



CapHaz-Net

Social Capacity Building  
for Natural Hazards  
Toward More Resilient  
Societies

## Risk governance and natural hazards

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## Preamble

This report is the result of work package (WP) 2 of CapHaz-Net which fulfils a specific function in the logic of the project: The central concepts of WP 1 and 2 – social capacity building and risk governance – were prior to the project identified as the major framework concepts of CapHaz-Net. They directly relate to the other thematic work packages (on risk perception, social vulnerability, risk communication, risk education and social resilience; see the figure below). Therefore both reports are so-called ‘living documents’. That means that they will be further enriched over the project by state-of-the-art knowledge, examples of ‘good’ and ‘bad’ practices in the field of natural hazard mitigation and adaptation, and by empirical examples and hazard-specific discussions.

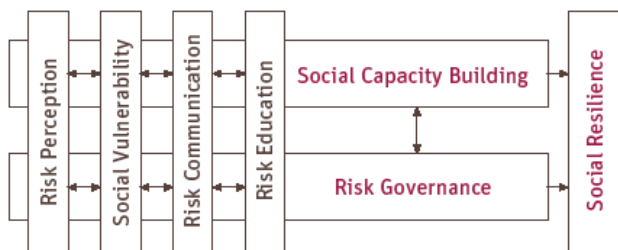


Figure 0: CapHaz-Net's working structure

This version of the report (no. 3) is based on a preliminary draft which was presented at a workshop at Lancaster University on November 11, 2009 to a wider audience of 40 participants. At the Lancaster Workshop we used the unique opportunity to discuss the ideas presented in the report with a number of experts in this field and to further improve the content and the structure of the WP 2 report. This report has taken on board many of the suggestions and comments we received during and after the workshop. We want to use the opportunity again to express our gratitude to all the participants.

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# 1 Introduction

This report examines risk governance and how this might be understood in the context of natural hazards in the European Union. The report is a key deliverable from Work Package 2 of the CapHaz-Net FP7 ‘coordination action’. The objective of the report is to review the existing literature on governance and risk governance and to examine how these concepts and approaches have been or could be applied to natural hazards.

In addition to a review of the ‘state of the art’, drawing from both academic and practitioner literatures, three brief empirical examples of past disaster events are included, each drawing on previous research undertaken by the research team. The empirical examples are of the:

- Hull Urban and Pluvial Flood of 2007 in the UK;
- Vereinigte Mulde River Flood of 2002 and Flood Protection in Germany;
- Barcelona Drought of 2008 in Spain

These empirical examples provide a way of ‘bringing to life’ the real world practices of governance and revealing some of the challenges, dilemmas, critiques and better and worse practices that are involved. Following the empirical examples the report looks ahead to consider some future challenges posed to the governance of natural hazards.

At various points in this document questions are highlighted in shaded boxes. These are intended to stimulate thinking about how governance and risk governance issues relate to other project work packages (WPs) on capacity building, vulnerability, perception, communication and education.

## 2 Rationale

There are two interconnected rationales for considering the relevance and application of governance and risk governance ideas to natural hazards (see Figure 1):

- **Societal change:** wider changes in society and in ways of conceiving, organising and structuring the coordination of societal objectives inevitably shape the manner in which natural hazards are dealt with. As described in section 3, a broad shift has been taking place in how societies are governed and this is as relevant to the handling of natural hazards as it is to other societal concerns such as crime, housing, economic regeneration or transport. The nature of the shift is unclear and contrasting accounts and explanations have been offered. However, section 3 outlines some characteristics of this transition – for example, a ‘rolling-back’ of the state, increased privatization and the entry of new forms of actors (private companies, partnerships, Non-Governmental Organizations (NGOs) etc.) into the political decision-making process. We therefore need to understand the nature of these changes and how they impact on established ways of carrying out risk or hazard ‘management’ in its various forms.
- **Risk challenges:** risk or threats to safety, health and well being and our understanding of these are changing. For example because of climate change and through our experience of new disaster events e.g. the Asian Tsunami, Hurricane Katrina, European heat waves and droughts, or UK summer floods. The challenges these risks pose are shifting because of evolving patterns of vulnerability and the demonstrated limitations of existing approaches to mitigating or reducing risks. Furthermore, understanding of risk itself appears to be changing with greater appreciation of the limitations of science and predictive models and acknowledgement of the intrinsic uncertainties of knowledge. Risks are perceived to be more uncertain than previously thought and modern society appears to be increasingly intolerant towards the impacts of hazards and our apparent inability to cope with risks of various forms. This means that established models and ways of thinking and acting over natural hazards may not be ‘fit for purpose’, and that better frameworks are needed. Moving from established approaches of risk mitigation, risk prevention or risk management towards ideas of ‘risk governance’ is one shift in which answers to the challenges of contemporary and future risks may potentially be found.

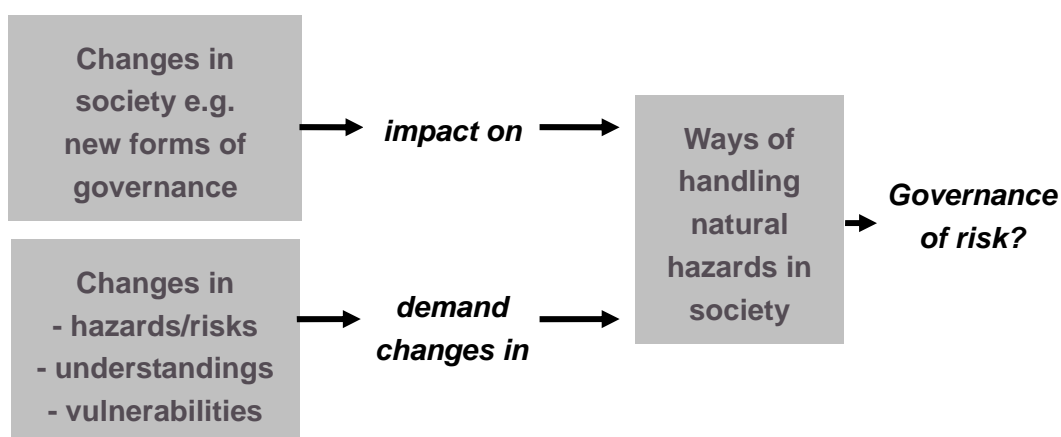


Figure 1: Two rationales for focusing on natural hazards and risk governance

The first rationale leaves open the question of whether or not changes in wider society are having positive impacts on the handling of natural hazards. Indeed there may be problematic outcomes involved and therefore critiques of various forms to be considered.

The second rationale has a more intrinsically positive or normative orientation, as the demand is for better ways of handling risk challenges. A shift towards 'risk governance' may in this light be presented as a necessary and positive move (although agreement on this is unlikely to be absolute). These differences in orientation and the debates that are associated with them will be evident in the review and discussion that follows.

Clearly, both rationales point to important questions that are, themselves, very much open to discussion and debate. This 'living document' does not attempt to provide concrete answers to these questions – nor specific definitions of governance. Instead, it seeks to explore the issues in more detail. This report will therefore be revised and updated as the discussion develops throughout the lifetime of the CapHaz-Net project.

### 3 Governance

In order to discuss the more specific field of risk governance it is first necessary to explain what we mean by governance and explore some of the changes that we began to discuss in section 2 which relate to the different ways in which societies have been governed in recent years.

#### 3.1 Exploring governance<sup>1</sup>

Governance is a complex concept that is subject to varying definitions. This report does not aim to offer a single, catch-all definition of the term. However, it is useful to reflect on the kinds of ideas that are encompassed within our understanding of the concept. Throughout this document we conceive of governance as encompassing a number of formal and informal arrangements and procedures, which change over time. These changes can also have the effect of redefining the relationships between government institutions and civil society. In short:

*“Governance is the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest.” (Commission on Global Governance 1995)*

For the majority of theorists, an important change in governance practices took place in many countries during the 1980s and 1990s (Bevir, 2003; Rhodes, 1997). These changes are described in different ways. However, there are certain common core elements to this ‘new governance’ that can be identified:

**Multiple actors, networks and partnerships.** A key characteristic is that the new ways of governing involve a diverse yet interdependent set of actors organized as part of a network. For example, Rhodes (1997) describes a situation where:

*“there is no longer a single sovereign authority. In its place there is: the multiplicity of actors specific to each policy area; interdependence among these social-political-administrative actors: shared goals; blurred boundaries between public, private and voluntary sectors; and multiplying and new forms of action, intervention and control. Governance is the result of interactive social-political forms of governing” (p.51).*

Of course, this has implications for governments. As Bevir and Trentmann (2007) highlight, one of the defining features of the new governance is the fact that the state is perceived to be increasingly dependent on other actors *“to secure its intentions, to deliver its policies, and to establish a pattern of rule”* (p.2). Consequently, it takes on a new role which is less about service delivery and more about making policy decisions. Such a change reflects Osborne and Gaebler’s famous distinction between the ‘rowing’ (service delivery) and ‘steering’ (decision-making) functions of government (Osborne, 1992). As such, notions of partnership need to be approached critically, as the term may be used to represent a variety of very different state-society relationships including co-resourcing and co-delivery as well co-deciding.

<sup>1</sup> We are grateful for Bruna De Marchi’s assistance with this section.



**New forms of authority and control.** This increased emphasis on ‘steering’ necessitates new forms of control based more upon diplomacy and management, as opposed to more traditional techniques of coercion and enforcement. For Rosenau (2004) the new governance is still about the exercise of authority, but crucially while states once relied on laws and regulations, they now employ a broader range of strategies including shaping people’s shared norms and habits, informal agreements, negotiations, etc.

**Multi-level governance and issues of scale.** Theorists often speak of ‘multi-level governance’ and the ‘hollowing out of the state’, which refers to “the loss of functions upwards to the European Union, downwards to special-purpose bodies and outwards to agencies” (Rhodes, 1997). In the past, the different tiers of government – from the local to the national and international – were seen as fitting neatly inside one another like Russian dolls (Hajer, 2005). Today, however, this linear chain of command has given way to a more complex structure based on networks, as subnational organizations such as local government and the voluntary sector can communicate directly with supranational organizations such as the European Union, and vice versa. For Rhodes therefore:

*“central-local relations are a ‘game’ in which both central and local participants manoeuvre for advantage. Each deploys its resources, whether constitutional-legal, organizational, financial, political or informational, to maximize influence over outcomes while trying to avoid becoming dependent on the other ‘players’. It is a complex game, in which the various levels of government are interdependent” (Rhodes, 1997 p.9).*

As Rosenau (2004) argues, such changes do not mean that nation states have no role to play, merely that they are no longer the main players in the system. This may represent more of a departure for some countries than for others – in the UK, where the national government has traditionally been strong and regional government very weak (Rhodes, 1996), the movement of power outwards and upwards is readily visible. However, for countries like Germany, Switzerland and Italy, where the regional and local levels of government respectively have been very important, the shift to new governance practices may not appear as immediately apparent or distinct. In Eastern and Central Europe the fundamental transition from very strongly state-centric communist government, to various forms of democracy have represented a major shift in the locus of power and practice of government, but even so traditions of centralized, hierarchical, state-led government can still be in place.

As a result of such diversity, scholarly opinion is divided over how “new” these features of the new governance really are and how much it is possible to talk of a widespread cross-national shift or trend. For example, Bevir and Trentmann (2007) argue that networks and non-state actors have always had a role in policy processes, even if their roles were perhaps less explicit in the past.

The discussion in this section has highlighted a change to the ways in which the state and civil society operates – all of which are relevant to the ways in which risks are understood and managed. However, there are variations to the extent of these changes throughout Europe and therefore it remains important to be sensitive to the contextualization of governance in time and place.

### 3.2 Why the new governance?

A number of reasons are given for the emergence (in some places at least) of new processes of governance with the key characteristics outlined above (Bevir and Trentmann 2007). These include:

- an increase in economic activity on a global, transnational scale
- increased activity of supranational institutions such as the European Union, also transcending national boundaries in their scope and operation.
- the rise of neo-liberal ideology and its tackling of what were perceived to be the inefficiencies of centralized state control and the overly bureaucratic public sector, replacing these with a market based logic of service provision through the private sector.
- the spread of information technology, which made it easier to link different organizations and introduce changes,
- the rise of international management fashions based upon corporate ideals (Bevir, 2003).

Marks and Hooghe (2004) also point to problems such as climate change, financial crises and terrorism which are global in scope and which require new forms of governance as they cannot be dealt with by nation states working in isolation. Arguably they are also problems that cannot be managed only by nation state governments *within* national borders, their systemic complexities and wicked or messy characteristics necessitating multi-actor processes and partnerships organized through network rather than hierarchical relations (Watson, 2009).

A further more critical hypothesis discussed at the Lancaster workshop, is that the turn to the new governance arises as a consequence of governments failing to address and solve some fundamental societal problems. The government therefore finds it useful to shift responsibility for solving problems onto others, whilst also maintaining control and authority over key matters of policy objectives, targets, resources and the like. Using the earlier analogy the government wants to continue to steer, but also wants more people to row in the direction they are heading. The extent to which this hypothesis might be relevant to hazard and risk governance will be considered in later sections.

### 3.3 The new governance as something positive?

A key topic of debate concerns the question of whether the forms of governance that have emerged can be viewed as something positive (Hajer, 2005). Those who argue in favour of the changes say that they amount to an **increase in democracy** – they claim that, as the state becomes less controlling and more actors become involved in the policy process, there are greater opportunities for the public and other previously marginalized groups to become involved in decision making (Rosenau, 2004).

In short, the new governance is said to **empower people** through their increased participation in the process. Furthermore, it has been argued that the inclusion of more actors in policy making is more capable of accounting for the existence of diversity in the ‘real’ world as a plurality of perspectives can be incorporated into decisions (Marks, 2004). This has strong connections to and implications for social capacity building.

However, other commentators take issue with such ideas. They claim that **power relations** still play a vital role in policy negotiations and, consequently, the most powerful actors will still be able to use their leverage to ensure that the outcomes are favourable to them. In short, what

looks like multi-level governance is actually just multi-level participation (Bache, 1999; Guy Peters, 2004; Bache, 2004) – more voices might be found contributing to the policy process but that does not mean those voices are being listened to. As such, the new governance may be a subtle device for maintaining established power relationships and risk exposures while giving the impression of openness, interaction and engagement.

There are also major issues surrounding the **accountability** of the new governance processes. For example, the so-called ‘hollowing out of the state’ is said to weaken institutional accountability as key ‘public’ services and policy decisions which were once the preserve of the elected political parties are ‘farmed out’ to the private sector or other, unelected bodies (Rhodes, 1997). A common critique of such neo-liberal ideology is therefore that it looks to the market to resolve issues of accountability and justice (Bevir, 2007). As Rhodes (1997) highlights, the ‘special purpose’ bodies which were created by neo-liberal governments to look after particular aspects of service provision were not elected by the public and, as a result, it becomes hard for the public to influence their decisions, hold them to account for their actions or depose them if their actions are felt to be unfair.

It is not just the unelected nature of these bodies which is problematic, but the fact that so many different organizations are involved in decision-making and service delivery, which makes it very hard to identify **who is responsible for what**. This is what Bovens (1990) described as: “‘the problem of many hands’ where so many people contribute that no one contribution can be identified; and if no one person can be held accountable after the event, the no one needs to behave responsibly beforehand” (p.115). Such a situation is particularly problematic for issues of risk governance, as will be discussed in subsequent sections of this report.

Critiques of the new governance therefore revolve around the trade-offs that exist between efficiency and accountability, as well as participation and control (Bache, 2004). As Guy Peters and Pierre (2004) point out: “*The argument is that the capacity to govern has been sold, or at least downgraded, in an attempt to achieve more open and inclusive bargaining*” (p.88).

**Questions:**

To what extent can shifts towards the new governance be seen across Europe, and what variation is there? Have some EU member states seen stronger and more significant processes of change than others?

How might wider patterns of ‘rolling back’ and ‘hollowing out’ of the state, privatization, devolving and sharing of power have positive or negative implications for processes producing vulnerability and shaping the intensity of disaster experiences?

## 4 Risk governance

Having reviewed a breadth of perspectives on governance in general, we can then see how the body of work on risk governance that has emerged over the past decade, engages with particular aspects of this broader literature and particular meanings of governance as a concept. The literature on risk governance (broadly defined) is voluminous and we do not propose to cover it all here. For the purposes of the present discussion we have chosen to focus particularly on two of the best-known examples from the field: chiefly, Renn's model of risk governance and Beck's writings on 'risk society'. The discussion is therefore designed to provide an introduction to some of the main issues for discussion, rather than an all-encompassing review of the field. It is also important to remember that, as this is a living document, this discussion will be enriched during the lifetime of the project in order to take account of new and interesting developments that are taking place within the field.

