

Institutional inertia and policy innovation for climate change adaptation: the case of flood risk management

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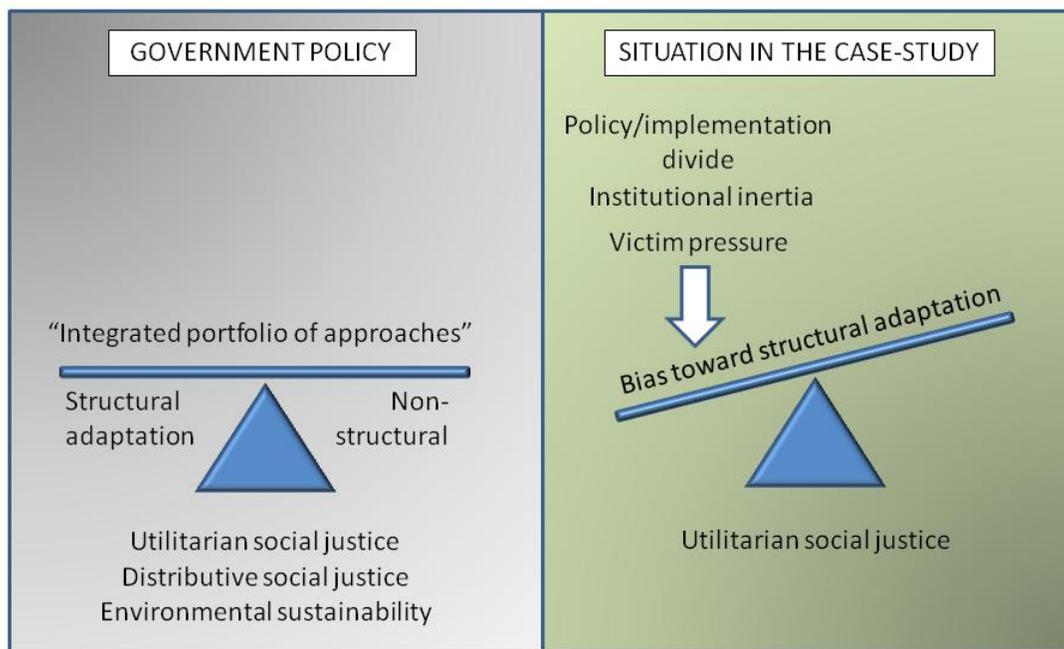
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Abstract

Interviews were conducted with risk managers in a case-study area in England to determine the factors influencing the choice between more traditional, engineering based, adaptation to flood risk and those focussing on vulnerability reduction. The findings of in-depth analysis of these interviews have implications for climate change adaptation as a whole. They suggest that government policies to implement a broader range of adaptation measures might be hampered by institutional cultures formed when engineered approaches were the norm. Political decentralisation and the fashion for public consultation exacerbate this effect, leaving decision-makers more responsive to the influence of those directly affected by natural hazards than they are to policy pronouncements by government.

Graphical abstract



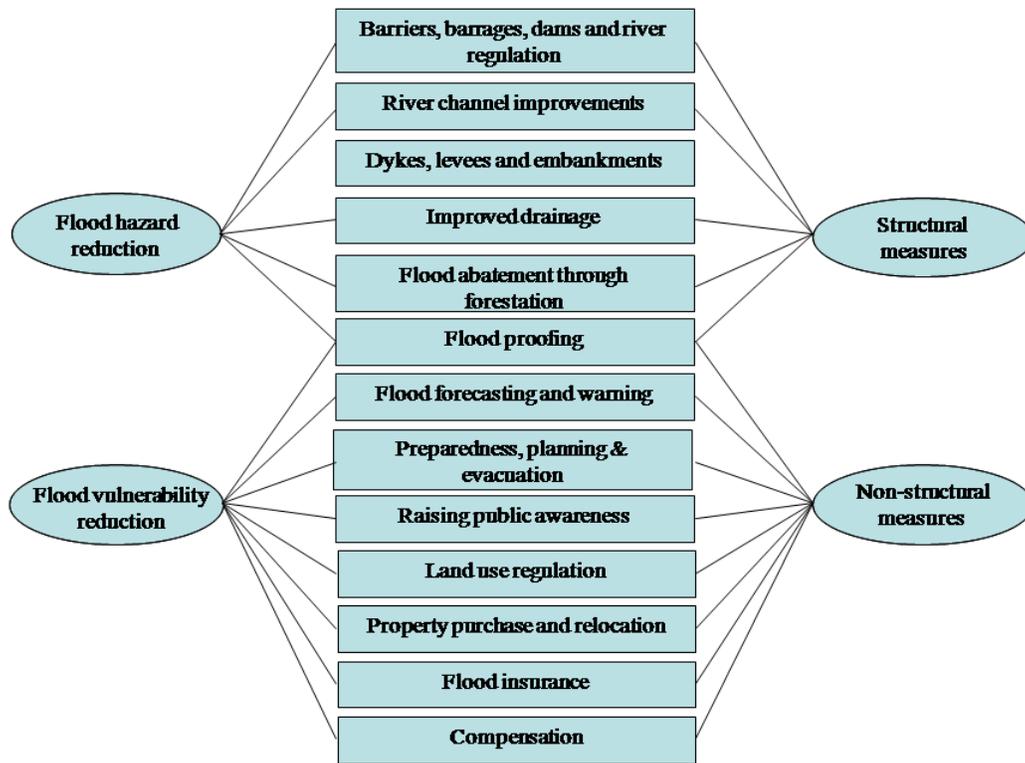
1. Introduction

Adaptation to climate change is an essential complement to greenhouse gas mitigation and can provide ‘breathing space’ for global emissions trajectories (Adger et al., 2005). As the prospect of climate change becomes more widely accepted, so existing practices for adaptation to environmental risks need to be reviewed. Not only does adaptation need to increase; in order to ensure social justice and environmental sustainability, a wider range of strategies needs to be used.

