LOCAL COMMUNITIES AT RISK FROM FLOODING

Social Vulnerability, Resilience and Recommendations for Flood Risk Management in Europe

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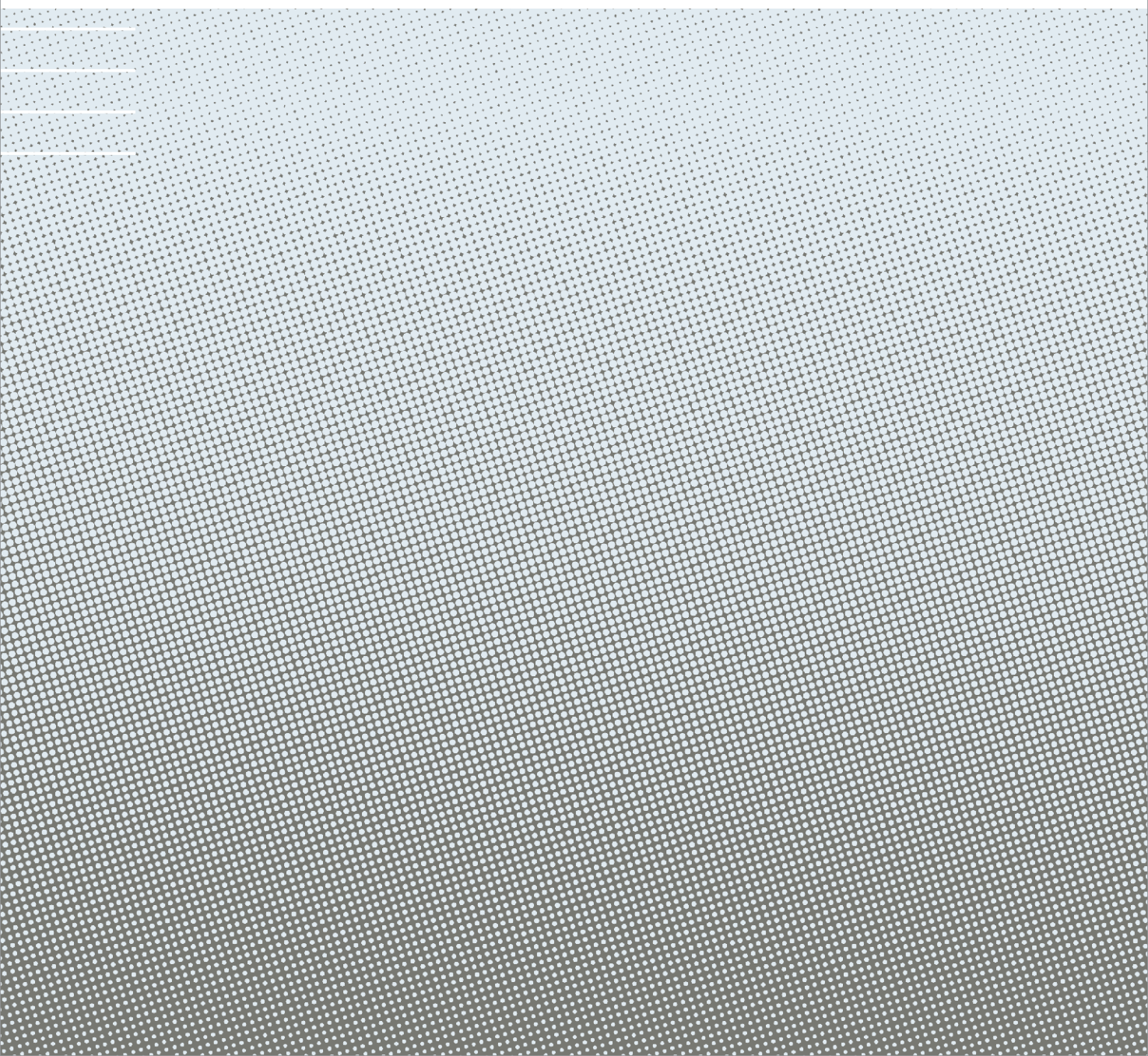

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INTRODUCTION: ABOUT FLOODSITE

Time and again, disastrous floods threaten regions and the people living there, their belongings and the basis of their existence. Flood risks, causes and consequences recently regained public awareness not least from the major floods in the European basins of the Oder, the Tisza and the Elbe as well as from the disasters in New Orleans, Bangladesh or Indonesia during the 1990s and early 2000s. It would appear that just as measures of technical defence (i.e. dikes, walls etc.) had been elevated, greater material losses also incurred. Our work is based on the assumption that flood hazard mitigation as well as a sustainable and participative development of floodplains is only feasible when the perspective of the people living in flood-prone areas, their risk perceptions and behaviour are known, taken into consideration and accepted.

This brochure summarises the main findings from a European cross-regional and cross-cultural investigation within Europe's largest flood-related research project ever: the Integrated Project FLOODsite *(Integrated Flood Risk Analysis and Management Methodologies),* which was funded by the European Commission in its 6th Framework Programme. Between 2004 and 2009 FLOODsite brought together scientists and stakeholders from a wide range of research, administration, policy and economic bodies. Its efforts covered the physical, environmental, ecological and socio-economic dimensions of flooding. More than 250 people from 37 partner organisations in 13 European countries contributed to the 35 work packages (›Tasks‹) of this project. Together they conducted case studies on a number of pilot sites, among them the Elbe, Tisza, Scheldt, Thames and Ebro river catchments as well as the German Bight (for a summary: Samuels et al. 2008).

▸ www.floodsite.net

The authors want to thank Volker Meyer and Frank Messner (UFZ), Maura Del Zotto and Giovanni Delli Zotti (ISIG) as well as Amalia Fernández-Bilbao (formerly FHRC) for their valuable support.

The authors of this brochure worked together on FLOODsite *task 11*, which explicitly focused on the people at risk without neglecting the viewpoints of the decision-makers in charge. Under the heading ›Risk perception, community behaviour and social resilience‹ we carried out regional analyses in Germany (the Mulde river), Italy (the Adige/Sarca and Tagliamento rivers) and the United Kingdom (with a focus on the Lower Thames river). Our research provided evidence on the perceptions and actual behaviour of the people at risk, about appropriate, accepted and possible mitigation measures from a bottom-up perspective as well as people's vulnerability and resilience to flooding.

We would like to share this knowledge with a wider audience, and therefore decided to summarize the key findings of our research in this booklet. Its multi-language character reflects some of the cross-cultural synergies and differences that we faced over the course of this work. We will continue our efforts in the near future (2009–2012) within the new European research project CapHaz-Net (*Social capacity building for natural hazards – Toward more resilient societies*) as well as the ERA-Net CRUE project RISK MAP (*Improving flood risk maps as a means to foster public participation and raising flood risk awareness: Toward flood resilient communities*).

► www.caphaz-net.org

► www.risk-map.org

We hope that you will both enjoy and benefit from reading this booklet!

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Leipzig, Gorizia and London in May 2009

01 Scope of the research

01 SCOPE OF THE RESEARCH

1.1 Research concepts and methodological approach

The reason for undertaking research in three different European regions was to better understand the impact of floods on communities. The questions that primarily concerned us were: How do communities located in flood-prone areas live with their rivers, how do they perceive floods and which interpretations about floods do they develop? Do communities have specific capacities and capabilities to prepare for and recover from disastrous flood events?

When applying the term ›community‹ we do not want to pretend to be able to identify unique and shared characteristics of a culturally-integrated and homogeneous group. It is rather that the term underlines that specific spatial contexts, different types of local knowledge and collective memories are important to better understand how local communities adapt to and cope with floods.

Research concepts

We approached the aforementioned questions with three scientific concepts; that is *social vulnerability, resilience, and risk construction*.

With regard to *social vulnerability,* we went from the assumption that the material damages and mental or physical health consequences of a major flood disaster cannot solely be explained with reference to the event itself and its management. Therefore, we took into account the specific circumstances and applied an event- and phase-sensitive approach allowing an analysis of how people were prepared for, coped with and recovered from a flood that they experienced (see the text on the right).

01 Mulde flood 2002
Photographer
André Künzelmann

SOCIAL VULNERABILITY

In our research, we defined social vulnerability as a specific form of social inequality in the context of a so-called disaster and applied the definition put forward by Blaikie et al. (1994). They understand vulnerability as »the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard« (ibid., 9; similarly Wisner 2004). This approach considers both the social and temporal dimensions of a disaster, which is its main strength from our point of view.

We also assumed that specific groups of people were less able to prepare for, cope with and recover from a flood event than others. In *social vulnerability* research these groups are usually identified by referring to classical socio-economic and demographic variables (such as age, income, education, gender etc.). We considered this understanding as a hypothesis, which we wanted to test with regard to different contexts and phases of a particular flood (for critical perspectives on the concept of vulnerability see also Handmer 2003, Furedi 2007). Therefore, we developed a *long-term perspective on floods* by taking into account the periods ›before‹ and ›after‹ the water inundated a residential area. We differentiated between three different phases of a flood, which overlap and feed into one another (see also Fig. 1):

- The phase of ANTICIPATION covers the entire time-span before the crisis itself. The situation spans from a vague – or even no – idea of a potential flood to a possible flood warning or even a call for evacuation and individual preparedness activities (e. g. taking documents and securing valuables). The disastrous event has not yet happened but behaviour is increasingly directed towards it. Uncertainty about how to interpret the situation predominates among the actors involved (De Marchi 1995).
- RESISTANCE AND ABILITY to cope are necessary from the point where the water starts to inundate people's homes and their belongings among other things. At this point the flood is taking place and people are responding to it. Support from social networks and rescue become central. However there is still a great deal of uncertainty regarding flood damages and further impacts, the next steps to be taken as well as the time horizon of the flood event.