### 4.1 The meaning of risk governance

Writing from a research perspective, Renn argues that risk governance is a wide-ranging and inherently multidisciplinary activity that:

*"requires consideration of the legal, institutional, social and economic contexts in which a risk is evaluated, and involvement of the actors and stakeholders who represent them. Risk governance looks at the complex web of actors, rules, conventions, processes and mechanisms concerned with how relevant risk information is collected, analysed and communicated, and how management decisions are taken." (Renn, 2008 p.9)*

In this definition we can clearly see links with wider notions of the new governance – the involvement of multiple actors and stakeholders; the range of ways in which knowledge is produced and authority is exercised; and the importance of situating governance in a multidimensional societal context. Whilst we can think about risk governance in this way as a description of what is relevant to understanding how risk governance operates, there are also more prescriptive definitions. For the International Risk Governance Council (IRGC), risk governance is defined as:

*"the application of the principles of good governance to the identification, assessment, management and communication of risk" (IRGC (International Risk Governance Council), 2009).*

In this interpretation risk governance is seen as having a set of definable good qualities which provide for the effective integration of the key components of how problematic risks are handled by policy institutions (see later discussion). It is therefore used as something to be advocated, sought after and applied – a normative rather than only a descriptive or analytical term. In what follows we particularly focus on the Renn and IRGC formulations of risk governance, but bring in other conceptualizations of the governance challenges related to natural hazards as the discussion progresses.

### 4.2 Why the turn to risk governance?

According to Renn (2008), interest in risk governance has undergone a dramatic increase in recent years across a variety of disciplines, where it can be applied to anything from the work-

ings of the global stock markets to the provision of medical treatments and the introduction of new genetic technologies.

The high level of interest in the subject is reflected in the formation of the International Risk Governance Council in 2003. The IRGC's aim is to "*facilitate a better understanding of risks and their scientific, political, social and economic contexts and of how to manage them*" (International Risk Governance Council, 2009). At the core of its approach is the recognition that many risks currently facing the world are complex and uncertain and that improvements in risk governance are necessary if we are to make sound decisions about these risks and bolster public confidence in our capacity to respond effectively towards them. Here the second of the two rationales for focusing on risk governance identified earlier (section 2), can clearly be seen at work.

There are strong connections here not just to the changing nature of the risks that are being faced, but also to the ways that these risks and societal responses to them are understood. Perhaps the most influential account of this can be found in Beck's 1992 work, 'The Risk Society'. At the heart of Beck's thesis is the notion that the unintended consequences of modernization have resulted in new forms of risk that pose a challenge to pre-existing social and political processes (Bulkeley, 2001). Beck argues that these contemporary risks have three distinguishing features:

1. They are not the result of poverty or underdevelopment but instead result from many of the modernizing processes that have yielded benefits in other areas.
2. They are distanced over space and time but affect all people and all places.
3. They cannot be sensed directly and thus rely on scientific knowledge to detect them.

(Beck, 1992)

Climate change could be viewed as an example of such a risk as it came into being as an unintended consequence of the fossil fuel consumption that is behind much of the world's economic development. It is also global in scope and is heavily reliant on scientific knowledge to identify and monitor its existence and development. According to Beck, the response to such risks is a process known as 'reflexive modernization' "where modernization finds itself ever more occupied with the mastering of problems arising from the process of modernization itself" (Beck, 1992 p.34). The inability of existing political structures to be able to deal with these risks has major implications for governance processes as the public loses confidence in the decision-making process and the ability of the political system to yield acceptable solutions.

More recently – and with concepts of governance and globalization in mind – Beck has extended his ideas through discussion of what he calls the 'global risk society' (Beck, 2006). This is characterized by the features described in Box 1. In short, therefore, Beck's ideas suggest that new kinds of risks pose a challenge to existing governance processes, resulting in the development of new kinds of political processes which attempt to deal with these risks. For science and practices of knowledge production the challenges have been particularly significant, with much debate about how to deal with public unease about science and enhance democratic involvement (Expert Working Group on Science and Governance 2007).

- Global risks that shatter national and political boundaries by showing that all parts of the globe are interlinked and dependent upon each other.
- The production of uncertainty, or what Beck refers to as “unknown unknowns” which cannot be contained at the level of the nation state.
- The increased importance of risk perception as our reliance upon science and technology becomes destabilized: “More important than all the ingenious probability scenarios of the experts becomes the question of who believes there to be a risk, and why” (p.42).
- Increasing doubt or lack of confidence in society’s ability to respond and cope effectively with low-certainty risks
- New lines of conflict around risk perception. For example, Europeans accuse Americans of becoming obsessed with the risks from terrorism, while Americans accuse Europeans of being unduly concerned about ecological threats.

*Crucially from a governance perspective, the global risk society also involves:*

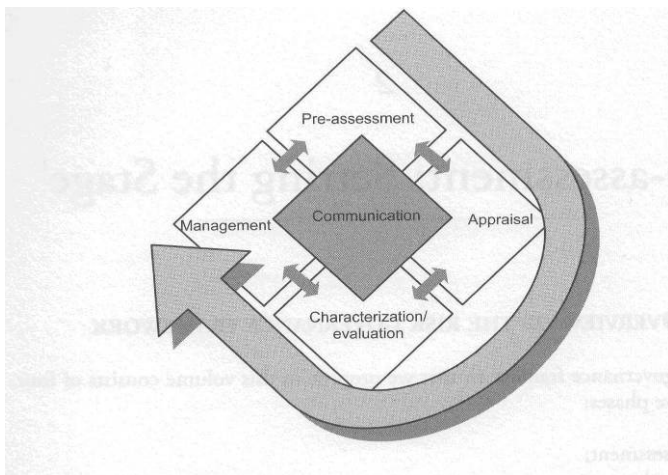
- The failure of national and international rule systems to control and manage risks.
- A new global politics of uncertainty where there is increased pressure on governments to ‘take action’ over risks “regardless of whether the measures taken do in fact minimize the risk, increase it or have no effect at all” (p.43).
- A culmination of the preceding factors which results in what Beck refers to as a new politics of risk construction and risk minimization.

Adapted from Beck (2006)

### **4.3 A framework for risk governance**

Renn’s 2008 book ‘Risk Governance’ presents a comprehensive framework for understanding the topic. The book shows that there are different models for conceptualizing the way that risks are handled, from a simple and linear ‘technocratic’ model, where “*objective science is seen to directly inform policy-making*” (p.11) through to the ‘transparent (inclusive) risk governance’ model advocated by Renn, “*in which science, politics, economic actors and representatives of civil society are invited to play a role in both assessment and management*” (p.11).

Renn’s risk governance framework involves four consecutive phases of pre-assessment, appraisal, characterization/evaluation and management. It is particularly significant that a further fifth element - risk communication - is at the centre of the model, being important at all phases and providing for flows of information and dialogue between them. The key point about this model is that, unlike many previous attempts to characterize the risk management process, it is not linear but “open, cyclical, iterative and interlinked” (p.47), as shown in the following diagram:

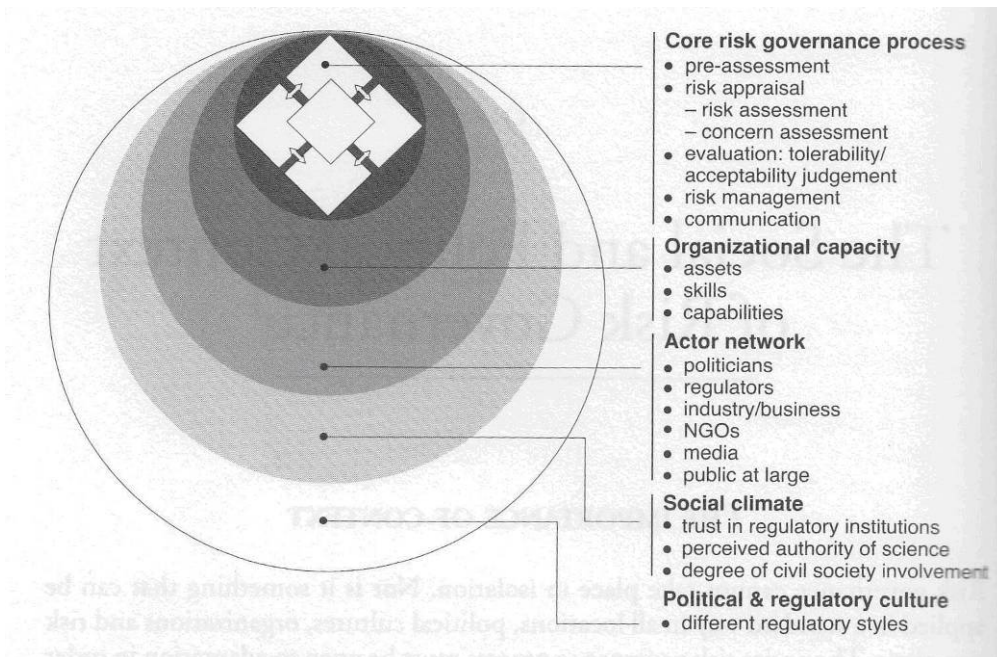


**Figure 2:** The five elements of risk governance (taken from Renn, 2008, p.48)

Hence the cycle of risk governance is presented as iterative – risk is never fully controlled or eradicated, as understanding of both the risk itself and the activities within each phase is constantly evolving.

The horizontal component of Renn’s diagram – involving risk appraisal and risk management – captures what he describes as “the two major challenges of risk governance: generating and collecting knowledge about the risk, and making decisions about how to mitigate, control or otherwise manage it”. However, the vertical elements of the diagram – risk pre-assessment and risk characterization/evaluation – indicate the closeness of the connection that exists between knowledge and values. For example, pre-assessment – the stage at which a risk is framed and defined – will inevitably involve social values, in the form of the determination of what risks are socially significant, the setting of goals, objectives and contextual conditions, as well as our existing knowledge about the hazard (Renn, 2008).

Renn is also clear that, when thinking about how risk governance might actually operate in practice it is vital to be aware of the wider social and political context in which decisions are being made. Figure 3 shows how a host of factors – from organizational capacity to political and regulatory culture – can have a big impact on how risk governance will operate in a particular setting; linking risk governance to the broader shifts towards the new governance. For Renn, therefore, risk governance is not “*something that can be applied in a standard way in all locations, political cultures, organizations and risk situations*”. Instead, “*the entire risk governance process must be open to adaptation in order to reflect the specific context of each risk*” (Renn, 2008 p.353). This is an important point to bear in mind in considering how the framework might be applied to different forms of natural hazard.



**Figure 3:** Placing risk governance in the wider social and political context (taken from Renn, 2008, p.354)

The need to account for the specificities of different risks as well as the social, institutional and political contexts in which they are located can prove a particular challenge for attempts to successfully manage risks at the national or supranational scale as it means that blanket protocols which are insensitive to variations in national or local cultures are likely to be ineffective.

Looking across the wider literature that has used and applied risk governance ideas it is evident that this is dominated by studies discussing technological hazards, such as those posed by nuclear power or GM crops. By contrast, more ‘natural’ hazards<sup>2</sup>, such as floods, droughts or alpine risks, are poorly covered by the risk governance literature. A key aspect of Beck’s (1992) risk society theory argues that contemporary society is dominated by new kinds of risks that are the by-products of technological modernization and which depend upon science to detect them. However, such an account offers only a partial description of the risks facing us today. Firstly, many of the risks experienced in contemporary society are *not* new – natural hazards have troubled society for a very long time and, just because there are now additional problems of technological hazards to attend to does not mean that the earlier problem of the risks posed by natural hazards have been resolved. Also with climate change ‘natural’ hazards are increasingly taking on an explicitly social dimension<sup>3</sup>. Equally, while modernization and development bring hazards of their own, millions of people throughout the world remain affected by risks – both natural and technological – resulting from the ‘older’ problems of poverty and underdevelopment. Finally, as Bulkeley (2001) points out, many contemporary hazards are anything but invisible – in particular, natural hazards such as floods can remain very perceptible to the senses (although groundwater and ‘secondary’ flooding are more hidden; see Hull empirical example in section 6.2).

Therefore although we can learn much from the literature on technological hazards, it is also important to consider the ways in which natural hazards may require a somewhat different treatment. Alternatively, it might suggest as many would now argue that the traditional distinction

<sup>2</sup> see the WP1 report for an explanation of how we see ‘natural’ hazards as socially produced, rather than independent of human society and processes

<sup>3</sup> See the WP1 report for discussion of the problematic distinction between ‘natural’ and technological hazards and how this is resolved within CapHaz-Net



between the technological and the natural is breaking down – that contemporary risks should be understood as the interplay between the two.

**Question**

To what extent is ‘social capacity building’ (as examined in WP1) a necessary part of realizing ‘good’ risk governance? If wider stakeholder participation is required for risk governance what does this imply for social capacities and what limits and constraints might exist?

To what extent do differences between forms of risk necessitate different forms of governance process? Can models applied largely to technological risks be translated to natural hazards? Are there important differences between types of natural hazard – e.g. floods, alpine hazards, droughts and heatwaves – in terms of their type of onset, magnitude, frequency, periodicity, spatiality etc., that need to be taken into account?

## 5 Governance and natural hazards

In now applying ideas of governance and risk governance to natural hazards we can as a first step consider to what extent the broader changes involved in the shift towards new forms of governance have been observed and commented on in the natural hazards literature.

### 5.1 Multiple actors, networks and partnerships

The management of natural hazards has always involved the activities of multiple actors beyond the public sector. This is particularly obvious in emergency and disaster response activities where coordination between multiple public services, voluntary and community organizations is typically involved. In most of Europe the private insurance industry has similarly always been a key part of the management of disaster risk (through risk transfer), but notably with quite different arrangements between the state and the insurance industry arrived at across EU member states (OECD 2002, 2009).

However the hazards literature has noted the shift towards a greater diversity of actors being involved and the development of new roles and stronger forms of collaboration and partnership working. For example Christoplos *et al.* (2001) identify the shifting roles for various actors commenting that '*there are no longer set piece roles for states, NGOs, the private sector and local institutions in dealing with disasters*' (pg 189). They also comment that '*institutional pluralism and public-private partnerships are key*' (pg 188) echoing calls across various organizations for more inclusion and better collaboration between actors. As a specific example in the UK the development of local and regional 'resilience forums' has actively included such a diversity of public, private, and non-governmental actors. Medd and Marvin (2005) interpret this as a shift to a 'governance of preparedness' in which key players are brought together into 'new configurations' of institutional actors.

### 5.2 Multi-level governance

For natural hazards the relationships between levels of governance have also become increasingly important. This can be seen in for example the international scale joint frameworks and cooperation strategies – e.g. the Global Disaster Information Network, the EU-Mediterranean Disaster Information Network. The Hyogo framework (2005) identifies '*good governance*' and '*international and regional cooperation*' as particularly important to support actions at local levels, with major disasters seen as often beyond the capacities of nation states to manage on their own. The EU has become more directly involved in the governance of natural hazards, through, for example, setting down pan-European provisions in the Water Framework Directive and Floods Directive and establishing cooperation and funding mechanisms for large scale emergency responses. New ways of working between local, regional and national actors have also been focused on in the literature. For example May *et al.* (1996) draw on empirical examples in New Zealand and Australia to analyse the significance of what they call 'intergovernmental approaches' to hazards that involve moving from coercive to cooperative approaches between national, regional and local actors.

### 5.3 Shifts of responsibility away from the state

Shifts of responsibility have been associated to some degree with a shift from a stance based upon mitigation to one focused upon resilience and adaptation, where flood management is a

good case (Rogers-Wright, 2009). Here, recent years have seen signs of a shift from an approach based upon flood prevention via structural approaches and the provision of large-scale flood defences to an emphasis on resilience and adaptation where the goal is to help people live with the impacts of floods. For example, within the UK, such approaches are enshrined in the government's strategy 'Making Space for Water' (Defra, 2005), as well as in recent policy initiatives which attempt to encourage householders and businesses to make changes to the fabric of their buildings in order to make them more resistant and/or resilient to floodwaters (Defra, 2008). This has been seen as evidence of a split between the rowing and steering elements of governance – with government continuing to set flood policy but at the same time seeking to shift responsibility for costs and actions to other segments of society (Watson *et al.* 2009).

Similar changes are also taking place across Europe in relation to the problem of water scarcity. Structural solutions such as the construction of new reservoirs and desalination plants have been and are still being used to try and make more water available to more households, particularly at times of water stress. However, contemporary approaches are increasingly emphasizing the role of learning to live with water scarcity via demand management and the adoption of drought-sensitive farming methods (Chappells, 2007; Ali Memon, 2006). In these ways those at risk – householders, businesses, farms, infrastructure managers etc. – are becoming managers of that risk and part of the multi-scale risk governance network.