The range of options available is illustrated by Figure 1, which lists some of the adaptation measures available for the management of one common risk: that of flooding. These options include the more traditional highly engineered, or *structural*, measures that

reduce the probability of a flood, but also *non-structural measures*, which reduce vulnerability.

Figure 1 A categorisation of flood risk management measures into *structural* and *non-structural* (adapted from Parker, 2007)



This paper looks at some of the institutional and cultural barriers to an expansion of the range of such measures that is used. Taking flood risk in the UK as an example, it considers the problems faced when the organisations that are tasked with managing societal exposure to environmental risks are asked to broaden the range of techniques they use. It suggests that cultures and rationalities that have become embedded within these organisations as a result of previous, more narrowly defined, policies can present a significant barrier to adaptation and limit the ability of society to respond flexibly and with fairness to climate change.

The argument presented draws on case-study research relating to the development of a flood risk management strategy in an area near London, southeast England. In-depth interviews with stakeholders and decision-makers involved in the strategy design reveal an ingrained and continuing institutional preference for the construction of large-scale flood defence schemes and the legitimisation of this by a representation of public opinion as favouring this preference. Government policies for the diversification of adaptation measures have, as yet, borne relatively little fruit. This paper concludes that in an age where decentralisation has weakened the command powers of central governments

(Rhodes, 1997) institutional inertia is partly responsible for this weakening because it slows responsiveness to policy innovation.

1.1 The changing policy context

In recent years, the emphasis within the public discourse on flood risk management discourse has shifted away from large-scale engineering measures and towards the promotion of a broader range of adaptation measures (Johnson et al., 2005). Hence, whereas in 1993 the Environment Agency's flood strategy only listed flood warnings and flood defence as its priority aims (Environment Agency, 1993), by 2005 the UK Government was clearly indicating its desire to see the use of an "integrated portfolio of approaches" to manage flood risk (Defra, 2005, p. 8).

This change of policy direction resulted from a recognition that conventional means of reducing flood risk had become insufficient in relation to the scale and nature of the problem. In 1998, after a major flood revealed the extent of the risk to which the UK was still exposed, an independent review of the event (Bye and Horner, 1998) found that the extent and state of the nation's defences were not to blame and concluded that structural defences alone could never protect communities against the most extreme floods. Two years later, the occurrence of another large flood was rapidly followed by the publication of the synthesis report on climate change by the IPCC (2001). The consequence of these events was the emergence of a general view that the frequency of flooding and the extent of the exposure were not only higher than previously thought, but were also increasing.

A government-sponsored investigation into the likely effects of climate change confirmed this view (Evans et al., 2004a; 2004b). Looking at a number of future economic and political scenarios, it concluded that if expenditure on flood defence was maintained at existing levels, annual damage levels for England and Wales, estimated at the time as £1 billion per year, would rise to between £1.6 billion and £29 billion by the 2080s. Over the same period, it reported, the number of people living in high risk areas would increase from 1.4 million to between 2 million and 3.9 million (Evans et al 2004b).ⁱ

As shown in Table 1, expert opinion gathered by Evans et al. suggested that river and coastal defence reduced risk exposure by far more than other types of measures. Table 1 shows predicted damage reductions for different elements of the proposed portfolio.

ⁱ The large differences between estimates are the result of the use of different assumptions about future economic systems and policies and different assumed levels of economic growth.

Table 1 Examples adaptation measures and their predicted effectiveness at reducing flood damage (adapted from Evans et al., 2004b, pp. 43 and 46)^a

Type of adaptation measure	Reduction in damage
River defences	38%
Coastal defences	32%
Urban storage, conveyance and infiltration	5%
Event management (forecasting and warning, flood-fighting, damage avoidance)	21%
Land-use planning and management	24%
Retro-fitting existing homes with flood protection	19%

^a The authors calculated figures for a number of possible scenarios of world economic policy and economic growth. The numbers shown here reflect their estimates for just one of these scenarios, in which growth and income were relatively low and government intervention relatively high.

Although a risk management system dominated by defence was seen as delivering the most effective means of reducing damage, the study concluded that such a system does not deliver either environmental quality or social justice (2004b). For example, it fails to provide distributive justice to small groups of at-risk properties, for whom per-property costs are usually too high to justify defence measures and which often, therefore, receive no state investment at all in risk reduction. Similarly, it tends to undervalue the environmental benefits of the creation of wetlands and wash-lands, which reduce flood risk while also contributing to targets such as those in the Convention on Biological Diversity and the European Water Framework Directive.

The authors of the study concluded that, if the issues of environmental quality and social justice were to be addressed as well as that of damage reduction, a far broader “portfolio of measures” was required (2004b). This view was subsequently adopted by the Government in its influential 2005 strategy, *Making Space for Water* (Defra, 2005).

However, implementation of this aspect of central government policy has been slow. Although a whole range of measures is now under development or in use across England, those that do not rely on defence still form a weaker part of the “portfolio” of approaches. For example, the independent review of the 2007 floods (Pitt, 2008) argues that planning controls in flood risk areas are not applied rigorously enough and that there is a lack of a clear policy for the use of temporary and demountable defences. It also suggests that property-level adaptation measures are insufficiently promoted, citing Harries’ (2008a) finding that fewer than 6% of at-risk householders who have never been flooded have implemented even the simplest forms of such measures. Similarly, although awareness-raising and flood warnings have received significant investment, warning systems are seen as inadequate by flood victims (Parker et al., 2009) and two-fifths of residents of at-risk areas remain unaware that they are at risk (Harries 2008a).

1.2 Barriers to policy change

Barriers to policy change are to be found at the level both of the policy-making function in central government and within the organisations responsible for implementing policy.

There are at least two ways in which the UK government has itself helped entrench the bias toward structural measures. For example, a high-profile agreement between the government and the Association of British Insurers (ABI) asserts that ABI members will continue to offer insurance to high-risk households only if the Environment Agency instigates “greater investment in defences [...] and faster and more consistent decisions on flood defences” (quoted in *ibid*, p136), and ABI members promise to offer cover to new customers only if their home is not at “significant risk” of flooding (ABI 2010). Embedded within these statements is an assumption that flood risk is to be managed by structural measures (“flood defences”). Similarly, ‘significant risk’ is defined purely in terms of probability, thereby implying that the key to ABI-central government collaboration is the prevention of floods (using structural measures) rather than the reduction of flood vulnerability (using non-structural measures).