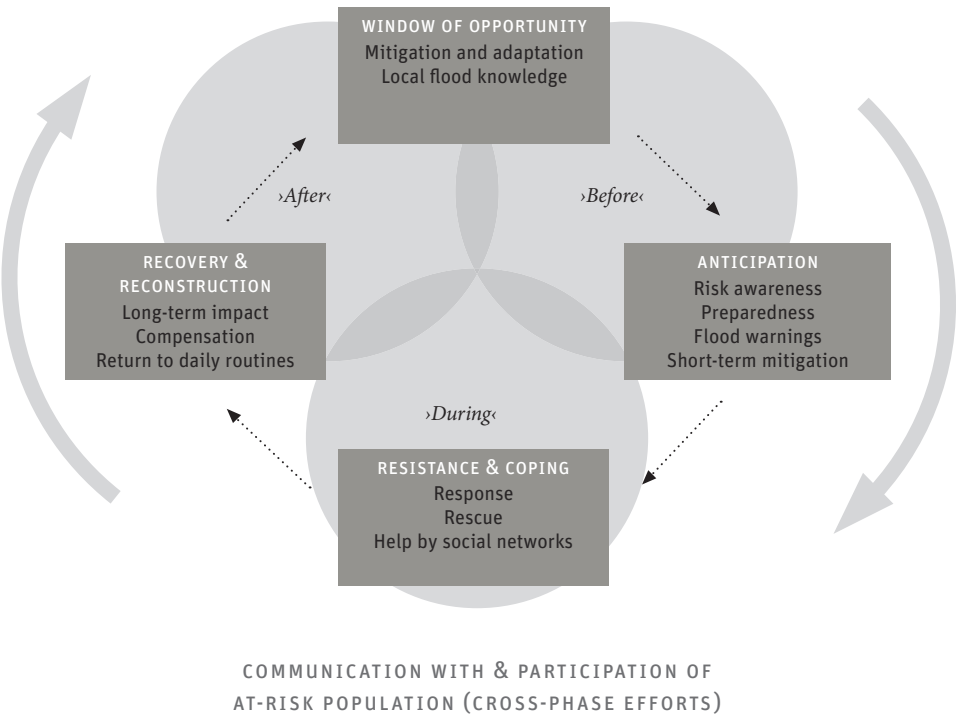


Fig. 1 Main subjects of research arranged according to the different flood phases
Source: authors' considerations

- RECOVERY AND RECONSTRUCTION relate to the post-flood situation, mainly the efforts to return to some form of ›normal‹ life and the long-term consequences with respect to physical and mental health. This phase also includes dealing with material and physical damages. In the research literature, the time-period immediately after an event is also referred to as a »window of opportunity« (Kuhlicke and Drünkler 2004) indicating – though not undisputed (Felgentreff 2003) – that this is the best moment for sensitising the necessity of public and private mitigation measures.

Although Fig. 1 indicates a circle of these phases recurring time and again, there are changes going on. Ideally, a NEW ANTICIPATION PHASE would differ from the one described above, in a way that reflects learning and social change or, to put it differently: a new hazard cycle begins which is not a repetition of the one previously experienced. COMMUNICATION (such as warning or information on public and private measures) and the INVOLVEMENT OF THE PUBLIC in flood risk management are cross-phase issues and highlighted as such in Fig. 1.

Another key concept that we applied was *social resilience*. The notion of resilience meanwhile gained considerable attention in the field of disaster research. Although the term originated in the field of ecology in the 1960s and 1970s (Holling 1973, Folke 2006), in the meantime it has also been identified within the social sciences as an approach that helps to better understand the occurrence of surprising events and attempts to give advice on how to expect – paradoxically – the unexpected. However, during our research it became increasingly apparent that it is not an easy concept to work with.

Within the discourse on hazards and disasters resilience is quite often treated as the counterpart of vulnerability: »Vulnerability comes from a loss of resilience« (Downing and Franklin 2004, 1). In this argument, vulnerability mostly relates to the exposure of individuals/groups, while resilience refers to the internal capacities of individuals/groups to absorb disturbances and stress. However, it has already been highlighted that people's capacities are a central part of their social vulnerability. Therefore one might ask: What is the analytical additional value of the concept of resilience if it is merely considered to be the »flip-side« (Folke et al. 2002, 13) of vulnerability? Apparently, there is none. Such a view is even dangerous as it »lends to circular reasoning: as a system is vulnerable because it is not resilient; it is not resilient because it is vulnerable« (Klein et al. 2003, 40). We therefore argue that vulnerability and resilience should be differentiated (see the text on the right).

02 Mulde near Erlln
Photographer
André Künzelmann

SOCIAL RESILIENCE

We adopted the FLOODsite definition of social resilience as »[t]he capacity of a community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organising itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures« (FLOODsite 2005, 25).
In contrast with social vulnerability, this definition highlights the nature of the concept as a collective one – in other words: we understand social resilience as a property of communities, rather than of individuals (Adger 2000, Folke 2006).
What is more, we accepted the normative notions of the concept and understood it as a »desired state, which it is sought to achieve or maintain« (Green 2004, 324). This also implies that social resilience might be understood as something to be ›built‹ or ›enhanced‹, thus as a policy objective.

We expected social capital (mainly social networks) to be an important dimension that enhances social resilience as well as community attachment and trust in local authorities. While the importance of these social networks – such as »social capital« (in the sense of Bourdieu 1986) – at the moment of the crisis is rather evident and the topic of many newspaper stories on ›unprecedented solidarity‹, their role before and after a disastrous event is often neglected.

Neither vulnerability nor resilience are something given or constant. Social vulnerability to flooding might be influenced by reducing damage potentials and increasing capacities to prepare for and cope with a hazard. In the context of the flood risk management paradigm, private preparedness measures are regarded as being particularly crucial for reducing one's vulnerability. However, by personally undertaking any such measures implies that people are aware of the risk of being flooded, that they attribute a certain significance to these measures and that they are able and willing to adopt such measures.

All of these perceptions and behaviours are related to people's *risk constructions*.

By using this term we want to underline that risk is neither a process that is simply attributed to natural processes (e. g. a hazard) nor an objectively given constant. Rather, risk is understood as being socially constructed in the sense that is influenced and even defined by norms and values as well as belief systems (institutions; more generally see: Kuhlicke 2008).

03 Everyday life
at the Mulde River
Photographer
André Künzelmann

Risk construction is a broad term, which also comprises issues that are referred to more frequently such as risk awareness and subjective perceptions of risk-related issues. These social constructions of risk both influence the application of preparedness measures and the assessment of public flood protection and management by the people at risk.

It is imperative that social vulnerability, resilience, and people's risk constructions are understood and explored for effective flood risk management. Most obviously, it is the residents at risk, their social embedding, their behaviour and capacities that set the conditions for a hazard to become a disaster.

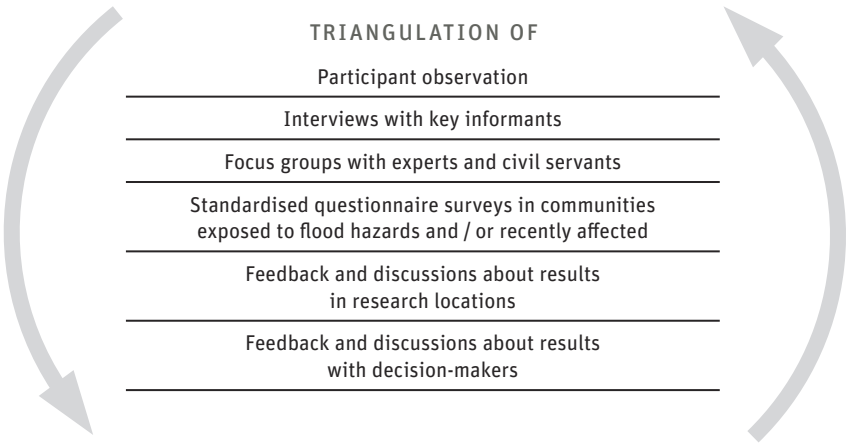


Fig. 2 Methodological approach
Source: authors' considerations

Methodological approach

We explored the aforementioned issues and their implications for flood risk management with a broad range of social-science methods. Most importantly, we applied the methodological principle of triangulation of standard and non-standard (›quantitative‹ and ›qualitative‹) methods. The purpose behind using triangulation is to investigate a certain problem from different perspectives as well as to integrate the viewpoints of different groups of actors. Standardised questionnaire surveys were our main method of data gathering. This step was preceded by interviewing decision-makers and focus groups in the regions and the communities that were under investigation. After having interpreted the preliminary research results, we discussed them with members of the communities and/or with the authorities in charge of flood risk management. The results of this triangulation process were used for permanently refining our data interpretations (Fig. 2).

Finding an appropriate understanding of key concepts is but one step in research. Another indispensable one is to make such a concept measurable – to operationalise it. To meet this aim, we defined hypothetical indicators of social vulnerability (based upon a broad literature review; Tapsell et al. 2005). Table 1 displays these indicators and their use in the case studies.

Table 1 Hypothetical indicators of social vulnerability and their use in the case studies
Source authors' compilation based on indicator set (Tapsell et al. 2005) and the country reports (De Marchi et al. 2007; Tunstall et al. 2007; Steinführer and Kuhlicke 2007)
Remark The brackets for some of the ticks mean that these indicators were not measured directly.

Hypothetical indicators of social vulnerability (+ = hypothetically higher / - = hypothetically lower degree of social vulnerability)		Use of indicators in:		
		German case study	Italian case study	Case study England and Wales
Location- / event-related indicators	Research location	•	•	
	Place of work / residence		•	
	Risk index (high risk area +)		•	
	Depth of flooding	•		•
	Serviced by flood warning system (yes -, no +)	(•)		•
	Length of evacuation	•	•	•
	Flood impact	•	•	•
Socio-demographic indicators	Age (children and very elderly +)	•	•	•
	Gender (women +)	•	•	•
	Employment (-), unemployment (+)	•		•
	Occupation (unskilled +, skilled -)	•	•	•
	Education (lower level +, higher level -)	•	•	•
	Family / household composition (large families +, single parents +, one-person households +)	•	•	•
	Household income	•	(•)	•
	Tenure	•	•	•
	Long-term illness or disability (+)	•	•	•
	Length of residence (new migrants +)	•	•	•
	Social networks' type	•	•	
Physical structures	Type of housing (single storey accommodation +, mobile housing +)			•
	Number of rooms (low number +)			•
	Rural / urban (high density urban +)	(•)		
Community structures	Levels of risk awareness and preparedness (low +)	•	•	•
	Previous flood experience (no experience +)		•	•
	Fire brigade / civil protection membership (yes -)	•	•	
	Community embedding		•	
	Social networks' location	•	•	
	Support index (low +)	•	•	
	Trust in authorities (no +, yes -)	•	•	

1.2 Case studies in Germany, Italy and the United Kingdom

Between 2005 and 2007 we conducted three in-depth investigations at the regional level in the river catchments of the Vereinigte Mulde (Germany; Steinführer and Kuhlicke 2007), the Adige/Sarca and the Tagliamento rivers (Italy; De Marchi et al. 2007) and at the national level in England and Wales (with a regional focus on the Lower Thames; Tunstall et al. 2007 and Fig. 3). In the German and Italian research locations, primary investigations were carried out. Due to the existence of a high number of previous similar studies in England and Wales, existing survey data were reanalysed.