#### 5.4 Diversity in governance and hazards across Europe

Whilst such examples of the emergence of new forms of governance can be found, we need to guard against over-generalisation. As noted earlier the extent and significance of these changes can be quite different across the member states of the EU and counter-cases can be found in which the key characteristics are not evident or are manifest in quite different ways. To assist in thinking about some of these differences across Europe, Table 4 in Annex 1 gives some examples of the various governance arrangements applied to natural hazards within different European countries, while the box below gives a more detailed insight into how France deals with these issues.

##### **Multi-level Governance: The Example of France (by Jacques Comby and Thierry Coanus)**

Although a centralized state, the French governance approach to natural hazards is similarly complex to other European countries (cf. Table 4 in Annex 1). However, broadly speaking the preventive side of risk management is more a local responsibility, the emergency side of risk management is more a national responsibility, and decision processes regarding land use are also under national State supervision and control.

The principal action of the **National State** could be defined as the following: Provide relevant scientific information about risk; supervise the security of major equipment (dams, etc.); provide alerts (weather and flood alerts) if needed; organize assistance when the crisis exceeds the capacity and/or the size of a municipality; keep the public domain in good condition; produce the PPRI (Plans de Prévention des Risques Inondations), and facilitate the actions of the municipalities through providing funding.

The **Region** is a rather new entity (b. 1972), which has only had executive powers since 1982. As a territory, it is supervised by a double hierarchy system. The Regional Council is elected,

and has a President. This elected authority has no direct responsibility in flood risk management, but can be involved through funding (rebuilding of protection equipments such as dikes, research and studies) and prevention/information towards local populations. The other authority is the 'Préfet de région', which has authority on National State policies at the regional level. In some cases, the 'Préfet de Région' is also 'Préfet de bassin': this means it has authority on relevant policy actions on a definite catchment territory.

The '**Département**' is one of the 95 main administrative divisions of France, and is a quite 'old' territory (first established as such during the French Revolution). As a territory, it is also supervised by a double hierarchy system. On the one hand, the 'Département' is a 'collectivité territoriale' (elected assembly with some executive powers) with a President. On the other hand, National State local policies are driven by the 'Préfet' (the 'Département' level of the State executive power). The 'Préfet' is in charge of assistance when the crisis exceeds the capacity of the municipalities (through bodies or administrations such as fire departments, police forces, hospitals, which came directly under his authority in case of emergency situations, *etc.*). The Prefecture devises the DDRM (Document d'Information sur les Risques Majeurs): information documents on major risks for all the municipalities of the 'Département', and approves (*i.e.* makes legally applicable) the PPRI (flood risk prevention plan).

At the **municipality level** ('Commune'), the mayor (elected) is the security manager, but has no executive authority for (heavy) assistance purposes in case of emergency – only for protection policy. His main obligations are: to take into account the risk issues in urban planning documents, because of legal constraints such as PPRI. But even without them, he is supposed to manage correctly the PLU ('Plan Local d'Urbanisme', local land use plan), which is directly under his responsibility; to provide relevant information to the population through a DICRIM ('document d'information et de communication sur les risques majeurs'), to keep in good condition protection equipments, general maintenance and warning procedures; to devise the assistance and emergency system (when it does not exceed the capacity of his municipality). He has to devise a PCS ('Plan Communal de Sauvegarde' – municipal safeguard plan), which organizes crisis management at the municipal scale.

The role of **citizens** in risk prevention and management is defined by two main legal acts: The law of 2002 (17th February), generally called 'Law of proximity democracy' and the law of 2004 (13th August), generally called 'Law of civil security modernisation'. One of the National State *Leitmotiv* is: information, education, responsibility, consultation. The citizens' participation is defined as a 'target' and an actor of risk prevention. For long, populations at risk were consulted through 'enquête publique' procedures (public survey): for a definite period (generally 2 months), residents living on the territory can go to the town hall and write down comments and possible disagreements regarding the result of preparatory studies (mainly, technical maps and future regulations). These comments are summarised by a 'commissaire-enquêteur' and are supposed to be taken into account before the final decision occurs.

A further interesting comparison relates to the insurance arrangements provided within different countries for disaster risk. Here, we can see a long standing involvement of the private insurance and re-insurance industry as an actor in the management of risk, but there has been no

movement of governance of insurance upwards to the European level. Insurance arrangements and the relation between market and public measures are determined at a national level and as a consequence a great diversity exists across member states. For example in the UK in line with the 'shift of responsibility' thesis, there has been an ever increasing trend towards individualization of flood risk, segmentation of the market and differentiation between insurance premiums depending on degrees of assessed risk at a particular location. However, in other parts of Europe exactly the opposite trend has been seen. For example in France compulsory cover for disaster risk is shared since 1982 amongst all policy holders with an identical additional percentage premium paid on top of the assessed premium for fire insurance (French Disaster Reduction Platform 2007). This approach (which is similar to those in Belgium, Spain and Norway) is guided by a principle of solidarity and mutuality, which contrasts directly with the individualizing, market driven logic of the UK.

In both cases public-private partnerships have been central – in the UK an agreement between the government and insurance companies to ensure the continued provision of flood insurance cover even in high risk locations (although at very high prices); in France a consensual setting up and ongoing monitoring of the shared risk arrangement linked to a public risk prevention policy. But importantly the outcomes of these public-private partnerships remain quite divergent and ideologically distinct.

This example clearly demonstrates the need for CapHaz-Net to develop an appropriately differentiated and contextualized view of how governance and risk governance operates in practice across Europe.

## **5.5 Issues and critiques**

Whilst taking this point on board, where examples of the new governance can be found in the natural hazards field it is important to recognise the critique that this has stimulated. For example, the disaster recovery literature has particularly highlighted the problems that can follow from a retreat from state responsibilities towards sharing these with other actors, particularly those in the private sector. Recent arguments, such as those presented by Klein (2007) and Gunewardena (2008) mount a harsh critique of neo-liberal disaster reconstruction policies which, they claim, enable the private sector to benefit from disasters at the expense of local people. According to such accounts, neo-liberal policies encourage disaster response initiatives that are led by big corporate interests – such as rebuilding and redevelopment programs fronted by engineering consultancies and private developers. Such actions are said to perpetuate, rather than resolve, the socio-economic inequalities which led to local people becoming vulnerable to hazards in the first place, thus leaving communities more vulnerable to the effects of disasters in the future. Gunewardena argues that this shift from 'assistance' to 'investments' amounts to "a predatory form of capitalism that triggers a secondary set of disempowering consequences for affected communities" (Gunewardena, 2008 p.4).

Critiques have also centred on partnerships and participation. Pelling (2003) argues that partnerships, where local people can be involved alongside non-governmental organizations and state actors, are an important tool of governance, but also emphasizes that partnerships must be treated with caution if they are not to fall into the trap described in section 3.3 whereby the interests of the more powerful actors (including formal government) involved are allowed to dominate the decision-making process:

*“Collaboration between actors – particularly when grassroots actors are involved – can provide opportunities for learning how to access resources and build self-esteem with which to claim rights to resources for local risk reduction. But neither partnerships nor grassroots actors should be viewed romantically. Power lies in relationships, and when partnerships are built on unequal relations of power development outcomes are open to bias. This is as true for relations between local organizations and non-governmental or state actors as it is for relations between men and women, the young and old, or different ethnic or religious groups at the local level” (Pelling, 2003 p.90)*

Such concerns are paralleled in work on participation figures within governance frameworks for hazards and related environmental management practices within Europe. For example, Petersen *et al.* (2007) critique the ‘new environmental governance’ of the Water Framework Directive arguing that this has become a way of extending state power rather than introducing a new form of more democratic politics into environmental decision-making.

## **5.6 Summary and comparison of key themes**

The table overleaf (Table 1) attempts to draw together the discussion up to this point by identifying some of the key features of governance and then commenting on the possible positive and negative ways in which these may materialize in the governance of natural hazards.

**Table 1:** The implications of shifts to governance for the governance of natural hazards

<b>New forms of governance</b>	<b>Governance of Natural Hazards</b>	<b>Potential Positive Implications</b>	<b>Potential Negative Implications</b>
Networks of multiple actors beyond the state	Government agencies, private sector utilities, businesses, community groups, householders	Different voices are heard; different skills, knowledges and capabilities are drawn on; better communication and coordination.	Unclear accountability amongst different actors; illusion of involvement; tokenistic inclusion; slow decisions and compromise solutions
Multi-level governance networks	International agreements. Cooperation between nations. Regional and local networks	Greater flexibility, sharing of skills and resources. More cooperative solutions between levels.	Unclear distribution of responsibilities; conflicts between scales; disaster capitalism
Diverse forms of control	Communication and persuasion; use of market mechanisms; regulation of private companies	More effective and efficient ways of achieving policy objectives	Reliance on market mechanisms disadvantages those with fewer resources. Fragmentation and ineffective regulation
Distributed responsibility	Sharing of responsibilities with private sector, NGOs and individuals	Empowerment. More effective action in more places. Local decision making. More resources	Unclear who is responsible. Fragmentation of policy making and policy implementation tasks. Individualising problems so that those who are underresourced and marginalized become most vulnerable

## 6 Risk governance and natural hazards

As noted earlier the concept of risk governance and the normative models of good governance that have been put forward have tended to largely focus on forms of technological risk. But as De Marchi and Ravetz (1999) argue, governance issues are important for all kinds of risks – whether ‘natural’ or technological in nature – and common frameworks for managing or governing multiple forms of hazard and risk have been increasingly sought after (White *et al.* 2001). How well then does the Renn risk governance framework in its general form (and recognizing the need for it to be contextualized in its application), fit within the concerns of and needs for dealing with natural hazards?

### 6.1 The elements or phases of risk governance

If we re-visit Renn’s diagram (see p.16), we can see that all five elements of the risk governance framework can be readily identified in the field of natural hazards.

**Box 2:** The elements of risk governance as applied to natural hazards

**Risk Pre-assessment** – this involves the framing of a risk as a relevant problem, the identification of its implications, the setting up of processes of early warning and monitoring and the selection of scientific conventions for risk assessment. Each of these elements are part of processes for managing natural hazards. Although the identification of natural hazards as ‘relevant problems’ is generally long established, new forms of risk are still being identified as significant in particular places partly because of the changing impacts of climate change e.g. heatwaves in Northern Europe, more intense forms of flash floods, glacial outburst floods in the Alps. White *et al.* (2001) however note how scrutiny of ‘*the creation of new and enlarged risks from natural hazards*’ is not as evident as it should be.

**Risk Appraisal** – this has two major components: The scientific assessment of the risks of human health and the environment and the scientific assessment of societal concerns related to the risk as well as social and economic implications. Assessment techniques for natural hazards are increasingly appraising risks, although much of the assessment work focuses primarily on the hazard, with assessments of impacts and vulnerabilities often rather limited and ‘reductionist’. The assessment of societal concern, involving the appraisal of and collection of evidence on risk perceptions and the dimensions of expressed concern, is less routinised and less well established within institutional practices.

**Risk Characterization/evaluation** – this involves processes of delineating and justifying a judgement about the tolerability or acceptability of a given risk. Whilst not necessarily couched in the language of tolerability or acceptability, such judgments are routinely made for natural hazards, for example in decisions over investment in flood defences or other hard engineering, in the setting of thresholds for when response plans are activated (e.g. heatwave plans), or in determining the boundaries of land use planning zones limiting developments in risky areas.



**Risk Management** – this involves the review of all options for taking action, based upon the information and knowledge generated in previous phases. Options for taking action can take many forms, falling within categories such as risk avoidance, risk reduction, risk transfer, and ‘doing nothing’ and each can be evaluated according to multiple criteria such as effectiveness, efficiency, sustainability, fairness and ethics. In the natural hazards field the need to choose between options based on a range of criteria has become more apparent, with, for example, the shift away from reliance on structural hard engineering options in flood management towards a broader portfolio of structural and non-structural measures (see below).

**Risk Communication** – this has been a theme in the natural hazards field for a long time, although usually conceived in terms of communication with the public through hazard warning systems, informing people on how to act and wider hazards education. Communication between stakeholders has also been integral to disaster response and emergency management where good information flows, coordination and collaboration are crucial.

This brief analysis appears to suggest that in terms of the specification of component parts and elements, risk governance (as advocated by Renn and the IRGC) does not bring anything distinctly new to the natural hazards field. Existing models of risk management applied to natural hazards at first sight appear to have the same or similar component parts<sup>4</sup>. For example, in the model of flood risk management presented by Schanze (2007), sequential stages of risk analysis, risk assessment and risk reduction are specified with the managing entity consisting of a ‘*multi-actor constellation representing several sectors (e.g. water and spatial planning authorities), adjacent areas (e.g. multiple municipalities) and different levels (e.g. local regional)*’ (pg 3).

However, some important distinctions can be made. First is the extent to which the risk governance framework recognizes the challenges of knowledge about risks, foregrounding issues of complexity (in particular systemic risks), uncertainty and ambiguity and advocating the design of strategies which explicitly recognise these knowledge challenges from the very beginning (IRGC 2008). Conventional approaches to risk management in contrast tend to be less explicit about such challenges, if not seeking to hide them from view. Second is the distinction between the *degree* to which risk governance necessarily involves multiple actors, extended actor networks and collaborative processes, and the more limited notions of participant involvement usually represented in models of risk management. Even though models of risk management may acknowledge the importance of stakeholder involvement and the like, government and expert bodies may still in reality be the primary if not sole actors involved in most of the core elements listed above. As a corollary this means that expert knowledge (and its scientific epistemology) still very much dominates, and local or lay knowledges remain peripheral and are given little real credence or significance. Risk governance potentially may go further towards equalizing knowledge claims and giving recognition to a greater diversity of voices. Following this line of argument Grieving and Glade (2008), in a rare and brief discussion of risk governance and natural hazards, focus on the greater degree of trust and ‘acceptance’ that the risk governance framework might engender, concluding that it does constitute a ‘new principle’ in the field.

<sup>4</sup> (note: terminology is confusing here as ‘risk management’ is sometimes used as an overarching concept, encompassing such activities as appraisal, assessment and evaluation, rather than as in Renn’s framework as a stage of action or intervention)

## 6.2 Communication, participation and knowledge

In this light where the risk governance framework is *most* distinctive is in the centrality it gives to risk communication across and between all stages. The main emphasis of the framework is to see hazard assessment and risk management as acts of communication rather than a series of behavioral actions. Communication is understood to encompass many forms and purposes of flow of information between the different actors involved in risk governance and to include different modes of interaction, participation and partnership rather than only flows of 'expert to non-expert' information. Such themes are becoming increasingly evident in the natural hazards field, but are not as central or applied to all aspects. Problems of knowledge flow and the failure of accumulated knowledge to then be effectively used to reduce disaster risks and losses have been repeatedly highlighted (White 2001) and various calls have been made for better communication practices between expert and policy actors as well as between professionals and publics (see Faulkner *et al.* 2007 on the development of a 'translational' discourse on flood risk uncertainty). Green *et al.* (2007) highlight the different perspectives of engineers, emergency planners, the public and researchers and the need for communication to be '*defined in terms of communicating problem definitions and choices, rather than numbers*' (pg 234).

The need for more effective participatory processes has also become a more significant theme. For example, an influential statement of key principles of sustainable hazard mitigation (Mileti 1999) includes the importance of participatory processes (principle 6) and the involvement of more than those with scientific or technical expertise (principles 3 and 6). Schneider (2002) stresses the need to integrate emergency management into processes of community planning and development and argues for the need to see disasters as '*community-based problems requiring community based solutions*' (p143). Pearce (2003) similarly stresses the importance of public participation within a framework of community planning that integrates closely with disaster management. Tompkins *et al.* (2008) associate good governance of disasters with stakeholder participation in decision making, democratic access to knowledge and transparency and accountability in relation to policy decisions. As noted above, there is a fundamental question therefore of whose knowledge counts and is given respect in governance processes and how different forms of knowledge claim can be brought together and be critically evaluated in a transparent manner.

