through the process of identifying local geographical distributions of vulnerability and disadvantage and developing actions to respond.

- See the **Further Portal Resources** for a full list of caveats to consider when using the maps provided<sup>6</sup>. Also see here<sup>7</sup> for more information about how vulnerability should really be recognised as a process, rather than a static characteristic.

**1.4 Much of the evidence used in the maps is already available, but it is often not provided in a form which helps develop an appreciation of the full range of factors driving negative effects on wellbeing in a local area, particularly those related to social causes.** Traditional resource-

---

<sup>1</sup> Link to paragraph 1.5

<sup>2</sup> Link to Table 1

<sup>3</sup> Link to **References** Zsomboky, M., Fernandez-Bilbao, A., Smith, D., Knight, J. & Allan, J. (2011) “Impacts of climate change on disadvantaged UK coastal communities”, Joseph Rowntree Foundation, York.

<sup>4</sup> Link to **References** Houston, D., Werritty, A., Bassett, D., Geddes, A., Hoolachan, A. & McMillan, M. (2011) “Pluvial (rain-related) flooding in urban areas : the invisible hazard”, Joseph Rowntree Foundation, York

<sup>5</sup> Link to **References** Benzie, M, Harvey, A, Burningham, K, Hodgson, N and Siddiqi, A (2011) Vulnerability to heatwaves and drought: adaptation to climate change, JRF <http://www.jrf.org.uk/publications/vulnerability-heatwaves-and-drought-adaptation-climate-change>

<sup>6</sup> Link to **Further Portal Resources** Caveats and limitations of the map data.

<sup>7</sup> Link to Section 3 (3.1)

based measures of wellbeing used by economists, for example, the loss of income or property values due to extreme weather, do not go far enough to capture the full range of losses and wider social impacts involved<sup>8</sup>. Richer accounts of social vulnerability are available, but they tend to be qualitative and provide only one type of evidence that decision-makers need. Social deprivation indices have become the *de facto* means of measuring and mapping social vulnerability. While these indices have a role to play and contain many of the factors of interest, they do not include them all. As a result, practitioners and other decision-makers may miss out on developing responses to target those in most need and miss opportunities for taking action.

### Box 1: Foundations for the mapping work in this study

There is much debate about how to define and characterise social vulnerability and its connection to vulnerability more widely. According to the IPCC, vulnerability to climate change is: *a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity*<sup>1</sup>. On this website we distinguish vulnerability and climate disadvantage. The concept of vulnerability is used to describe the capacities of individuals and social groups to respond to the impacts of adverse events. A useful characterisation of vulnerability is offered by Kelly and Adger: *'we define vulnerability in terms of the ability or inability of individuals and social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being'*<sup>2</sup>. Vulnerability is a matter of how external stresses impact on well-being. How vulnerable an individual or group will be to a climate related event depends upon not just their personal sensitivity to the event, but also the environmental and social factors that lead to losses in well-being. How far an individual or group is disadvantaged by a climate related event will depend on both their vulnerability and the degree to which they are exposed to the event<sup>3</sup>.

It is helpful to consider the adjustments required to avoid negative consequences of events in terms of what can be done before, during and after events to minimise impacts. These phases are more commonly considered in disaster management frameworks<sup>4</sup>, but can be applied to climate adaptation and climate-related extreme weather. They connect to the means of building community resilience.

Resilience and vulnerability are closely related to each other. A useful definition of social resilience is *'the ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change'*<sup>5</sup>. Addressing the personal, environmental and social factors that affect the degree to which a community is vulnerable to a hazard such as flood, drought or heatwave will also address how well a community is able to bounce back after the impacts of the hazard. A community that is better able to prepare for, respond to and recover from external hazards like floods or heatwaves will be more resilient to that hazard. Building resilience needs to account for: the degree to which the community comes into contact with a hazard capable of causing harm; the amount of inherent susceptibility to harm in that community; and the extent to which people in the community are able to make adjustments in order to avoid negative consequences.

1. Link to **References** IPCC (2007) Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J. and Hanson, C. E. (eds). Cambridge: Cambridge University Press p. 883
2. Link to **Reference** Kelly, P. M. & Adger, W. N. (2000) Theory and Practice in Assessing Vulnerability to Climate Change and Facilitating Adaptation. *Climatic Change*, 47(4) 325-352.
3. Link to **Reference** Lindley, S. J., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York
4. Link to **Reference** ISDR International Strategy for Disaster Reduction (2005) Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters  
<http://www.unisdr.org/2005/wcdr/intergover/official-doc/L-docs/Hyogo-framework-for-action-english.pdf>
5. Link to **Reference** Adger, N. 2000, 'Social and ecological resilience: are they related?' *Progress in Human Geography* 24: pp. 347-364, page 347.

<sup>8</sup> Link to **References** Lindley, S., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York.

**1.5 Social vulnerability comes about through the interaction of a number of personal, environmental and social factors** that affect the way in which climate hazards impact on the well-being of individuals or groups:

- Personal features of the individual such as age and health;
- Environmental characteristics such as the availability of green space, quality of housing stock or elevation of buildings;
- Social and institutional context, such as levels of inequality and income, the strength of social networks, the cohesion of neighbourhoods and the day-to-day practices of institutions, such as care regimes in nursing homes. Social factors can be very influential on the outcomes of heat-wave events, yet evidence suggests that the design of responses still tends to over-rely on assessments of people’s biophysical susceptibilities<sup>9</sup>, i.e. their *sensitivity*.

**1.6 Maps of *socio-spatial vulnerability* are provided in the map portal showing how the personal, social and environmental factors which help to explain uneven impacts from extreme events like flooding and heat waves come together in particular neighbourhoods.** Vulnerability is measured through five dimensions (see Box 1<sup>10</sup>):

- *Sensitivity* – personal biophysical characteristics, such as age and health, which affect the likelihood that a heat wave or flood event will have negative welfare impacts.
- *Enhanced exposure* – the aspects of the physical environment, such as the availability of green space or housing characteristics, which tend to accentuate or offset the severity of heat wave or flood events;
- *Ability to prepare* – primarily the social factors that enable individuals or communities to prepare for heat waves or floods. With respect to floods this includes factors such as income, insurance and local knowledge;
- *Ability to respond* – primarily the social factors that enable individuals and communities to immediately respond to heat waves and flood events, such as income, insurance, personal mobility, fear of crime, community networks and local knowledge;
- *Ability to recover* – primarily the social factors that enable individuals and communities to recover from heat waves and flood events, such as income, insurance, housing mobility, social networks, knowledge and availability of hospital and GP services<sup>11</sup>.

**1.7 Maps of *climate disadvantage* show how social vulnerability combines with the potential for exposure to hazards – present day flood likelihood and future patterns of high temperatures - in local neighbourhoods.** Climate disadvantage can be estimated and mapped through the combination of representations of hazard-exposure and socio-spatial vulnerability<sup>12</sup>. The relationships between the different datasets available in this resource are illustrated in Figure 1a, based on the overall conceptual framework in Figure 1b.

**1.8 This website provides new information to support practitioners in the process of a broader and deeper consideration of social vulnerability and climate disadvantage at the local level.** Data are available for 2011 and 2001 for England. Equivalent data for Scotland, Wales and

---

<sup>9</sup> Benzie, M, Harvey, A, Burningham, K, Hodgson, N and Siddiqi, A (2011) Vulnerability to heatwaves and drought: adaptation to climate change, JRF <http://www.jrf.org.uk/publications/vulnerability-heatwaves-and-drought-adaptation-climate-change>

<sup>10</sup> Link to Box 1

<sup>11</sup> Link to **References** Lindley, S., O’Neill, J., Kandeh, J., Lawson, N., Christian, R. & O’Neill M. (2011) “Climate change, justice and vulnerability”, Joseph Rowntree Foundation Report, York.

<sup>12</sup> Link to **References** Lindley, S., O’Neill, J., Kandeh, J., Lawson, N., Christian, R. & O’Neill M. (2011) “Climate change, justice and vulnerability”, Joseph Rowntree Foundation Report, York.

Northern Ireland for 2001 can be found here<sup>13, 14</sup>. The information in the following sections and the associated map portal are provided to:

- Explain the aspects of well-being that are endangered by climate change but which are not yet adequately captured by existing approaches to adaptation policy
- Outline the social dimensions of vulnerability to climate change which have not yet been sufficiently recognised in adaptation policy
- Provide supporting evidence for building up local profiles of climate disadvantage and social vulnerability for your area
- **Illustrate the uneven geographical distributions in climate-related social vulnerability and climate disadvantage<sup>15</sup>**
- Show how factors can be represented and mapped to develop and extend the evidence provided in the resources. **See the list of indicators used in ClimateJust here<sup>16</sup>**
- Assist with the process of using the evidence to support local decision-making, including through encouraging a consideration of limitations in the data.

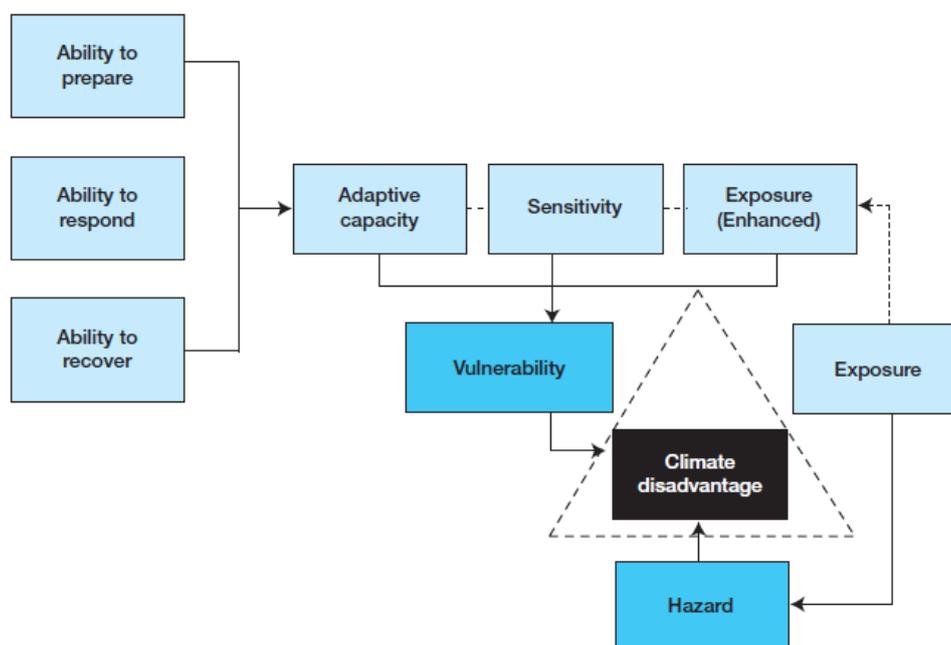


Figure 1a: Conceptual framework for assessing socio-spatial vulnerability and climate disadvantage<sup>17</sup>

<sup>13</sup> Link to **References** Lindley, S., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York.

<sup>14</sup> Link to **References** Lindley, S. J. & O'Neill, J. (2013) Flood disadvantage in Scotland: mapping the potential losses in well-being. Scottish Government Social Research <http://www.scotland.gov.uk/Publications/2013/10/5328>

<sup>15</sup> Link to section 3.

<sup>16</sup> Link to table (from user guide/report)

<sup>17</sup> Link to **References** Lindley, S., O'Neill, J., Kandeh, J., Lawson, N., Christian, R. & O'Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York.