A similar implication is contained within the government’s five outcome targets for flood risk management capital programmes (Defra Secretary of State, 2008). The first of these *outcome measures* specifies the average benefit cost ratio that must be achieved for the overall package of projects that are implemented. Due to a deficit in the skills and knowledge necessary for the evaluation of the costs and benefits of non-structural measures, this is likely to cause a tilt towards structural measures, which are more familiar and more easily evaluated. Of the remaining four targets, two specify biodiversity and habitat targets that can only be contributed to by structural measures and two specify reductions in flooding probability.

Although these examples reveal an ambiguity in the government’s communication of their desire for a broader portfolio of flood risk management measures, this discussion focuses on the barriers to that aim that are presented by those who are responsible for implementing government policy. In the rest of this section, it is argued that attempts to change behaviours and assert new rationalities have met with resistance at the point of delivery and that this effect has been exacerbated by a reduction in the ability of policy-makers to exert direct control over policy implementation.

1.2.1 Resistance at the point of delivery

Much resistance to policy change at the point of delivery results from *policy feedback* – the legacies of previous policies and the resulting institutional inertia. These legacies can take many forms.

Usually, the literature on policy feedback refers to the legacy of systems and procedures created by previous policies (Elmore, 1978; 1979). An example in the arena of flood risk management is the use of *benefit cost analysis*, a prioritisation tool popularised by the US Army Corps of Engineers (Porter, 1995) and embedded into practice in England as a

result of a desire to promote economic efficiency and of the focus of early policies on engineered solutions. Benefit cost analysis requires the identification of quantified economic values for the policy options under consideration. However, it is difficult to allocate values to the benefits of non-structural measures because they often involve a degree of behaviour change and this is relatively unpredictable. Furthermore, given that non-structural methods have not been very common in the past, there is a lack of established procedures and data for their evaluation. As a result, the ability of decision-makers to promote non-structural measures is constrained by the stringencies of the prioritisation system and by their inability to meet its requirements with regard to such measures.

In addition to legacies relating to procedures and systems, however, policy feedback can also leave cultural legacies, for example, by impacting on the *social identity* of delivery organisations. It is on this latter aspect that this paper concentrates.

Social identity is of key importance for the understanding of behaviour (Tajfel, 1982; Turner, 1985; Abrams and Hogg, 1990). Consisting of the habits, preferences and “rationalised myths” of organisations (Scott, 1983, p. 14), social identities provide the sense of shared purpose that allows institutions to function effectively (see Meyer and Rowen, 1977). Moreover, because adherence to a social identity is seen to promise acceptance, mutual support, protection and advancement, any threat to that identity tends to be collectively resisted by all those affected.

Within each of their life contexts, people select for themselves the most salient social identity and then divide other actors into those who share this identity with them (the *in-group*) and those who do not (the *out-group*). To try to ensure recognition and support from within their chosen *in-group*, individual members seek to conform to the core qualities of that group, as embodied by notional proto-typical members. Furthermore, they construct their representations of the world in such a way as to legitimise the behaviours associated with these qualities; accentuating the good points of the *in-group* while simultaneously emphasising the bad points of *out-group* behaviours – especially those perceived as possible threats (Abrams and Hogg, 1990).

Included in the behaviours considered in this way are forms of rationality. The type of rationality a person employs identifies him or her as an adherent to a particular culture and, therefore, as a member of a particular social identity group. The defence of that form of rationality is also a defence of the integrity of the *in-group*. We can therefore see that, as argued in *Institutional Theory* (e.g. Scott, 2005), cultural systems and models of rationality are conjoined.

It is for this reason that *policy feedback* limits the ability of central policy-makers to introduce changes in policy direction (Skocpol, 1992; Pierson and Smith, 1994). Policies are what Hudson and Lowe (2004) call *sticky*. They mould the cultural and social identities of the people who deliver them, creating *in-groups* that then resist any changes that are perceived as threats to their identities. This is why successful changes in policy direction require bottom-up support as well as top-down instruction (Sabatier, 1988).

The resistance resulting from policy feedback can be overcome by what Krasner (1988) calls *exogenous shocks*: events that shake the legitimacy of the assumptive worlds within the architecture of social identities and thereby facilitate change. Due to their moral force, these shocks also transcend the social divides caused by social identity groupings and allow increased social exchange between in-groups and out-groups. As a result, *exogenous shocks* create windows of opportunity in which policy change is more possible. Flood events large enough to attract widespread criticism of the state are examples of such shocks (Johnson et al., 2005). In England, the 1947 floods are said to have ‘catalysed’ a major revision of the scale of defences needed to protect agricultural land, the 1953 East Coast floods to have prompted the development of a storm-tide warning system and the 2000 floods to have precipitated a toughening-up of the land-use planning regime (*ibid*).

1.2.2 Reduction in the ability of policy-makers to exert control

The impact of front-line resistance to policy shifts, described above, is particularly acute in situations where a separation of the functions of policy making and policy implementation has loosened the control of central government policy-makers over the delivery of policy. Such is the case with regard to flood risk in England.

A full description of governance arrangements for UK flood risk management can be found in Johnson and Penning-Rowsell (2010) but it is important to emphasise here that most flood risk management activity in England is implemented under the aegis of the Environment Agency, an arms-length agency funded by block grant from the Department for Environment, Food and Rural Affairs (known as *Defra*). As a quasi-independent agent of the government, the Environment Agency is only partly under the influence of central government and only projects requiring more than £100m capital funding require central government approval. Performance targets and monitoring are used by Defra to direct the Environment Agency’s work, but these are seen by some commentators (e.g. Rhodes, 1996; 2008) as providing an imperfect tool for the implementation of central policy and as having reduced the ability of contemporary government departments such as Defra to implement central policy decisions (though see Holliday, 2000, for an alternative view).

