



## Promoting Community Resilience: learning to live with a changing coast

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### Setting the scene: natural hazards in the South West

The challenge of how to deal effectively with natural hazards and environmental change is not one that is new to the people of Devon and the South West of England. Historical records illustrate the devastating impact of coastal and riverine flooding in the region and the iconic Lynmouth and Boscastle floods have, to some extent, made parts of the region synonymous with the challenges of enabling communities to live alongside the natural hazards associated with steep upland topography and intense rainfall events. Indeed, the storms of the 2013-14 winter season have demonstrated the risks to communities sited along vulnerable parts of the Devon and Cornwall coast. However, despite the historic legacy of dealing with flooding from both rivers and the sea, the projected impacts of anthropogenic climate change indicate that severe winter storms and intense rainfall events are likely to become more frequent in the future, potentially leading to more damaging coastal erosion and flooding.

### Climate change, the 'risk society' and resilience

Recent research within the social sciences has examined the ways in which policy makers and politicians have conventionally approached the challenge of dealing with these types of natural hazards and highlights the major role that communities, in particular individuals, play in the process of preparing for and recovering from natural hazards. In doing so, it offers insights into how we currently approach the challenge of flooding and coastal erosion and what we might do about it in the future.

This research highlights that the issue of **flooding and coastal erosion is one that is complex and controversial**, with different claims being made about its causes. When the issue of **climate change** is considered, the issue also becomes heavily politicised. Since the 1970s, scientists have accumulated a vast amount of evidence showing that global temperatures are rising and that human activity has almost certainly contributed to this warming. Since the industrial revolution in the 19<sup>th</sup> century, greenhouse gas concentrations within the atmosphere have risen sharply as countries place significant demands on natural resources such as coal and oil. These gases are exceptionally effective at absorbing solar energy when it is emitted back from the earth's surface as long-wave radiation. As Earth's atmosphere warms, the changes impact upon many natural processes. Although the increase in average global temperature over the past 100 years appears relatively small (0.89°C), this has already affected weather patterns, caused sea level rise and begun to melt glaciers and polar ice sheets. A warming world will affect many natural processes, and it will inevitably affect us. However, although anthropogenic (human-induced) climate change is largely accepted within the scientific community, it remains a highly contested issue within society. A key reason is the fact that the scientists cannot be absolutely sure about the degree and timing of climate change. Three problems loom-large. First, we need to know how Earth's climate has behaved in the past so that we can place

recent changes into an historical context. Nature's 'diaries', such as tree rings and ice cores, have provided a wealth of information on temperature and rainfall variability over different timescales, yet there remain big challenges in reconstructing the exact timing and magnitude of these changes. Second, models that use immense computing power to imitate the Earth's system are our most powerful tool, providing a window to our potential climate future. Yet, whilst the sophistication of these models improves year-on-year, they rely on a large number of assumptions and present limitations that result from our incomplete knowledge of the climate system. Third is how we develop as a planet: the amount of harmful greenhouse gases in the atmosphere will depend on how countries around the world develop and the speed at which this happens. Whilst these causes of uncertainty are accepted within the climate science community, those sceptical about the urgency of taking action use this uncertainty to question the political priority climate change has been given by governments. The notion of anthropogenic climate change has therefore become a heavily debated issue throughout the media and in realms of politics and business.

In addition to studying the complexities of anthropogenic climate change, social scientists have demonstrated that this 'politicisation' of science and (traditionally accepted) expert knowledge is the result of a broader shift in society that is beginning to **question science as a valid basis for decision-making**, in particular through the use of social media and the Internet. In other words, the debates and discussions about the science of the climate and its impacts that were once the preserve of 'experts' in scientific institutions are now openly contested and countered by so-called climate change sceptics and 'deniers', who mobilise arguments and data beyond the traditional scientific community to make their points.

Finally, researchers have examined the UK government's current approach to dealing with issues like flooding, which is dominated by the promotion of '**resilience**' – a term which on the face of it sounds simple to define, but is itself highly complex and contested. Resilience is a term that originates in the natural sciences and refers to the ability of a system (such as an ecosystem) to withstand and recover from external shocks (for example, a major storm). Social scientists have adopted this term in three ways:

**Engineering resilience** is about protecting people and places by building physical structures, like flood walls, to remove the risk of a disaster;

**Ecological resilience** is concerned with adapting each time a disaster occurs, for example being prepared for when a flood happens and knowing what to do;

**Evolutionary resilience** is about making big changes to your community and even where you live, for example deciding to move away from an area at high risk of flooding.

### **Making the change?**

These three perspectives in turn have had a fundamental impact on the ways in which conventional approaches to risk management have influenced our understanding of how people and communities prepare for events like flooding and coastal erosion. Drawn from psychology on the most part, risk managers often frame the problem as one of communication – that is, enabling people to better understand the risks so that they can take action when a flood or storm warning is issued. This approach focuses on understanding how individuals perceive environmental problems and what thinking strategies, called 'cognitive' approaches, they use to deal with information. They have revealed many factors that influence how people think about climate change, the most potent of which has been called the 'psychology of denial', in which cognitive strategies are formed by individuals to 'excuse' themselves from taking action. Throughout most of central government, the use of such psychological approaches has become the norm, meaning that preparing for events like

floods and other natural hazards has largely become an exercise in one-way communication between the expert and the citizen.