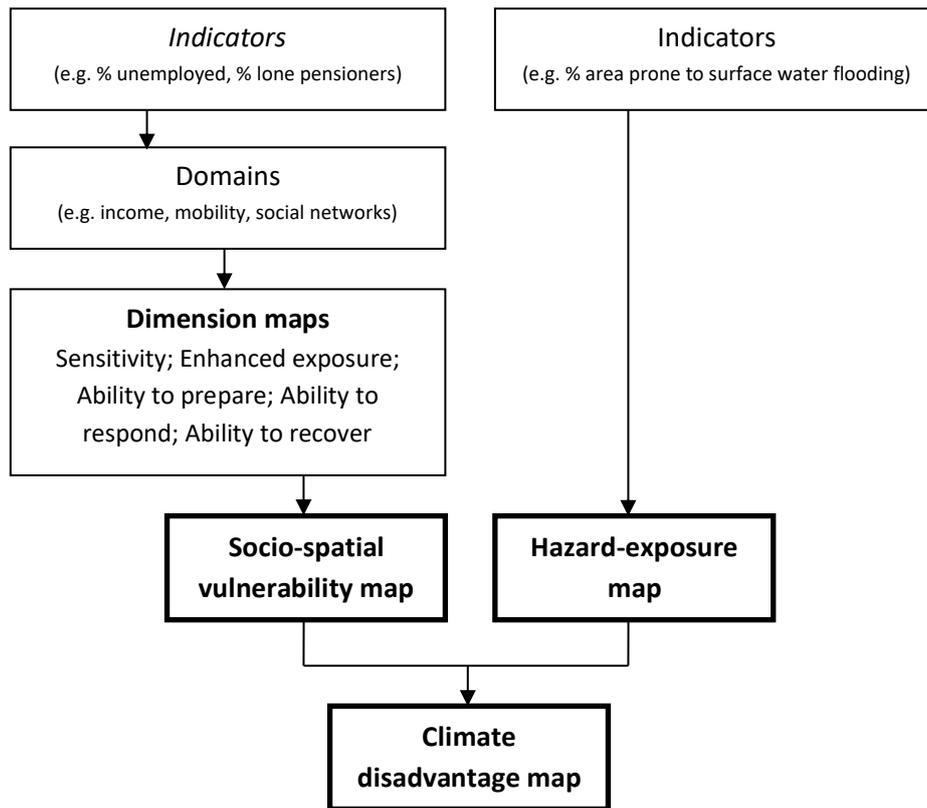


Figure 1b: Climate disadvantage as a measure of socio-spatial vulnerability and hazard-exposure

Table 1: Factors determining uneven impacts to the same climate-related event. Divided into three broad groups: sensitivity, exposure and adaptive capacity<sup>18, 19, 20</sup>. Click here for the ClimateJust list<sup>21</sup>.

Influence	Factor	Heat/Flood
Sensitivity: (+) increasing susceptibility;(-) reducing susceptibility	Age: very young and elderly (+)	Both
	Gender: women may be more likely to have caring responsibilities (+) men (esp. young) associated with risk-taking behaviour (+)	Both
	Health status: illness (+)	Both
	Physical and mental health problems (+)	Both
	Residential care homes (+)	Both
	Neighbourhood characteristics (+/-)	Both
Exposure: (+) enhancing; (-) offsetting	Basement, single storey and mobile housing (+)	Flood
	Homeless, tourists, transients (+)	Both
	Location (+/-)	Both
	Overcrowding (+) high housing density (+)	Both
	Thermo-insulate housing: air conditioning (-)	Heat
	Top-floor flats (+)	Heat
	Unventilated buildings (+)	Heat
	Urban dwellers (+) living in city centre (+) land cover (+/), green space (-), access to parks and green spaces (-)	Both
Adaptive capacity: (+) reducing ability to adapt; (-) increasing ability to adapt	Access to decision making: increased access (-)	Both
	Access to medical establishments (-)	Heat
	Awareness and preparedness: high awareness (-)	Both
	Density of medical establishments and services (higher -)	Heat
	Density and access to air-conditioned environments outside the home (-)	Heat
	Disability, e.g. lack of mobility (+)	Both
	Educational attainment (poor +)	Both
	Family/household composition: large families (+), single parents (+), single-person households (+)	Both
	Flood experience: no experience (+)	Flood
	Income (low +)	Both
	Insurance accessibility (good -)	Flood
	Length of residence, linked to prior experience: short residence (+)	Both
	Mobility: lack of transportation (+)	Both
	Occupation: skilled (-) or unskilled (+), also linked to income and financial status	Both
	Proportion of minority ethnic groups and new migrants/visitors, e.g. due to potential language issues (+) high population turnover (+)	Both
	Resources available to local authorities (+/-)	Both
	Serviced by flood warning system: yes (-), no (+)	Flood
	Skills and access to technology, e.g. access to environmental information (lack +)	Both
	Social isolation (+)	Both
	Socio-economic status (+/-)	Both
	Social deprivation (high +)	Both
	Tenancy characteristics: Renters (+), homeowners (-)	Both
	Trust in authorities: no (+), yes (-)	Both

<sup>18</sup> Link to **References** McGregor, G. R., Pelling, M., Wolf, T. and Gosling, S. (2007) The Social Impacts of Heatwaves, Science Report – SC20061/SR6. Environment Agency. Available at: <http://publications.environment-agency.gov.uk/PDF/SCHO0807BNCW-E-E.pdf> [Accessed 29 September 2011]

<sup>19</sup> Link to **References** Tapsell, S. M., Tunstall, S. M., Green, C. and Fernandez, A. (2005) Indicator set. Report T11-07-01 of FLOODsite Integrated Project, Flood Hazard Research Centre, Enfield. Available at <http://www.floodsite.net/html/publications3.asp?taskID=11> [Accessed 29 September 2011] Tapsall, *et al.*, 2005

<sup>20</sup> Link to **References** Cutter, S. L., Emrich, C. T., Webb, J. J. and Morath, D. (2009) Social Vulnerability to Climate Variability Hazards: A Review of the Literature. Hazards and Vulnerability Research Institute, University of South Carolina, Columbia. Available at [http://adapt.oxfamamerica.org/resources/Literature\\_Review.pdf](http://adapt.oxfamamerica.org/resources/Literature_Review.pdf) [Accessed 20 November 2009]

<sup>21</sup> Link to table (from user guide/report)

## 2. Why is it important?

**2.1 Mapping the social causes of uneven impacts from climate change and extreme weather and mapping patterns of potential exposure need to be given equal emphasis.** Much effort has gone into providing local decision-makers with supporting evidence concerning the geographical patterns of potential exposure to climate-related events, particularly flooding. While this is important, much less attention has been paid to providing equivalent supporting evidence concerning the other factors which explain why one community can have a very different health and wellbeing outcome than another even when exposed to the same event. This has restricted the development and implementation of local responses which address the specific social, personal and environmental factors that render people more or less vulnerable to losses in well-being.

**2.2 The ClimateJust portal provides map resources to help you to consider social factors in your local adaptation planning.** Evidence from past UK flooding and heat wave events are used to measure socio-spatial vulnerabilities and map geographical distributions of climate disadvantage. A greater consideration of the causes of uneven impacts can also help you to make your adaptation plans more socially just.

- See the **Further Portal Resources** for a presentation about why socially just adaptation is important.

**2.3 Social deprivation is often used as a proxy for social vulnerability and there is evidence of a link between deprivation and exposure to hazards.** A study in 2006 looked at the association between Environment Agency flood risk zones and the proportion of the population within them classified as being deprived. Although no clear trend was found for river-related flooding, for coastal flooding the most deprived people were more likely to live in exposed areas compared to the least deprived (Figure 2). In a separate study, slightly higher proportions of deprived communities were also found to be located in areas likely to be exposed to particularly intense rainfall and therefore surface water flood events<sup>22</sup>.



Figure 2: Deprivation and coastal flooding: Percentage of England's total population living within zones 2 (between a 1 in 200 and 1 in 1,000 annual probability of sea flooding) and 3 (1 in 200 of greater annual probability of coastal flooding) by deprivation decile<sup>23</sup>

<sup>22</sup> Link to **References** Houston, D., Werritty, A., Bassett, D., Geddes, A., Hoolachan, A. & McMillan, M. (2011) "Pluvial ( rain-related ) flooding in urban areas : the invisible hazard", Joseph Rowntree Foundation, York.

<sup>23</sup> Link to **References** Walker, G., Burningham, K., Fielding, J., Smith, G., Thrush, D. & Fay, H. (2006) "Using science to create a better place: Addressing Environmental Inequalities: Flood Risk", Science Report: SC020061/SR1, Environment Agency, Bristol.

**2.4 Social deprivation indices do not capture the full range of factors affecting impacts on people's wellbeing from events like floods and heat waves.** For example, although the many of the 38 indicators used in the English Index of Multiple Deprivation 2010<sup>24</sup> cover some of the same themes (such as income, education, access to services, health and crime), they do not include:

- Age, other than the *Income Deprivation Affecting Older People Index*;
- Tenure, other than *Social and private housing in poor condition* and *Difficulty of access to owner-occupation*;
- Building or local environment characteristics specifically linked to higher exposure levels, such as building elevation or the amount of greenspace;
- Social networks and isolation, either directly or by proxy;
- Past flooding events or potential for insurance access problems;
- Mobility, other than personal disability.

**2.5 The socio-spatial vulnerability of an area is a cause for concern in itself as it suggests that the wellbeing of the community living there could be improved.** Many dimensions of vulnerability are not hazard specific. Social isolation, low income, the absence of voice and lack of insurance will render individuals vulnerable when facing other pressures too (e.g. loss of employment, illness, theft or burglary). However, for vulnerability to climate change to translate into welfare losses, the area where vulnerable people live clearly needs to be exposed to a climate hazard, like a flood or heat-wave.

**2.6 In preparing for climate change and extreme weather events, the need to account for social vulnerability is becoming increasingly recognised in guidance and legislation. It is linked with wider sustainability goals and therefore relevant across the framework of current legislation.** Addressing issues associated with social vulnerability can therefore be either an explicit or implicit requirement for authorities and their partners in service delivery. The sections below focus on England, but the same broad issues are recognised across the UK.

**2.7 Local authorities and their partners in service delivery have statutory duties and other responsibilities in relation to:**

- ***Flood and Water Management Act (FWMA) 2010*** The Flood & Coastal Erosion Risk Management<sup>25</sup> strategy for implementing the Act sets out guiding principles. Sustainability is a central theme, following the strong public support (96%) identified at the draft bill stage<sup>26</sup>. The strategy also highlights that some individual elements, such as the national capital allocation system, should consider both flood risk and also how far those affected are able to help themselves, in other words taking account of how much adaptive capacity is already within a community. Guidance for risk management authorities sets out how sustainable development should be brought into decision-making in the context of context of flood and coastal erosion risk management. This includes:

---

<sup>24</sup> Link to **References** DCLG (2011) The English Indices of Deprivation 2010 Neighbourhoods Statistical Release

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6871/1871208.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6871/1871208.pdf). Last accessed May 2014.

<sup>25</sup> Link to **References** Defra and the Environment Agency (2011) Understanding the risks, empowering communities, building resilience The national flood and coastal erosion risk management strategy for England [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228898/9780108510366.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228898/9780108510366.pdf)

<sup>26</sup> Link to **References** Defra (2011a) Guidance for risk management authorities on sustainable development in relation to their flood and coastal erosion risk management functions [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69447/pb13640-sdg-guidance.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69447/pb13640-sdg-guidance.pdf)

- o *taking account of the safety and wellbeing of people and the ecosystems upon which they depend,*
- o *taking action to avoid exposing current and future generations to increasing risk*
- o *improving the resilience of communities, the economy and the natural, historic, built and social environment to current and future risks*<sup>27</sup>.

The guidance also identifies *Well-being and Social Justice* as a theme, namely to ‘ensure that FCERM activities continue to contribute to community well-being and address issues of social justice’<sup>28</sup>. Defra’s recent (2011)<sup>29</sup> guidance for mainstreaming the government’s sustainable development vision into practice recognises the need to account for the social dimensions of policies and reiterates that *a key part of Government’s agenda is a focus on fairness and wellbeing*. Defra’s earlier policy statement on the appraisal of flood and coastal erosion risk management spells out some of the social justice issues to consider (Table 2). This stresses the need to fully consider social vulnerability alongside some of the other social justice themes covered in this portal.

Table 2 Principles to ensure a strong, health and just society<sup>30</sup>.