Furthermore, the choice of flood risk management strategy is affected by few legal and administrative constraints or obligations. National laws give permissive powers rather than duties to the Environment Agency, and Defra is limited by central government funding rules in its ability to ring-fence grant money to ensure it is used for flood risk management alone. Although European Union directives such as the Water Framework Directive and the Birds Directive have put some constraints on policy design, even the 2007 European Floods Directive stops short of insisting on whether and how adaptation to flood risk should occur.

Further decentralising forces are at work within the Environment Agency itself. Traditionally, decisions about flood risk management have been viewed as regional or

local, with regional committees having an influential role that was enshrined in legislation (Penning-Rowsell et al., 2008). Although recent years have seen the creation of a central committee (the Environment Agency's *National Review Group*) to oversee the design and prioritisation of projects, the key strategies and measures for the management of flood risk in particular areas are still largely determined at the level of the Environment Agency's area and regional offices. Decisions about whether and how to respond to particular flood risk situations are often left, therefore, to local decision-makers.

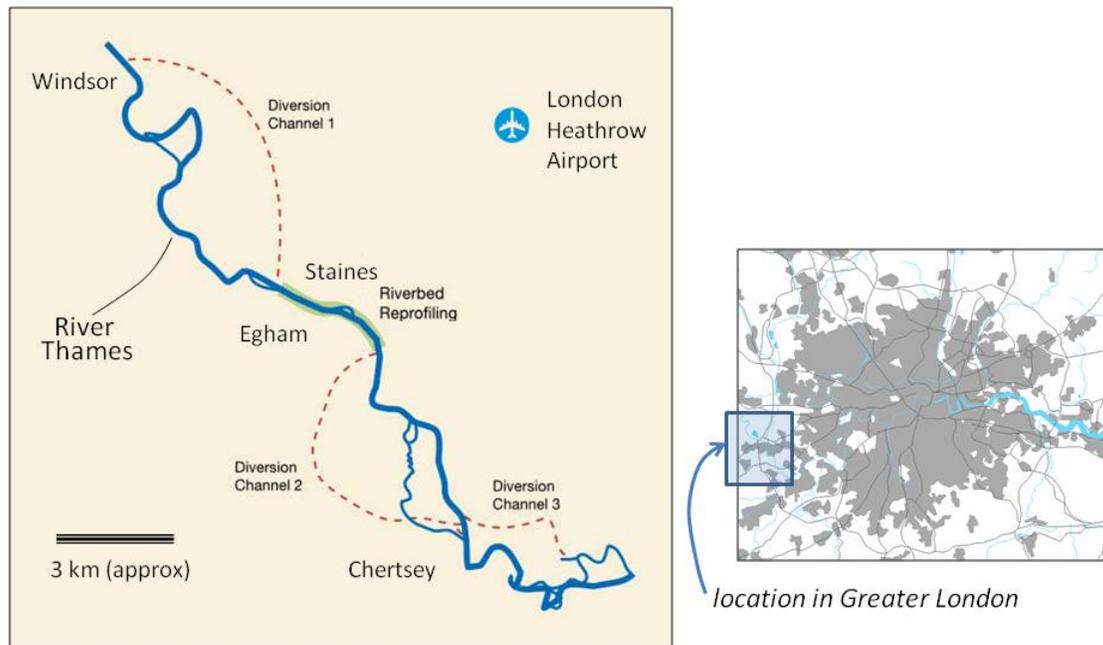
As specified in Defra's strategy appraisal guidelines (Riddell and Green, 1999), the main criterion for the design of individual risk management schemes, is, in fact, the calculated ratio of a scheme's monetised benefits and costs – the *benefit-cost ratio*. Current performance targets stipulate that the average ratio of benefits to costs for the Environment Agency's capital programme should be at least 5:1 and that all projects should have an incremental ratio "robustly greater than 1" (Defra Secretary of State, 2008). A ratio of 5:1 is, indeed, generally considered the minimum benchmark (Defra, 2009) and projects with lower ratios are only funded on those rare occasions when they are considered an overriding political priority. However, comments by participants in this research, as well as the experiences of one of the authors over many years working with the industry, suggest that much consultancy time is employed trying to devise ways to evaluate evidence that achieve higher ratios and move projects higher up the priority list for funds. As a result, the prioritisation of a project can depend as much on the skill of the consultants involved as it does on the integral value of the project.

Aside from the need to attain high benefit-cost ratios, teams of local Environment Agency staff are left with some discretion about the design and content of the scheme proposals that they put before national Environment Agency decision-making committees. The research reported here set out to explore the influence of professional and institutional cultures and particular local pressures on the type of adaptation measures proposed in these schemes and to understand how these factors affect the fulfilment of the government's desire to see the implementation of a wider portfolio of adaptation measures.

2 Material and methods

The investigation took as its case-study the Thames floodplain between Windsor and Richmond – a densely populated and prosperous area to the west of London (see Figure 2). According to the Environment Agency (2007), a flood with a 1% annual probability would affect 15,000 properties and 37,000 residents in this area and would cause £400 million worth of damage. Climate change, it is predicted, could increase flood flows in this area by between 5% and 10% over the next 50-100 years, causing key threshold levels within the floodplain topography to be reached more often and resulting in a substantial increase in flood frequency (*ibid*).

Figure 2 Map of the case-study area, showing the main conurbations and some of the proposed structural flood risk management measure



At the time of the research, although £2m had been spent on designing a strategy to reduce this risk, no agreement had yet been reached on a suitable package of measures. Large-scale engineering projects such as the construction of diversion channels and the use of dredging were being considered (see Figure 2). However, the highly built-up nature of the floodplain, combined with potential disruption to environmentally designated areas and the habitat of one Red Book listed species of freshwater mussel, had delayed progress and added to predicted costs. The original study on which this paper is based set out to look at the decision-making processes that informed the strategy's design and to understand how and why the choices of particular types of adaptation measure were made.