## 6.3 Vulnerability, 'social forces' and recovery

There are also some important dimensions of handling natural hazards and of the associated research literature that do not appear to be captured as effectively by the risk governance framework. The first is the substantial work in the natural hazards field focusing on vulnerability and understanding the 'social forces' that lead to and produce disasters (White *et al.* 2001). Risk is understood in the IRGC definition as a combination of hazard (energy, material, information) and hazard absorbing systems (structures, human beings), with risk proportional to the strength of the hazard and the vulnerability of the hazard absorbing system. The place of vulnerability is therefore recognised and vulnerability assessment is included as part of the 'risk appraisal' stage of the governance framework (Birkmann 2006). Whilst important this does though tend to limit the notion of vulnerability to a technical element of knowledge generation. Other understandings of vulnerability would see it not only as something to be measured, but rather as at the foundation of what *creates* or produces disasters (Pelling 2003). Here the focus shifts away from the hazard itself towards differences between social groups in capacities to anticipate, cope, resist

and recover from the impact of a natural hazard and the social forces and processes that produce these differences. How governance should address these goes far beyond the risk focus of the risk governance framework (Tomkins *et al.* 2008). We can though note that potentially at least the underlying vulnerabilities and inequalities that contribute to disasters may be better exposed and addressed by opening up assessment and decision making processes to include more voices, in particular those who are normally excluded and marginalized from expert and governmental processes.

In a related way the risk governance framework is less obviously effective in encompassing the governance of disaster and ensuing processes of recovery (although a recent IRGC report has briefly considered the governance failures of the response to Hurricane Katrina; IRGC 2009). This in part reflects its origins and predominant application in cases of technological risk, where large scale disaster events may not be applicable at all, or if they are they are much less familiar and recurrent. The management of natural hazards is often characterized in terms of a cycle of phases of 'pre-event', 'event' and 'post-event' activity. Such a conceptualization does not though map readily on to the risk governance framework, which arguably is largely concerned with pre-event activity (although recognizing the feedback of risk experience into other elements). However the shift towards new governance processes is highly relevant to disaster management and recovery, and as noted, this has both critical and more positive dimensions. According to Gunewardena, disaster recovery involves more than just a 'search and rescue mission'. "*It should be grounded, rather, in an interrogation of the complex intertwinement of power, rights and justice with the objective of ensuring human security beyond mere survival*" (Gunewardena, 2008 p.8). In short, post-disaster governance practices should address – or at the very least not worsen – the existing socio-economic inequalities that make people vulnerable to the effects of natural hazards. At the heart of their recommendations is a focus on giving power back to local communities and a commitment to reducing the kinds of structural inequalities that perpetuate vulnerability – the latter a theme largely missing from accounts of risk governance that do not address underlying mechanisms and structures.

Whilst such perspectives on disasters are largely focused on the developing world, the lessons offered – in terms of the role that governance can play in disaster mitigation and response – can still be applied to the European context where vulnerabilities may be less immediately apparent and where policy making tends to be more focused upon hazard control and prediction than disaster response and recovery. They also highlight the fact that the temporal dynamics of risk governance might not be best represented in a simple circular manner, implying somehow that there is a recurrent return to the first step. Representation of the progress of governance as a 'helix' of continual change in which there is never a return to starting conditions may be more appropriate.<sup>5</sup>

Bringing a number of these points together it is instructive to consider a well known model for representing the processes and dynamics of natural hazards and disasters. Figure 4 shows the 'access model' of Wisner *et al.* (2004) which has at its centre dimensions of household livelihood, social forces, social relations and structures of domination and which emphasizes the iterative, circulating dynamism of multiple time phases and events. In this model a trigger event only becomes a disaster through social processes, which are structured by the way a society operates politically, patterns of socioeconomic inequality, degrees of social protection and the

<sup>5</sup> We are grateful to Patrick Pigeon for these specific observations and suggestions made at and subsequent to the workshop.

marginality of household livelihoods. Future work might seek to grapple with how this powerful model might be productively interfaced or integrated with concepts and processes of risk governance, for example shaping the degree to which social protection operates effectively (particularly for the most vulnerable social groups) and social and institutional learning is able to break out of the loop of continually repeating disaster experiences.

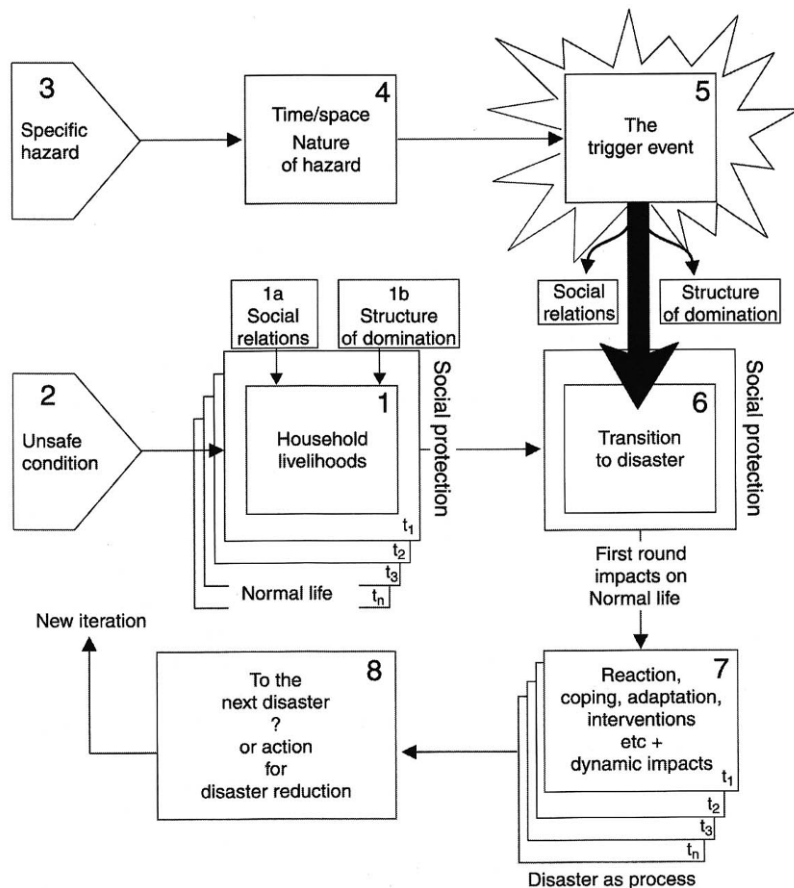


Figure 4: The access model of hazards and disasters (taken from Wisner *et al.* 2004)

### Questions

Does the Renn risk governance framework adequately encompass the key and specific activities involved in dealing with natural hazards? How as a general framework for all risks does it need further differentiation and specification? Can it productively be brought together with other frameworks from the natural hazards literature?

For example can issues of scale – in space and time – be better captured by the risk governance framework? Can the framework be developed in its application to natural hazards to recognise the different temporal phases involved and to better incorporate the shifts in relations that emerge in response to an ‘event’?

Is vulnerability in particular sufficiently central to and incorporated within the risk governance framework in the context of natural hazards?

## 7 Empirical examples of governance and natural hazards in Europe

### 7.1 Introduction

There are later stages in the CapHaz-Net project in which we will focus on the practices of governance for specific forms of hazard in regional contexts – flooding, alpine hazards, and drought/heat wave hazards. However it is still useful in initially examining the concepts and challenges of risk governance to link these to some specific experiences and contexts and to see how some of the general ideas might be revealed. In this section three empirical examples are presented. These empirical examples have not involved new research, but draw on the ongoing work of members of the research consortium. They each focus on different experiences, over different timescales and in relation to different hazard issues.

The first on a specific urban pluvial flood in Hull in the UK considers a hazard for which expert risk assessment and management processes are poorly developed and focuses both on the causes of the flood, local patterns of vulnerability and the experience of recovery for local people. The second on the flood protection policies that emerged after the flooding of the river Elbe and tributaries in Germany considers an extreme example of a familiar form of river flooding. How responsibilities and institutional arrangements have been assigned and the tensions and difficulties that there are around incorporating both structural and non-structural measures into flood protection are the main focus. The third considers the experience of a significant period of drought in the Southern European city of Barcelona and how the management of this was positioned in relation to broader changes in water policy.

In each case we do not intend to provide a definitive account, but rather an analysis that can help to stimulate thinking and debate.

### 7.2 Empirical example 1: The Hull urban pluvial flood, UK

In June and July 2007 a series of floods afflicted towns and cities across the UK. In what constituted one of the most costly flood episodes in the whole world that year, over 55,000 properties were flooded, over 100,000 people were evacuated and 13 died (Pitt, 2007). Whilst much of the flooding was from rivers and affected areas that had been flooded before, some took a different form. So-called pluvial floods happen when the infrastructure of urban areas proves unable to cope with intense rainfall. Hull, in the North East of England, suffered from a major flood of this form, with over 8,600 homes flooded in the course of a few hours on June 25th. It became known as the ‘forgotten city’ because of the way media reporting focused on other places hit by the floods, overlooking a city in which some of the most serious consequences were felt.

#### *The city and the flood*

The City of Hull in the North East of England is a port city, with strong historic traditions in fisheries and shipping. The City sits at the mouth of the River Humber and is low lying with over 90% of its area below high tide levels. As a consequence most of the city is identified in Environment Agency flood maps as at risk of flooding, and there is a history of floods in the City from both the river and the sea.

The June 2007 flood though involved the movement of neither sea nor river water. This was a ‘pluvial flood’ in which extremely heavy rainfall fell directly onto the city – June 2007 was the wettest month recorded in Yorkshire since 1882 (Coulthard, 2007a; 7). Although ‘natural’ factors of already heavily surcharged and saturated soils and a water table sitting at a high point

in its tidal-related cycle contributed, what was most significant in producing the flood was the poor performance of the urban drainage infrastructure. Due to the low elevation of the city the drainage system is fully pumped, using mechanical rather than gravitational processes to make water flow, and involves a complex network of pumping stations. It was this system that proved unable to cope with the levels of water flowing within the City.

### **Impacts, vulnerabilities and recovery**

The accumulations of flood water affected many parts of the city in a patchwork. As the Independent review report comments:

*“...not all parts of Hull were struck with equal force. Given the nature of pluvial flooding, some wards or even roads within neighbourhoods were much more severely affected than others .... Even in wards that escaped widespread inundations, some localised flooding was severe”. (Coulthard et al. 2007b P8)*

Data collected in the immediate period after the flood showed that over 8,600 houses on more than 600 streets were flooded, affecting over 20,000 people or 8% of the population. In addition 1,300 business and 91 schools were affected, seriously disrupting education provision in some cases for an extended period. Of the flooded households, 6,300 households were forced out of their homes to live in alternative accommodation, with over 1,400 people living in caravans for an extended period of time.

Hull is a poor city, the 9<sup>th</sup> most deprived district in England, with a set of associated health, social and economic problems (Director of Public Health, 2005). This by itself is a significant factor in increasing vulnerability to the impacts of flooding. For example, research by the Association of British Insurers (2002) found that 50% of households in the lowest income decile in the UK do not have contents insurance. A database collated by the City Council further reveals patterns of vulnerability amongst flooded households. As of 4 months after the flood, there were 8,439 flooded properties. Table 2 distinguishes between tenure of housing and the classification used by the City to identify categories of vulnerability – Gold households are the most vulnerable comprising residents over 60 years of age, people with disabilities and single parents with at least one child under five. Silver all uninsured properties that are not already in the Gold category, and Bronze all other flooded households.

**Table 2:** Households flooded in Hull: tenure by vulnerability category

<b>Totals</b>	<b>Cases</b>	<b>Council Rented</b>	<b>Housing Association</b>	<b>Owner Occupiers</b>	<b>Private Rented</b>	<b>Not Known</b>
Gold	3741 (45%)	1161	425	1842	303	10
Silver	852 (10%)	378	18	228	224	4
Bronze	3756 (45%)	188	27	3252	272	17
Total	8349 (100%)	1727	470	5322	799	31

Source: HCC FLOSS database figures as of 13 November 2007

This data shows the scale of vulnerability amongst the population of the City, with 45% of the households flooded falling into the most vulnerable category, defined by several of the characteristics identified above as accentuating problems in coping and recovering.



**Figure 5:** Caravans outside Flooded Homes in Hull

In an intensive qualitative study carried out after the flood<sup>6</sup> the severity, complexity and extended nature of these problems has been revealed (Whittle *et al.* 2010, Lancaster University, 2009; Sims *et al.*, 2008a). For example, those people without household contents insurance had to meet the cost of replacing all their possessions themselves (contamination with sewage meant that residents were advised to throw away everything that was touched by the floodwater):

*“When the council told us to throw everything out which had come into contact with the water as the water was contaminated we were absolutely gutted – more so when the dust cart came and took it all away. As we weren’t insured all we could think of was ‘Oh my god we’ve got nothing left and it took us years to get that sort of furniture together’”* (Marion, diary).

They also found finding alternative accommodation to live in enormously difficult, in part because of local estate agents pushing up rents and making profits ‘from others misfortune’. Even for those people with insurance it took repeated and frustrating battles and negotiations with loss adjusters to settle a claim, a task much harder for those without the capacity, time, confidence or capability to take this on. As research on other major floods has reported (e.g. Convery and Bailey, 2008; Reacher *et al.*, 2004; Tapsell *et al.*, 2003) the health impacts after floods can be severe with existing conditions made worse, new illnesses put down living in poor conditions and high levels of stress produced by trauma, anxiety, disruption and the pressure on family relationships. The diaries and interviews revealed many cases of severe stress and psychological impacts. For example:

*“Some days I just felt like jumping off the Humber Bridge. It’s been that low, it’s been that bad, except I’m not brave enough to do it. But the state of mind you’ve been in – some days I’ve just sat in here and just sobbed and sobbed and sobbed.”* (Leanne, interview)

Whilst older people were a specific concern for the council, with local community wardens making particular efforts to support them during the recovery process, it proved difficult to identify all cases of need and some people were reluctant to be helped or even to admit to having been flooded.

<sup>6</sup> Lancaster University (2009) Flood, recovery and urban resilience: a real-time study of local recovery following the floods of June 2007 in Hull  
[www.lec.lancs.ac.uk/cswm/hfp](http://www.lec.lancs.ac.uk/cswm/hfp)

Some householders who initially thought that they had escaped the flood entirely have also had the problem of 'secondary flooding' to contend with. In many places the flood water was relatively shallow and it was a matter of a few centimetres that could determine whether or not the threshold of the house was breached and water flowed into front rooms and kitchens. However even if bad water did not visibly come over the doorstep, it could still invisibly enter the space of the home through flowing into voids under suspended floors, soaking joists and the underside of floorboards and causing damage that was subsequently remedied by means of the 'strip out' – the same process of gutting and replacing that was used with households that experienced visible flooding above the level of the floorboards. 'Secondary flooding' caused particular problems in Hull, not only because of the number of households affected (in November 2007, 20 new cases were being discovered each week). The timing of the appearance of secondary flooding also caused problems, as the damage – in the form of rising damp, mould, buckling floorboards etc. – was often slow to appear, with people reporting damage over a year after the original flood event.

### **Governance issues**

This case of the Hull flood raises many governance issues, including failures of effective governance, as well as highlighting challenges to current and future practices.

#### **1) Privatization and regulation**

The operation of the drainage system of the City was the responsibility of a private water company, Yorkshire Water, which took up this role when the water industry was privatised as part of a wider programme of 'rolling back' the state in the 1980s. Investigation of the condition of the main pumps by the time the flood had happened found these to be in 'poor condition and unreliable' (Coulthard *et al.*, 2007b). One pump in the Bransholme area of the City, was overwhelmed by the flood water and completely failed. Other parts of the system proved to have insufficient capacity. Looking back at the history of the system and decisions taken, the Independent Review Body (IRB) found that few records could be retrieved from Yorkshire Water but what they could gather showed that a series of recommendations for upgrades of vulnerable or aging parts of the system had been ignored and the cheapest options had always been selected by a company with a concern for its profits profile and return to shareholders:

*"From the range of options presented in the 2004 and 2006 [engineering capacity] reports, it would appear that Yorkshire Water have consistently taken the cheapest path available to them at the time... We feel it is deeply regrettable that it has taken the events of 25<sup>th</sup> June 2007 for the deficiencies in East and West Hull's drainage system to become public knowledge. Had one of the permanent solutions recommended in 2004 and 2006 been implemented we believe the impacts of the June 2007 floods would have been less severe."* (Coulthard *et al.*, 2007b p.39)

The IRB's report also looked at the role played by OFWAT, the water industry regulator. The regulator has a crucial part to play within the water industry because the high levels of capital investment required to transport and supply water and sewerage prevents competitors from entering the market, with the result that each water company enjoys a monopoly in the region that it serves. This absence of competition can act as a disincentive to further capital investment in the relevant infrastructure, and therefore effective regulation is essential in order to protect the interests of the public. However, the overall conclusion of the IRB's report was that OFWAT's



regulatory powers were insufficient and weakly applied. In the first instance, there are no mandatory standards for surface water drainage and sewage capacity and, consequently, OFWAT has no powers to ensure that the infrastructure is designed to particular standards. Secondly, under current legislation it is not compulsory for the water companies to share all the relevant information about their strategy, performance and operation to either OFWAT or the public. Therefore, although OFWAT requested an 'independent' review of Yorkshire Water's performance, this review was undertaken by a private consultancy which was appointed and paid for by Yorkshire Water. Perhaps unsurprisingly, the resulting report made no mention of the design capacity problems highlighted by the IRB (Coulthard *et al.*, 2007b).