Broad Principles	Rationale
All impacts of different policy and investment options should be recognised in appraisal and where possible valued.	To ensure that no preferential treatment is given to certain types of costs or benefits which may accrue to different groups in society.
Costs and benefits should be disaggregated so that it is clear which sections of society are paying for and gaining from different options.	To seek contributions from private beneficiaries. To ensure that the poorest members of society are not indirectly subsidising wealthier beneficiaries
Distributional adjustments should be made, where appropriate, in line with official guidance.	To better understand whether there is evidence that the marginal utility of an extra pound to a poorer person is higher than that of a richer person in an appraisal area or across a catchment or shoreline, or across wider programme.
Capping or decision rules should be considered and applied consistently.	To ensure that a disproportionate level of benefit does not accrue in specific properties when benefits could be spread more fairly and efficiently across wider number of beneficiaries.
Vulnerability of people should be considered in appraisal including vulnerability to residual risks: e.g. where benefits may arise via flood warning, adaptation and resilience measures.	To ensure that social justice relates to not only the less wealthy, but also those who may be vulnerable to the risks, such as the elderly.
Procedural justice should be considered throughout.	To ensure fair and equitable access to the decision making process. Good stakeholder engagement and governance, as part of appraisal, are important aspects.
From time to time Government may set targets to encourage the delivery of flood and erosion risk management to specific sections of society for reasons of social justice.	To influence fairness through target setting across the programme. For example, the target for the current period which relates to reducing the risk in the most deprived areas.

<sup>27</sup> Link to **References** Defra (2011a) Guidance for risk management authorities on sustainable development in relation to their flood and coastal erosion risk management functions [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69447/pb13640-sdg-guidance.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69447/pb13640-sdg-guidance.pdf)

<sup>28</sup> Link to **References** Defra (2011a) Guidance for risk management authorities on sustainable development in relation to their flood and coastal erosion risk management functions [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69447/pb13640-sdg-guidance.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69447/pb13640-sdg-guidance.pdf) Page 28

<sup>29</sup> Link to **Reference** Defra (2011b) Mainstreaming sustainable development – The Government’s vision and what this means in practice <http://sd.defra.gov.uk/documents/mainstreaming-sustainable-development.pdf>. Last accessed May 2014.

<sup>30</sup> Link to **Reference** Defra (2009) Appraisal of flood and coastal erosion risk management: A Defra policy statement (June 2009) [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69419/pb13278-erosion-manage-090619.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69419/pb13278-erosion-manage-090619.pdf). Last accessed May 2014.

- **Health and Social Care Act 2012** puts local authorities at the centre of activities to improve health and to bring together the work of the NHS with that carried out by organisations involved in providing social care, housing, environmental health, leisure and transport services. Important instruments for joining up actions to address climate risks and extreme weather events are the *Joint Strategic Needs Assessments (JSNAs)* and the associated strategies produced by *Health and Wellbeing Boards*. Tackling inequalities is central to the Act and many factors are also associated with aspects of social vulnerability:
  - population level demography – age, gender, ethnicity, population; growth and migration flows;
  - social, economic and environmental determinants of health – housing quality, environment, employment, educational attainment, benefit uptake, crime, community cohesion, and community assets such as libraries;
  - behavioural determinants of health – exercise, smoking, diet, alcohol and drug use, immunisation uptake
- **The Equality Act 2010** allows for positive action in favour of people in groups with protected characteristics<sup>31</sup>. Protected characteristics include disabilities defined as “*physical or mental impairment that has a ‘substantial’ and ‘long-term’ negative effect” on normal day-to-day tasks*”<sup>32</sup>.
- **The Civil Contingencies Act 2004** identifies local authorities, along with the emergency services and NHS bodies as the key organisations who have a responsibility for developing plans for emergency situations. They need to work with other organisations in local resilience fora to develop responses to support civil protection.
- **Action on reducing health and social inequalities is central to the Sustainable Development Unit for NHS England and Public Health England’s recent Sustainable Development Strategy**<sup>33</sup> (Figure 1). The strategy is an important reference point for actions in relation to statutory responses. The SDU also provides additional guidance on statutory and policy drivers for action.<sup>34</sup>
- **The Heat-wave Plan for England**<sup>35</sup> is non-statutory but provides a basis through which other obligations to produce adaptation plans can be developed. The main purpose is to provide information which helps in the process of building more resilient communities to heat-waves. It does this through setting out ways to prepare for heat-wave events and what to do to avoid some of the most severe impacts from prolonged exposure to high temperatures. Raising awareness among the wider public – especially sensitive groups - is one important goal but there are other actions which are also recommended for organisations whose role is likely to have an influence, such as the NHS, local authorities,

---

<sup>31</sup> Link to **reference** Gov.uk Discrimination: your rights <https://www.gov.uk/discrimination-your-rights/types-of-discrimination>. Last accessed May 2014.

<sup>32</sup> Link to **reference** Gov.uk Definition of disability under the Equality Act 2010 <https://www.gov.uk/definition-of-disability-under-equality-act-2010> Last accessed May 2014.

<sup>33</sup> Public Health England and the Sustainable Development Unit for NHS England (2014) Sustainable, Resilient, Healthy People & Places A Sustainable Development Strategy for the NHS, Public Health and Social Care system

<sup>34</sup> Public Health England and the Sustainable Development Unit for NHS England (2014) Statutory and Policy Drivers for Change presentation <http://www.sduhealth.org.uk/policy-strategy/engagement-resources.aspx>

<sup>35</sup> Link to **reference** [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/201039/Heatwave-Main\\_Plan-2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201039/Heatwave-Main_Plan-2013.pdf)

public agencies and a range of organisations working with sensitive and vulnerable groups. According to the plan it is the role of local NHS, public health and social care organisations to oversee the care associated with people with particular susceptibilities, to help reduce the potential for over-exposure and to help ensure that associated service provision is sufficiently resilient to cope with the challenges associated with heat-wave events. There is an equivalent plan for cold weather events.

### 3. Where are socially vulnerable and climate disadvantaged people located?

**3.1 There are uneven distributions of climate disadvantaged neighbourhoods across the UK. The majority of extremely socially vulnerable neighbourhoods are in the UK's large urban centres or along the coast.** Some of these areas are also highly likely to be exposed to events with the capacity to cause harm. Supporting evidence for these claims is available through the research conducted in relation to the data in the map portal<sup>36</sup> and also a range of other research project outputs, only some of which are highlighted here.

- **It is well known that urban areas can exacerbate the impacts of events like heat-waves and flooding through the *Urban Heat Island* effect<sup>37</sup>.** The disproportionate effect of climate and weather events on urban residents is shown by higher heat mortality rates than in rural settings<sup>38</sup>. However, it is important to recognise that some neighbourhoods are more prone to extreme effects than others and differences relate to individual, environment and social factors. There are uneven patterns of access to green spaces within cities so that some communities – for example with a large proportion of black and ethnic minorities or which are classified as deprived - are disproportionately associated with dense urban areas with little green space<sup>39</sup>. There is also a connection between some vulnerable groups and certain types of housing and for that housing to be located in places where there is a higher chance of being affected, e.g. in older, terraced accommodation in valley bottoms<sup>40</sup>. Analyses carried out for London have revealed that relatively high proportions of key social infrastructure associated with health and education – and therefore with key vulnerable groups - is located within areas which are susceptible to flooding<sup>41</sup>.
- **Another area where communities are likely to be disproportionately affected by climate change in the future is the coast.** Research carried out for JRF has identified five areas of the UK coast which are considered to be especially vulnerable: South Wales, Northwest Scotland, Yorkshire and Lincolnshire, East Anglia and the Thames Estuary<sup>42, 43</sup>. Part of the reason for their vulnerability is connected to higher than average *deprivation*<sup>29</sup>. An analysis carried out in 2013 has shown a great variation in deprivation in mid-sized seaside resorts. Although, the largest resorts are on average more deprived than mid-sized resorts and the

---

<sup>36</sup> Link to the map portal

<sup>37</sup> Link to **Reference** Greater London Authority (2006) [http://static.london.gov.uk/mayor/environment/climate-change/docs/UHI\\_summary\\_report.pdf](http://static.london.gov.uk/mayor/environment/climate-change/docs/UHI_summary_report.pdf) Last accessed May 2014.

<sup>38</sup> Link to **Reference** Hajat, S., Kovats, R.S., Lachowycz, K. (2007) "Heat-related and cold-related deaths in England and Wales: who is at risk?", *Occupational & Environmental Medicine*, 64, pp. 93-100.

<sup>39</sup> Link to **Reference** CABE (2010) "Urban Green Nation: Building the evidence base", Commission for Architecture and the Built Environment, London.

<sup>40</sup> Link to **Reference** Houston, D., Werritty, A., Bassett, D., Geddes, A., Hoolachan, A. & McMillan, M. (2011) "Pluvial (rain-related) flooding in urban areas : the invisible hazard", Joseph Rowntree Foundation, York

<sup>41</sup> Link to **Reference** GLA (2009) "London Regional Flood Risk Appraisal", Greater London Authority.

<sup>42</sup> Link to **Reference** Zsamboky, M., Fernandez-Bilbao, A., Smith, D., Knight, J. & Allan, J. (2011) "Impacts of climate change on disadvantaged UK coastal communities", Joseph Rowntree Foundation, York.

<sup>43</sup> Link to **Reference** Preston et al (2014).

rest of England, the most extremely deprived resorts were found in the mid-size range<sup>44</sup>. Other studies have found a positive correlation between exposure to coastal flooding and levels of deprivation<sup>45</sup>. Since some of the measures of social deprivation and social vulnerability are held in common, this makes the coast an important place to target for building community resilience to climate-related events<sup>46</sup>.

- **Vulnerability is not a static characteristic of people or places; it can increase or decrease over time as a result of individual and community change, institutional measures and wider socio-economic processes.** Coastal communities are a good case in point. For many coastal areas, vulnerability is connected to the economic decline of former coastal resorts and the tendency for these areas to be associated with low paid, temporary work. Residents tend to be more likely to live in rented accommodation and to be older, both of these trends increasing over time<sup>47, 48</sup>. Housing tends to be less expensive and attracts people on lower incomes who may then find it difficult to relocate<sup>49</sup>. Coastal settlements tend to become more easily isolated too, particularly due to an already poor transport infrastructure<sup>50</sup>. This tendency towards increasing vulnerability is coupled with a higher chance of both people and critical infrastructure being exposed – as evidenced in winter 2013/4. Over the longer term some need for relocation is highly likely and this can bring a range of social justice implications. In the US, research has suggested that relocation could set in motion a new set of inequalities through selective outmigration and market re-adjustment of housing costs<sup>51</sup>. People requiring evacuation in relation to Hurricane Katrina were more likely to come from economically and socially disadvantaged places, suffer from emotional and physical stress, be uninsured and already in poor health. As a result there was a higher strain on services in receiving areas in terms of social services, employment opportunities and affordable housing<sup>52</sup>.

**3.2 Many neighbourhoods are both socially vulnerable to heat and also to floods.** Out of the 481 neighbourhoods in England that were estimated to be extremely vulnerable to river and coastal flooding in 2011, over 60% were also estimated to be extremely vulnerable to high temperatures. This is to be expected given the similarities in indicators which affect both heat and flood-related vulnerability. This also suggests that the same areas could be vulnerable to a range of other climate-related hazards.

---

<sup>44</sup> Link to **Reference** <http://www.ons.gov.uk/ons/rel/regional-trends/area-based-analysis/a-profile-of-deprivation-in-larger-english-seaside-destinations--2007-10/art-a-profile-of-deprivation-in-larger-english-seaside-destinations--2007-and-2010.html#tab-Key-Points>

<sup>45</sup> Link to **Reference** Walker, G., Burningham, K., Fielding, J., Smith, G., Thrush, D. & Fay, H. (2006) Using science to create a better place: Addressing Environmental Inequalities: Flood Risk, Science Report: SC020061/SR1, Environment Agency, Bristol.

<sup>46</sup> Link to Section 4

<sup>47</sup> Link to section 3.4

<sup>48</sup> Link to **Reference** Oven, K.J. et al. (2012) Climate change and health and social care: Defining future hazard, vulnerability and risk for infrastructure systems supporting older people's health care in England, *Applied Geography*, 33(1): 16–24.

<sup>49</sup> Link to **Reference** Zsamboky, M., Fernandez-Bilbao, A., Smith, D., Knight, J. & Allan, J. (2011) "Impacts of climate change on disadvantaged UK coastal communities", Joseph Rowntree Foundation, York.

<sup>50</sup> Link to **Reference** Zsamboky, M., Fernandez-Bilbao, A., Smith, D., Knight, J. & Allan, J. (2011) "Impacts of climate change on disadvantaged UK coastal communities", Joseph Rowntree Foundation, York.

<sup>51</sup> Link to **Reference** Curtis, K.J. & Schneider, A. (2011) "Understanding the demographic implications of climate change: estimates of localized population predictions under future scenarios of sea-level rise", *Population and Environment*, 33(1), pp. 28–54.