This area was selected for the case-study because the difficulty of implementing large-scale engineering schemes had obliged decision-makers to look for additional measures. These included the use of demountable barriers to protect groups of properties, the promotion of household-level flood protection and resilience measures and the introduction of tighter land-use regulation along key flow routes.

The main method used to meet the objective of the study was the *depth* or *semi-structured* interview. This method was indicated by the exploratory character of this study and by the ability of in-depth interviews to reveal the hidden representations, discourses and assumptions that influence decisions. Participants for the study were selected to represent the actor groups that most influenced the design of the flood risk management strategy in the case-study area. Some of these were selected by the research team at the outset of the research; others became evident in the course of the early interviews. In all, ten interviews were conducted with a total of thirteen respondents.

These included Environment Agency staff, the consultants hired to project-manage the development of the strategy, members of the strategy steering group and specialists brought in to advise on the social aspects of flood risk management (see Table 2).

Table 2 Respondents in the case study

Affiliation	Role
The Environment Agency	Customer-side project manager Area flood defence manager Regional flood defence manager Head office staff member responsible for approving funding for future development of the project and for reviewing the final scheme design
The Regional Flood Defence Committee	RFDC chairperson and member of the project steering group
Engineering consultancy	Project manager Previous project manager Graduate assistant
University	Advisor on social aspects of flood risk Advisor on public attitudes to flood risk; designed and analysed a survey of resident attitudes
Residents' flood forum	Chairperson
Department for Environment, Food and Rural Affairs	Regional Engineer for the area until this post was abolished in 2005
Political party	Member of Parliament for a part of the case-study area

The interviews were recorded, transcribed verbatim and analysed using a form of *textually oriented discourse analysis* (Fairclough, 2003). This technique was selected in order to reveal the deeper cultural and linguistic factors that might be influencing decisions about the design of flood risk management schemes. Many analytical methods focus on the surface content of speech. In contrast, textually oriented discourse analysis aims to uncover the representations, discourses and working assumptions that, while not necessarily the subject of everyday reflection or conversation, nonetheless structure people's talk and influence their behaviour (see Potter and Wetherell, 1987). This form of analysis draws on a tradition that sees language as functional as well as communicative; and as constituting reality, rather than simply describing it (Wittgenstein 1958, Austin 1962, Halliday, 1994). In this technique, analysts sensitise themselves to the different strategies that can be used to construct meaning and read texts with these strategies in mind, uncovering meanings and constructions that might otherwise be overlooked. Analysts critically interrogate their own presuppositions and unexamined techniques of sense-making and constantly ask, "Why am I reading this passage in this way?" and "What features [of the text] produce this reading?" (Potter and Wetherell, 1987, p168).

3 Results

The analysis of the case-study data indicates the existence of a distinctively engineering-focussed social identity amongst decision-makers and suggests that decision-makers resist, by rhetorical means, arguments for the expansion of the range of measures used in flood risk management. Two discourses are employed to this effect: a discourse of engineering and a discourse of public accountability.

3.1 Social identity and the engineering discourse

Although decision-makers in the case-study tend to express agreement with the need for a richer mix of flood risk management methods, the underlying rhetoric of their talk employs the engineering discourse and argues for the measure most consistent with that discourse: flood defence. This is perhaps unsurprising given that a number of the respondents were trained as engineers, but it nevertheless represents the persistence of the engineering paradigm in the face of a policy shift toward a greater focus on non-engineered approaches.

An example is provided by the following passage, in which the respondent accentuates the good qualities of his engineering identity by representing it as heroic:

With a[n engineering] solution you can set up a project team; they're very focused; [...] it's big civil stuff; there's lots of big contractors around who welcome the opportunity to get involved and you know there's lots of public interest around it, it's almost self-generating in terms of public interest, media, any messages you want to get out. It's a bit like the Olympics, you know, it's dead easy because they're tripping over themselves to want to know what's going on and so on and so forth. Having said that you've got a big initial challenge with a public inquiry, which is a huge challenge to get over in the first place. Once you've cleared that I think it's fairly straightforward. It's clear what you're delivering, it's clear what the outcome should be, there's a discrete project team set up to deliver it. [With non-engineering work] it's going to be far more of a challenge to engage people about what it is you're seeking to achieve.

In this passage of text, engineering is represented as the profession that provides “big solutions” to “big problems”. Such solutions are represented not only as large in scale, but also as heroic. In the above passage, the respondent compares big flood defence projects to the construction for the 2012 London Olympic Games and gives this a positive connotation by saying that people are “tripping over themselves” to find out about such projects. Whereas some people are “nervous of big civil engineering projects” and consider them “too frightening”, the prototypical engineer is represented as able to “pull it off”. An equivalence is therefore created between ‘large’ and ‘heroic’, thus enhancing the social identity of the engineer.

“Big” is also equated with clarity of purpose and method, and with unity of form. This indicates *structural measures* – large-scale engineered measures that focus on reducing the probability of a flood of the hazard itself (see Figure 1). Structural measures can be contrasted with *non-structural measures*, which reduce exposure or vulnerability (see Figure 1) and usually rely on human interventions to do so. Non-structural measures can, in reality, be equally as large as engineered projects, but are described by the respondent

as “bitty” and as therefore less likely to “engage people”. Although this makes such projects “a challenge”, challenge is here associated with uncertainty of aims and so is negatively connoted. Even though engineers might be less able to meet this challenge, the positive representation of the engineering social identity is therefore preserved.

The importance of the core skills of the engineer for his or her social identity is revealed by interviewees’ descriptions of flood defence as “the traditional way”. Engineers, it is argued, prove themselves to their fellows by building lasting and visible constructions and not by implementing non-engineered projects that leave no physical, structural legacy. Engineering is represented as the discipline of science. Engineers “believe in science”, “really want” science and shy away from measures that are represented as unscientific (whose predictability is described, dismissively, as “a finger in the air job”). As a result, the undertaking of non-engineered projects diminishes individuals’ conformity to the group prototype and undermines their ongoing membership of the group. Even worse, the conduct of such work by recent engineering graduates delays the development of the skills and portfolio of work that they need in order to become chartered engineers and, as a result, reduces the flow of new members into the engineering in-group.