Recent developments in both research and practice at local scales have indicated that this psychologically-dominated perspective has a number of limitations. First, it tends to be politically unambitious and does not afford citizens, and local stakeholders more broadly, to think 'outside of the box' about the problem in their area or indeed about how things may change in the future in relation to problems like climate change. Second, there is a tendency to crowd out alternative perspectives that may complement existing scientific approaches. This is not to argue that science be replaced with an alternative way of seeing the world, but rather it is about recognising the knowledge and expertise local people can add to that science. Third, many of the basic assumptions underlying psychologically-driven approaches have been questioned as being inadequate for expressing the complexity of human behaviour and decision-making. Finally, such approaches do not enable people to think in the long term about how the places in which they live may change in the future and how they might 'evolve' into a way of living with environmental change, and therefore become more resilient to the changes caused by climatic change.

If psychologically driven approaches are problematic, what might replace them as a way of dealing with the controversial nature of issues like flooding, coastal erosion and environmental change in the future? One of the ways that geographers are making a unique contribution to understanding climate change communication is by arguing that too much focus has been placed on two issues by researchers and politicians: first, that climate change is largely a global scale problem and second that it is only 'experts' (e.g. scientists) who can hold valid knowledge about climate change that helps us to understand how to take action. In contrast, they argue that a focus on climate change's impacts on the places where people live and a focus on the local knowledge people have about their environment would be more appropriate. Geographers have therefore begun to experiment with what is called knowledge 'co-production', where people in a specific place come together to discuss an environmental challenge for their community and share their understandings of its causes and possible ways they can change their behaviours. Using 'co-production' techniques is quite different from traditional forms of communicating science because it places local residents, business owners and landowners on an equal footing with people who were often regarded as experts, like climate scientists, engineers, local councillors and academic researchers. The idea behind co-production is that through discussion, debate and recognising where people disagree, an understanding of a problem can emerge that everyone trusts in and can accept. Because people are focussing on real local issues, the 'big' issue of global climate change is much easier to 'get on the table'.

### **Co-producing climate change knowledge: a case study of flooding in the UK**

We can look at a practical example of knowledge 'co-production' by exploring how climate change can be understood at a local level through people sharing their experiences and understandings of a common natural hazard: surface water and river flooding. We use flooding as an example because it is a widespread and growing problem for the UK. Floods in late 2012 caused major problems for the South West of England, with infrastructure being affected and hundreds of homes flooded. The changing weather patterns caused by climate change are likely to witness more intense rainfall events across the UK, potentially leading to more severe flooding in the future. Traditional methods for dealing with flooding have tended to focus on building higher flood walls to keep the waters away from homes and businesses, yet climate change projections indicate that certain periods in the year are likely to get wetter on average, with increases in very intense rainfall events. In the South West, with steep sided hills and villages located in valley bottoms, the risk of increased flooding is high.

So how can we enable communities in this region of the UK to prepare for more flooding events caused by climate change? One way to do this would be to build more flood defences and hope for the best. Yet this is unrealistic, largely because of the cost of such defences for small communities. Instead, communities are being encouraged to become more 'resilient' to flood events. Yet if small communities in counties like Devon and Somerset are to become more resilient to flooding in the future, they will need to agree on what to do, and that means agreeing on why the flooding occurs and how it will increase with climate change.

In November 2013 we ran a workshop with the people of Dulverton, a small town located on the River Barle on the southern side of Exmoor. The workshop brought together local residents, business owners, land owners and managers, environmental scientists and managers and members of local government. Central to their discussion was how the risks associated with flooding for Dulverton would change with climate change and increased rainfall. The inter-active workshop also involved people sharing their experiences of being flooded, their local understandings of what causes flooding in the catchment and the ways in which they have coped and helped others during flood events. They did this in the spirit of co-operation and were encouraged to listen as much as possible to others, as well as put their own viewpoints forward.

The outcome of the workshop demonstrated how discussing a locally important issue can enable people to relate their own experiences to climate change and how this can help them to understand its impacts:

- Recognising the River Barle catchment is an upland river system and is vulnerable to increasing rainfall intensities caused by climate change;
- Educating people about the likely changes to rainfall patterns in the future because of climate change;
- Encouraging all those living within the river catchment to become involved and engaged in discussions about how to tackle flooding problems in the future;
- Making sure that the planning system and future development recognises the risks associated with flooding in the area and how these will alter with climate change;
- Making sure the flood warning system was fast enough to react to intense rainfall events, which are likely to increase with climate change;
- Encouraging land owners to manage their land in ways that prevent increased runoff of rainwater and stop obstructions, like fallen trees, getting into the river channel;
- Supporting the community to become more resilient to flood events in the way they prepare beforehand and respond afterwards.

Rather than having to discuss climate change as a global, abstract and scientifically complex subject, people were able to think about how climate change will affect them in the future by focusing on their everyday lives and just one aspect of climate change – the likelihood of more intense rainfall events over Exmoor. As a result, the discussions in the workshop focused on how the impacts of more intense rainfall events would affect village communities like Dulverton and how the whole river catchment could be managed differently in the future to reduce the impact of flooding. The workshop therefore demonstrated that focusing on a particular problem in a locality and selecting one component of climate change's impact is much less controversial than trying to discuss climate change as a World-wide problem. Most importantly, the group has committed to working together to do research on what causes flooding in the area and to support the town in coping with future flood events.

## **Conclusions and implications**

Understanding and communicating the risks associated with flooding, coastal erosion and the impact of climate change (and the science that lies behind it) is complex and challenging. Social scientists have added a great deal to our knowledge about why people find understanding natural hazards and climate change difficult. Although there is no quick and easy solution to communicating climate change and its impacts, enabling people to discuss it within their own community and to understand its likely impacts on them and others offers the potential to enable people to feel included in the process of knowledge production and become more resilient to environmental change. A full description of the case study described here can be found in the Dulverton Flood Report, available on the Living with a Changing Coast website.