<sup>52</sup> Link to **Reference** Curtis, K.J. & Schneider, A. (2011) "Understanding the demographic implications of climate change: estimates of localized population predictions under future scenarios of sea-level rise", *Population and Environment*, 33(1), pp. 28–54.

**3.3. Headlines associated with the geographical patterns of socio-spatial vulnerability and climate disadvantage for England are shown below for river and coastal flooding, surface water flooding and high temperatures.** It is important to remember that the statements relate to broad trends at the national and regional levels. Even in areas that do not have high overall levels of social vulnerability and climate disadvantage there may still be pockets of high social vulnerability and disadvantage. In developing local responses to climate-related hazards and climate change adaptation plans it is crucial to identify local patterns of vulnerability and disadvantage. **See the map portal<sup>53</sup> to identify the vulnerability and disadvantage in your local area and the information on potential actions<sup>54</sup>.** The factors associated with the maps are outlined in the User Guide<sup>55</sup> with more information given in the explanations in the map portal itself.

### **3.1 River and coastal flooding**

**3.1.1 In the present day extreme flood disadvantage with respect to river and coastal flooding is estimated to affect some 7% of English neighbourhoods.** This is around 1% fewer overall than was estimated for 2001, though due to changes in the indicators used in the index it is not possible to directly compare 2001 and 2011 with confidence. Maps of the distributions of river and coastal flood disadvantage, river and coastal flood exposure and flood-related socio-spatial vulnerability are given in Figure 4. **Look in more detail at the maps for your area in the map portal<sup>56</sup>.**

**3.1.2 The ClimateJust maps show a North-South divide in England associated with patterns of flood disadvantage<sup>57</sup>.** The North tends to have more neighbourhoods where the combination of social vulnerability and the potential to be affected by river and coastal flooding creates extreme disadvantage based on the geographical definition of neighbourhoods used in the ClimateJust data<sup>58</sup>. The Yorkshire and the Humber region is the region estimated to have the largest proportion of its neighbourhoods classed as being extremely flood disadvantaged in relation to river and coastal flooding, nearly 15%. Yorkshire and the Humber also has the highest proportion of England's total number of extremely disadvantaged neighbourhoods (23%). Around 9% of the East Midlands region's neighbourhoods are estimated to be extremely flood disadvantaged (around 11% of England's total). Although only 7% of the South East's neighbourhoods are estimated to be disadvantaged in relation to river and coastal flooding, this represents the second largest contribution to England's total number of extremely flood disadvantaged neighbourhoods (17%), partly due to the fact that the South East is the largest region in England. All English regions have some neighbourhoods where flood disadvantage is extremely high, i.e. based on the combination of social vulnerability and the chance of being affected (Figure 5). The pattern in 2011 is similar to that found for 2001.

---

<sup>53</sup> Link to the map portal

<sup>54</sup> Link to Further Portal Resources Q3

<sup>55</sup> Link to Further Resources section.

<sup>56</sup> Link to the map portal

<sup>57</sup> Link to Figure 3

<sup>58</sup> Link to Caveats and limitations document.

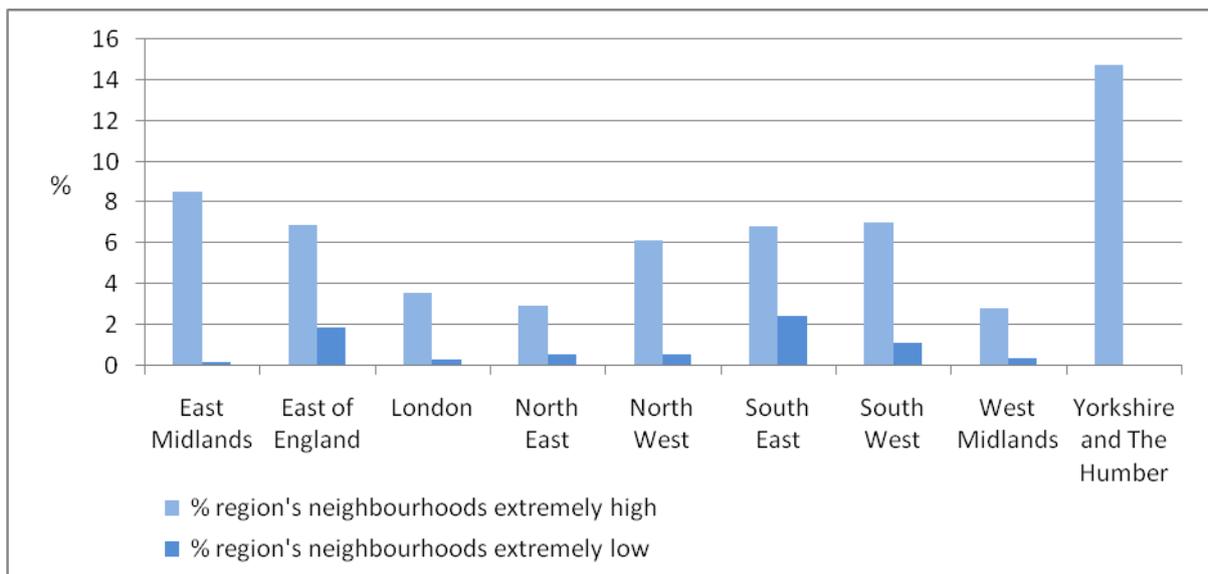


Figure 5: Proportions (%) of the total number of a region’s neighbourhoods estimated to have extremely high or extremely low flood disadvantage with respect to river & coastal flooding, 2011.

**3.1.2 Considering socio-spatial vulnerability alone, there are also uneven distributions in socially flood vulnerable neighbourhoods.** Again, all regions of England have some extremely socially vulnerable neighbourhoods (Figure 6). Yorkshire and the Humber, the North West and North East regions have the highest proportions of neighbourhoods which are extremely socially flood-vulnerable, all with 10% or more. This corresponds to 17%, 21% and 7% of England’s total count being located within these regions, respectively. The lowest proportions of extremely flood vulnerable neighbourhoods as a proportion of regional neighbourhoods are in the South East and the East of England and they each make up around 5% of England’s total count. It should be pointed out that all areas, including the South East, will have other more localised areas with extremely high social vulnerability with respect to flooding. Using the guidance on factors and associated indicators, the existence of such pockets of social vulnerability can be investigated with additional local datasets and further local knowledge.

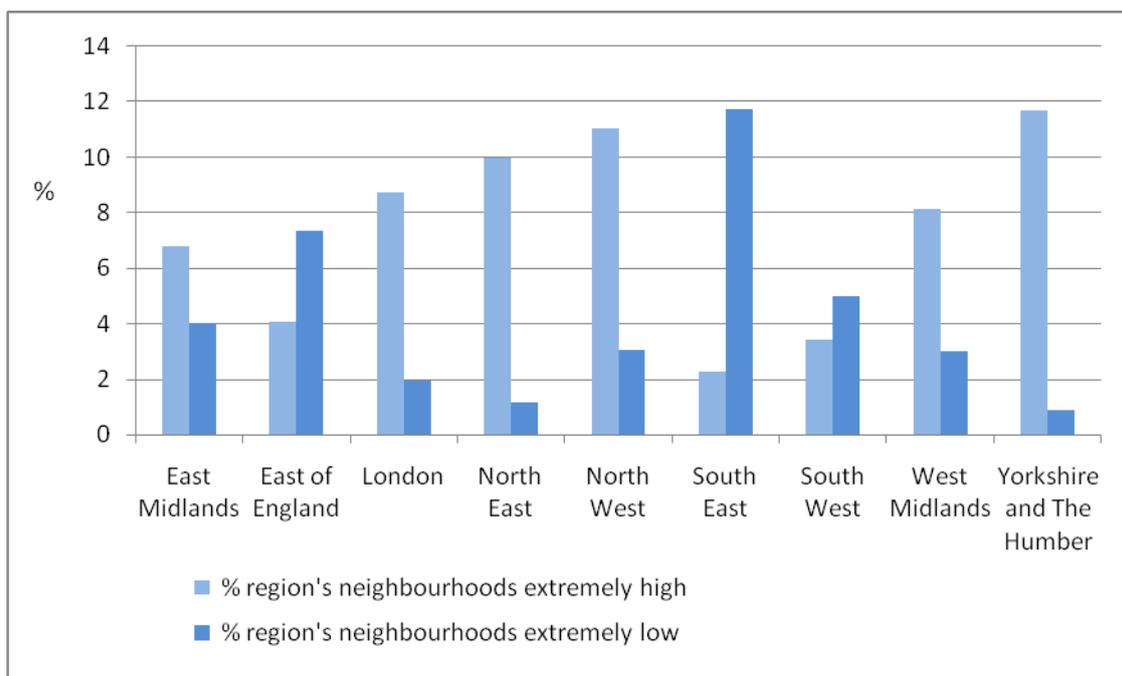


Figure 6: Proportions (%) of the total number of a region's neighbourhoods estimated to have extremely high or extremely low social vulnerability to flooding in 2011.

### 3.2 Surface water flooding

**3.2.1 In the present day extreme flood disadvantage with respect to surface water flooding with a 1 in 30 year probability is estimated to affect some 5.6% of English neighbourhoods.** Around 7.4% of English neighbourhoods are estimated to be extremely flood disadvantaged with respect to the more severe, but lower probability, 1 in 1000 year surface water flooding events. Maps of the distributions of surface water flood disadvantage, surface water flood exposure and flood-related socio-spatial vulnerability are given in Figure 7. **Look in more detail at the maps for your area in the map portal<sup>59</sup>.**

**3.2.2 London is the region with the highest proportion of extremely flood disadvantaged neighbourhoods (nearly 12%) with respect to surface water flooding.** This is almost twice the proportion of neighbourhoods affected compared to any other English region (Figure 8) and represents around 30% of England's total count of extremely disadvantaged neighbourhoods with respect to surface water flooding. The results demonstrate how hazard context is important for understanding how the vulnerability data may translate into impacts. A greater likelihood of exposure to surface water flooding is to be expected given the built-up nature of the city and this combines with the relatively high proportion of extremely flood vulnerable neighbourhoods shown in Figure 5. The South East has the highest proportion of extremely advantaged neighbourhoods, followed by the South West. All English regions have some neighbourhoods which are estimated to be disadvantaged with respect to surface water flooding. There are also likely to be more people and communities disadvantaged at sub-neighbourhood level, especially given the particularly

<sup>59</sup> Link to the map portal

geographically constrained characteristics of surface water flooding. This may be particularly important in rural areas where neighbourhoods are particularly large.

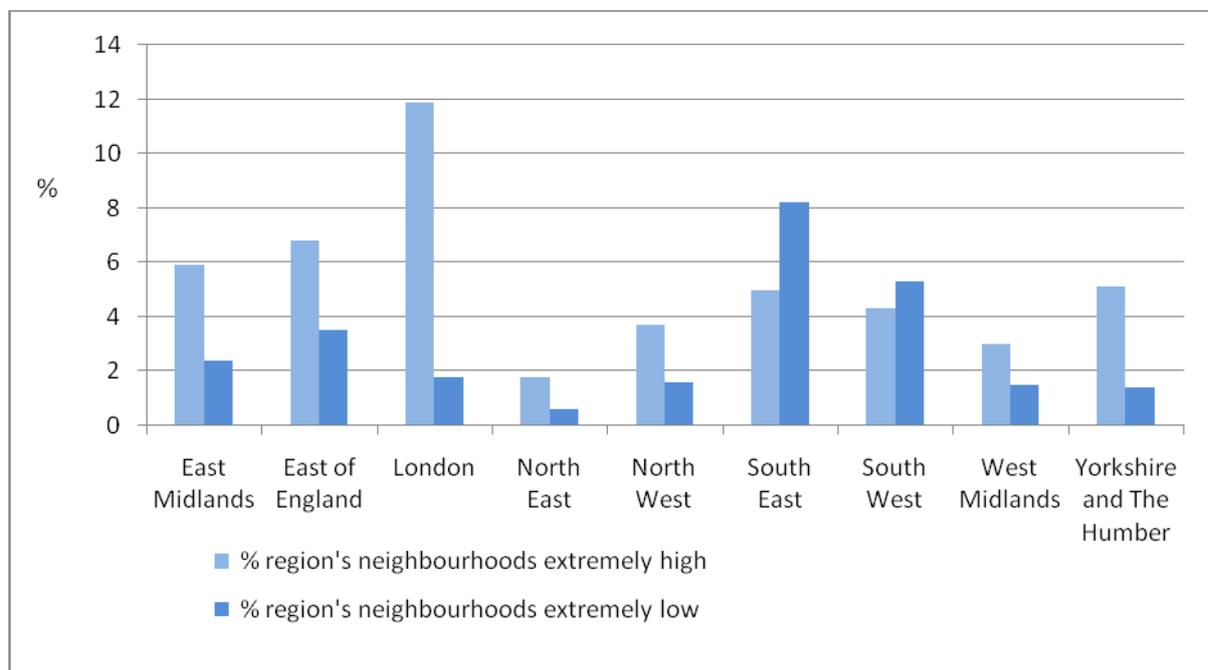


Figure 8: Proportions (%) of the total number of a region’s neighbourhoods estimated to have extremely high or extremely low disadvantage with respect to surface water flooding (1 in 30 year probability), 2011.