Hence, the rhetorical defence of the engineering social identity – i.e. the denigrating terms “frightened” and “nervous” to describe people who would promote non-engineered approaches; the criticism of those approaches as “unproven”, “fluffy”, “woolly”, “unacceptable” and “second best”, and the heroic representation of those engineers who continue to prefer to engage in large-scale engineering work. Non-engineered approaches to flood risk management are, at best, depicted as playing a supporting role to engineering approaches or as being measures whose use is only justified where a stop-gap is needed while funding and planning permission are sought for engineered solutions and their construction is completed.

The influence of the engineering identity is also evident in the framing given by some respondents to discussions about flood risk management and in the representations of engineered defences and alternative forms of flood risk management. These are expressions of what Giddens (1991) calls *practical consciousness* – the tacit, normally unconscious assumptions and predispositions that people employ as heuristic measures in their every-day lives. These assumptions and predispositions are reflected in the nomenclature used to describe flood risk managers and also the background they normally come from. Those in charge of flood risk management at the local and regional level are still known as “flood *defence* managers”; local decision-making bodies are known as “regional flood *defence* committees”, and the vast majority of the Environment Agency’s annual budget for flood risk management is spent on the maintenance or construction of engineered defences. Furthermore, the consultants used for the design of flood risk management strategies are, in the main, companies with origins in engineering disciplines and the evidence from this study, as well as from the authors’ experience more generally, suggests that many key decision-makers have civil engineering backgrounds.

One consequence of decision-makers' preference for the engineering approach appears, in the case-study, to be the low valorisation of any design that is not centred on engineered solutions. This is illustrated in the followed text:

- Respondent [...] we changed the word from 'scheme' to 'project', because 'project' felt better. When you're trying to sort of describe not doing anything, you know? We've got this project, it's to resolve this need and the way we're going to do this is by doing very little. [...] But a 'project' was a better way, because [...] you will work with local people with a project that empowered the people to do something for themselves – maybe giving them funding to have a committee or whatever – something that empowered them to actually manage themselves, rather than expect that hard defences would be put in place.
- Interviewer So by changing the term do you... do you allow different things to be included within it?
- Respondent Yeah, I think you do. [...] I think changing the language is very important. [...] I think 'scheme', because it's actually in grant memoranda, in the financial memoranda, these words are there, cast in stone, they mean something. You look at all the guidance that refers to 'schemes' and this infers [engineering works].

In this interview extract, although some non-structured flood risk management techniques are represented in a positive fashion (“something that empowered them to actually manage themselves”), the overall project design is nevertheless represented as a choice between engineered defence or inaction and the proposal that consists of mainly non-structural elements is described as “not doing anything” and “doing very little”. In other words, the text simultaneously reflects two different rational modalities – one that reflects the rhetoric of flood defence and connotes non-structural measures as valueless, and another that uses the rhetoric of flood risk management and connotes them as valuable. As argued by Jovchelovich (2002), this state of *cognitive polyphasia* indicates the presence of conflicting interests – in this case, the desire to adhere to the familiar engineering culture and the desire to pay some dues to the ideology being promulgated by central government.

Respondents themselves seem to be aware of this conflict and show signs of trying to adjust the linguistic repertoire of their profession in order to reduce the gap between the two rationalities. The respondent above acknowledges the ability of terminology to structure thinking and claims to have attempted to manipulate that phenomenon by introducing a change in the language that is used. The substitution of “project” for “scheme”, he argues, would allow the inclusion of approaches that did not involve engineering – such as, for example, measures that empowered residents to manage the risk of flooding themselves. Another respondent states that he and his team had intentionally tried to change the terms they used in order to encourage the inclusion of more non-engineered approaches to flood risk management:

[...] rather than diving straight into structural measures, we will have this overview to say 'okay, for particular areas the best approach is a combination of things'. We have sort of coined the phrase 'basket of measures' so the 'basket of measures' are some structural [i.e. engineered flood defences], some non-structural, some capital, some revenue.

However, there was little evidence of these new terms having found their way into normal spoken usage, for respondents still generally spoke of ‘schemes’ rather than ‘projects’ or ‘baskets of measures’. The habitual terminology used by social and professional groups does not change easily and instrumental manipulations of language can meet with resistance. Hence, the concept of “flood plain management” used by the Environment Agency (2007) to define an approach that included all non-engineered measures is described critically by project team members as “that FPM thing”, a “rag-bag of different measures” and “not a good descriptor”.

The above discussion suggests that the social identity of flood risk managers in the case-study centres on the characteristics of a prototypical engineer who implements heroic-scale measures that have scientifically predictable impacts. As described above, this identity has been codified in the language used to describe decision-makers. It also includes embedded negative assumptions about the value of non-engineered measures and defines its terms in such a way as to implicitly exclude such measures from a normal repertoire of options.

Individual identities are fluid and change in response to the forces exerted by surrounding cultures (Kumar, 1997) and, if we follow the line taken by some modernists, also according to a person’s perception of the requirements of their own ontological security (Giddens 1991). Hence, although the increasingly pervasive culture of ‘flood risk management’ encourages the adoption of an identity that valorise techniques not traditionally associated with the engineering tradition, decision-makers’ day-to-day location in a social context that valorises the engineering culture leads to a situation of polyphasia in which they simultaneously favour large-scale engineered solutions.

3.2 Routes of accountability and the discourse of public opinion

When this underlying engineering-dominated value system is questioned (as it was by the interviewer), flood risk managers tend to fall back on an alternative line of argument: one provided by the discourse of public accountability. Their accountability to the public appears to play a greater rhetorical role than their accountability to government policy-makers, whose influence is given far less prominence.