The Vereinigte Mulde case study (Germany)

Along the Vereinigte Mulde, a tributary to the River Elbe, we selected three locations in the Saxon section of the river which were heavily flooded in August 2002. Similar to many other parts of the Elbe catchments this area experienced very heavy rainfall and thereafter severe inundations. The Elbe flood of 2002 was the single most expensive flood in German history amounting to economic losses of 11.6 billion Euros (Schwarze and Wagner 2007). However, most damages were compensated for in the aftermath of the flood. When all of the donations and reimbursement payments are added together, then it is safe to say that more than 100% of the damages were compensated for (Mechler and Weichselgartner 2003). This is without example in German flood history. After the flooding of the River Rhine in 1993, by contrast, only 10% of damages incurred there were compensated for by the authorities (DKKV 2003).

04 Collection of newspaper articles on the 2002 flood in Grimma Photographer Annett Steinführer

The village of *Sermuth* (with approx. 600 inhabitants in 2005) is divided by the Zwickauer Mulde and both old farm buildings and new buildings are to be found close to the river. *Erlln* is a village located at the end of a single one-way road just behind the dike, that gives the impression of an ›autarkical‹ community. It consists of 33 properties and has some 90 inhabitants. Erlln is situated at the Freiberger Mulde, close to the confluence of the two Mulde Rivers to the Vereinigte Mulde. The village was completely inundated by the 2002 flood with water levels that were some 85 cm above the dike level. *Eilenburg* is a small town that had a population totalling about 17,500 in 2005. The historic centre (located on an island) was, together with other parts of the city, inundated due to several dike breaches during the 2002 flood. Economic losses amounted to some 200 million Euros. In the aftermath of the flood, Eilenburg received one of the most costly flood defence systems in the whole of Saxony. Different measures such as the back-spacing of dikes at a bottleneck, the heightening of a bridge for widening the water passage below and flood protection walls, as well as improved and heightened dikes were applied. A self-portrait of the municipality on the Internet depicting these different measures led to the statement: »In 2009, Eilenburg will be flood-proof as far as this is possible by human means«.

Fig. 3 Location of the case studies in Europe

The Adige/Sarca and Tagliamento case study (Italy)

The six research locations from the Italian case study are in the upper Adige/Sarca river basin in the Trentino Alto Adige Region, and in the upper Tagliamento river basin in the Friuli Venezia Giulia Region. The main types of flooding in these areas include both torrential processes – with flash floods and debris flows – and fluvial processes with river floods. Four of the sites are located in the province of Trento (*Bocenago, Roverè della Luna, Romagnano,* and *Vermiglio;* with between 300 and 1,800 inhabitants according to the 2001 census), where all flood events occurred either in November 2000 and/or in November 2002. In most sites, evacuations were necessary. The site in the province of Bolzano/Bozen (*Vipiteno/Sterzing;* with almost 6,000 inhabitants) is located in a high flood risk area, where the last destructive flood occurred in July and August 1987. Finally, the site in the Friuli Venezia Giulia Region, *Malborghetto-Valbruna* (with approx. 1,000 inhabitants), was hit by a severe flash flood in August 2003 (for more detail of that case study: Scolobig 2008, Scolobig et al. 2008).

	German case study	Italian case study	Case study England and Wales
General approach	Primary investigation	Primary investigation	Reanalysis of data from previous surveys
Standardised questionnaire survey	N = 404 (2005)	N = 686 (2005/2006)	N = 2,124 (2002–2005)
Semi-structured interviews with affected citizens and/or decision-makers	N = 22 (2004–2007)	N = 18 (2005)	
Focus group interviews		6 focus groups (2005)	

Table 2 Methods and material used in our research

The Lower Thames case study (UK)

The focus of the Lower Thames case study was on re-analysing, or further secondary analysis of the data from some earlier studies conducted by the Flood Hazard Research Centre. The data sets were very different from the case study data in the German and Italian studies, which focused on particular localities and particular flood events. Two of the data sets used cover a range of locations (up to 30) and many different flood events in England and Wales between April 1998 and December 2001. A further data set focused on a particular location along the River Thames and a single key flood event in 2003. The data were originally collected between 2002 and 2005. They were analysed for other purposes, based on particular theoretical frameworks and have been reported elsewhere (RPA/FHRC 2004, Tunstall et al. 2006, Tunstall et al. 2005, McCarthy et al. 2006). This therefore allows some limited comparison with data from the German and Italian case studies. The UK studies focused on individuals and households rather than upon communities. Moreover, there is very little data on flood risk constructions across the studies. However, the re-analysis provided a valuable opportunity to investigate issues and relationships not considered in the original analysis.

02 Principal results and their relevance for practice

02 PRINCIPAL RESULTS AND THEIR RELEVANCE FOR PRACTICE

From the broad range of research topics and results from the three European case studies, this chapter presents the most important findings. We structured the empirical findings around five topics that we consider to be important for both research and practice. Therefore we consolidate the results and draw lessons from our investigations (and from previous work of many other scholars) by formulating *recommendations for flood risk management with communities at risk* (Steinführer et al. 2008 a and 2008 b). The recommendations are aimed at addressing professionals in the field of flood risk management and research at the European, national, regional and local levels. They cover five areas that we regard to be particularly relevant:

- Flood risk awareness
- Flood preparedness
- Flood risk communication
- Participation in flood risk management
- Social vulnerability

The recommendations are all structured in the same way: First, we single out central problems, then we provide a number of (mostly positive) recommendations *(›things to do‹)*, which are, thirdly, supported by some more concrete background information in order to sensitise the whole range of problems *(›things to be aware of‹)*.

In the first part of this chapter we want to explicate the European context that is currently shaping flood risk management strategies on the national level, by specifically considering the European Floods Directive and its stipulations for involving the general public (see also the text on the right).

In the European Floods Directive (EU 2007), the call for *public involvement* reads in the following way: »Member States shall encourage active involvement of interested parties in the production, review and updating of the flood risk management plans …« (Article 10). It is not only in this document but also generally agreed upon that a stronger involvement of citizens in risk management efforts is important, since

- it may contribute in raising risk awareness and disaster preparedness,
- it presumably enhances the acceptance of prevention measures and
- the local population may provide knowledge that is fruitful for risk prevention efforts.

THE EUROPEAN FLOODS DIRECTIVE

The »Directive 2007/60/EC on the assessment and management of flood risks« entered into force on 26 November 2007. It requires EU member states »to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. […] Its aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. […] The Directive applies to inland waters as well as all coastal waters across the whole territory of the EU. […] Member States shall [take] into consideration long term developments, including climate change, as well as sustainable land use practices in the flood risk management cycle addressed in this Directive.«

► Quoted from http://ec.europa.eu/environment/water/flood_risk/ (last access: 5 May 2009).

As for European and national flood policies, this might be considered as encouraging a fundamental change, which acknowledges the crucial role of the local communities (those at risk and those regularly or recently affected) and in the meantime imposes new demands upon them: namely to allocate responsibility for risk reduction and protection top down also on individuals, rather than to regard it as exclusive to the public sector (a process which we call »privatisation of risk«; Steinführer et al. 2008 b). Indeed, those at risk are expected to contribute to improved flood protection by implementing personal preparedness measures by their own initiative and, to a considerable extent, at their own expense. The German Water Management Act *(Wasserhaushaltsgesetz, WHG)*, for instance, makes this very much explicit: It stipulates that every citizen who is prone to flood hazards has to implement mitigation measures that are in accordance with his possibilities and abilities (WHG §31a; in more detail: Kuhlicke and Steinführer 2006; similarly for the Netherlands: Terpstra and Gutteling 2008, with considerations on social justice and fairness for the UK: Johnson et al. 2007).

05 Destroyed Pöppelmann Bridge in Grimma after the 2002 Mulde flood
Photographer André Künzelmann

What is seldom reflected on with respect to the involvement of the public is the question of *whether the public is aware of this stipulation and whether* (and how) *the public wants to get involved* if at all. In the following sections we will question this assumption along with many others in order to contribute to a more realistic picture of the people and communities at risk from flooding.

06 Different media to raise flood risk awareness
Photographer André Künzelmann

2.1 Recommendations concerning flood risk awareness

The problem

A low level of risk awareness of people living in flood-prone areas is usually a central challenge for flood risk managers. It is assumed that with a higher degree of awareness people would also be better prepared for a future flood.

RECOMMENDATIONS

- Keep the issue hot in times of a ›no flood event‹.
- Find regular, repeated ways to raise flood risk awareness.
- Use different modes and media to raise flood risk awareness (such as newsletters, handouts, leaflets, text messages, radio and TV spots etc.).

Background and illustration

There are many problems in life that preoccupy people. Based on our studies and in line with other research, we want to highlight that being potentially affected by a (major) *flood is just one such worry among others*. What is more, in comparison with threats such as diseases, the loss of a close relative, financial misery, unemployment and the like, flooding is not always regarded as the most important one. Quite naturally, with a growing time-interval to the last major event, flood hazards take a back seat. Thus, people don't think about rising waters all of the time. Not least, one cannot live (or would not want to live) in constant worry. Thus, even in the case of a flood event as severe as the 2002 Elbe flood in Germany, the respondents in our investigations ranked flooding (three years after the event) in comparison with other concerns at only a middle position.

Therefore, information, instructions, awareness campaigns of different kinds and via a broad range of media are necessary to generate and ›update‹ flood risk awareness. Good examples of this are to be found in many places across Europe. However, they must not be a ›one-off‹ effort. From many discussions with flood risk professionals we know that once they have provided this kind of information to the residents at risk, they often feel that they have done their job. However, we want to highlight an issue, which is – at least – as important as the information provision itself: the *regularity or repetition of such activities*.

But isn't it true that in future flood risk and flood hazard maps – as stipulated by the European Floods Directive – will solve the problems of information and awareness?