### 3.3 High temperatures

**3.1.1 The combination of present-day vulnerability and future patterns of temperatures shows that extreme heat disadvantage is mainly associated with densely populated urban locations** (London, Birmingham); to a lesser degree it affects the East of England, South East and South West. In the north of England, the projected increase in future temperatures is less extreme than in the south, resulting in less pronounced disadvantage to heat. Maps of the distributions of heat disadvantage, exposure to high temperatures and heat-related socio-spatial vulnerability are given in Figure 9. **Look in more detail at the maps for your area in the map portal<sup>60</sup>.**

**3.1.2 Around 9% of English neighbourhoods are extremely socially vulnerable with respect to heat** which is similar to the proportion estimated for 2001. Due to changes in some of the indicators used in the index it is not possible to directly compare 2001 and 2011 with confidence.

**3.3.2 London is the region with the highest proportion of its neighbourhoods estimated to be extremely socially vulnerable to heat**, followed by the West Midlands and the North West (with high concentrations around Manchester and Birmingham). London neighbourhoods have the highest average (mean) socio-spatial heat vulnerability scores in England. Relative to the rest of England, almost 25% of all London neighbourhoods were highly socially vulnerable with respect to heat in

<sup>60</sup> Link to the map portal

2001<sup>61</sup>. This proportion has grown to 28% in 2011<sup>62</sup> (Figure 10). It represents getting on for half of all of England’s neighbourhoods estimated to be socially vulnerable with respect to heat (47%). Regions with the most neighbourhoods in the lowest socio-spatial heat vulnerability class are in the South East and East of England. However, this lower vulnerability is offset to some extent by the chance of seeing higher temperatures, relative to northern England, for example.

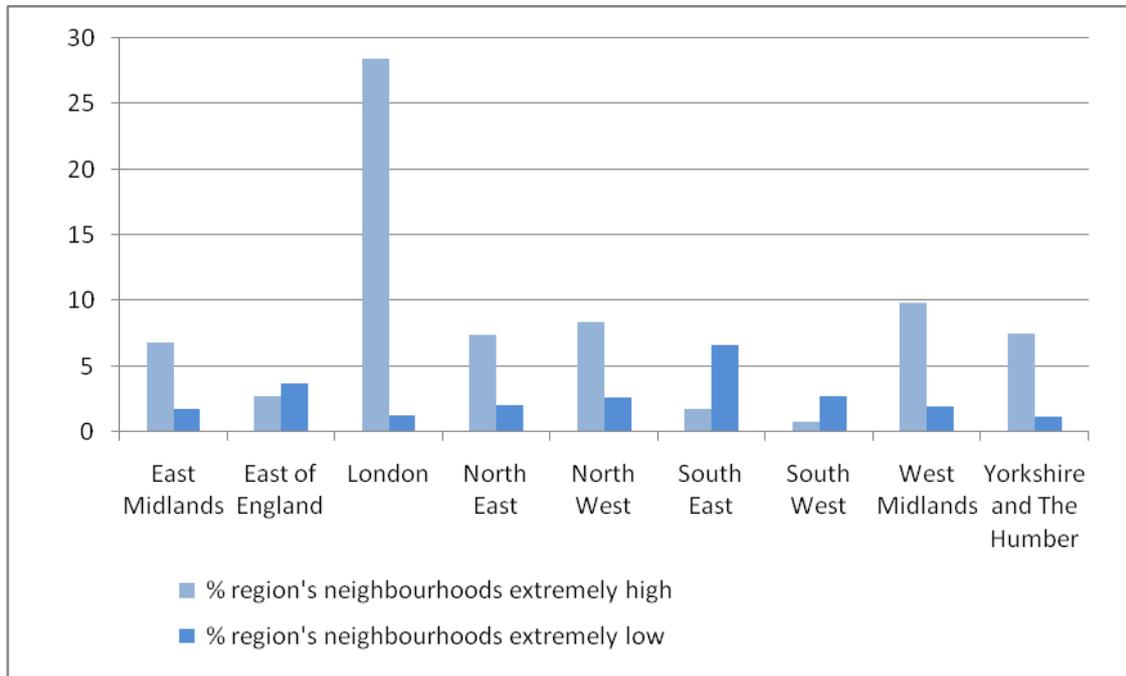


Figure 10: Proportions (%) of the total number of a region’s neighbourhoods estimated to have extremely high or extremely low social vulnerability with respect to heat.

<sup>61</sup> Link to **Reference** Lindley, S., O’Neill, J., Kandeh, J., Lawson, N., Christian, R. & O’Neill M. (2011) “Climate change, justice and vulnerability”, Joseph Rowntree Foundation Report, York.

<sup>62</sup> Link to **Reference** Lindley, S., O’Neill, J., Kandeh, J., Lawson, N., Christian, R. & O’Neill M. (2011) “Climate change, justice and vulnerability”, Joseph Rowntree Foundation Report, York.

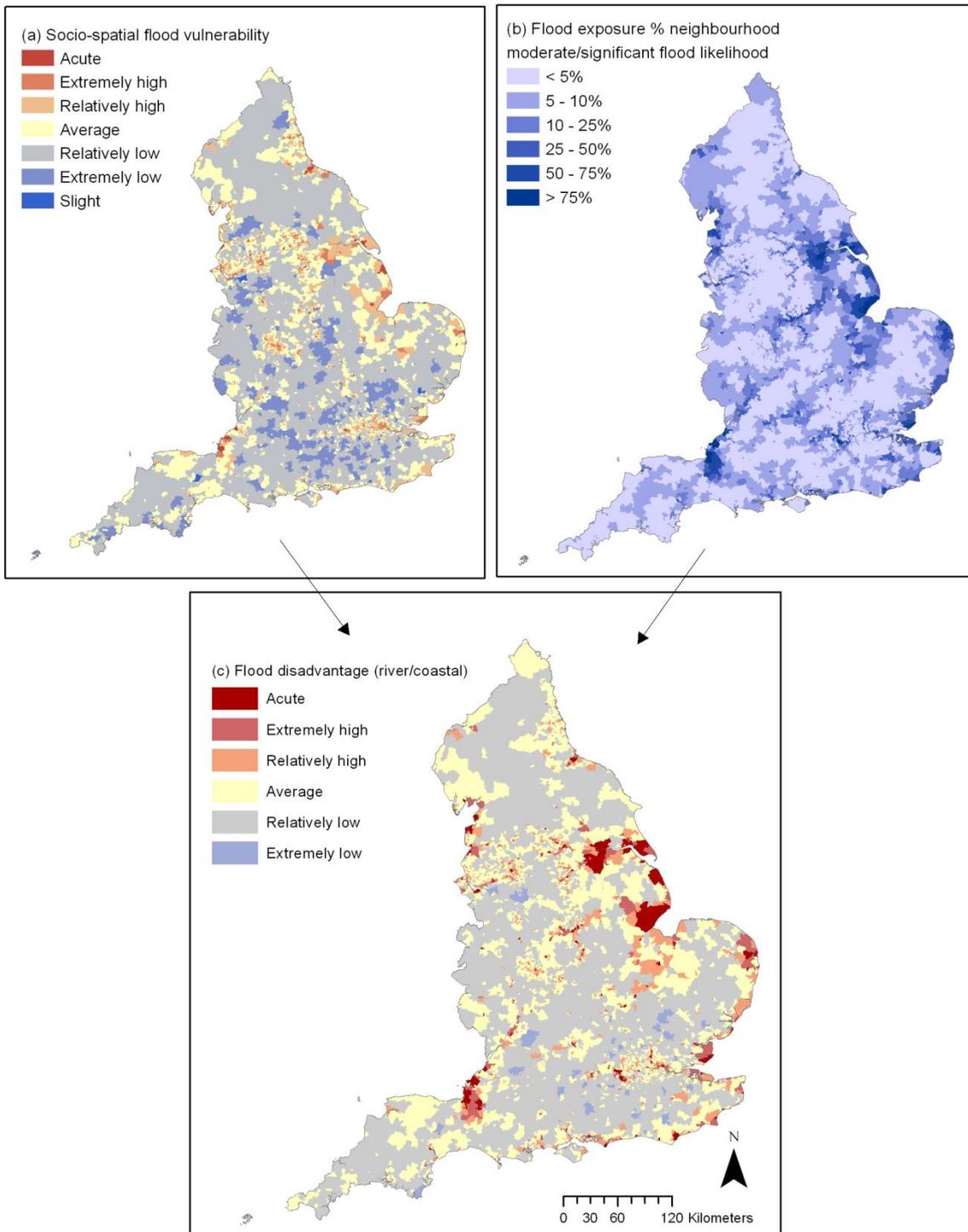


Figure 4: Neighbourhood-scale flood disadvantage from river and coastal related flooding in England based on 2011 data. (a) socio-spatial vulnerability (b) river and coastal flood hazard-exposure and (c) the combination of (a) and (b) to identify flood disadvantage.

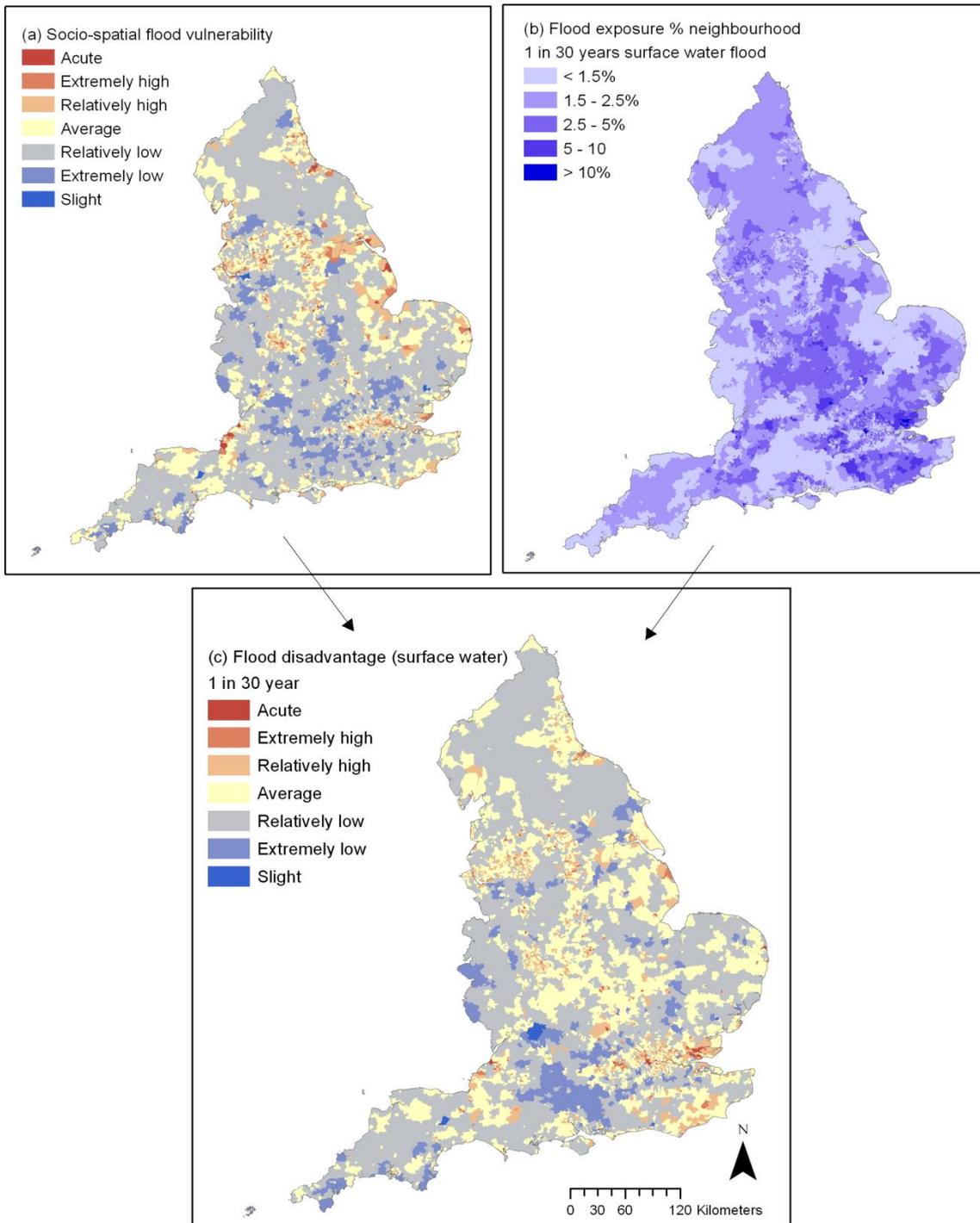


Figure 7: Neighbourhood-scale flood disadvantage from surface water related flooding in England based on 2011 data (1 in 30 years). (a) socio-spatial vulnerability (b) surface water flood hazard-exposure and (c) the combination of (a) and (b) to identify flood disadvantage.