## **2) Institutional fragmentation and responsibility**

Other problems with the management and functioning of the drainage system included institutional fragmentation with different organisations responsible for different parts of the drainage infrastructure. Within Hull, the Environment Agency is responsible for all open bodies of water, as well as for river and tidal flood defences; Yorkshire Water is responsible for the sewers and Hull City Council is responsible for the roadside gullies that feed into these sewers, except where these fall on private land – in which case they are the responsibility of the property-owner. This results in a complex picture where “No single agency... accepts responsibility for any elements outside their own terms of reference nor have they historically allowed others to influence their own obligations” (Coulthard *et al.*, 2007a p.3). As a result: “the flooding in Hull has revealed the difficulties of having multiple agencies responsible for different areas of the drainage system” (ibid p.3).

Similar conclusions were also reached at the National Level in the Pitt Review – the independent review commissioned by the government to determine the causes and consequences of the 2007 floods. Pitt commented that: “responses to local flood risk are piecemeal and not necessarily prioritised. Each of the organisations with a responsibility for certain assets tends to carry out maintenance and improvement works independently, as there is currently little incentive to do otherwise. This results in investment decisions being made in isolation, which at best leads to inefficiencies and at worst actually increases the risk of flooding” (The Cabinet Office, 2008 p.84).

This fragmented nature of institutional responsibilities was a source of anger in Hull, with residents feeling that the relevant agencies were using the complex ownership regime as an excuse to evade their responsibilities and avoid taking action. Consequently, although the IRB's report concluded that blocked drains were not to blame for the flooding<sup>7</sup>, many residents drew upon local media reports and the evidence of their own eyes (this was particularly important for those who had lived in their neighbourhoods for a long time) to argue that council cutbacks on drain cleaning as a result of financial problems were to blame. However, these claims were strongly disputed by the City Council itself.

## **3) Knowledge, assessment and expertise**

As the Pitt Review noted (Pitt 2007), extreme pluvial flooding is hard to predict and is not currently part of the established routines of flood risk modeling, assessment, mapping and warning. The flood risk map that is produced by the EA precisely delineates areas at specified levels of

<sup>7</sup> They did concede that it may have worsened the flooding in some locations.

risk from sea and river flooding, but pluvial flooding is not included. Consequently some of the areas that were flooded in Hull in 2007 were not mapped as being 'at flood risk' and many people were surprised when they flooded because they lived nowhere near the river. Similarly the EA flood warning system operates on the basis of monitored and modelled sea and river levels. It does not predict and therefore warn on flooding solely from pluvial events. Hence for the Hull flood whilst heavy rain was forecast there was no specific flood warning issued to local people.

Issues of knowledge and expertise also come to the fore where 'secondary flooding' and building restoration is concerned. In the case of 'secondary flooding', no water is visible above the floorboards in the home and, as a result, detecting the problem and its cause requires a series of technical interventions and expert judgments by surveyors. Insurers and surveyors may argue that the problem is one of damp, rather than flood, thus meaning that residents are unable to access the kinds of support and financial assistance available to 'flood victims'. Equally, no concrete standards exist for what should be done to a flooded property in terms of the repairs process. The accepted practice is one of stripping back fixtures, fittings and plaster, followed by a period of 'drying out' – however, some surveyors argue that this process causes unnecessary expense and disruption for the householder and that other, less drastic methods are more effective.



Figure 6: A 'stripped out' house

#### 4) Response capacity

Sir Michael Pitt described the floods of 2007 as “the country’s largest peacetime emergency since World War II” (Pitt 2007 p.vii). Responding to an event of this magnitude was a tremendous challenge and, within Hull, a range of organizations were involved in dealing with the emergency, including Hull City Council, Humberside Fire and Rescue Service and the police. However, the IRB’s report also paid testament to “the incredible resilience and high levels of social capital shown by the residents of Hull. The good will, comradeship and willingness to help neighbours and strangers in times of need are extraordinary” (Coulthard *et al.*, 2007b p.61)

However, other aspects of the emergency response phase were criticised – in particular, communication between the relevant agencies and the public was felt to have struggled, with some 360 calls to the fire service going unanswered because the telephone lines were inundated (Coulthard *et al.*, 2007a p.17). Once again, the fragmented management of the drainage system also caused problems for attempts to minimise the scale of the flooding as there was no centralised information regarding the ownership, maintenance and management of the various parts of the drainage system.

One of the biggest challenges for risk governance is how to ensure that there is enough spare capacity in key institutions and systems to respond to large-scale disasters. There is a clear tension here in that the kinds of privatizing processes described previously tend to result in spare capacity being taken out of the system (on the grounds that its existence is uneconomic on a day-to-day basis). However, this can mean that, when a disaster happens, such 'pared-down' services and infrastructure struggle to cope with the demands placed upon them. Within Hull, a key part of the immediate emergency response effort involved the mobilisation of some 750 council staff who were taken from their desk jobs to 'door knock' and find out which properties in the city had been affected and what the needs of their residents were (Coulthard *et al.*, 2007b). Hull also has a system of community wardens who work in their respective communities to help local residents and to tackle issues of antisocial behaviour, nuisance and vandalism. During the immediate response to the floods and the longer term recovery process that followed, the community wardens performed a wide range of essential tasks, including evacuating schools and residential homes, providing health and safety information and cleaning products to residents, operating emergency centres and supervising closed roads. They also played a key role in the council's door knocking campaign and collected considerable amounts of data on the flooded households. Although much of the work fell outside the wardens' usual duties, their good people skills and in-depth knowledge of their communities meant that, in particular areas, they provided a valuable source of help for residents and workers alike. The Independent Review Body's report identified the wardens' key strengths as being their flexibility and their local knowledge:

*"The Community Wardens proved to be an effective and flexible human resource. They were able to respond quickly and effectively and had the benefit of a large amount of local knowledge of the area and the residents where they were based. (Coulthard et al., 2007b p.18).*

In many respects, therefore, the community warden service represents the kind of flexible capacity that can be vital in helping residents to recover from disasters such as floods. However, recent City Council funding cutbacks have led to a dramatic reduction in the service, with 110 wardens across the city being reduced down to 38 (Goodwin Development Trust, 2009). This raises important questions about how the recovery effort could be resourced if the floods were to happen again.

### **5) Governance of recovery**

The floods of 2007 provoked an intense debate about organizational responsibilities. The Pitt Review (2007) criticized what it saw as poor coordination between different agencies and, as a result, recent government consultation documents have attempted to clarify, firstly, which organizations are responsible for which particular aspects of emergency response in the aftermath of a major flood (Defra, 2008) and, secondly, which roles different organizations should play in flood risk management (Defra, 2009). However, studies looking at the longer-term recovery process (as opposed to the immediate emergency response phase) show that almost no attention has been paid to the question of who is responsible for helping and supporting residents during the months and years that follow the flood, as they go through the long and difficult process of trying to get their lives and homes back on track (Whittle *et al.* 2010).

The study of flood recovery in Hull has revealed that residents come into contact with a range of different companies and organizations in the aftermath of a flood, from insurers to loss adjusters, builders, estate agents and the city council (Sims *et al.*, 2008a). Indeed one resident had contact with 15 different agencies during the recovery process. However, it is currently up to the resident to negotiate his or her way through this organizational maze and this can be very difficult when conflicting advice is provided and when the various agencies involved do not communicate with each other, as one resident described:

*We lost the fridge and the freezer and the cooker in the kitchen but the scary thing was we were actually still using them – nobody condemned them or even suggested that they were contaminated in any way, shape or form until we moved out. And then they said, “Oh you shouldn’t have been using them”... The thing is as well, you find out different things from different people. Just by talking to your neighbours – they’d been told a completely different story to what you are getting told by their insurance company. (Melanie, interview)*

Another interviewee, who was a council tenant, said that she had been instructed to throw out everything that the water had touched, because it would be contaminated. However, when the contractors came to strip out her kitchen, they left the kitchen units in place, despite the fact that these had been completely under water. Such examples show how, at present, the kinds of experiences that the resident has during flood recovery – and the processes that he or she goes through – are almost entirely dependent on which companies or agencies that person has contact with. Consequently if loss adjusters or builders are obstructive or unhelpful, the resident has to try and resolve matters on his or her own by questioning, arguing and pushing for a different solution to the problem. However, more vulnerable residents who lack the skills, knowledge and financial resources to do this can be left in very difficult circumstances unless they have someone to champion their cause. In Hull, attempts were made to bridge this ‘recovery gap’ by use of a number of services. Firstly, the Citizen’s Advice Bureau helped many owner occupiers and private renters who had disputes with insurers, builders or landlords. Secondly, the community wardens worked to help and support households placed in the most vulnerable ‘gold’ category. Finally, the council also launched a dedicated Flood Advice Service which residents could go to for advice and help around flooding issues. The diaries of FAS workers revealed the kinds of help and support that this service was able to provide for vulnerable residents:

*“Have been dealing with a lady this week that had been living in appalling conditions. Unfortunately it is certainly not a one-off case. She had no floorboards downstairs and her floor space was still full of water. The whole of her upstairs was wet to the touch and everything in it. She is registered disabled and has severe epilepsy so felt the house was especially unsafe for her to be in. She appeared to have been overlooked and ignored by her insurance company. Emily and I managed to find her alternative accommodation and push her insurance company into dealing with her claim as a priority. We were so pleased to have been able to help her.”*

However, although the FAS and community wardens did provide help and support to many people, vulnerable residents still slipped through the net and there were many people who needed help but did not receive it. The FAS was also closed one year after the event despite the fact that many residents were still experiencing problems with ‘secondary flooding’.

There were also issues about how the recovery process was funded. After the floods, the Red Cross sent £720,000 to help Hull during the flood recovery. However, during a group discussion, flood support workers revealed how frustrated they were by the fact that all this money

had to be spent by the first anniversary of the floods. They felt that, in order to be effective, the funding had to be available for a much longer timescale in order to help people with the more protracted problems they were facing. There is therefore a mismatch between the ways in which flood recovery is governed (and political imperatives which say that flood recovery must be seen to be finished quickly in order for the various organizations involved to be viewed as successful) and the much longer-term needs of residents on the ground.

### **6) Building future resilience?**

Particularly in the context of climate change, policy makers and practitioners tend to highlight the importance of building resilience for the future. Ideally, therefore, disaster recovery should not just aim to return people to 'normal' but, instead, return them to a state where they are more resilient and not susceptible to repeat events in future. Such thinking is behind recent government consultations on property-level flood resistance and resilience measures, which advocate the installation of structural measures in people's homes to lessen the damage and disruption caused by flooding (Sims *et al.*, 2008b). However, research in Hull indicates that very few properties have had such measures installed in them during the repairs process<sup>8</sup>. When asked about this, residents explained that the main barriers included the fact that insurers would not pay for them – this is because the terms of insurance are based upon the principle of replacing like with like. By contrast, property-level flood resistance and resilience measures are considered to constitute an improvement to a property, and this is not allowed under insurance principles. Another problem concerns a lack of technical expertise and building materials necessary to install these measures, which could result in considerable delays to the repairs for the resident. It could therefore be argued that, by putting people's homes back to normal, people's vulnerability to future flood events has been reproduced. However, there are also other respects in which people may be left more vulnerable for the future. Many residents found that their homes lost value after the floods, or that their insurance premiums or excess payments greatly increased:

*"The excess has gone up £5,000 we have to pay on contents and £5,000 on buildings. So if the same thing happened again we've £10,000 to find before we start. And where do we pluck that from? Where do we get that from? We haven't got £10,000. Or do we save anything at all or do we literally just let the whole lot go and say it's all gone and claim what we can and just have everything lesser?" (Leanne, group discussion)*

Other residents found that they could not get insurance at all. There was also a feeling that a repeat of the flooding would be just too much to cope with from an emotional perspective, as Abby described: *I'd rather just set fire to the house, walk away and just never come back I think. I couldn't do it again."*

### **7) Learning lessons and reforming governance**

The sheer scale of the damage and disruption caused by the floods of 2007 has resulted in a number of policy initiatives designed to learn the lessons for the future. At the national level, the Pitt Review made 92 recommendations for improvements, covering areas as diverse as flood warnings, flood risk legislation, recovery guidance and the advice given to householders (Pitt 2007). Many of the issues addressed in this report were directly related to the governance of

<sup>8</sup> It is more cost-effective to install property-level flood resistance and resilience measures during repairs because building work is already being carried out.

flood risk and recovery and, as a result, government consultation documents have been produced in an attempt to deal with Pitt's critiques.

Particular areas in which change can be identified include the launch of the Draft Flood and Water Management Bill (Defra, 2009), which aims to unite previously disparate bodies of flood risk legislation in one document which, crucially, also includes reference to surface water flooding<sup>9</sup>. The draft bill also attempts to establish clearer lines of organizational responsibility, with local authorities being given a stronger role in flood risk management within their localities. The need for an integrated flood warnings system which covers all types of flooding (not just the pluvial and coastal sources covered by the current system) is also highlighted. By contrast, the consultation on the National Flood Emergency Framework (Defra, 2008) attempts to establish clarity over which organisations are responsible for what actions in the immediate aftermath of a flood. Finally, the consultation on property-level flood resistance and resilience measures explores possible ways of encouraging householders to get such measures installed in their homes.

Of course, it is not just central government that is implicated in responding to the Pitt Review – a host of organizations, including the Environment Agency and the Association of British Insurers have been challenged by the recommendations and are looking at how to improve their own institutional practices. At the local level, too, Hull City Council conducted its own lessons learnt exercise, although this report is not in the public domain.

In many respects, therefore, it looks as if flood governance practices are changing. However, there are other respects in which change appears slow in coming. At the local level, one of the biggest questions concerns the way in which institutional lesson-learning actually takes place. During the floods, many Hull City Council staff were seconded from their normal roles to perform flood-related duties and they amassed considerable amounts of skills and experience while performing these roles. However, after the floods, these individuals returned to their day jobs and senior management staff moved on to roles in other organizations. Therefore, although potential improvements have been committed to paper, the power of these lessons learnt reports is questionable when the individuals involved are no longer in the same jobs.

**Summary:** Governance issues were central to every aspect of the events in Hull – from the multiple stakeholders and subsequent confusions over responsibility and maintenance that were implicated as being partially responsible for the floods, to the ways in which the recovery was managed by multiple agencies with differing results for residents. More recent developments that have taken place in Hull, such as the downsizing of the community warden service, are also symptomatic of the cuts in public funding and the 'rolling back of the state' that are often associated with new forms of governance. The Hull example also illustrates how some of these new forms of governance – for example, the cuts to the warden service and the individualization of risk resulting in rising insurance premiums for residents – could have a detrimental impact on the ability to cope with risks in future. However, at the national level some more positive changes are in evidence as the Hull floods were a contributing factor in the launch of some new policies around flood and water management issues (for example the Flood and Water Management Bill) which seek to counter some of the problems of these new governance processes such as the institutional fragmentation of drainage management issues.

<sup>9</sup> Surface water flooding was omitted from previous flood risk management legislation.

### 7.3 Empirical example 2: The Vereinigte Mulde River flood and flood protection policy, Germany

While the Federal Republic of Germany had for most of its history not been affected by disastrous weather extremes – apart from the storm flood in Hamburg in 1962 – a series of floods during the 1990s and finally the 2002 summer flood along the Elbe River and its tributaries initiated a public and political debate on how to design flood protection efforts more effectively in the future<sup>10</sup>. The Vereinigte Mulde case study will therefore deal primarily with the time span reaching from the 2002 flood to summer 2008. It demonstrates that the flood protection approach implemented in 2002 was largely developed under the influence of the experiences of the 2002 flood.

#### ***The German political context***

Germany is a federal and parliamentary representative democracy by constitution. Its main features are a polycentric administrative structure and decentralized political system. The administrative structure consists of three levels of decision-making that possess constitutional autonomy: the federal (*Bund*), states (*Länder*) and the local authorities (*Gemeinden* and *Städte*). Flood protection is, above all, the responsibility of the states. However, the federal level provides the general conditions that have to be considered by the states. The states and also the local authorities are responsible for implementing the actual measures.