Flood risk and flood hazard maps are indeed crucial instruments for flood risk management, and in many European towns and regions they already exist and are at least in some places available to the public. However, we think that these maps won't solve all of these problems. On the contrary, new impediments might come about, such as:

- the restricted abilities of quite a few people at risk to understand and Interpret these maps in the way that they are intended,
- the socially and age-group selective use of web-based technologies (in many places the maps currently in use are to be accessible via the Internet),
- the necessity of permanently updating these maps at all spatial scales, which is both time- and manpower consuming (not so much an issue in England and Wales as there is a national body responsible for flood risk management),
- the suggestive power of such maps (pretending to display ›the reality‹),
- the economic disincentives of making these maps easily accessible to the public since flood risk professionals fear that information about risk levels could accentuate anxiety, decrease property value and conflict with economic development plans, as well as
- the political disincentives of making these maps easily accessible to the public due to different, more permissive policies in the past, e. g. with respect to building licences (reported to us e. g. in Italy).

► www.risk-map.org

One has to be aware that it will take time to change people's perceptions and attitudes, and one cannot expect them to change overnight. One has to allow for an accommodating period that will need to be supported by programmes of information provision and awareness-raising. The next step is to find *diverse channels* (e.g. local newspapers, leaflets, text messaging, radio or TV adverts) through which one can inform people about the risk of flooding, the first and most important actions that should be undertaken in case of a disastrous event and the contact details of those people responsible for flood risk management.

Yet, *many of the residents* living in flood-prone areas are *indeed aware of the risk* of being flooded either once or even several times over the course of their lives. This is not based on pure theoretical or statistical knowledge about flood probabilities but usually these people dispose of personal flood experience or local knowledge from within their communities. In some cases (e.g. the disastrous 2002 flood in Germany) this experience was related to a bitter lesson of having lost almost everything after around 30 years with no major flood event.

A repeated research finding relates to the fact, that – if people had already experienced a major disastrous event – they found it hard to believe that it was happening (again). Hence flood risk managers also need to take into account a widespread resistance to imagine that one might be personally affected (again). Even when the residents at risk acknowledge the possibility of being victims of a future flood event, according to our surveys they tend to concentrate on possible damage to assets and personal belongings rather than considering the possibility of personal injuries or loss of life. We would like to emphasize that a reaction of denial is not necessarily pathological and in some cases it may even help to maintain one's mental sanity. It can be ruinous however, if it impedes taking positive action.

2.2 Recommendations concerning flood risk preparedness

The problem

The residents at risk are expected to improve their preparation for a flood, i.e. to personally take measures that make them more prepared for the event of a flood (e.g. by modifying the physical structures of their homes, changing their behaviour or taking out flood insurance). Yet, researchers and professionals alike report on very low levels of preparedness.

RECOMMENDATIONS

- Have realistic assumptions about people and their willingness and interest to get involved in activities that make them more prepared.
- Use the period immediately after a flood event as a ›window of opportunity‹ to convince the residents at risk to apply measures which are appropriate to their type of housing and their budget.
- Find regular, repeated ways of informing people about different kinds of preparatory measures.
- Use different modes and media to inform people about different kinds of preparatory measures (newsletters, handouts, leaflets, text messages, radio and TV adverts etc.).
- Investigate financial or other mechanisms that help to assist those on low incomes to be able to afford to adopt these measures.

07 Filling sandbags in 2002 before the flood came
Photographer André Künzelmann

Background and illustration

Flood risk *awareness does not necessarily translate into preparedness*. Whether or not residents at risk take actions is complex and based on many factors. People need to be made aware of the possible impacts of flooding on their households and communities *and* have the appropriate resources available with which they can respond. Overall they have to perceive the *need to act*. Thus, while awareness (or feeling endangered) relates to attitudes, preparedness has to do with actual behaviour – and as is the case with many issues in life, there is no linear or direct route from risk awareness to mitigation behaviour. Our research provided evidence that adopting personal preparedness measures, being informed about public flood protection, feeling prepared and, finally, being prepared are four distinct issues, each of which require different approaches in flood risk management. There is no direct, immediate, and univocal link between perceptions, opinions, and attitudes on the one hand and actual actions and behaviours on the other. Although this finding is not surprising, it is necessary to stress it time and again.

There is a broad range of possible preparatory measures, such as

- measures with respect to buildings and furniture (such as elevation measures, shielding with water barriers, waterproof sealing, fortification of cellars and foundations, adapted interior fitting and furnishing of those storeys endangered by a flood, safeguarding of hazardous substances), behavioural measures (such as having the necessary medicine, sufficient food, sandbags as well as important phone numbers at hand but also being aware of reliable sources for gathering information) or,
- when applicable, flood insurance.

However, *not all of these measures will be applicable to all residents at risk.* It is more likely that their implementation will depend on the age and type of home, the household budget, the composition of the household and the age of its members, personal preferences etc. Therefore – as in the case of flood risk awareness – *regular and repeated information* concerning the necessity for and the costs and diversity of preparatory measures is needed. One should also be aware that people are restricted by their interest and willingness to inform themselves about flood mitigation efforts, both with regard to personal and to public measures.

What is even more important, from our point of view, is that residents of flood-prone areas continue to *regard public institutions* as being first and foremost *responsible for their safety*. While the demand that individuals should take responsibility and adopt private preparedness measures seems relatively well established within the scientific community and among flood-risk managers, the results of our research show that among the residents at risk *traditional assumptions about flood protection* predominate: They are very much in favour of technical solutions (›structural measures‹), and in their point of view flood protection needs to be borne by public authorities (similarly: Brown and Damery 2002, Terpstra and Gutteling 2008). Many of our survey respondents perceived far-reaching personal preparedness measures as an overload. In spite of personal flood experience (and even disastrous events in recent years), most respondents take no steps to protect their dwellings mostly because they don't know what to do, have little confidence in available preparatory measures, believe they live in a safe area and rely on structural devices (e. g. dikes).

In fact, they rather perceive ›others‹ as a major guarantor of their safety i. e. the municipality, the relevant agency, the region, the state etc. (depending on the respective political environments in their countries). These findings highlight the fact that flood risk management also requires new partnerships and synergies, and that simply placing greater responsibility on private shoulders is likely to be ineffective.

A further problem likely to arise in this context

Flood risk professionals frequently reported to us that the presence of protection work induces what they called a *›false sense of security‹* in the residents of flood-prone areas, which also hinders them from taking up private preparedness measures. To rephrase it more pointedly: Such measures are counterproductive for private flood preparedness.

RECOMMENDATIONS

- Pay attention to the convincing power of structural devices – they communicate very powerful messages, which range from a high degree of safety to a confirmation of being at risk, according to the type of work and local circumstances. In other words, they are never ›neutral‹, but subject to different interpretations by those at risk.
- Demonstrate creatively to what extent such measures will contribute to safety and what their limits are.
- Do not assume that those living in protected areas acknowledge or understand that they are at risk.
- Include those in protected areas in awareness-raising campaigns.

08 Newly constructed flood wall in Erlln 2009
Photographer
André Künzelmann

Background and illustration

Firstly, dikes, dams, embankments and barriers as well as effective risk management agencies *make people feel fully protected* in case of flooding. Secondly, such measures themselves – for example, a dike constructed to protect a certain area from a flood with a certain statistical return rate – *change the return rates of floods* as they intervene in the regular pattern and shift floods into more rarely occurring events. Furthermore, it is not only the technical measures, but also *agencies' good performance*, which encourages residents' progressive disengagement with a culture of self-protection, and reduces personal preparedness and the sense of responsibility. Put together, the vulnerability of an area may not necessarily decrease in the long run. On the contrary, it may even rise as the capacity of professional risk management results in a *decreasing capacity of the communities at risk*.

However this *›false sense of security‹* is not least produced by heavy investments in structural devices which are, quite logically, predominantly conducted after major flood events – thus in the afore-mentioned ›window of opportunity‹, when the residents at risk are supposed to be sensitised for taking private preparedness measures. Why should they feel motivated to think about sandbags, waterproof sealing or permanently raising furniture in the face of structural protection measures, which are impressive by their very presence, their apparent technical perfection and costs? Heightened dikes, renovated flood walls, new barriers, etc. – all of these technical devices promote safety and are powerful symbols on which people count on for a secure future. In addition, the dominant rhetoric, which accompanies the planning and construction of such work is one of full control and related safety as the huge investments involved must be justified. Of course there is an occasional remainder of ›residual risk‹, but such words are technical jargon, and their chance of getting people's attention is low against the powerful alliance between the rhetoric of ›don't worry, everything is under control‹ and the symbolic power of the structural work.

We therefore recommend *creatively making transparent the limits of such protection work*. One example could not only be to show the water level marks from past flood events in the areas at risk, but also to indicate up to which point existing and planned technical measures offer safety – and what a higher flood wave would mean. This would also allow people at risk from plain floods to be able to better judge the minimum level to which the water will ascend when the dikes are overtopped. By putting up signs that indicate the level of safety, the expression of a ›residual risk‹ becomes easier to understand when it is manifest in the surrounding environment.

Finally, it is not only structural devices but also *other acts of getting back to ›normality‹* carried out by public authorities that signal this sort of control and contribute to the ›false‹ sense of security felt by the residents at risk. The *reconstruction and rehabilitation of public buildings* after major disastrous events is one such symbol. All invitations of prudence to residents in the same area will go unheard. Moreover, any attempt to establish building constraints will appear unintelligible to private actors, as an undue and unjust limitation of personal rights. Public perplexities (and possibly opposition) are more likely to occur when public money is invested in brand-new construction work, whereas it may be less pronounced in the case of historical buildings that existed before destructive floods were experienced. What seems irrational from a certain perspective is indeed quite reasonable from another.

09 Flood marker in Grimma reminding of the 2002 Mulde flood
Photographer André Künzelmann

2.3 Recommendations concerning flood risk communication

The problem

In spite of different types of information available on flood risk and the ›right‹ behaviour at the time of the crisis or before, residents at risk still complain that they do/did not know that they live/d in an area at risk, how to behave in cases of emergency, and which mitigation measures to take.

RECOMMENDATIONS

- Communicate in an understandable way with the people at risk: the easier, the better.
- Avoid purely technical and statistical expressions like ›flood return period of 1:50/1:100‹ etc.
- Do not use statistical probabilities in flood risk communication at all. One alternative way could be to explain in more detail concepts, assumptions, procedures and rationale for calculations.

Background and illustration

For the people living in flood-prone areas, *flood risk is not a statistical number* but rather seen as either something concrete, related to their personal experience, or indirectly presented to them, e.g. through oral communication from their families and communities or by flood markers. Flooding then is something which might happen or which happened in the past, irrespective of its statistical frequency distribution. In any case, it is not something to be talked about in numerical terms like ›flood return period of 1:100‹ (in German *HQ 100* or *hundertjährliches Hochwasser,* in Italian *piena con periodo di ritorno centennale).* Therefore it is meaningless to talk to the residents at risk in such a technical way.