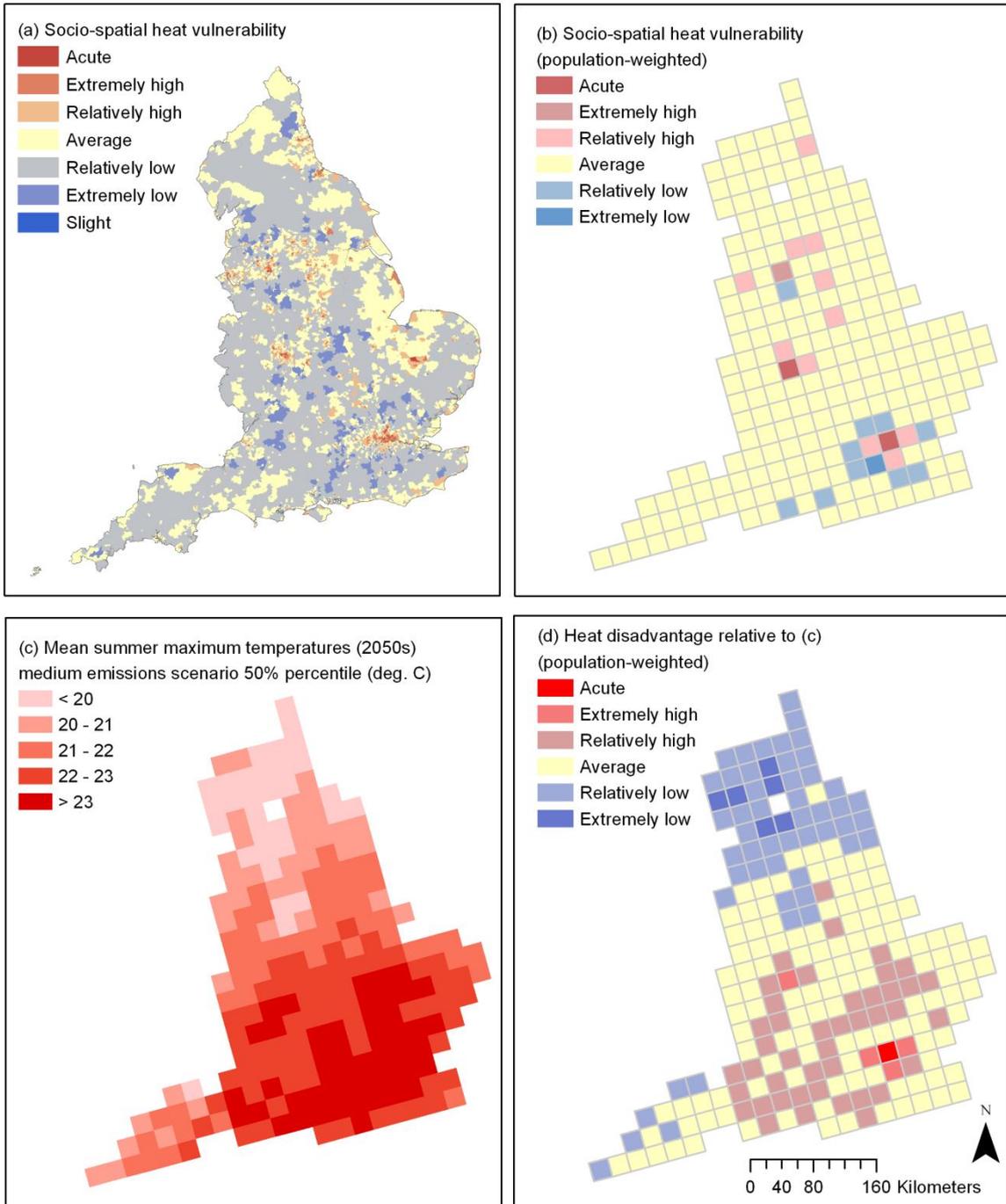


Figure 7: (a) Socio-spatial heat vulnerability in England: by neighbourhood (b), expressed as a population-weighted total (c), heat hazard-exposure measured as the medium emissions scenario 50% percentile mean summer temperatures in the 2050s (d) and heat disadvantage relative to (c).

## 4. What can be done?

### 4.1 Consider the general actions which you can take.

4.1.1 **Identify locations in your local area which have extremely high socio-spatial vulnerability and extremely high disadvantage to different hazards using the ClimateJust map portal<sup>63</sup>.** These places are a good place to start when considering developing responses as they indicate a local area which has challenges in terms of the potential for being affected by an event like a flood or heat wave and also the likelihood for the social impacts of those events to be greater.

4.1.2 **Identify locations in your local area which have different profiles of socio-spatial vulnerability and disadvantage using the ClimateJust map portal<sup>64</sup>.** A local area may not be highlighted as having extremely high socio-spatial vulnerability. However, this does not necessarily mean that no action is required. For example, the area may still be associated with extremely high sensitivity, increased exposure or a lack of adaptive capacity. Even in areas with very low overall social vulnerability, there is still a high likelihood that there will be some vulnerable people who require assistance in order to avoid being severely impacted. **Different actions will be appropriate for each of these different neighbourhood types (See Figure 12).**

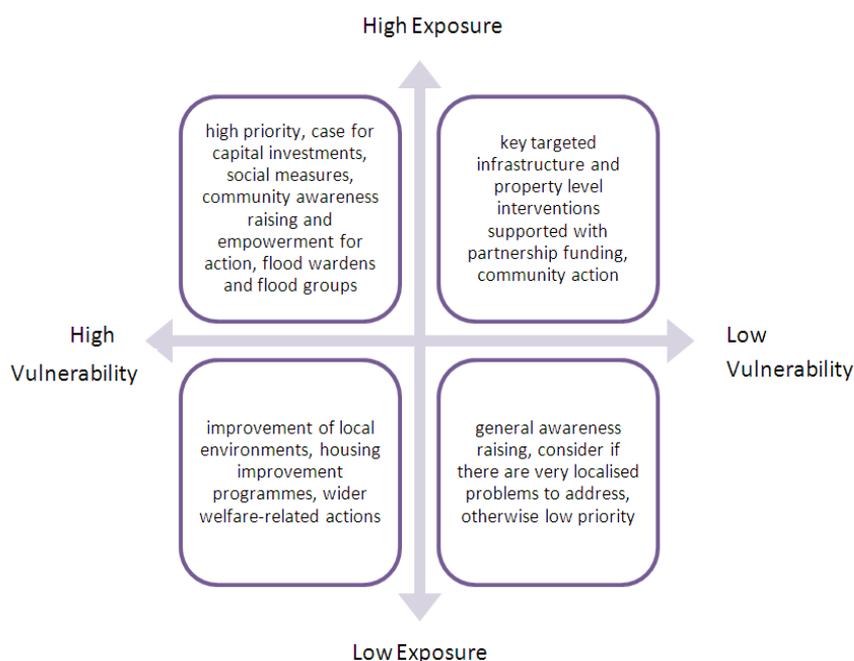


Figure 12: Actions related to different climate disadvantage types.

<sup>63</sup> Link to map portal

<sup>64</sup> Link to map portal

4.1.3 **Develop multi-dimensional assessments of social vulnerability and consider how people and communities can face multiple challenges which may be important for building resilience.** Multi-dimensional assessments take account of different causes of uneven impacts, different geographical scales, different time-frames and different perspectives of the issues. Adaptation can be made more effective by taking account of differences in the sensitivity of people and communities, differences in abilities to prepare for, respond to and recover from extreme weather events, and differences in the physical characteristics of neighbourhoods themselves. Each of these dimensions and the individual indicators behind them can be explored using the resources in the map portal<sup>65</sup>. Part of this activity involves considering finer scale geographical data and data for more recent datasets which is held within your organisation or partner organisations. **See the examples of how to interpret the data for local areas**<sup>66</sup>.

4.1.4 **Benefits can be gained from mainstreaming climate adaptation measures and messages into the activities of agencies working with vulnerable groups such as social care providers. See the Further Portal Resources to find out more about broader actions which you can take to improve resilience** such as those associated with partnership working, raising awareness and community engagement and empowerment<sup>67</sup>. Examples of actions that address social vulnerabilities at the local authority level could include the following:

- addressing institutional routines and habits of places such as in residential nursing homes and other places which provide care. See for example *Advice for care home managers and staff: supporting vulnerable people before and during a heatwave*<sup>68</sup>
- maintaining and improving social care for the elderly in their homes, using for example telecare solutions<sup>69</sup>
- the use of public spaces such as post offices and libraries in which members of the local community can meet and which might act as safe spaces during floods or cool spots during heatwaves, and making other spaces, such as schools and local businesses, available to the public in the event of a climate hazard. See an *analysis of provision of social infrastructure in relation to vulnerable groups in Greater Manchester*<sup>70</sup>;
- fostering community support groups and engaging and empowering local communities in decision making about responses to flooding<sup>71, 72</sup>.

4.1.5 **Identify the magnitude and likelihood of hazards associated with the changing climate, including flooding and heat-waves.**

---

<sup>65</sup> Link to map portal.

<sup>66</sup> Link to Example pen-pictures of local areas

<sup>67</sup> Link to Further Portal Resources Q3 carousel question.

<sup>68</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/201036/9544-2901034-TSO-Supporting\\_VP\\_Accessible\\_Care\\_Home.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201036/9544-2901034-TSO-Supporting_VP_Accessible_Care_Home.pdf)

<sup>69</sup> <http://www.bournemouth.gov.uk/Housing/CouncilHousing/IndependentSeniorLiving/BournemouthCareline/HowCouldweHelp.aspx>

<sup>70</sup> <http://www.adaptingmanchester.co.uk/documents/heat-and-social-vulnerability-greater-manchester-risk-response-case-study>

<sup>71</sup> 6\_Community engagement and awareness raising\_AK

<sup>72</sup> 4-FosteringTies-AC

- Use the measures of flooding and high temperatures in the ClimateJust map portal to compare patterns of socio-spatial vulnerability with patterns of potential exposure to flooding and heat-waves<sup>73</sup>.
- Draw on existing risk assessments, adaptation tools such as the *UKCP09 projections*<sup>74</sup> and other local information (for example following the UKCIP *Local Climate Impacts Profile (LCLIP)*<sup>75</sup> process). **See the Further Resources section for an example LCLIP for Greater Manchester**<sup>76</sup>.
- Examine the impacts of extreme weather events including their location, timing, costs and the effectiveness of responses by using the Severe Weather Impacts Monitoring System (SWIMS) tool<sup>77</sup> to record local experiences and support continuous learning. Record social as well as economic impacts associated with events and consider longer-term and not just immediate impacts.