As the same time as the roots of accountability to central government have been weakened by the introduction of arms-length management arrangements, the New Public Management agenda has promoted greater and more direct accountability to the public (Hood, 1991). As a result, the influence of public opinion has waxed while that of central government has waned.

Public consultation forms an increasingly prominent part of the responsibilities of bodies, such as the Environment Agency, that have responsibility for managing environmental risks. This, our study suggests, may have led to the attribution of increased importance to public opinion in the matter of selecting flood risk management strategies. Although decision-makers continue to represent themselves as the experts in flood risk

management, they also depict it as a collaborative process and consider themselves accountable to a wider public:

Interviewer	Aren't you kind of, as the 'experts', supposed to do what is expertly judged right?
Respondent	You would think so. (Second respondent: Yes) I think those days are long gone and I think we are accountable much more for what we do and how we do it and we have to bring people along with us. Otherwise it just doesn't work these days.

The engineering discourse and the discourse of public accountability at first appear unlikely allies: the former, after all, is premised on narrowly framed scientific rationality, whereas the latter relies on a broader range of considerations including affect and social norms (Harries, 2008b). Nevertheless, almost without exception the decision-makers in this study gave public opinion as a fundamental reason for their continued reluctance to adopt non-engineered adaptation measures. One reason for this is the operational definition of 'the public' that these decision-makers used – a definition restricted to recently flooded people, who tend to favour measures that keep water away from their homes over measures that reduce the damage caused:

Interviewer	Who does that really mean when you say 'the public'?
Respondent	The individuals who are affected by the [...] It's predominantly those who are affected by the flooding. I don't think the population outside of the flood plain are that bothered.

(Emphasis added)

This narrow conception of 'the public' is probably the result of two factors. First, the historically reactive nature of the Environment Agency's flood risk management function has traditionally led to projects only being initiated where flood events have stimulated public demand for defences. In the past, therefore, the primary customer group for flood risk management strategies consisted of people who had experienced floods, rather than wider constituencies such as taxpayers or voters as a whole, or those at risk of flooding. Secondly, any existing tendency to neglect at-risk populations who have not been flooded is encouraged by their relative disinterest in flood risk management. Identified by Kates (1962) and frequently confirmed since (e.g. Tunstall et al., 2006; Grothmann and Reusswig, 2006), this disinterest can discourage decision-makers from investing time and resources in the needs of such communities and lead to them being, in effect, disenfranchised:

I'd rather work with communities who are up for it, who are interested, who do want to work with us, where there is a real sense that actually they can benefit and we can make a difference by working together; rather than with communities where there's a lack of interest.

In reality, not even all those who have been flooded are fully considered when decision-makers frame the concept of public accountability. As one respondent admits, it is often only the views of the "vociferous ones" that are taken into account.

The use of this representation of 'the public' is unsurprising, for it reflects the forces at work in the consultation process. Consultation meetings are attended, predominantly, by people who have themselves experienced flooding and, more particularly, by the more confident and "vociferous" flood victims. Being communicated to decision-makers

directly, the needs and expectations of these sections of the public will be more vivid than those of others and will therefore also be more influential (see Nisbett and Ross, 1980). Furthermore, key decision-makers know that they will be called on to explain their decisions to these same householders in future face-to-face meetings, so will tend to consider them their most important public constituency:

You know, over the years, having experienced flooding and going and talking to people on the ground when they're being flooded, the trauma of all of that is such that, you know, if you say to them, "well that's still going to happen but you'll get an hour's more warning", or "you might be able to put up some boards to protect your home"... I would find it very difficult.

Respondent [The decision makers on this project have] had significant amounts of involvement: public meetings, etc. And this is not untypical. It's typical across all EA projects where issues have arisen; staff would get out there in front of... of... of members of the public and they were always uncomfortable, it seems to me, to say, 'no'. They always wanted to be helpful [...]

Interviewer So rather than say 'no' [to major infrastructure projects], they were saying...?

Respondent "We'll see what we can do"; "we'll take it further"; "we'll do more studies".

Respondents in the study represent flood victims' behaviour as far more forceful than central policy statements that favour the wider portfolio of measures. Groups representing flooded residents are said to be "articulate" and "adept at political action". This is described as making decision-makers feel personally vulnerable ("we're at the end of that, in all the public surgeries"; "people were tearing each others' eyes out at the first two flood forum meetings"; "the consultants are terrified of the [residents group]"). Such emotional and social force has an appeal beyond the rational calculation of scientific benefits and costs. It appeals to decision-makers' desire to avoid stigmatisation and to forge and maintain identities as people who perform a valued public service and are respected for doing so.

As a result of the above, the preferences of flooded communities fuel a public opinion discourse that is a powerful ally to the engineering discourse. This helps protect and sustain a social identity that is centred on the notion of flood defence and that shies away from the widespread adoption of a broad portfolio of risk management approaches. Centrally determined policy objectives can be forced through using performance targets and auditable standards of practice but, in the absence of specific standards and targets, are less vivid and immediate than the emotionally-framed demands of flooded householders. For this reason also, they are less likely to be assimilated into the decision-making cultures of policy-implementing institutions.

4 Conclusions and discussion

Many societies around the world have institutions that are tasked to protect citizens from the effects of environmental risk events, including those associated with climate change. Such institutions create for themselves a character, culture, identity and rhetoric that are based on the particular beliefs and practices that enable them to perform the functions for which they were created. The research reported here suggests that these beliefs and

practices might not be congruent with the current environmental and demographic context, in which the range and scale of the risks is growing, and in response to which a far broader range of adaptation measures needs to be employed.

Legislative action might be one way of addressing this institutional inertia, but the success of this course of action is in no way guaranteed. As was the case after the 2007 UK floods, major environmental disasters tend to motivate governments to set aside the necessary resources for the creation of new legislation. In such cases, however, public pressure makes it difficult for societies to introduce measures that reduce vulnerability but do not also reduce the probability of an event occurring.