We are even convinced that it is much more than just meaningless: this kind of information does actually convey the *wrong idea*. Indeed, it is not people's misunderstanding when they (as reported frequently) believe that a 100-year flood occurs only once in a century and that after such a major event it will not happen again for another 99 or 100 years. Rather, it is an inappropriate use of the technical jargon, which is unreasonably expected to be understood by outsiders. The same applies for communicating water levels: Only a few people can probably imagine the possibility of a flood wave of 8 or 10 metres height coming down their street. But then, again, such information is meaningless. Rather, it is better to find a significant building or well-known landmark in your area, of a similar height and to compare the maximum flood wave with this landmark.

To sum up: the question ›Do people understand me‹ is a good start, but you can do better by asking a different question (to yourself first and then to your audience): ›Am I making myself understandable / understood?‹ It is better to put oneself in the shoes of those who are listening and *avoid certain technical expressions*.

A similar problem refers to ›risk language‹

Many of those in charge of flood risk management feel they betray their mission by admitting (to themselves and to others) that they cannot take on ›full responsibility‹ and grant ›total safety‹. Thus they fear losing credibility by admitting danger.

RECOMMENDATIONS

- Speak of both: risk and safety.
- It is easy to talk about risk – people are used to risks in many decisions in their life.
- Yet, sometimes a positive message might be more appropriate to provoke a certain kind of behaviour (e.g. the application of private preparedness measures): then it would be more apt to use ›safety‹ rather than ›risk‹.

Background and illustration

Actually, the fear of losing credibility is not completely unrealistic: in those communities where structural devices collapsed during an event, residents held local authorities responsible for the inadequacy of the protection measures in which they had decided to invest large sums of public money. Moreover, flood risk managers and professionals fear that risk (and especially residual risk) communication can cause undue alarm and anxiety among residents.

Flood risk professionals should however be aware *that people do not necessarily ask for ›complete safety‹ or ›zero risk‹*. Most people are used to living with risks and taking them in their everyday life: for them to feel safe does not necessarily equate to them being convinced that a particular risk is at a negligible level. Some of our research findings point in this direction and reveal that residents do not equate ›being safe‹ with ›being without risk‹.

Thus, risk and safety are not perceived as two faces of the same coin. It would rather seem that the two terms drive the respondents' thoughts in two different, almost opposite directions. For many of our interviewees, discourses about danger and risk point towards the hydro-geological phenomena in general, the characteristics of the flood events (especially their unpredictability and uncontrollability) as well as structural devices and the physical presence of protection works. Safety, on the other hand, is associated with civil protection services, voluntary fire brigades, as well as with informal networks and local ties among other things. Safety is basically about trust in the people in charge and in reliable persons. These findings suggest that *reframing the risk- into a safety-communication context* can be a way out. Such positive messages (i. e. ›you can improve your safety if …‹) elicit tendencies towards pro-active behaviour and acceptance, while negative messages (i. e. ›you are at risk if …‹) elicit flight and rejection.

A further problem likely to arise in this context

Even if flood risk professionals provide information: how adequately (with regard to the intention of the message) will they be understood by the residents at risk?

RECOMMENDATIONS

- Collect feedback on the messages issued (e. g. on content, tone and language) via personal discussion with the people at risk or by (professional) questionnaire surveys.
- Approach ethnic minorities – provide material in their mother tongues and collect feedback.
- Use ›peace times‹ to check communication weaknesses and design appropriate exercises and drills to improve awareness and effectiveness.

Background and illustration

One can never be sure that information or a message is at all considered by the addressees and whether it is interpreted in the way its authors intended. Even children's games make use of this (think of the game of ›Chinese Whispers‹ which kids call *Stille Post* in Germany and *telefono senza fili* in Italy). The message issued is not necessarily the one that is received. Thus, *checking the comprehensibility* of the messages issued is as important as the messages themselves. Such translation work back and forth is worthwhile in order to come to a deeper understanding of mutual perceptions and to avoid incorrect assumptions or reciprocal stereotypes.

Although less relevant in the areas that we investigated (with the exception of one region in Italy), the question of ethnic minorities and their involvement in flood risk management activities is becoming increasingly important – in particular in large urban areas. Since *language is the key to inclusion* in many societal spheres, in multi-ethnic areas messages and materials (also the ones mentioned above: text messaging, radio and TV adverts, etc.) must not be restricted to the language of the majority.

2.4 Recommendations concerning participation in flood risk management

The problem

In many policy fields, including flood risk management, there are increasingly more demands for the participation and involvement of ›the public‹. But what is a good participation process? How should it be organised? Who should be involved?

RECOMMENDATIONS

- Stakeholders need to be involved in decision-making processes at time scales and levels in line with their interests, knowledge and skills.
- At the beginning of such a process, its desired outcome should be made clear.
- Ensure that sufficient time and resources are allocated for engaging stakeholders.

10 Informing the public about the new flood wall in Grimma 2009
Photographer
André Künzelmann

Background and illustration

Supported by our empirical evidence we think that the widespread assumption that people want to get involved in flood risk management is too optimistic. A large number of residents maintain that technocratic top-down approaches prevail in flood management and feel that technicians are the most influential actors in decision-making processes. Most of those surveyed don't feel as though they are involved in decision-making processes and, as highlighted above, tend to assign responsibility to agencies that are in charge of flood prevention and mitigation. Such attitudes start off a *vicious circle*. Public authorities feel the pressure from the residents' demands for assistance and, by positively responding to this, further amplify its magnitude and the citizens' tendency not to invest in prevention (in more detail: Scolobig and De Marchi 2008, Kuhlicke et al. 2009).

To break the vicious circle of the delegation of responsibility for safety to the authorities, an effort needs to be made to ensure the involvement of local stakeholders in the design of flood management plans and to periodically update them in order to ensure their continued effectiveness and validity. A major prerequisite is the following one: any discourse and/or practice involving public participation must start with a clear and honest statement of its desired outcomes. This essential step is often neglected (either out of inexperience or bad will) with extremely negative consequences for the whole process. Outcomes may be broad or restricted, general or specific, but it is essential that they are made transparent and explicit. Furthermore, they must be shared by all of those involved. This of course does not mean that the desired results of a process are the same for all stakeholders – in fact the opposite is usually true.

Such processes of public involvement will also enable a factor to be incorporated, which is often forgotten about: *local knowledge*. We are strongly convinced that another relevant aspect, which triggers a decrease in people's adaptive capacity is the progressive erosion of local knowledge, due to several reasons including migration phenomena and the decrease in traditional lifestyles. This knowledge concerns not only the territory (morphology, dangerous areas, etc.), but also its management (abandonment or exploitation, checking and monitoring, etc.) and is fundamental for the local residents not only to understand how to behave in emergencies, but also to foresee and mitigate dangerous events.

Its progressive erosion resulted in residents losing the skill to recognise environmental signals, making them less and less able to enact self-protection behaviour. Among others, a wealth of information can be found in historical documents, which provide insight into re-discovering forgotten sources of hazards, identifying old and new critical spots, and understanding how human factors interact with physical ones to increase or reduce vulnerability. In the Italian case studies, we found that some toponyms in local dialects hold the memory of past events. These are, for example, *Prà dell'acqua* (water meadow) in Romagnano, *March* (rotten soil) in Bocenago and *Slavini* (flash floods) in Roverè della Luna. Thus local knowledge does exist, but it has to be dug out from sources, which are not normally accessed by risk assessors: libraries, newspaper collections, local archives of different kinds, elderly people's memories, etc. In this perspective, risk assessment becomes an integrated activity, which is open to different kinds of knowledge, be it disciplinary or not.

2.5 Recommendations concerning social vulnerability

The problem

There are some social groups that are unlikely to be reached via leaflets, text messaging, or radio adverts – people who are not equally prepared for, able to cope with and recover from a flood event. In the scientific discourse these people are usually referred to as ›vulnerable‹.

RECOMMENDATIONS

- Identify and keep a register of vulnerable groups and housing within local areas.
- Provide targeted flood warnings to those at risk and particularly vulnerable as well as specific awareness-raising activities targeting those groups with low awareness or access to information.
- (If applicable) encourage people to take out flood insurance, particularly groups with a lower social status and improve the ways that insurance claims and property repairs are dealt with.
- Provide grants for home-owners to purchase flood protection products.
- Build your efforts upon and along existing social networks in the communities at risk.
- Do not rely solely on glossy brochures or the Internet – people might not find and read that type of information and they might not be interested in these types of media or have access to them.

11 Affected citizens after the 2002 flood in Grimma Photographer André Künzelmann

Background and illustration

According to the literature on social vulnerability, it might be expected that specific social groups within communities, e.g. households with young children, older residents, the terminally ill or disabled, the unemployed, and those on lower incomes or with a lower social status would be particularly vulnerable during flood events (Tapsell et al. 2005, Steinführer et al. 2009). Although we found some evidence for groups that are more vulnerable at certain time frames of the flood, the situation is much more complex. Taking into consideration a statement by John Handmer (»We are all vulnerable«; Handmer 2003), time and again the question arises of who is vulnerable to a certain flood event in which way and how, then, to approach these groups.

Two main findings need to be highlighted: Firstly, *no single social variable or set of social variables* could be identified *to explain all aspects* of vulnerability, coping and resilience of local communities and social groups. Different social factors come into play in the different phases of a flood event and, more particularly, affect specific behavioural responses and coping activities.

Neither was there one single social group (the very old, the very poor, those without a social network etc.) who proved to be particularly vulnerable throughout all of the phases. Moreover, in many cases the relation between vulnerability and the underlying social structures did not turn out to be linear. Secondly, *context is key:* both local conditions and event specifics need to be taken into account to explain social vulnerability to flooding – it is thus always rooted in specific spatial, socio-economic, demographic and cultural contexts.

Therefore, we do not present a list of vulnerable groups here – because they do not exist as such (see our context-related findings however in the case study reports: De Marchi et al. 2007, Steinführer and Kuhlicke 2007, Tunstall et al. 2007).

However, our research findings also indicate that *some social groups within communities are more likely to need specific targeting and support* (although these not necessarily do under all conditions), i. e.:

- those with no previous flood experience,
- those who have recently moved to an area,
- those with a lower social status,
- those living alone without a social network outside of their home,
- households with terminally ill or disabled members,
- those living in vulnerable housing (like caravans or bungalows), and
- older people (in particular the very old not living in homes for the elderly).