4.1.6 **Review the case studies in the Further Resources section to see what others have done.** In particular **see the Further Resources section for information about work carried out by:**

- **JBA consultants on using the ClimateJust data to support adaptation planning in Wigan Council**<sup>78</sup>. Their work makes suggestions about how you might use the data for supporting the development of adaptation plans and other responses.
- **Hampshire County Council**<sup>79</sup> which has developed their own version of the data in this portal. This is supported by a ‘how to’ document which explains some of the technical details which may be suitable for data specialists within your authority.
- **Leeds City Council**<sup>80</sup> which has developed an online mapping portal covering multiple indicators of social vulnerability.

4.2 **Consider specific actions to help build resilience for the people and communities that you identify.**

- **See the Further Portal Resources to find out more about actions associated with particular socially vulnerable groups**<sup>81</sup>, recognising it is the combination of characteristics which can determine the most extreme social vulnerability.

---

<sup>73</sup> Link to map portal (exposure and disadvantage maps)

<sup>74</sup> Link to **References** <http://ukclimateprojections.metoffice.gov.uk/>

<sup>75</sup> Link to **Further Resources** 22-tool-LCLIP <http://www.ukcip.org.uk/wizard/current-climate-vulnerability/lclip/>

<sup>76</sup> Link to **Further Resources** 4\_CaseStudy\_EcoCities\_AC

<http://www.adaptingmanchester.co.uk/documents/greater-manchester-local-climate-impacts-profile-gmlcip-and-assessing-manchester-city>

<sup>77</sup> Link to **Further Resources** 1-tool-SWIMS-AC

<sup>78</sup> Link to **Further Resource** section 4\_Wigan\_data

<sup>79</sup> Link to **Further Resources** section 6-casestudy-HCC & Hants\_technical\_how\_to\_SSVI\_THT1

<sup>80</sup> Link to **Further Resources** section Case\_Study\_Template\_ClimateJust\_Leeds

<sup>81</sup> Link to **Further Portal Resources** Q1 carousel question

## 5. How can we do it?

- ✓ 1. **Use the map portal to build up a profile of the neighbourhoods in your area.** Consider vulnerability and potential exposure, the nature of vulnerability and different indicators. Look, in particular, for values which are high or extremely high.
  - **Use the case studies and worked examples in the Further Resources section to see how others have made use of the data. Also see our detailed User Guide.**
  - **See Figure 12 for more information about neighbourhood types.**
  
- ✓ 2. **Determine what broad types of neighbourhoods exist in your area as a result of your profiling work.**
  - Do you have any extremely vulnerable or climate disadvantaged areas which could be targeted for further action? After further investigation you may be able to construct a case for additional external support to help you to develop responses for some of these areas.
  - Do you have any areas which although not extremely vulnerable overall, have particular issues in terms of very high levels of sensitivity, exposure or some of the different social factors? Specific indicators can help you highlight particular groups with specific needs and help you to involve the right partners in developing and delivering appropriate responses.
  - Do you have areas which are mainly average or low vulnerability where you could raise general awareness to help communities to help themselves, or where communities might be encouraged to support more vulnerable individuals?
  - Do you have areas which are less socially vulnerable but have the potential for high exposure and which should be targeted in terms of raising awareness and promoting self-help, or where physical rather than social solutions might be important?
  
- ✓ 3. **Verify the data for your area through a combination of local knowledge and additional internal data resources.** For example you may want to:
  - Involve data departments in your authority or at County level to determine whether there are data at different geographical scales (particularly in rural areas where neighbourhoods cover large geographical areas) or which have been made available after 2011. You might consider the following questions: How can these data be used within the broader framework for understanding social vulnerability and climate disadvantage? What do internal resources suggest about very local areas within neighbourhoods which are not identified in the national data? What trends are apparent in your area? How can the data be used to supplement, develop or replace some of the provided indicators? What are priorities for action for developing the data?
  - This activity may also involve selected representatives within your organisation or partners in service delivery with particular specialisms, for example in health, transport, planning, environment, housing or social care.

- ✓ **4. Use the data to discuss broad themes and ideas related to vulnerabilities and associated actions and to draw up a set of priorities.**
  - Discuss the data and local profiles at a meeting with your partners in service delivery and, where appropriate, neighbouring authorities. For example, your use of the data can complement existing internal and external decision-making processes designed to help with flood and coastal risk management (Figure 13). Your activities should also fit within other decision-making processes for local adaptation, e.g. the UKCIP Adaptation Wizard<sup>82</sup>.
  - Partner with representatives of the voluntary and community sector and consider how and when to involve local communities in discussions. When using data externally, consider how this can be done without causing unnecessary concern or possibly stigmatising areas, for example through avoiding explicit reference to place names or street names.
  
- ✓ **5. Consider what additional data need to be collected to support your activities.** Is it feasible to collect additional data locally or is action required at county and/or national scales? Additional data resources may be available from other tools and resources. See the **Further Resources** for a list of tools that you could use to develop further information on some of the themes in the ClimateJust data<sup>83, 84</sup>. However, even where data are imperfect, they can still be used to frame discussion.
  
- ✓ **6. Review the Recommended general actions<sup>85</sup>.** This includes information about raising awareness and partnership working.
  
- ✓ **7. Review the specific actions associated with particular vulnerable groups<sup>86</sup>.** Also consider how multiple priorities can be delivered together for some of these groups, e.g. relating to a range of hazards or relating to a range of ways which individuals and communities might be affected.
  
- ✓ **8. Use the data and information to inform local adaptation plans or other related actions.**

---

<sup>82</sup> Link to Further Resources section (6.1)

<sup>83</sup> Link to Further Resources section

<sup>84</sup> Link to 1\_AvoidScratchTools\_AC

<sup>85</sup> Link to **Answer to Carousel Q3 Recommended General Actions**

<sup>86</sup> Link to Further Portal Resources Q1 carousel question

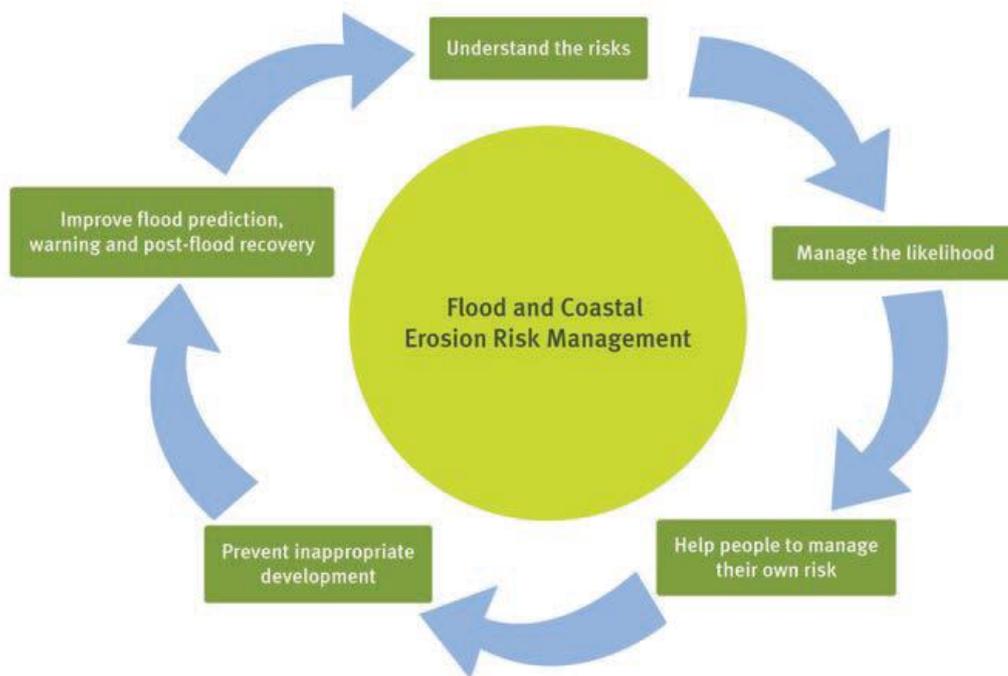


Figure 13: Flood and Coastal Risk Management process for Government activities<sup>87</sup>

---

<sup>87</sup> Link to References Defra and the Environment Agency (2011) Understanding the risks, empowering communities, building resilience The national flood and coastal erosion risk management strategy for England [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228898/9780108510366.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228898/9780108510366.pdf)  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228898/9780108510366.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228898/9780108510366.pdf)

## 6. Further portal resources

### 6.1 Tools and resources

Name	Developer	Type of Resource	ClimateJust Link
<b>ClimateJust map data User Guide</b> This document provides technical information about the indicators and index shown on the map data. It needs to be used alongside any downloaded data.	<b>University of Manchester</b>	<b>Technical Guidance</b>	<b>User_Guide</b>
<b>ClimateJust worked example</b> Use this resource to understand how a profile of a local area can be developed from the provided data for your area	<b>University of Manchester</b>	<b>Guidance</b>	<b>Worked_example</b>
<b>A grid based approach to estimating social vulnerability and potential exposure to flood and heat-waves.</b> A technical document explaining the way that Hampshire County Council mapped social vulnerability	<b>Hampshire County Council</b>	<b>'How to' document</b>	<b>Hants_technical_how_to_SSVI_THT1</b>
<b>Local Climate Impacts Profile (LCLIP)</b> Designed to support the UKCIP Climate Adaptation Wizard, this tool supports the assessment of past weather-related events and their impacts as a basis for understanding the possible impacts of future weather-related events.	<b>UKCIP</b>	<b>Guidance and Spreadsheets</b>	<b>22-tool-LCLIP</b>
<b>Community Resilience Toolkit</b> Aimed at local communities and the organisations working with them, this set of resources supports the process of understanding local needs and developing emergency plans based on those needs	<b>Cabinet Office (UK)</b>	<b>Communities Reports, checklists and case studies</b>	<b>14-tool-CABOFFCR-AC</b>
<b>Severe Weather Impacts Monitoring System (SWIMS)</b> A data collection tool to encourage learning around the impacts of and responses to past extreme weather events as the basis for improved future decision-making.	<b>Kent County Council</b>	<b>Online Tool</b>	<b>1-tool-SWIMS-AC</b>
<b>Built Infrastructure for Older People's Care in Conditions of Climate Change (BIOPICCC) Toolkit</b>	<b>Durham University</b>	<b>Health and Social Care Online Tool</b>	<b>3-tool-BIOPICCC-AC</b>

Aimed at anyone with a role in supporting health and social care for older people. Resources cover understanding needs and protecting infrastructure.

<p><b>Advice produced through the Heat-wave plan for England 2013</b> The heat-wave plan contains advice for a range of practitioners and the public</p>	<p><b>Public Health England</b></p>	<p><b>Advice for different groups</b></p>	<p><b>21-Heatwave_Plan</b> <a href="https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201035/9543-TSO-2901033-Heatwave_-_Supporting_Vulnerable_People_HSCP_Accessible.pdf">https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201035/9543-TSO-2901033-Heatwave - Supporting Vulnerable People HSCP Accessible.pdf</a>; <a href="https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201037/9545-2901035-TSO-Yourself_Accessible.pdf">https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201037/9545-2901035-TSO-Yourself_Accessible.pdf</a></p>
<p><b>Public Health Outcomes Data Tool</b> A set of indicators and associated data about public health and health inequalities supporting the <i>Public Health Outcomes Framework</i>. Data Indicators are updated on a regular basis and available at a range of geographies across England</p>	<p><b>Public Health England</b></p>	<p><b>Health sector Data</b></p>	<p><a href="http://www.phoutcomes.info/">http://www.phoutcomes.info/</a></p>
<p><b>Strategic Health Asset Planning and Evaluation (SHAPE)</b> A mapping tool principally aiming to support strategic planning of health services and infrastructure but which has a role in providing more effective adaptation solutions.</p>	<p><b>NHS</b></p>	<p><b>Health Sector Online Tool</b></p>	<p><b>2-tool-SHAPE-AC</b></p>
<p><b>Advice for care home managers and staff: supporting vulnerable people before and during a heat-wave</b></p>	<p><b>Public Health England</b></p>	<p><b>Health sector Guidance document</b></p>	<p><a href="https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201036/9544-2901034-TSO-Supporting_VP_Accessible_Care_Home.pdf">https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201036/9544-2901034-TSO-Supporting VP Accessible Care Home.pdf</a></p>
<p><b>Advice for health and social care practitioners: supporting vulnerable people before and during a heat-wave</b></p>	<p><b>Public Health England</b></p>	<p><b>Health sector Guidance document</b></p>	<p><a href="https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201035/9543-TSO-">https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201035/9543-TSO-</a></p>