As a result of the 2002 flood and the public debate in its aftermath, in May 2005 a new flood protection law (*Hochwasserschutzgesetz*) became effective in Germany, which for the first time provides coherent instructions for how to adapt to flood hazards. This law complements the Water Management Act (*Wasserhaushaltsgesetz, WHG*) (Köck, 2005). It has been the duty of the single states (*Bundesländer*) to put the federal law into legislation from May 2007. The state of Saxon acted early and passed its Water Law (*Wassergesetz, WG*) in September 2004.

In the context of the discussion of risk governance, the following important regulations (*Regelungen*) within this legislation need to be highlighted:

- Areas prone to floods with an exceedance probability of 1/100 are defined as ‘flood prone areas’; the standard to define the protection goal for settlements in prone areas is also the exceedance probability of 1/100 (WHG § 31 b Abs. 2);
- In flood prone areas the utilization of land is considerably restricted and prerequisites for exceptions to this are much more tightly defined (WHG § 31 b Abs. 4);
- Thirdly, citizens in areas prone to flood hazards are obliged to implement mitigation measures in accordance with their possibilities and abilities (WHG §31 a). Almost the same phrase is to be found in the formulation of the new Saxon Water Law (WG § 99).

There has been some critique of these regulations (Köck 2006), for example on the following specific points:

- the exclusive orientation on statistical return rates, which are based on past events is problematic since it neglects the fact that simple projections are not sufficient to anticipate future risks. This point of criticism is particularly relevant, since there is no binding time frame for updating the flood protection plans.

<sup>10</sup> This case-study is a condensed version of two previously published reports (Schanze et al. 2008, Beck et al. 2009)

- furthermore, defining flood protection standard simply based on a statistical return rate (e.g. 1/100) is not meaningful, since economic, ecological and social criteria are not considered.
- whilst it is positive in principle to require citizens to implement private adaptation measures, this requirement is largely not known about and regarded by some as an over-excessive demand on the individual.

### **Research on the Vereinigte Mulde flood**

The case study is based on research in three communities along the Mulde River, a tributary of the Elbe River (see Steinführer and Kuhlicke 2007 for details of methods). The area was heavily affected by the flood in August 2002, causing major damage in towns and villages. The existing flood protection system collapsed in many places during this exceptional “flood of the century” which was defined as an event with an exceedance probability of 1/200 – 1/250 (von Kirchbach et al., 2002; Freistaat Sachsen, 2002; SMUL, 2003). Overall, the 2002 flood is the single most expensive flood in German history. The economic losses were estimated at 11.6 billion €. (Schwarze and Wagner, 2007). The three communities examined represent quite different approaches to flood protection, since they pursue different strategies with regard to the implementation of structural and non-structural measures. In summary:

- The city of Eilenburg (18,000 inhabitants; 2003) experienced severe damages in 2002. Quickly after the flood the collapsed levee system surrounding the city was rebuilt and reinforced. It represents a community which pursues a classical structural flood protection approach relying mostly on dikes and walls surrounding the city.
- The village of Erlin (93 inhabitants, 2005) also experienced severe damages in 2002. It applies a mixture of relocating dikes (non-structural) and improving existing dikes (structural).
- The city of Grimma (18,000 inhabitants, 2003) also experienced severe damages in 2002. The city represents a community which has to rely on non-structural measures such as a locally organized warning system, since it is not yet protected by technical flood protection measures.

### **Responsibilities, finance and administrative structures**

There are two different authorities responsible for flood protection in the case study area. While the State Reservoir Administration (LTV) is above all responsible for structural measures, the Saxon State Agency for Environment and Geology (LfUG) is responsible for non-structural measures such as warning. Between both organizations a misbalance exists with regard to their financial resources, a misbalance which has consequences for adaptation measures.

To understand the current situation, it is insightful to go back to the time shortly after the flood. In the aftermath the decision-makers used the bitter “lessons learnt” as a “window of opportunity” to improve the flood protection along the Mulde River. After the 2002 flood the responsible *Saxon State Ministry of the Environment and Agriculture* (SMUL) initiated the reconstruction and development of new flood protection and put the LTV in charge to design and implement this new flood protection concept (*Hochwasserschutzkonzept*).

The LTV developed after the flood a new flood protection concept, which is quite innovative, at least in the German context, exceeding in one respect even the legal requirements. The indicative protection goal is to protect settlements against floods up to an exceedance probability of 1/100 by means of flood protection measures (LTV 2003). However, this protection goal is only valid for densely populated areas. For single buildings and temporal settlements a protec-



tion goal is designed only up to an exceedance probability of 1/25 and for agricultural areas only against floods with an exceedance probability up to 1/5. Hence, the flood protection concept takes different protection goals into account. Furthermore, each structural measure was prioritized according to their meaning for the communities at risk. Therefore all 1,600 measures planned in the 47 flood protection concepts were evaluated and prioritized (SMUL 2005). Most of the measures given a high priority have been already carried out or will be conducted during the next few years.

Besides these flood protection concepts focusing on structural measures the SMUL initiated the development of a flood warning system (the Saxon Flood Centre, see [www.hochwasserzentrum.sachsen.de](http://www.hochwasserzentrum.sachsen.de)). This warning system is supervised by the *Saxon State Agency for Environment and Geology* (LfUG).

An important characteristic of this administrative structure is the availability of considerable financial resources. In the aftermath of the 2002 flood the affected communities and regions could rely on heavy financial support by the European Union, the *Bund* (federal state) and The Free State of Saxony. One narrator explicated that about half a billion Euros are available for flood protection until 2013 and stated: “No measure dashes against money”. And another underlined: “We have so much money around that it would be really great if it needed no authorization process”

As a consequence of the previous outlined development (1/100 protection goal for settled areas, the division of responsibility and funding) structural adaptation measures have been clearly prioritized in Saxony. To reach the standard protection goal, structural measures inevitably need to be implemented. The funds, which were available for reconstruction and for which the Saxon Government decided to apply, that is the European Regional Development Fund (ERDF), clearly favors structural measures, too. The flood protection concept was already organized in-line with the standards of ERDF. It was furthermore decided that the Ministry of the Environment and Agriculture would receive large amount of funding. The ministry transferred most of the money directly to LTV (Figure 7) and the latter employs mostly engineers favoring structural measures. As a result, no integrative view was pursued on flood protection. While LTV, responsible for structural measures, is financially better equipped and leads in the implementation of adaptation measures, LfUG, responsible for non-structural measures (e.g. warning), is not involved in the same way and, thus, structural measures are preferred.

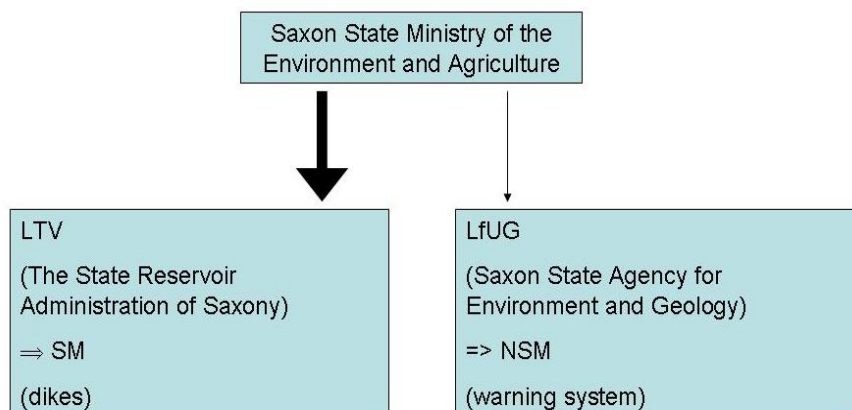


Figure 7: Administrative Structure and Distribution of Money

It needs to also be emphasized that during the initial phase of setting up the flood protection concept and defining responsibilities climate change played no role, neither in documents nor in discussions. This has started to change only in the last 2 years.

### ***The views of decision makers and the local population***

The analysis of the view of decision-makers involved in flood risk management as well as the opinions of the local population reveal three dominant arguments that relate in various ways to governance and risk governance issues.

**(a) There exists a strong desire among the affected population for structural measures, which is connected with a demand for security.** The 2002 flood meant a loss of control for many people and caused considerable damages – not only in an economic sense but even more so in an emotional sense (Steinführer and Kuhlicke, 2007). In the aftermath of the flood therefore a need for security developed among the population. This need is mostly associated with a specific imagination about how flood protection should be organized, which finds its expression in a strong belief in the superiority of structural measures. Generally, the interviewees underlined that the population desires a form of protection, which is visible and which appears as reliable. These attributes are associated with structural measures like dikes and walls.

This need was taken into account by the decision-makers: “The State government works for the citizens and not for itself, from there comes the input and from there a political opinion is developed”. As the overall majority of the population favoured physical measures – an assumption that is clearly confirmed by empirical investigations – the representatives of the political system favoured these measures too.

This dominant view is contrasted with technical considerations by the decision-makers themselves. Particularly the LTV was also considering measures that had a greater non-structural character (e.g. the slitting of dikes or the relocation at bottlenecks). However, in the course of time in many cases they adapted their plans to the dominating belief among the population about how such measures should be implemented.

**(b) Even if non-structural measures were considered in the aftermath of the 2002 flood they could not be realized, since there was strong resistance among the population.** Resistance to non-structural measures appeared in many cases. In ErlIn, for instance, a ring dike was planned offering protection for a 100 year flood. At the same time the old dike should be slated to create more retention area for the Mulde River. However, local residents did not favour these measures and resistance was building up. Two interests group were key. The local farmers feared that their fields would be prone to repeated flooding twice per year and their fields hence prone to an increased pollution. The local soccer association feared that if the dike would have been slated the soccer field would also have been regularly flooded. Because of this resistance the LTV decided to rebuild the old dike according to its previous level of protection.

Furthermore, the ring dike in ErlIn could not be put into practice as it was initially intended by the LTC, since the new dike required changes in the land use in ErlIn. The citizens affected did not consider compensation payments as sufficient. As a result the LTV initiated an intensive dialogue with the local population to convince them of the necessity that every single person has to contribute to the overall aim of protecting the community more effectively. Some decision-makers use the phrase of “strategic resistance” to underline that some citizens also used the

argument to force up the prices for their properties. Because of all these resistances a delay of the construction work and an increase of transaction costs were inevitable.

**(c) Generally trust among decision-makers as well as between decision-makers and the local population is important for the implementation of adaptation measures.** The interviews revealed that the better actors know and trust each other the more likely it is that measures are quickly completed. Of particular importance are contacts to local decision-makers and the affected population, because their local knowledge is essential for the implementation of measures. However, more important is their acceptance and embedding within the community. Local decision-makers, it is argued, have the integrity and acceptance, which regional decision-makers (e.g. LTV) do not have, at least in the view of the local population. People trust local decision-makers more than regional, which are more distant to the specific issues and argument on the spot. Therefore, the inclusion of local decision-makers (e.g. mayors) and their support for the respective measure to be implemented is important for building a trustful relationship between the executing authorities and the responsible persons.

This is also emphasized by the case of Grimma where a locally operated warning system was installed after the flood. The mayor proposed along with others to install an SMS warning system, which is not dependent on the official warning system of the Free State of Saxony. Many people assign the implementation of this measure to the personal interests, charisma and effort of the mayor of Grimma. The consideration and complementation of non-structural measures is in our empirical example, above all, dependent on the personal effort of an individual – and not a formally institutionalized effort of flood protection.

**Summary:** The empirical example shows the effect that particular forms of governance can have on the kinds of strategies that are employed to deal with hazards. Although on the legislative level an integrative adaptation approach is pursued, this strategy is not implemented on the organizational and project level. Here technical measures clearly dominate. The reasons are therefore, that, firstly, the organizational division of labour between the LTV (responsible for structural measures) and the LfUG (responsible for non-structural measures) favours structural measures, since the LTV is mainly responsible and disposes over higher funds. Secondly, the responsible decision-makers of the LTV, although open minded to non-structural measures, are mostly grounded in an engineering culture favouring structural measures. Thirdly, among the local population a strong belief in the superiority of structural measures exists, which is taken up and implemented by the decision-makers. This empirical example therefore supports the argument made in the earlier sections of this report where we show that it is essential to understand the broader governance processes at work within a particular region before we can understand the more specific issues concerned with the management of natural hazards.

#### **7.4 Empirical example 3: The Barcelona drought 2007/8, Spain**

The drought experienced in the internal Catalan basins, from January 2007 until May 2008, has been claimed to be the worst experienced for 68 years. In order to understand the governance issues involved in this drought episode the wider physical, policy and political context needs to be introduced.

### The context of water supply and demand

Droughts are one of the adverse meteorological events that have the greatest effect on Catalunya. Notwithstanding, uncertainty is and has always been a characteristic of the availability of water resources in Catalunya, especially in the inland basins. With a general Mediterranean climate, its location and geography mean that Catalunya displays certain atypical features that result in a very diverse and irregular annual rainfall pattern, with high interannual variability and strong unevenly territorial rainfall distribution even in normal circumstances (Dptmt. de Medi Ambient. GenCat, 2009). The strong regional and seasonal differences in precipitation and soil moisture, characteristics of Catalunya, have important implications for water supply, notably the need for the transfer and storage of water within the different regions to match supply and demand, since demand represents a very high proportion of average inflow (Dptmt. de Medi Ambient. GenCat, 2009).

Depending on the irregularity of the weather, Catalunya suffers strong, highly-localised precipitation, and dry cycles. Drought cycles have been experienced recurrently for many years now. Hence, though not being the norm, droughts are not exceptional in Catalunya. Over the last 20 years (1988-2008) there have been 6 drought alert periods in the internal basins, leading to the adoption of exceptional measures in order to guarantee supply (see Figure 8) (Water in Catalunya, ACA, 2008).

Additionally to the suffered recurrent drought cycles, the case of Barcelona, Catalunya, presents the added problem of a structural deficit in the internal Ter-Llobregat basin region where urban demand, mainly driven from approximately 5.5 million people, 90% of the Catalan population, depend on 5 dams accounting for a total water storage capacity of about 600hm<sup>3</sup>; thus, being demand very close to the available level of resources. Moreover, it is where demanding standards in terms of quality and guarantee of supply are the highest (Water in Catalunya, ACA, 2008). This structural deficit, the fact that domestic use is the highest demand on the internal hydrographic basins and its propensity to suffer drought periods adds further pressure among competition with other economic sectors.

This complexity makes the critical problem of water shortages the environmental issue which has attracted and attracts more popular and political attention than any other one in Catalunya, even in Spain (Kent *et al.*, 2002).

Dammed volumes in Ter-Llobregat system



Figure 8: Dammed volumes in Ter-Llobregat system with indication of drought decrees ordered by the Catalan Water Agency over the last 25 years (Source: Water in Catalunya, ACA, 2008).

### ***Droughts and management approaches***

To add to this complexity is the fact that droughts in Spain, and in Catalunya, had always been managed by emergency. Hence, drought management policies were usually using a crisis management approach by declaring a national and regional drought program to alleviate drought impacts (the Drought Decree of Catalunya), or by transporting water from different rivers or water basins to another location, such as from the Ebro river (Karen, V. 2007). This is instead of creating sustainable short and long term drought mitigation and preparedness policies and plans of action that could reduce vulnerabilities to droughts.

In 2001 the Hydrological National Plan established in article 27 the basis for the planned management of droughts and the development in each basin of a special drought action plan (Romero,R; 2008). Also the following years have seen further valuable information and management experience gained from the drought episodes of 1998-2002 and 2005. This in particular enabled the writing of regulations for the use of reservoirs and the development of numerical management models for the different use systems. It was during the drought of 2005 that the decree passed by the Catalan Government (Decree 93/2005, 17 May) added important improvements to previous approaches. These included: the strict definition of the entry thresholds into each of the three differently defined scenarios to each defined use system, the integrated management of groundwater, research projects to substitute the resource with regenerated waters, and the smooth running of the coordination and communication areas specifically established for this episode (<http://aca-web.gencat.cat>).

For Catalunya, the Catalan Water Agency (ACA) is the public authority with full competence over the entire water cycle for the internal watersheds of Catalunya (planning, administration, control, promotion, regulation and management). It is, therefore, the water authority or watershed body for this public water area. For watersheds shared among more than one community, the Agency shares competence with the hydrographical confederations of the Ebro and Júcar regarding treatment and intervention in the public water domain (<http://aca-web.gencat.cat>). The Agency is regulated by the Legislative Decree 3/2003 which regulates the competences of the Government of Catalunya and of the local authorities in water issues and hydraulic works. It is also regulated by the statutes which describe its organisational structure and system of functioning. Nowadays the governing policies and management concerning water in Catalunya are based on the principles of the Water Framework Directive (<http://aca-web.gencat.cat>).