In any case, it is important to stress again that this is *no universal catalogue* – the specific local / regional, socio-economic, demographic and cultural contexts should always be taken into consideration. Indeed issues that appear to us as identical might only seem to be, simply because we don't question them. One prominent example in a European perspective refers to tenure: while in some cultures renting a flat is considered to be a sign of a lower social status – and, thus, of greater vulnerability –, in others (e. g. in Switzerland or in Germany) rental housing is widespread also among the middle- and partly even the upper classes. Hence, home-ownership has distinct meanings and implications in different cultural backgrounds.

When examining vulnerability, the social embedding of the people at risk also needs to be taken into account. People are part of different *social networks,* both of informal and formal character. The former are made up of kin, friends, neighbours and the like, the latter comprising of all connections with official organisations, such as local authorities, civil protection agencies or voluntary fire brigades etc. In many of the cases that we investigated, many or even the most useful behaviour indications for the residents at risk came from formal sources, either alone or in combination with informal networks. Most help provided during and after a major flood event was by informal networks, hence by family and relatives, as well as voluntary organisations.

Thus, in ›peace times‹ these networks should also be *specifically addressed and involved* in the course of flood risk management and communication efforts. Very often they dispose of specific stocks of non-disputed knowledge – they simply ›know the river‹ and ›know what to do‹. In the case of a major flood event, such knowledge might also be counter-productive (as the affected residents behave in a way in which they behaved in a past flood event because they cannot imagine a situation worse than the ones that are already stored in their personal knowledge; Kuhlicke 2008), It is worth making such implicit knowledge explicit and sharing it with a greater community – and also learning about its potential limitations.

03 ZUSAMMENFASSUNG DER DEUTSCHEN FALLSTUDIE

3.1 Das FLOODsite-Projekt

Das Forschungsprojekt FLOODsite vereinte zwischen 2004 und 2009 Wissenschaftler, politische Entscheidungsträger und Praxispartner von 37 Institutionen aus 13 europäischen Ländern. FLOODsite steht für ›Integrierte Hochwasserrisikoanalyse und -managementmethoden‹. Das Projekt wurde im Rahmen der Thematischen Priorität ›Nachhaltige Entwicklung, globaler Wandel und Ökosysteme‹ des 6. Forschungsrahmenprogramms der Europäischen Kommission gefördert.

▸ www.floodsite.net

FLOODsite entwickelte eine Methodik zur integrierten Hochwasserrisikoanalyse, die sowohl die hydrologischen und ökologischen als auch die ökonomischen und sozialen Dimensionen von Hochwasserrisiken und hydrologischen Extremereignissen berücksichtigt. Diese wurde im Rahmen des Projektes europaweit in verschiedenen Fallstudien und Pilotgebieten getestet. FLOODsite gilt als wesentlicher Baustein zur Umsetzung der im November 2007 verabschiedeten europäischen Hochwasserrisikomanagementrichtlinie (EU-HWRM-RL).

FLOODsite war in fünf *Themenbereiche* gegliedert:

1. Risikoanalyse: Ursachen, Verlauf, Verwundbarkeiten (Vulnerabilitäten)
2. Hochwasservorsorge und nachhaltiges Management: Katastrophenmanagement, Maßnahmen vor und nach dem Hochwasser
3. Technologische Integration: Entscheidungsunterstützung und Umgang mit Unsicherheit
4. Pilotanwendungen in europäischen Flussgebieten und Küstenzonen
5. Wissenstransfer, Ausbildungsmaterialien und -module, bewusstseinsbildende Maßnahmen

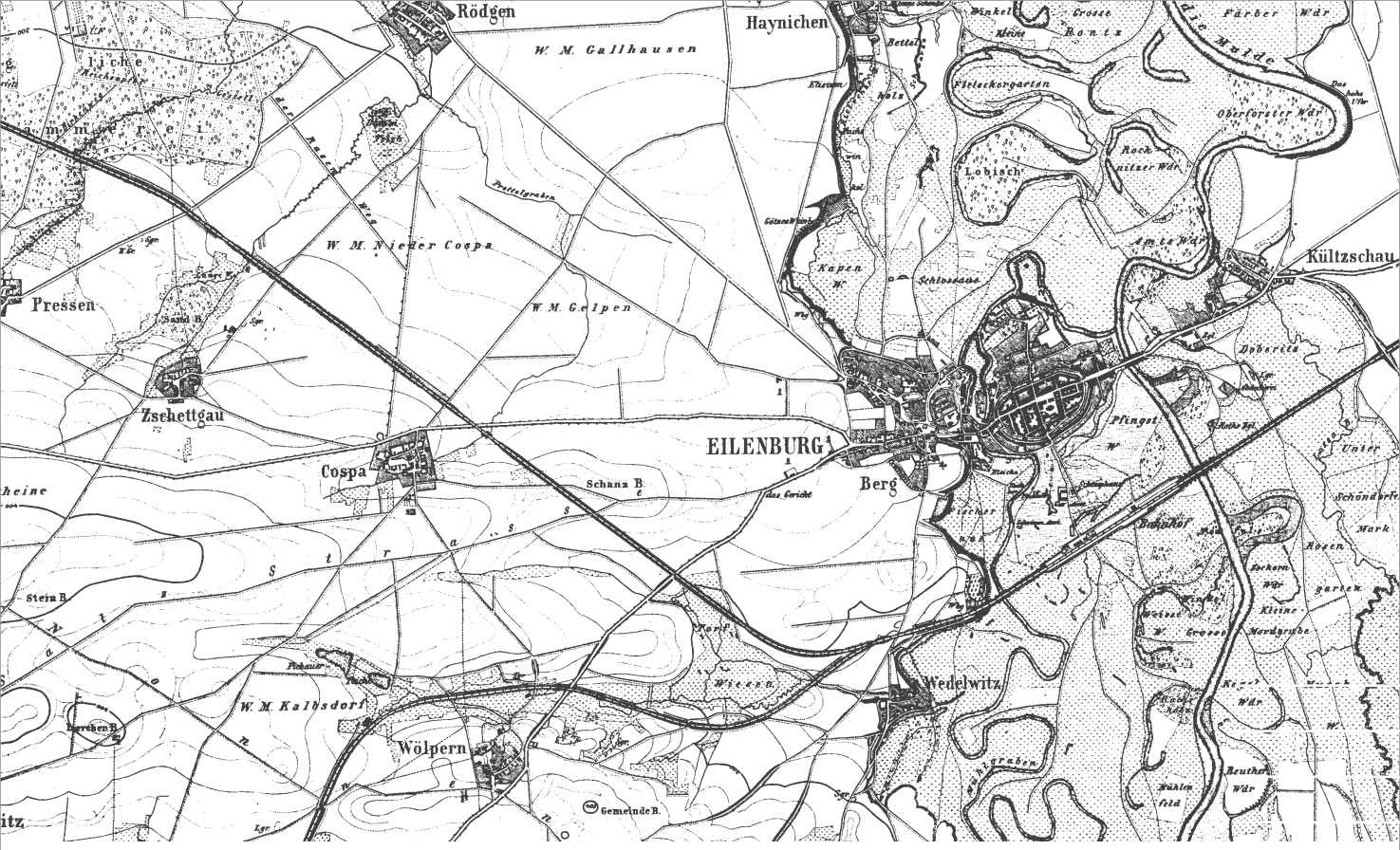
Diese Themen ebenso wie die Zusammenarbeit innerhalb des Projektes und seine Koordination wurden in 35 Arbeitspaketen *(tasks)* bearbeitet. Eines davon war *task 11*, dessen Ergebnisse diese Broschüre zusammenfasst. Dieser *task* befasste sich vorrangig mit der Perspektive der vom Hochwasser betroffenen Bevölkerung, ohne jedoch die Sicht von lokalen und regionalen Entscheidungsträgern zu vernachlässigen.

Task 11

Die sozialwissenschaftlichen Analysen des FLOODsite-Projektes interessierten sich für die Risikowahrnehmungen und -konstruktionen der in Überschwemmungsgebieten lebenden Bevölkerung sowie ihre Vorsorgemaßnahmen und Bewältigungsstrategien in der Folge extremer Hochwasserereignisse. Dabei standen die Wechselbeziehungen von subjektiven Risikowahrnehmungen und individuellen Vorsorgemaßnahmen einerseits sowie die Bedeutung verschiedener sozialer Netzwerke während und nach einer Flut andererseits im Mittelpunkt. In einem internationalen Vergleich zwischen Deutschland (Vereinigte Mulde), Italien (Adige / Etsch, Sarca und Tagliamento) und Großbritannien (Themse) wurde Wissen über angemessene, akzeptierte und mögliche Vorsorgestrategien entwickelt und diese mit der Sicht von Entscheidungsträgern gespiegelt. Empirische Grundlage der Untersuchungen waren Experteninterviews, Fokusgruppengespräche sowie standardisierte Haushaltsbefragungen und narrative Interviews mit betroffenen Einwohnern.

Die beteiligten Forschungspartner waren:

- Flood Hazard Research Centre (FHRC), Middlesex University, London, Großbritannien
- Istituto di Sociologia Internazionale di Gorizia (ISIG), Programma Emergenze di Massa (PEM), Gorizia, Italien
- Helmholtz-Zentrum für Umweltforschung (UFZ), Leipzig, Deutschland.



12 Messtischblatt für Eilenburg und die Muldeauen von 1856, erstellt von der Preußischen Landesvermessung

3.2 *Zentrale Ergebnisse*

Die Untersuchungen des UFZ bezogen sich auf das Flussgebiet der Vereinigten Mulde, dessen Anliegergemeinden im August 2002 von der so genannten »Jahrhundertflut« betroffen waren. Im Dezember 2005 wurde eine standardisierte Haushaltsbefragung in der Stadt Eilenburg (ca. 18.000 Einwohner, gelegen an der Vereinigten Mulde) sowie in den Dörfern Sermuth (Gemeinde Großbothen; etwa 400 Einwohner, am Zusammenfluss von Zwickauer und Freiberger Mulde) und Erlln (Gemeinde Zschadraß; ca. 90 Einwohner, an der Zwickauer Mulde) durchgeführt. Die Befragung konzentrierte sich auf Aspekte der Risikowahrnehmung, die konkrete Betroffenheit durch das Hochwasser 2002 und dessen Folgen sowie der Bewertung von privaten und öffentlichen Schutz- und Vorsorgestrategien (N = 404; Fragebogenrücklauf: 76 %). Zur Vertiefung einzelner Themenbereiche wurden in der Folgezeit zusätzlich leitfadengestützte Experten- und narrative Interviews mit Betroffenen durchgeführt.