<b>Six Steps to Flood Resilience</b> Designed to address the lack of easy-to-use guidance to support the use of novel flood resilience measures in planning, this resource provides a process to follow and resources for further information	<b>Building Research Establishment, Manchester Metropolitan University and University of Manchester</b>	<b>Guidance document</b>	<b>18_tool_sixsteps_AC</b>
--	---	--------------------------	----------------------------

<b>Climate Adaptation Wizard</b> This long-standing tool provides the basis for supported decision-making in relation to climate change risk assessment and climate adaptation planning.	<b>UKCIP/Environment Agency</b>	<b>Documents and online materials; connected tools</b>	<b>24-climate-adaptation-wizard</b>
---	---------------------------------	--	-------------------------------------

## 6.2 Reports

Name	Author	Type of Resource	ClimateJust Link
<b>Case studies of adaptation to climate change in south-west England.</b>	<b>Benzie et al (2011)</b>	<b>Report</b>	<b>2_report_Benzie_et al_2011_ak.doc</b>
<b>Impacts of climate change on disadvantaged UK coastal communities</b>	<b>Zsamboky et al (2011)</b>	<b>Report</b>	<b>3_report_Zsamboky_et al_2011_ak.doc</b>
<b>Pluvial (rain-related) flooding in urban areas: the invisible hazard.</b>	<b>Houston et al (2011)</b>	<b>Report</b>	<b>4_report_Houston_et al_2011_AK.doc</b>
<b>Climate change, justice and vulnerability</b>	<b>Lindley et al (2011)</b>	<b>Report</b>	<b>1_report_lindley_et al_2011_ak</b>
<b>UK Climate Change Risk Assessment: Evidence Report, London</b>	<b>Defra</b>	<b>Report</b>	<a href="https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report">https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report</a>
<b>Sustainable, Resilient, Healthy People &amp; Places A Sustainable Development Strategy for the NHS, Public Health and Social Care system</b>	<b>Public Health England and the NHS Sustainable Development Unit (2014)</b>	<b>Report</b>	<a href="http://www.sduhealth.org.uk/documents/publications/2014%20strategy%20and%20modulesNewFolder/Strategy_FINAL_Jan2014.pdf">http://www.sduhealth.org.uk/documents/publications/2014%20strategy%20and%20modulesNewFolder/Strategy_FINAL_Jan2014.pdf</a>
<b>Adaptation to Climate Change for Health and Social care organisations “ Co-ordinated, Resilient, Prepared”.</b>	<b>NHS Sustainable development Unit (2012)</b>	<b>Report</b>	<a href="http://www.sdu.nhs.uk/documents/publications/Adaptation_Guidance_Final.pdf">http://www.sdu.nhs.uk/documents/publications/Adaptation_Guidance_Final.pdf</a>
<b>Telecare: a crucial opportunity to help save our health and social care system</b>	<b>Yeandle (2009)</b>	<b>Report</b>	<a href="http://www.sociology.leeds.ac.uk/assets/files/research/circle/tel">http://www.sociology.leeds.ac.uk/assets/files/research/circle/tel</a>

### 6.3 Case Studies and Examples

Name	Developer	Type of Resource	Link
<b>A county perspective on social vulnerability assessment and its uses: the case of Hampshire</b> This case study outlines how Hampshire County Council initiated and implemented an assessment of social vulnerability.	<b>Hampshire County Council</b>	<b>Case study</b>	Hants_technical_how_to_SSVI_THT1
<b>Creating a core cities mapping tool for responding to climate change related extreme weather</b> This case study documents the creation of a GIS mapping tool that would allow partners within and outside of Leeds City Council to prepare for and respond to climate change related extreme weather and which could be transferred to the remaining core cities and other areas	<b>Leeds City Council</b>	<b>Case Study</b>	Case_Study_Templates_ClimateJust_Leeds
<b>Using ClimateJust data in Wigan</b> Outline of how JBA consultants worked with Wigan Council to use the ClimateJust data to develop local adaptation measures	<b>JBA consultants &amp; Wigan Council</b>	<b>Guidance &amp; Case Study</b>	<b>4_Wigan_data</b>
<b>Greater Manchester Local Climate Impacts Profile</b>	<b>Ecocities</b>	<b>Online example of an LCLIP</b>	<a href="http://www.adaptingmanchester.co.uk/documents/greater-manchester-local-climate-impacts-profile-gmlcip-and-assessing-manchester-city">http://www.adaptingmanchester.co.uk/documents/greater-manchester-local-climate-impacts-profile-gmlcip-and-assessing-manchester-city</a>
<b>Example of a Joint Strategic Needs Assessment</b>	<b>London Borough of Hackney</b>	<b>Online material (external)</b>	<a href="http://www.hackney.gov.uk/Assets/Documents/City-and-Hackney-Health-and-Wellbeing-Profile-2011-12.pdf">http://www.hackney.gov.uk/Assets/Documents/City-and-Hackney-Health-and-Wellbeing-Profile-2011-12.pdf</a>

### 6.4 References and Weblinks

Benzie, M, Harvey, A, Burningham, K, Hodgson, N and Siddiqi, A (2011) Vulnerability to heatwaves and drought: adaptation to climate change, JRF <http://www.jrf.org.uk/publications/vulnerability-heatwaves-and-drought-adaptation-climate-change>

Zsamboky, M., Fernandez-Bilbao, A., Smith, D., CABE (2010) "Urban Green Nation: Building the evidence base", Commission for Architecture and the Built Environment, London.

Cutter, S. L., Emrich, C. T., Webb, J. J. and Morath, D. (2009) Social Vulnerability to Climate Variability Hazards: A Review of the Literature. Hazards and Vulnerability Research Institute, University of South Carolina, Columbia. Available at [http://adapt.oxfamamerica.org/resources/Literature\\_Review.pdf](http://adapt.oxfamamerica.org/resources/Literature_Review.pdf) [Accessed 20 November 2009]

Curtis, K.J. & Schneider, A. (2011) "Understanding the demographic implications of climate change: estimates of localized population predictions under future scenarios of sea-level rise", *Population and Environment*, 33(1), pp. 28–54.

DCLG (2011) The English Indices of Deprivation 2010 Neighbourhoods Statistical Release [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6871/1871208.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6871/1871208.pdf). Last accessed May 2014.

Defra (2009) Appraisal of flood and coastal erosion risk management: A Defra policy statement (June 2009) [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69419/pb13278-erosion-manage-090619.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69419/pb13278-erosion-manage-090619.pdf). Last accessed May 2014.

Defra and the Environment Agency (2011) Understanding the risks, empowering communities, building resilience The national flood and coastal erosion risk management strategy for England [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/228898/9780108510366.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/228898/9780108510366.pdf)

Defra (2011a) Guidance for risk management authorities on sustainable development in relation to their flood and coastal erosion risk management functions [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69447/pb13640-sdg-guidance.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69447/pb13640-sdg-guidance.pdf)

Defra (2011b) Mainstreaming sustainable development – The Government’s vision and what this means in practice <http://sd.defra.gov.uk/documents/mainstreaming-sustainable-development.pdf>. Last accessed May 2014.

Greater London Authority (2006) [http://static.london.gov.uk/mayor/environment/climate-change/docs/UHI\\_summary\\_report.pdf](http://static.london.gov.uk/mayor/environment/climate-change/docs/UHI_summary_report.pdf) Last accessed May 2014.

Hajat, S., Kovats, R.S., Lachowycz, K. (2007) "Heat-related and cold-related deaths in England and Wales: who is at risk?", *Occupational & Environmental Medicine*, 64, pp. 93-100.

Houston, D., Werritty, A., Bassett, D., Geddes, A., Hoolachan, A. & McMillan, M. (2011) "Pluvial (rain-related) flooding in urban areas : the invisible hazard", Joseph Rowntree Foundation, York

IPCC (2007) Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Parry, M. L., Canziani, O. F., Palutikof, J. P., van der Linden, P. J. and Hanson, C. E. (eds). Cambridge: Cambridge University Press

Knight, J. & Allan, J. (2011) "Impacts of climate change on disadvantaged UK coastal communities", Joseph Rowntree Foundation, York.

Lindley, S. J., O’Neill, J., Kandeh, J., Lawson, N., Christian, R. & O’Neill M. (2011) "Climate change, justice and vulnerability", Joseph Rowntree Foundation Report, York

Lindley, S. J and O’Neill, J. (2013) Flood disadvantage in Scotland: mapping the potential losses in well-being. Scottish Government Social Research Available at <http://www.scotland.gov.uk/Publications/2013/10/5328>. Last accessed May, 2014.

McGregor, G. R., Pelling, M., Wolf, T. and Gosling, S. (2007) The Social Impacts of Heatwaves, Science Report – SC20061/SR6. Environment Agency. Available at: <http://publications.environment-agency.gov.uk/PDF/SCHO0807BNCW-E-E.pdf> [Accessed 29 September 2011]

Oven, K.J. et al. (2012) Climate change and health and social care: Defining future hazard, vulnerability and risk for infrastructure systems supporting older people's health care in England, *Applied Geography*, 33(1): 16–24

Preston, I., Banks, N., Hargreaves, K. Kazmierczak, A., Lucas, K., Mayne, R., Downing, C and Street, R (2014) *Climate Change and Social Justice: an evidence review*  
<http://www.jrf.org.uk/sites/files/jrf/climate-change-social-justice-full.pdf>

SNIFFER (2009) 'Differential social impacts of climate change in the UK'. SNIFFER Project UKCC22. Available at [http://www.sniffer.org.uk/Resources/UKCC22/Layout\\_Default/0.aspx](http://www.sniffer.org.uk/Resources/UKCC22/Layout_Default/0.aspx) [Accessed 29 September 2011]

Tapsell, S. M., Tunstall, S. M., Green, C. and Fernandez, A. (2005) Indicator set. Report T11-07-01 of FLOODsite Integrated Project, Flood Hazard Research Centre, Enfield. Available at <http://www.floodsite.net/html/publications3.asp?taskID=11> [Accessed 29 September 2011] Tapsall, et al., 2005

Walker, G., Burningham, K., Fielding, J., Smith, G., Thrush, D. & Fay, H. (2006) "Using science to create a better place: Addressing Environmental Inequalities: Flood Risk", Science Report: SC020061/SR1, Environment Agency, Bristol

<https://www.gov.uk/discrimination-your-rights/types-of-discrimination>. Last accessed May 2014.  
<https://www.gov.uk/definition-of-disability-under-equality-act-2010> Last accessed May 2014.

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/201039/Heatwave-Main\\_Plan-2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/201039/Heatwave-Main_Plan-2013.pdf)

<http://www.ons.gov.uk/ons/rel/regional-trends/area-based-analysis/a-profile-of-deprivation-in-larger-english-seaside-destinations--2007-10/art-a-profile-of-deprivation-in-larger-english-seaside-destinations--2007-and-2010.html#tab-Key-Points>

## 6.5 Further portal resources

### Related to this material

- **Benefits of green infrastructure**<sup>88</sup>
- **Older people and vulnerability**<sup>89</sup>
- **People on low income and vulnerability**<sup>90</sup>
- **Adapting buildings**<sup>91</sup>
- **Working in partnership**<sup>92</sup>
- **Awareness Raising**<sup>93</sup>
- **P\_Why are socially just responses to climate change important?**<sup>94</sup>
- **Caveats and limitations of the map data**<sup>95</sup>

---

<sup>88</sup> Link to 2\_Green Infrastructure

<sup>89</sup> Link to 12-older-people

<sup>90</sup> Link to 4\_low incomes\_AK

<sup>91</sup> Link to 11-adaptingbuildings-AC

<sup>92</sup> Link to message 4-FosteringTies

<sup>93</sup> Link to message 6\_Community engagement and awareness raising

<sup>94</sup> Link to presentation P\_Why are socially just responses to climate change important?

<sup>95</sup> Link to Caveats and limitations of the map data (separate document)

## **Other material**

- (1) Who is most socially vulnerable to flooding and high temperatures?**
- (3) What actions can be taken to improve local community resilience to climate impacts and extreme weather?**
- (4) Which households emit the most carbon?**
- (5) How can the transition to low carbon communities be made more equitable?**
- (6) Who is most likely to experience fuel poverty?**
- (7) What local actions can be taken to tackle fuel poverty?**