If public opinion is allowed to retain its current level of direct influence on the practice of environmental risk management, the use of an expanded range of adaptation measures is likely to be limited. In the UK, as in many other parts of the western world, members of the public have come to depend on the feeling of safety from nature for their sense of essential security (Harries, 2008b) – either because they are accustomed to representing nature as harmless (Hewitt, 1995) or because they have come to rely on the state to fully protect them. This representation of nature as essentially benign is not easily changed for, like all social representations, it is defended against contradictory evidence by perceptive filters and blocks (see Abric, 1984). For this reason, only the experience of repeated or particularly severe environmental events prompts changes in representations and associated behaviours (see Kates, 1971). The experience of single, less extreme, events has little effect on the representation of nature and can result in increased popular pressure for more measures to reduce event probability, making it harder for decision-makers to include vulnerability reduction in the range of risk management measures. Hence, for example, the increased funding announced by Defra after the 2007 floods was depicted by the Government as an increase in funding for flood defence rather than as money for both mitigation and impact reduction.

As illustrated in the above discussion, the influence of the public preference for probability reduction over consequence reduction is magnified by the present fashion for community consultation in public sector decision making (e.g. Defra, 2002; European Commission, 2004). Although public consultation “democratises the delivery of environmental policy” (Penning-Roswell et al., 2008), it tends to attract the involvement only of those most directly and personally affected by the issue and most vociferous in their demand for change. Inevitably, local level decision-makers begin to perceive this group as ‘the public’ to whom they are responsible. As a result, until some means is found of making decision-makers accountable to policy-makers for national level priorities around environmental sustainability and distributive justice, these priorities will tend to be neglected in the face of the demands of a relatively small number of ‘victims’ who insist on the elimination of the risk in their own localities. The absence of any such accountability mechanism in the present system results in a distortion of decision-making around adaptation, and prevents it from balancing the interests and values of different parties rather than just taking account of the views of recent flood victims (Paavola and Adger, 2005).

The ability of the most keenly aggrieved members of the public to hold back adaptation is also evident in a second area of climate change impact: coastal erosion. This is of relevance to the present argument because budgets and policies for coastal erosion management are developed by Defra largely in parallel with those for flood risk management. As reported by O’Riordan et al. (2008), Defra’s efforts to substitute a policy of managed realignment for the previous policy of defence is, in some places, being held back by the pressure placed on local decision-makers by highly vocal residents. For example, they describe how local protests at the withdrawal of central government funding led one local authority to effectively circumvent national policy aims by investing its own money in cliff protection.

A first step toward avoiding the allocation of too much influence to victims of adverse environmental events should be to give greater prominence to the discourse of social justice. Social justice is multi-faceted (Walzer, 1983) and true fairness can only be achieved if adaptation operates within all of these facets (Adger et al., 2006). Yet the engineering approach currently focuses almost exclusively on utilitarian social justice and therefore falls short of delivering social justice from the perspective of equality and environmental sustainability (see Johnson et al., 2007). In addition, it fails to discriminate between benefits and costs that accrue to people who choose to live in high risk areas while fully aware of the risk and those that had no choice but to live in them or who could not have been expected to have been aware of the risk when they chose to do so.

One way of improving the social justice of the current system would be to facilitate more local funding of structural projects. In those cases where local people have knowingly chosen to live or work in a high risk area and wish to continue to do so, mechanisms should be provided for them to pay for appropriate measures themselves. In England, Defra has already changed its guidance to make this possible for flood defence schemes and there are examples, also, of communities funding their own coastal defence measures (see above). The problem with this kind of approach, however, is that it injects into the decision-making process the need to decide the vexed and contentious question of which communities have chosen to locate themselves in risk areas and which have had the risk imposed upon them.

A second step toward more balanced adaptation would be to operationalise the implications of the social justice discourse by facilitating the application of its principles within existing decision-making frameworks. To allow the equality benefits of non-engineered measures to be realised, either these equality benefits should be monetised and included in benefit-cost analyses, or those non-engineered approaches that facilitate greater equality should, as Johnson et al. (2007) argue with respect to flood risk management, be given lower benefit-cost thresholds.

An alternative possibility is suggested by the case of flood risk management in Scotland. Penning-Rowsell et al. (2008) report that the relevant managers in Scotland are less predisposed towards engineered defences than their counterparts in England because of their location in local authorities. Close working with other local authority staff such as spatial planners, they argue, has had a significant impact on professional flood risk

managers' attitudes to smaller-scale or less engineered measures, causing them to be "more flexible" and "subject to fewer professional constraints" (p. 149). This suggests that the integration of managers of environmental risks with professional groups who have different risk management cultures might be one way of encouraging a more flexible response to climate change.

In addition to cultural change, however, it is also necessary to adapt the systems that were designed to realise the old cultures. Examples from flood risk management include Defra's rules for funding flood risk management projects, which favour engineering projects by constraining capital expenditure less than revenue expenditure; the system for monitoring Environment Agency performance, which currently incentivises the use of flood defence more than the use of other measures, and the system for prioritising expenditure, which frames the question of prioritisation in such a way as to imply engineered works.

Perhaps the most significant lesson from this study concerns the balance between the influence of public consultation and centrally determined policy on local strategies for climate change and adaptation to environmental risk. Our research suggests that the institutional bias towards engineered measures, as opposed to behavioural approaches, is legitimised and reinforced by decision-makers' exposure to the most vociferous proponents of that approach – the most badly affected and most vociferous victims of adverse environmental events. It is unreasonable and probably also unrealistic to expect decision-makers to ignore the pressure that such people exert, for the status of 'victim' confers a widely accepted moral authority. However, in order to speed the introduction of a wider portfolio of measures to adapt to climate change, some means needs to be found of maintaining decision-makers' awareness of the perspective of the victims while leaving them less vulnerable to its social, emotional and political force.

The emotional and practical needs of flood victims do need to be addressed, but a way also needs to be found of ensuring that other, wider, priorities have a voice at the local level. This may require a review of current policy and practice with regard to public consultation. It should also prompt national policy-makers to consider carefully the degree to which they relinquish control over the implementation of policies for local adaptation to climate change.

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