### ***Changes in water policy***

These developments in Catalunya have taken place in the context of wider dramatic changes in Spain's water policy both in principles and in practical terms in the last twenty years (Garrido and Llamas, 2007). Among the major water policy reforms are the water law reform in 1999, enabling water market transactions (one of the main changes was the regulation of the exchange of water rights, permitting right-holders to engage in voluntary water transfers and the Basin Authorities to set up water banks or trading centres in case of droughts or of severe scarcity problems), the EU Water Framework Directive in 2000 (that implies for Spain a rebalancing of priorities from ensuring water supplies to all economic users to improving the ecological status of all water bodies), the 2001 National Hydrological Plan (NHP) and its subsequent reform in 2004, these two laws approved and repealed a major inter-basin water transfer project, the so-called Ebro water trans-

fer which epitomizes the breakdown of consensus of a century-old way of thinking, planning and executing water policies (Garrido and Llamas, 2007).

Though the old mode of water policy civil engineering projects, based on big water works, were often the main means to meet water demands, as the region's demands outstripped basin storage capacities, so inter-basin water transfers were often favoured as a way to compensate for water deficits. Such was the drive for economic development that the environment was seldom seen as an inhibiting political issue (Garrido and Llamas, 2007). Hence, in the mid-20th century dam construction increased ten-fold, such that today Spain has over 1,000 dams and reservoirs that cover more than 5% of the country's surface area (Downward and Taylor, 2007).

However, from the Spanish National Hydrological Plan (NHP) 2001 with its major Ebro water transfer plan, emerged a conflict between the need of regions to meet their rising water demand and the ability of the natural environment to sustain levels of abstraction without potentially lasting damage. The Plan detailed the transfer of 1050hm<sup>3</sup>/yr of water from the Ebro basin in Catalonia, some to as far as Almería (over 700km away), and was intended to balance national water 'abundance' and deficits. However, as noticed, serious environmental concerns were highlighted, particularly with respect to compliance with European Union (EU) environmental directives, such as the EU habitats directive and the EU water framework directive, the latter of which requires Spain to maintain the good ecological status of the Ebro River. Opponents also noted that the Ebro transfer would further accentuate the already apparent economic disparities that exist between the conceding and recipient regions, claiming that agriculture in northern Spain would suffer to support the seemingly unsustainable thirst for development in the south (Downward and Taylor, 2007).

Worthy of special note is also the fact that this approval and repeal of Ebro's water transfer went along with a political party change in the government. But, while the 2001 NHP was stopped soon after the Socialist Administration came into office in 2004, conflicts subsided but did not disappear (Garrido and Llamas, 2007). Therefore, the implications of the approval and subsequent repeal of such a big project go beyond the discussion of alternative plans to solve water problems, as it tells about the inability to create bipartisan agreements on issues that transcend the 4-year political periods.

In 2004, Spain's newly elected socialist government launched a new water policy named the Programa AGUA, 'actions for the management and the use of water' (Garrido and Llamas, 2007; Downward and Taylor, 2007). In his 2004 investiture speech, Spain's newly elected Prime Minister, José Luís Rodríguez Zapatero, stated, "I want to announce a new politics of water, a politics that will take into consideration the economic, social and environmental value of water with the objective of guaranteeing its availability and its quality, optimising its use and restoring the associated ecosystems" (Downward and Taylor, 2007). Therefore, the AGUA program was forthright in stating its compliance with EU environmental legislation and made specific reference to the EU Water Framework Directive in its stated aim of promoting water savings through full-cost recovery by 2010. However, recognising that water savings alone would not be sufficient to meet changing demands for water in the Mediterranean regions, it emphasised desalination as the means to '*better guarantee its availability and its quality*'; thus it was meant to replace the future supplies of the transfer by twenty large seawater desalination and waste water plants (Garrido and Llamas, 2007; Downward and Taylor, 2007).

### ***The 2007-8 drought and its management***

The last drought period experienced in the internal Catalan basins, from January 2007 until May 2008, has been claimed to be the worst drought ever experienced since 68 years ago. The persistent lack of rainfall, announced by ACA early January 2007 led to the Drought Decree being issued on 3 April, 2007. As stated before, having learnt from previous drought episodes the Decree was passed after a rapid processing of information and amendment in order to include aspects of interest to other ministries of the Catalan Government, water suppliers' associations, communities of irrigation farms affected, the Metropolitan Agency, and other members of the spillover committees, the bodies responsible for managing the regulated systems of the inland basins in Catalunya (<http://aca-web.gencat.cat>).

The Decree came into force on 13 April, 2007, and stated in its text that it should remain in force until 31 December 2007. As by the following 31 December the decline in reserves had not stopped and it was therefore not possible for all of the basins to exceed the limits required to be removed from the category of exceptional status 2, on 27 November 2007 Decree 84/2007 was passed, which was to remain in place until 31 December 2008 unless the reserves of water in all of the basins listed exceed the limits required to be removed from the category of exceptional status 2, at which point it would cease to be valid (<http://aca-web.gencat.cat>).

The Decree organised the management of the drought by setting up an inter-institutional committee made up of members of the Department of Governance and Public Administration; the Department of Agriculture, Food and Rural Action; the Department of Health; the Department of Innovation, Universities and Enterprise; the Department of Economy and Finance; the Department of Home Affairs, Institutional Relations and Participation; the Catalan Water Agency; the Catalan Association of Municipalities and Regions; the Federation of Catalan Municipalities and the Metropolitan Agency for Hydraulic Services and Waste Treatment. The aim of this inter-institutional committee was to make proposals to the Government in terms of actions and additional economic provisions aimed at defraying the costs resulting from the Decree corresponding to services or interventions provided by the different ministries of the Catalan Government.

The Catalan Water Agency (ACA) implemented a series of instruments and management plans that included a variety of measures aimed at reducing water consumption, the recovery of aquifers and the application of the new Decree on Drought 2007, which laid down different scenarios and progressive, selective restrictions in all areas aimed at conserving water reserves in order to prevent a situation of emergency in which restrictions would be applied to domestic water use. Restrictions on non-priority uses and savings in the supply based on the obligations established in the Decree represented a reduction in consumption from the supply network of around 6%, according to figures for 2005. The main instruments and management plans implemented were:

At the end of January 2007, the **Permanent Drought Committee (CPS)** was set up within the ACA as the executive body for monitoring periods of scarce resources and for planning actions to be taken.

The **Drought Management Committee (CGS)** was also set up and was set the double task of drawing up the new Decree on exceptional and emergency measures for the management of probable future periods of drought, along with the writing and processing of the Drought Management Plan.

A **campaign to encourage water conservation** was also launched. ACA opened a web site to inform about the daily progress of drinkable water availability, to explain about measures

taken to reduce water demand and to provide advice to citizens in order to collaborate in reducing water consumption. Furthermore, the website also allowed people to follow the water levels of the Catalan reservoirs through graphs and real images, as well as rain forecast for the next days and graphs of the evolution of the rains in the last decades. Moreover, some pedagogical resources to raise awareness about sound water practices and uses were also available.

In order to carry out its functions, the CGS created the working groups necessary for ensuring that the results were operational and were attained with the agreement of the different users, among which the **Working Group with Suppliers** (ATLL, ASAC, AAA, EMSHTR) should be highlighted, so as to coordinate drought management measures with the emergency supply plans.

In addition, the **Extraordinary Spillover Committee of the Llobregat** was set up in order to implement certain instructions for spillovers and catchment points that were more in-line with the real situation of the regulated reserves of this basin, as an advance implementation of the measures that were later laid out in Decree 84/2007. The reduction of supply to the river Llobregat had been more significant than the reduction of supply to the Ter and this measure aimed to safeguard those uses of water for which the supply came exclusively from reservoirs in the river Llobregat and the aquifer of Vall Baixa and the Llobregat Delta.

The measures to conserve water were laid down in the Decree and were complementary to the actions that could be taken by all citizens in terms of household consumption. They included municipal actions such as reducing the watering of gardens, closing ornamental fountains, reducing the cleaning of streets with drinkable water, controlling the filling of private swimming pools, the use of private springs, the production of municipal contingency plans for municipalities of more than 20,000 inhabitants and those covered by Aigües Ter-Llobregat (ATLL), the publication of edicts and the application of measures on a municipal level, etc (<http://aca-web.gencat.cat>).

The total investment (Tabel 3) made during the drought 2007-08 amounted to 507 M Euros that was distributed in the following way (<http://aca-web.gencat.cat>).

**Table 3:** Investments in different measures during the drought

<b>Measures and investments</b>		
Alleviation Measures	38.5 M€	Water supply by tankers Water conservation campaigns Shipping transport of water
Structural Measures	63.5 M€	New treatment plants Execution of new wells and recovery of wells in disuse
Advanced structural Measures	405 M €	Expansion of Blanes desalination plant Connection with the Cardedeu's drinking water plant Contribution of regenerated water flows to the river Llobregat Division of the <i>salmorras</i> sewer





Figure 9: Level of reservoirs at the Ter-Llobregat basin system (Source: El País, Water Catalan Agency)

By the beginning of spring 2008 shortages were predicted to occur due to the low storage level of water reserves (August and Geiger, WWF, 2008). In late April 2008/early May 2008, dams in the Ter-Llobregat system were at only 22% of their storage capacity (see Figure 9) and the ‘emergency’ scenario threshold was almost reached. However spring rains significantly improved the situation for most of the country ruling out any possible urban water shortages in the following autumn in Catalunya. Had the rains not arrived, urban water shortages could have occurred given the low storage level of water reserves available at the end of April 2008 (which decreased up to nearly 20% the Ter-Llobregat system by March 2008 (see Figure 9).

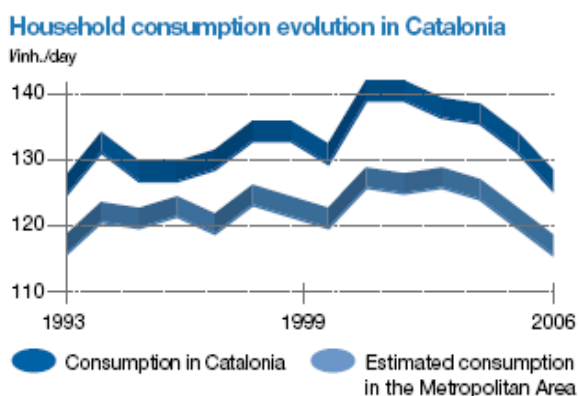


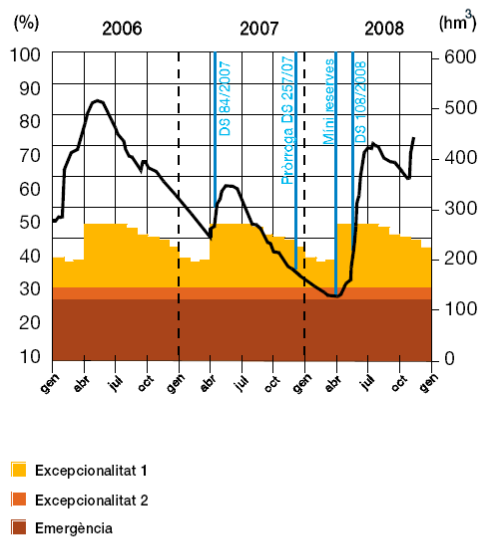
Figure 10: Household consumption evolution in Catalunya from 1993-2006 (Source: Water in Catalunya, ACA, 2008).

It must also be highlighted though, that all the effort during the drought 2007-2008 by either the Catalan Government, through their different applied water conservation awareness campaigns and the citizens contributed to reduce the risk of water limitations in urban supply. Janot Guil stated this fact in his press article in the ABC.es newspaper on 12 March, 2008, with the following headlines: “Each Catalan citizen saved more than 4.000 litres of water in 2007 due to the

‘Drought effect’”, noticing that the Catalan population had been aware of the problem and had translated its attitude into facts (ABC.es Catalunya, 12/03/2008). Actually, according to consumption turnover data from supplying companies, Catalan citizens consumed an average of four per cent less water in 2007 compared to 2006. However, in the Metropolitan Region of Barcelona (MRB) this percentage was six percent less rather than four, a figure which meant a global saving of 30 cubic hectometers, the equivalent to what the MRB consumes in a month.

Within Barcelona specifically the consumption trends are striking. The control in household consumption in the Metropolitan Region of Barcelona (MRB) was set to 110 l/inhab/day in 2007, whereas recorded water household consumption data in 2000 stood at around 210.8 l/inhab/day (see Figure 10). The Spanish water household consumption mean is 148 l/inhab/day (141 l/inhab/day in metropolitan areas). By comparison figures for other European countries include, 126 l/inhab/day in the Netherlands, 144 l/inhab/day in Ireland, 150 l/inhab/day in France, and 250 l/inhab/day in Italy.

## Reserves embassades al Ter - Llobregat



**Figure 11:** Evolution of reservoir levels at the Ter-Llobregat basin system with indication of the three different scenarios considered in the Decree of Drought. (Source: La política de l'aigua: fets destacables del 2008 a Catalunya. ACA, 2008).

foreseen (El País, 31/03/2008), since a responsible government, could not take policy decisions based on the possibility of rain (El País, 31/03/2008).

Given the emergency of the situation, suggestions from the Government were to reactivate transferring water projects (Garrido and Llamas, 2007). This produced again the controversy on the Ebro's or the Rhône river transfer, but this time the government added a new proposal: obtaining water from the river Segre (a tributary of the Ebro).

It was this last proposal of transferring water from river Segre to Llobregat that raised the major criticisms to the Government's management of the situation. The newspaper El País quoted in 31/03/2008: *'the transfer of 20-45 hectometers of water from the Segre to the Llobregat rivers, is not the worst solution. But it has been clouded by the erratic policy of the counselor of Environment, Francesc Baltasar, since it is a transfer proposed by a Government that had advocated the rejection of any transfer'* (El País, 31/03/2008); likewise, Joan Subirats (El País, 29/05/2008) stated that: *'the Government parties, in their management of the problem, contradict many of the good practices that they helped to start'* (El País, 29/05/2008); also a joint press release from different ecologist organisations (04/04/2008), Friends of the Earth, Ecologistas en Acción, Greenpeace, SEO/BirdLife and WWF/Adena, demanded rationality, sustainability and coherence in the water policy; finally Leandro del Moral asserted (18/06/2008) that: *'[...] the rainy spring [...] offers to the Catalan Government the opportunity to prove the truthfulness of its commitment to the new culture of water, as well as its willingness to manage drought, from now on, in a transparent and participative way.'*

In addition to the criticism of political incoherence was the lack of transparency, dialogue and clarity. Criticisms that were supported by the ICV youth associations with their statement of the lack of "transparency, negotiation and clarity" from the counselor when he proposed the Segre river transfer (El País, La Vanguardia, 07/04/2008); similar criticisms were also expressed

However, despite having dealt with this drought episode with more anticipation and preparedness than any other previously experienced, there were limitations. As Joan Subirats remarked in his article from El País (29/05/2008): *'The decisions that were taken previously were pointing at a very positive redefinition and reconsideration of the water management in Catalunya, though not allowing them to face the exceptionality of the moment'*.

Indeed, it was in late April 2008/early May 2008, in view of the seriousness of the situation concerning the water reserves at the Ter-Llobregat system (see Figure 11), that the Catalan Government announced household water restrictions would have to be applied in the coming October. Particularly if the drought cycle was going to continue and water resources from the neighbouring Ebro's basin were not transferred (Del Moral, 2008).

Thus, the immediate problem was: What to do from October'08 until April'09? Which was when the starting of the desalination plant in the Llobregat was

by the The Ecologist Left-Green association (EcoDiario, El Economista, 28/03/2008). Likewise the Mayor of Lleida, the socialist Àngel Ros, declared that the transfer of river Segre, in Lleida, was: *'I think it has been raised with a lack of dialogue and transparency, and with not much opinion from the territory'* and he added *'and it is just the lack of information what entails, on many occasions, to speculation and distrust'* (Europa press, 27/03/2008). Finally Joan Subirats (El País, 29/05/2008) stated that: *'we should consider it to be loathsome the communication that was provided about the decisions revealed and concealed that were being taken. The management of the counselor Francesc Baltasar has been "zig-zaging", rarely clear and almost always badly explained'* and he added *'Coordination and co-responsibility was absent, not only between the Catalan and the Central Government, neither between the different departments of the Catalan Government, nor even the Department of Environment and the Catalan Agency of the Water'*.