Das Hochwasser 2002: soziale Betroffenheiten und Überraschungen

Viel ist in der Forschung und von Praktikern in den vergangenen Jahren über die »Verwundbarkeit« (Vulnerabilität) unterschiedlicher sozialer Gruppen in Bezug auf Extremereignisse wie Hochwasser geschrieben worden. Auch wir gingen in unserer Studie zunächst davon aus, dass es vor allem sozial benachteiligte sowie alte und kranke Menschen waren, die verwundbarer waren gegenüber dem Hochwasser 2002 als einkommensstärkere und besser gebildete Gruppen sowie Menschen mit einem großen Netzwerk aus Verwandten, Freunden und Bekannten. Und tatsächlich fanden sich für diese Hypothesen einzelne Belege – allerdings längst nicht so eindeutig und ausgeprägt, wie zuvor erwartet und, ebenso wichtig, nicht in allen Phasen des Hochwassers. Anders gesagt: wir fanden *kein soziales Merkmal und kein Bündel an Indikatoren*, das *per se auf Verwundbarkeit* gegenüber einem extremen Hochwasser schließen ließe. Um es an einem Beispiel darzustellen: Zwar trugen Menschen im Alter von 65 Jahren und mehr schwerer als andere Altersgruppen an den gesundheitlichen und körperlichen Folgen der Flut 2002, doch lässt sich nicht feststellen, dass sie weniger Informationen oder Unterstützung im Verlauf des Hochwassers erhalten hätten.

Die stärksten Unterschiede, die wir feststellen konnten, waren die zwischen Mietern und Wohneigentümern (sowohl in Bezug auf ihre Schäden als auch ihr eigenes Handeln vor, während und nach der Flut) sowie die zwischen den drei untersuchten Gemeinden selbst. Das bedeutet: Hochwasser ist ein Ereignis, das *stets lokal* in seiner konkreten Ausprägung, in seiner Vorgeschichte, in den darauf bezogenen Erinnerungen und Bewältigungsstrategien zu betrachten ist. Was für Erlln gut ist, muss in Eilenburg noch lange nicht funktionieren.

Im Falle des Hochwassers 2002 ist aber auch seine Nachgeschichte zu berücksichtigen: Untersuchungen belegen (Mechler und Weichselgartner 2003), dass durch öffentliche Gelder und private Spenden mehr als 100 % der Schäden finanziell kompensiert worden sind – einmalig in der deutschen Hochwassergeschichte. Drei Jahre nach der ›Jahrhundertflut‹, zum Zeitpunkt unserer Untersuchungen, gab es kaum Unzufriedenheit mit oder Kritik an der Verwendung dieser Gelder unter den Betroffenen – auch dies dürfte ziemlich einmalig sein.

Umgang mit dem Hochwasserrisiko: Vorsorgemaßnahmen und Verantwortlichkeiten aus Sicht der Betroffenen

Wie stets nach solchen Ereignissen, war auch im Nachgang des Hochwassers 2002 viel von einem anderen Umgang mit den Flüssen, der Bebauung ihrer Auen und dem Hochwasserschutz die Rede. Auch die Bewohner der hochwassergefährdeten Gebiete wurden aufgefordert, eine aktivere Rolle zu spielen und sich besser selbst zu schützen. So ist seit Mai 2005 das Gesetz zur »Verbesserung des vorbeugenden Hochwasserschutzes« in Kraft, das das Wasserhaushaltsgesetz (WHG) unter anderem um das Prinzip der Eigenverantwortung ergänzt. Demnach ist Person »die durch Hochwasser betroffen sein kann, […] im Rahmen des ihr Möglichen und Zumutbaren verpflichtet, geeignete Vorsorgemaßnahmen zum Schutz vor Hochwassergefahren und zur Schadensminimierung zu treffen …« (WHG § 31 a, Abs. 2). Nahezu wortgleich findet sich diese Formulierung in der Ländergesetzgebung, so im Sächsischen Wassergesetz in der Fassung vom 1. September 2004 (§ 99, Abs. 3; ausführlicher dazu: Kuhlicke und Steinführer 2006).

In ihrer Selbsteinschätzung halten sich die Betroffenen im Jahr 2005 im Vergleich zum Hochwasser 2002 zwar tatsächlich besser auf ein ähnliches Ereignis vorbereitet, doch ist es nur ein geringer Teil (ein Fünftel der Befragten), der sich gut oder sehr gut gewappnet sieht. Auffällig ist die relativ große Zahl derjenigen, die sich weder gut noch schlecht vorbereitet sehen bzw. gar nicht wissen, ob sie überhaupt vorbereitet sind. Damit verbunden ist ein bemerkenswerter Aspekt: Die Mehrheit *sieht gar keine Möglichkeit, sich privat vor Hochwasser zu schützen*. Als Beispiel mag hier die Antwort eines der Befragten gelten: »[Vorsorge] finde ich unsinnig. Wenn das Wasser 2,61 m am Haus steht, was soll da vorgebeugt werden?« Wiederum andere halten den Schutz vor Hochwasser für eine Aufgabe der öffentlichen Hand. Ein nicht unerheblicher Teil der Befragten stößt sich auch an der vagen Formulierung des neuen sächsischen Wassergesetzes, und fragt: »Was bedeutet ›im Rahmen des Möglichen und Zumutbaren‹?« bzw. »Was sind geeignete ›Vorsorgemaßnahmen‹?« Die Antwort auf die Frage, wer für die Kosten des öffentlichen Hochwasserschutzes (z. B. Deiche, zusätzliche Überschwemmungsflächen) aufkommen soll, ist vor dem Hintergrund des bisher Gesagten ebenso nicht überraschend: Vor allem bei Bund und Land, nicht aber beim Einzelnen, werden die finanziellen Verantwortlichkeiten gesehen.

13 Mulde
bei Grimma
Fotograf
André Künzelmann

Allerdings tragen zu dieser Zurückhaltung bei den Bewohnern der gefährdeten Gebiete auch die Entscheidungsträger aus Politik und Verwaltung selbst bei. Nicht selten werden die Appelle an die Betroffenen, Vorsorgemaßnahmen zu ergreifen, angepasst oder in bestimmten Regionen gar nicht mehr zu bauen, durch gegensätzliche Signale der öffentlichen Hand konterkariert, wenn beispielsweise Gebäude oder Infrastruktureinrichtungen 1:1 an derselben Stelle wieder aufgebaut werden. Auch sind es gerade die technischen Hochwasserschutzmaßnahmen, die nach solchen Extremereignissen errichtet, verstärkt oder erhöht werden, die Kontrolle und Sicherheit suggerieren und das obschon sie gerade erst in ihrem Sicherheits- und Kontrollanspruch durch das Hochwasser widerlegt worden waren. Es sind gerade solche technischen Maßnahmen, die wirkmächtiger sind als die allmählich verblassenden Erinnerungen an solche Ereignisse wie das Hochwasser 2002 – bis zur nächsten ›Jahrhundertflut‹.

3.3 Ein- und Aussichten

Unsere Untersuchungen zeigen, dass es eine beträchtliche Kluft zwischen der Darstellung des Hochwasserrisikos aus ›Experten‹-Sicht sowie ihren Forderungen nach einem integrierten Hochwasserrisikomanagement auf der einen Seite und den Sichtweisen der betroffenen Bevölkerung auf der anderen Seite gibt. Während ›Experten‹ (Entscheidungsträger und auch Wissenschaftler) annehmen, dass die Öffentlichkeit am Hochwasserrisikomanagement teilnehmen sollte und möchte, ist einem Großteil der Bevölkerung diese Forderung nicht nur nicht bekannt, sie wird auch als ungebührend zurückgewiesen: Hochwasserschutz ist, so die vorherrschende Meinung, weiterhin eine öffentliche Aufgabe (und keine private). Das viel zitierte Paradigma ›Hochwasserrisikomanagement‹ betrachten wir somit als große Herausforderung und eine Langzeitaufgabe, deren Umsetzung mit Gesetzeswerken und Direktiven allein nicht zu bewerkstelligen sein wird. Es gilt, die Betroffenen zu beteiligen und ihre Akzeptanz für den Übergang vom (technischen) Hochwasserschutz zum (integrierten) Hochwasserrisikomanagement zu gewinnen. Wenn Hochwasserrisikomanagement nicht mehr vorrangig technische Lösungen zur Beseitigung der Gefahr, sondern das Leben mit dem Risiko und die verantwortungsbewusste, partizipative Entwicklung von Flussgebieten in den Mittelpunkt stellen soll, dann sollten die in den gefährdeten Regionen wohnenden Menschen mit ihren Wahrnehmungen und Handeln gleichberechtigt in die Analyse einbezogen werden. Dies ist allerdings leichter geschrieben als in die Tat umgesetzt. Aus diesem Grunde haben wir am Ende unseres Projektes Praxisempfehlungen formuliert, die darlegen, welche impliziten Annahmen in dem somit notwendigen Dialog zu berücksichtigen sind und wie dieser Dialogprozess ausgestaltet werden könnte. Diese Praxisempfehlungen sind – in englischer Sprache – auch in dieser Broschüre enthalten.

► Die Veröffentlichungen und Dokumente des FLOODsite-Projektes sind zugänglich unter: www.floodsite.net/html/publications.asp

Dort befinden sich auch die im Rahmen von Task 11 entstandenen Forschungsberichte (in englischer Sprache), darunter 1) drei Länderberichte; 2) ein internationaler Vergleich und 3) Empfehlungen für ein Hochwasserrisikomanagement mit den Betroffenen.
Für weitergehende Informationen stehen die Autoren gern zur Verfügung.

04 SINTESI DEL CASO STUDIO ITALIANO

4.1 Il progetto FLOODsite

FLOODsite è la sigla del progetto »Analisi integrata del rischio alluvionale e metodi di gestione« finanziato dalla Commissione Europea, nell'ambito del 6° Programma Quadro di ricerca (Azione »Disastri naturali«; Area tematica prioritaria »Sviluppo sostenibile, cambiamento globale ed ecosistemi«).
Il progetto è stato coordinato da Hydraulic Research Wallingford (UK) ed ha avuto una durata di 5 anni, da marzo 2004 a febbraio 2009.

▸ www.floodsite.net

Il progetto ha avuto 37 partner, in 13 paesi dell' Unione Europea: Belgio, Francia, Germania, Grecia, Inghilterra, Italia, Olanda, Polonia, Portogallo, Repubblica Ceca, Spagna, Svezia, Ungheria.