To prevent from repeating similar situations in the future, at present, work has already begun on developing the Drought Management Plan (EFE. Hispagua, 17/12/2008).

**Summary:** The Barcelona drought provides a good example of changing governance practices in relation to water management, from an approach which has historically been dominated by a reactionary approach to drought and the use of large-scale structural measures (such as water transfer projects and desalination plants) towards a more preventative approach based upon anticipation and water conservation. Interestingly, we can also see how there are interactions between the different levels of government, with EU policy (such as the Water Framework Directive) being a factor in the reorientation towards more environmentally-sensitive forms of drought management. However, problems occurred when the severity of the situation led to the government reconsidering the 'old' approaches of more structural measures, leading to allegations of inconsistency and 'erratic' policy-making.

## 7.5 Some comparative observations from the empirical examples

These three empirical examples highlight many of the points made earlier about the governance and risk governance of natural hazards; as well as introducing some further questions.

First, the **complexity** of risk governance is clearly evident, in terms of the number and diversity of public and private organisations and interests directly involved in each case and the involved and shifting relationships between different levels; from local, regional and national through to European. Also the impacts of shifts in state-market-society relations since the 1980s are highlighted, for example in the case of the Hull flood, where privatization and regulation of the water industry were implicated, and in the changes in Catalunya water policy over the last few decades. Clearly here the governance of natural hazards cannot be neatly demarcated from (water) governance more generally, or from wider political and ideological shifts.

Second whilst in each case we can see multiple actors operating through a variety of networks and partnership arrangements, the overall **governance regimes in place were not necessarily well-defined**. For example, in Hull most of the actors involved were no more than 'loosely coupled' and there was a lack of collective understanding regarding the exercise of authority and the allocation of roles and responsibilities. While the various actors were clearly reliant upon each other for the delivery of various risk management functions, a purposive system of governance to connect and coordinate those actors and functions had not been created.

There is therefore a substantial gap between the ideals of multi-stakeholder, multi-level governance and its effectiveness in reality.

Third, whereas the research literature tends to characterise **risk governance as a 'neat' process** involving distinct phases of inter-related activity, the empirical examples present a somewhat different picture. In Hull efforts to understand, prevent, mitigate, and recover from the flood were disjointed and often ineffective. In Germany and Catalunya the adoption of different potential risk management measures became politicised and controversial. Decisions were challenged, or reopened after previous apparent resolutions. The circular, iterative and messy character of risk governance is clear, with particular events or episodes having important catalytic effects. The various **temporal dimensions of governance** are therefore interesting to think about.

Fourth, and related, we can see in each case how there are **multiple measures** considered for enacting various forms of risk mitigation or reduction – extending from big-scale engineering (flood defence, drainage systems, water transfers) to actions by individuals and households. Whilst this represents a significant shift from the past where typically only structural measures were implemented, there are significant debates about the relative effectiveness, efficiency and acceptability of different measures, how they should be enacted and the 'mix' that should be pursued in any one case. In particular there are tensions around moving responsibilities towards individuals – in Barcelona this was productive in cutting water consumption, in Germany it is required by law but not welcomed or preferred by citizens, in Hull building household resilience into recovery processes has proved problematic.

Fifth, we can begin to trace the role of **knowledge and its communication** between actors in each case. In Catalunya efforts were made to provide for the improved collection and circulation of technical knowledge about the evolution of the drought, multi-agency committees were established and communication campaigns with the public appear to have had significant impacts in reducing water consumption. In Hull knowledge was in contrast far more problematic, with no ability to forecast the extent or locations of flooding, no specific flood warning being issued, poor coordination and communication between various agencies and problems with access to information for the post-flood inquiry. In Germany the importance of trust between actors was highlighted particularly at a local level, in shaping how knowledge is used and communications are responded to.

Sixth we can ask in each case about the role of **'learning'** in risk governance. There appears to be some evidence of productive learning in operation, for example in the learning from previous droughts in Spain and the recommendations emerging from various inquiry processes after the 2007 floods in the UK. However the processes of actual legislative, institutional or policy reform that relate to such learning can be slow and bureaucratic. Developing a risk governance approach that has a more proactive orientation and the development of processes which encourage self-learning and adaptation could therefore be an important goal. The Hull flood also showed how the householders that were flooded, as well as those involved in the relief efforts, gained a great deal of knowledge from their experiences but that such learning would typically be overlooked or devalued in traditional governance frameworks which emphasize 'expert-to-public' communication.

## 8 Challenges for future risk governance in Europe

This section of the 'living document' is to be developed over the rest of the project. For the moment it briefly highlights some issues for future discussion.

### ***Climate change and risks***

Various forms of natural hazard are expected to shift in their frequency of occurrence, severity and/or locational patterns as climate change takes hold. This has implications not only for the occurrence of natural hazards, but also for the certainty with which such risks can be assessed, and therefore for the knowledge about risks that can be claimed, utilized and communicated. Climate change is becoming part of the handling of natural hazards, but only patchily and the relationship between the governance of adaptation to climate change and the governance of risk is still taking shape.

### ***Social and economic change and vulnerabilities***

The FP6 SCENARIO project considered how potential future processes of change in Europe could be significant to the shaping of future vulnerabilities to hazards in Europe – and therefore potentially important for future risk governance. The project showed how each of the following could be significant:

- as the European population ages there will be more people living with greater vulnerability to the impacts of natural hazard events. The availability of resources to look after and protect this ageing population will be increasingly stretched, particularly in the poorer parts of the EU
- as migration continues, and potentially increases in its scale around Europe, the places where people live will evolve – potentially for the better or worse in relation to natural hazard exposure – and increased cultural mixing will pose greater challenges for those involved in risk communication and developing community preparedness. Climate change may provide a further driver for population movement and migration.
- as some parts of Europe and some parts of the European population become more wealthy, others are likely to remain poor and in poverty. This 'underclass' will continue to be particularly vulnerable to the impacts of natural hazards, especially where they are concentrated in risky areas and where the resources to afford insurance and protection measures are not available. An increasingly economically and socially polarized Europe may find it harder to provide anything like universal standards of protection and resilience.
- as Europe comes out of recession it is likely that the concentration of people, wealth, property and economic activity will continue to be focused on the major metropolitan urban areas, some of which are already prone to various forms of natural hazard. Marginalised and depopulated rural areas in parts of Europe may find it harder as a result to gather the resources to cope with natural hazards.
- as interconnections, infrastructures and networks, such as for those energy, transport and information, become, in various ways, more important to everyday life and economic activity and extended dependencies develop, the systemic impact of disruption and damage may become all the more significant. The systemic independencies this implies has been a strong theme of the IRGC.

### **Institutional and political change**

The credit crunch and global economic recession has raised questions about whether or not we will see a turn away from neo-liberal approaches and towards governments becoming more interventionist and less sanguine about reliance on market processes to achieve societal objectives. This could be interpreted as a move back towards more traditional ways of governing, or at least to some degree a re-balancing of relations between state, market and civil society. On the other hand for governments in major debt as a consequence of supporting financial institutions, a period of severely restrained public spending and streamlining of public services is widely predicted which could push even more strongly towards a 'rolling-back' of the state.

What implications could each of these changes have for risk governance in a European context?

What could they each also mean for social capacity building and for risk communication, perception and education?

Are there other important current and future potential changes that a future orientation to risk governance should be taking account of?

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## 10 Annex 1: Multi-level governance in Europe

**Table 4:** Multi-level governance in managing the risk arising from natural hazards: Some examples from Europe (to be continued)<sup>11</sup>

Country/Region	Multi-level Governance: How is responsibility for the management of hazards distributed between governmental actors at different levels (local, regional, national)?	Individualization of Risk: To what extent are those at risk from hazards being expected to reduce their vulnerability to harm?	Risk Transfer (insurance) (based on Schwarze and Wagner 2009)	Privatization and Marketization: are water utilities in public or private ownership? Have other relevant government functions been passed to private sector or to the market?
England/Wales (floods)	<p><b>National Level:</b> Environment Agency has national overview of all flood risks; coordination and responsibility for river and coastal risks (assessment, structural measures, and non-structural warning, awareness).</p> <p><b>Local Level:</b> Proposed [legislation is progressing] that Local Authorities (LA) should have a new role as lead local flood-risk authority, responsible for bringing together all relevant bodies (e.g. Environment Agency, water companies, district councils) to help manage local flood risk; including surface-water flood risks (previously excluded from legislation). Local Planning Authorities are responsible for floodplain development which must also comply with national policy (PPG25). Local responsibility for disaster response is strategically managed within a tiered national ‘resilience’ framework (e.g. through Regional and Local Resilience Forums).</p>	<p><b>Encouraging:</b> Flood policy actively encouraging (but not requiring) householders and businesses to be prepared and to increase their resilience. Includes some provision of funding support for households.</p>	<p>Pure <b>private insurance</b> with individual premium calculation, i.e. high supplementary premiums for high risk exposures. High market penetration (75 % of private building) but differentiation across the scale of deprivation (i.e. the more deprived are more likely to be uninsured/underinsured)</p>	<p>Water utilities privatized in early 1990s; OFWAT regulates the water industry, controls prices and performance; Much social housing sold to owners in 80s/90s.</p>
France (floods)	<p><b>National Level:</b> Management of flood risks depends on four different ministries (Ministry of Ecology, Ministry of the Interior, Ministry of the Economy and Ministry of Agriculture). Additionally, in June 2009 a new organisation was created (COPRIM) for the prevention of natural hazards;</p> <p><b>Regional level:</b> Councils and authorities have no direct responsibility, but can influence flood risk management indirectly (funding etc.).</p> <p><b>Department level:</b> Prefect is responsible for assistance when a crisis exceeds the capacity of the municipalities.</p> <p><b>Local Level:</b> Flood risk needs to be taken into account in urban planning documents, risks need to be communicated to citizens; protection measures etc. need to be maintained in good condition, responsibility for emergencies.</p>	<p><b>Not expected:</b> Citizens are not encouraged to reduce their vulnerability.</p>	<p><b>Private insurers are obliged</b> to provide comprehensive <b>insurance protection against natural hazards</b>; differentiation in market “insurable” risks and market “uninsurable” risks. To cover the latter all property insurance contracts pay a 12.5% premium above their household insurance; High insurance density almost up to 100 %</p>	

<sup>11</sup> This table was completed with contributions from Jacques Comby, Thierry Coanus (France), Christian Kuhlicke (Germany), Anna Scolobig, Luigi Pellinzoni (Italy), Blaž Komac, Primož Pipan (Slovenia), Matthias Buchecker, Corina Höppner, Michael Bründl (Switzerland), Marta Dinarès Fernandez, Meera Supramaniam (Spain).

**Germany/Saxony  
(floods)**

**National level:** Federal Government and national laws provide general policy framework and laws for risk management and disaster protection. They are further specified on the level of states.  
**State level:** Main responsibility the level of the states: In the state of Saxony, State Reservoir Administration (LTV) is above all responsible for planning and implementation of structural flood protection measures; Saxon State Agency for Environment and Geology (LfUG) is responsible for non-structural measures (e.g. warning).  
**Regional level:** Regional planning authorities provide general framework for land-use.  
**Local level:** Local authorities are responsible for urban land-use planning.  
 Responsibility **for disaster protection** depends on the magnitude of the event (local, regional and national).

According to the Federal Water Law (WHG § 31 a) and the Saxon Water Law (WG § 99) citizens in areas prone to flood hazards are **obliged** to implement mitigation measures in accordance with their possibilities and abilities.

**Pure private insurance;** Risk-based individual Premium calculation in the case of flood damage. Insurance density is under 10 %

**Italy  
(floods)**

**National level:** Environment Ministry determines trends and policies, allocates financial resources and coordinates the action of the Basin authorities (Law 183/89 identified 18 interregional river basin authorities). Department of Civil Protection coordinates the Government's actions relative to forecasting, early warning, support and rescue.  
**Interregional level:** Basin Authorities (interregional level) are in charge of assessment of flood risks and basin plans. Basin plans define flood prevention, mitigation and communication policies.  
**Regional and local level** (Italy is divided into 20 administrative regions, 103 provinces and 8102 municipalities): Regions, Provinces and Municipalities: i) are responsible for the implementation of the measures foreseen by basin plans; ii) prepare programmes for risk forecasting and prevention. The Prefect coordinates contingency plan and emergency response. Local fire brigades and civil protection services implement these plans.

**Encouraging:** Law 225/1992 (Civil protection law), Art. 6. Ordinary citizens share responsibility for civil protection activities (as preparation and response) with a number of public actors at national, regional and local level.

There is **no private insurance** protection against damages caused by natural hazards.

Decree 135/09 privatizes water utilities but still need final approval.

**Slovenia  
(floods)**

**National level:** The state is responsible for risk management according to the water law. Its power is given through the Ministry of Environment, who gives concessions to water companies. They should (and they are the only one who is allowed to) take care of the water courses by cleaning the bushes, building the dykes or dams, reinforcing the river banks etc.  
**Disaster protection:** Distribution between the actors depending on the scale of event: a) municipality level, b) national level. Local event – management is in the hands of

**Not expected:** Citizens are not encouraged to reduce their vulnerability.

People may insure their property (about 40 % of property is insured in Slovenia). Insurance for floods and earthquakes is possible and encouraged, but the decision is left to the owners. Quite large discounts may be available for "packet/all

The majority are in public ownership. In small settlements they are owned and run by local communities, while in towns they are run by public companies that have mostly been established by municipalities. In a few cases due to privatization, municipalities no longer have an influence on them. The majority

local authorities (municipality, major) and the local unit of the civil protection agency; Regional/national events – the national civil protection agency takes over its part, while the local community still holds its part.

inclusive insurances” (property+ flood+earthquake. It may be even lower if car and health are also included).

of these companies work on water utilities (pipelines, waste water) and also on garbage deposition. The only private water utilities have been individual ones that can still be found in small settlements with scattered housing in hilly and mountainous regions (a small spring is used as a water source).

**Spain  
(Droughts)**

**Regional level** Decentralization of water planning and management by Basin Agencies called *Confederaciones Hidrográficas* (CI). For rivers that flow through more than one autonomous community, Intercommunity watershed, the corresponding CI is assigned to administrative effects to the Ministry of Environment, responsibility for local emergency planning with regional/local emergency services, and disaster response.  
**Local level:** Intra-community watershed, the case when the river runs entirely within the territory of an autonomous community, the water administration of the respective autonomous community is then responsible for local emergency planning with local emergency services and disaster response (as in the case of Catalunya).

**Encouraging.** Awareness campaigns provide advice to citizens encouraging them to collaborate in reducing water consumption. The campaigns provide information about the daily progress of drinkable water availability.

Comprehensive **legal compulsory insurance** against damage caused by geo-atmospheric hazards and other extraordinary events (e.g. terrorist attacks). Insurance density is high up to around 80 %

In 2002, about 42% of the population in Spain was supplied by public water companies; 40% by private water companies which operate under concession contracts with the municipalities, 11% by mixed public-private companies; 6% by owned local corporations and the 1% left, by other supplying management systems.

**Switzerland  
(Alpine Hazards)**

**National level:** The legal framework for dealing with natural hazards are the Federal Forest Law 1991 (SR921.0 Bundesgesetz über den Wald, Waldgesetz, WaG und Verordnung, WaV), the Federal Water Engineering Law 1991 (SR721.100, Bundesgesetz über den Wasserbau, WBG und Verordnung, WBV), and the Federal Law for Landuse 1979 (SR700 Bundesgesetz über die Raumplanung, RPG und Verordnung, RPV). In addition, the federal offices publish recommendations to support cantons and communities in their duties.

**Regional level:** Additionally, there are cantonal forest laws and water engineering laws. In some cantons, river semi-public corporations are responsible for the maintenance of the protection infrastructure (e.g. Schwellengemeinden). Cantons are responsible for hazard mapping

**Local level:** In principal, communities are responsible for the safety of their citizens; they are supported by the cantons, who are responsible for protecting humans and high assets. Communities are responsible for putting the results of hazard mapping into practice.

**Encouraging:** Building insurers are encouraging private house owners to take mitigation measures. There are guidelines for architects, civil engineers and house owners on how to protect buildings against gravitational and meteorological hazards

**Public-private insurance:** All home owners must insure against natural hazards; two different systems: In 19 of 26 Swiss cantons there is a public cantonal property insurance (KGV); in the other 7 so called GUSTAVO cantons this protection is offered by private insurers. Private insurance premiums are around double as high as public insurance. Insurance density around 100 %

Water utility largely in public ownership with some exceptions of private companies (eg. Wasserwerke Zug). During recent 5 years or so some public providers have transformed into cooperations with public and private shareholders, this is especially the case for multi-utility providers