Il progetto si è articolato in sette temi
1. valutazione del rischio – fonti, percorsi e vulnerabilità
2. gestione del rischio – misure pre-alluvione e gestione dell'emergenza;
3. integrazione tecnologica – supporto alle decisioni e incertezza
4. applicazioni pilota – per fiumi, estuari e siti costieri;
5. *training* e consolidamento della conoscenza – linee guida per professionisti e operatori, materiali di informazione e formazione
6. verifica e valutazione
7. coordinamento e gestione del progetto.

Ciascuno dei precedenti temi era suddiviso in sottotemi, a loro volta articolati in compiti *(task)*. L'intero progetto comprendeva 35 *task*.

Obiettivi

- Fornire una metodologia europea integrata per l'analisi e la gestione del rischio alluvionale.
- Adottare un approccio sistemico includendo i fenomeni all'origine del rischio, la vulnerabilità socio-economica, gli aspetti territoriali ecologici e culturali.
- Esplorare somiglianze e differenze fra i fenomeni di piena in bacini idrografici, estuari ed aree costiere.
- Individuare un modello per la gestione integrata del rischio alluvionale.
- Integrare i risultati con quelli di altri progetti di ricerca nazionali e comunitari.

Task 11: Percezione del rischio e comportamenti nelle comunità esposte

Il principale obiettivo dal *task 11* era di approfondire la conoscenza degli aspetti sociali legati ai fenomeni idrogeologici. A tal fine si sono esplorate le relazioni tra livello di preparazione, resilienza e vulnerabilità delle persone e delle comunità esposte al rischio di alluvione e si è indagata la loro capacità di risposta e ripresa.

I partners coinvolti nel *task 11* sono

- Flood Hazard Research Centre (FHRC), Middlesex University, Londra, Inghilterra.
- Helmholtz-Zentrum für Umweltforschung (UFZ), Leipzig, Germania.
- Istituto di Sociologia Internazionale di Gorizia (ISIG), Programma Emergenze di Massa (PEM), Gorizia, Italia.

4.2 Il caso italiano

Nel lavoro svolto in Italia dall'Istituto di Sociologia Internazionale di Gorizia (ISIG), sono state considerate sei località interessate da diversi tipi di rischio idrogeologico: quattro in provincia di Trento (Bocenago, Romagnano, Roveré della Luna e Vermiglio), una in provincia di Bolzano/Bozen (Vipiteno/Sterzing) e una in provincia di Udine (Malborghetto-Valbruna; Scolobig 2008). Tutte le località, esclusa Vipiteno/Sterzing, sono state colpite di recente (tra il 2000 e il 2003) da alluvioni o colate detritiche.

Il disegno della ricerca includeva la triangolazione di diversi metodi e tecniche di rilevazione al fine di ricostruire un quadro il più completo possibile del fenomeno »rischio idrogeologico«, all'interno del quale poter confrontare ed integrare le prospettive di diversi attori. Oltre ad un campione di residenti nelle zone soggette ad alluvioni, sono stati coinvolti nella ricerca una serie di altri attori: funzionari preposti alla mitigazione del rischio e alla gestione delle emergenze, sindaci, consiglieri comunali, e quanti altri potessero fornire testimonianze qualificate relativamente ai temi e alle aree oggetto di studio. Dati e informazioni sono stati raccolti mediante osservazioni, interviste e gruppi di discussione condotti in loco ed inoltre attraverso la somministrazione faccia-faccia di un questionario ad un campione di residenti nelle comunità interessate (686 persone in totale).

Il paradosso dell'efficienza dei Servizi

I residenti considerano le attività di riduzione e prevenzione del rischio compito esclusivo (o quasi) dei Servizi preposti, piuttosto che di tutti i cittadini e, in generale, si sentono poco coinvolti nei processi decisionali legati alla gestione dei fenomeni idrogeologici. Ciò preoccupa non poco i responsabili dei Servizi, i quali vedono di fatto diminuire la capacità di auto-protezione dei residenti che tradizionalmente derivava da un bagaglio di conoscenze relative al proprio territorio e di norme comportamentali e competenze trasmesse di generazione in generazione. Paradossalmente, sembra proprio essere l'efficienza dei Servizi a favorire la delega, ossia un atteggiamento di minor responsabilità da parte dei cittadini che tendono a non farsi carico in prima persona della propria sicurezza.

Rischio e sicurezza

I due concetti inglobano molteplici aspetti e dimensioni, in parte comuni, ma non rappresentano per i residenti due facce della stessa medaglia e orientano i loro pensieri in direzioni diverse, se non quasi del tutto opposte. I discorsi sul rischio e sul pericolo coprono argomenti come la qualità di gestione del territorio, la conoscenza locale, le caratteristiche delle alluvioni – ad es. la loro imprevedibilità e incontrollabilità –, la presenza di opere di protezione. La sicurezza rimanda piuttosto alle reti di solidarietà e ai legami interpersonali, alla fiducia (o mancata fiducia) nelle istituzioni che si occupano della gestione del rischio, all'appartenenza alla comunità locale. I principali catalizzatori di sicurezza per i residenti sono persone in carne ed ossa, non opere di difesa o sistemi d'allarme: il primo posto spetta quasi sempre ai Vigili del fuoco volontari che la gente conosce, spesso personalmente, grazie alla loro presenza continua sul territorio.

Il ruolo delle opere di protezione

I responsabili della gestione delle emergenze sono preoccupati per la falsa sensazione di sicurezza indotta nei residenti dalla presenza di dighe, argini, barriere di contenimento, briglie. A loro avviso, quanti vivono in zone a rischio si illudono di essere completamente al sicuro quando esistono strutture fisiche dedicate a prevenire il verificarsi o le conseguenze di eventi calamitosi. I risultati dell'indagine con questionario confermano che gli intervistati attribuiscono alle opere strutturali una funzione di rassicurazione emotiva, ma al contempo essi rimangono consapevoli che tali manufatti non eliminano del tutto la possibilità del verificarsi di eventi disastrosi. C'è dunque un certo affidamento alle difese strutturali, una speranza nella loro efficacia, che non annulla però la consapevolezza del permanere di un rischio, seppur ridotto.

Preparazione e misure di protezione per il nucleo abitativo

Un elemento di vulnerabilità evidenziato in particolar modo dai responsabili dei Vigili del fuoco e della Protezione civile è la progressiva perdita della cultura dell'auto-protezione da parte della popolazione locale. Questa ipotesi è confermata dai risultati dell'indagine con questionario: pochi residenti si considerano sufficientemente preparati ad affrontare situazioni di emergenza e quasi nessuno ha adottato misure di protezione per il proprio nucleo abitativo (ad es. costruzione di canalette di scolo, acquisto di sacchi di sabbia, etc.). I residenti sono però animati da buoni propositi: più di metà manifesta una disponibilità ad investire del denaro per rendere la propria abitazione più sicura, nel caso in cui la propria zona di residenza venisse dichiarata soggetta a rischio idrogeologico.

Sistemi di allertamento

Questo tema è stato trattato più approfonditamente a Vipiteno / Sterzing, una località ad elevato rischio, ma non recentemente interessata da eventi alluvionali. Nonostante esistano in loco dei sistemi di allertamento e vi sia un'elevata familiarità con gli strumenti utilizzati (ad es. le sirene), si è riscontrato che la maggioranza dei residenti non seguirebbe le indicazioni comportamentali pianificate dai servizi preposti, bensì si attiverebbe alla ricerca di informazioni, mettendosi in contatto con amici, parenti o Vigili del fuoco volontari. Inoltre le reti informali di relazione si confermano come principale referente nei momenti di incertezza, quando la tipologia e gravità dell'evento minaccioso non sono ancora definite.

Le esperienze di alluvione

Alluvioni come quelle che hanno colpito le comunità oggetto d'indagine sono spesso inaspettate e sempre molto difficili da prevedere: in effetti la maggior parte degli intervistati ha dichiarato di esserne stato colto di sorpresa. La minoranza che aveva messo in conto una simile eventualità lo aveva fatto in base ad esperienze già vissute e non grazie ad informazioni fornite da fonti ufficiali. Anche nell'immediatezza del pericolo, pochi sono stati in grado di cogliere dei segnali ambientali premonitori.

I comportamenti durante gli eventi sono stati diversi: solo alcuni intervistati hanno dichiarato di essere fuggiti non appena si sono accorti di quanto stesse accadendo, altri si sono occupati di garantire la sicurezza di familiari, parenti ed amici o di mettere in salvo degli oggetti, altri ancora hanno voluto rendersi conto di persona di quanto stesse accadendo (avvicinandosi pericolosamente a rii e torrenti in piena). A giudizio degli intervistati, le indicazioni più utili per decidere il da farsi durante l'emergenza sono provenute da istituzioni e organismi preposti alla sua gestione (Vigili del fuoco volontari, Protezione civile), mentre l'aiuto concreto è arrivato in alcuni casi dagli stessi Vigili del fuoco volontari, in altri da familiari e parenti. Tra i principali »insegnamenti« derivati dall'esperienza dell'alluvione, gli intervistati citano la conoscenza dei comportamenti da adottare in caso di emergenza, un'accresciuta consapevolezza del rischio, la necessità di migliorare la gestione del territorio ed anche il consolidarsi della solidarietà tra compaesani.

Zonizzazione delle aree a rischio

La pianificazione urbanistica e territoriale delle zone a rischio è un aspetto critico che spesso crea conflitti e tensioni tra residenti e uffici competenti. In merito alle norme che stabiliscono vincoli alla costruzione in aree a rischio, la maggior parte degli intervistati è convinta che non vengano efficacemente definite o rispettate, vuoi per motivi economici, vuoi per una diffusa sottovalutazione del rischio.

4.3 Lezioni apprese

Le idee che le persone si formano sui fenomeni idrogeologici si originano da esperienze e conoscenze acquisite direttamente o trasmesse da altri. Le informazioni fornite da fonti ufficiali non sono certo le uniche a cui la gente presta attenzione, e di questo si deve tener conto in ogni e qualunque attività di comunicazione sul rischio indirizzata alle popolazioni esposte. Gli eventi vissuti in passato, i racconti su quanto è già accaduto, la stessa esistenza di opere di protezione, di regole edilizie e di vincoli territoriali formano parte di una comunicazione a cui diversi soggetti attribuiscono significati in parte diversi. I messaggi sono interpretati in base ad atteggiamenti, credenze, preferenze, opinioni relative non soltanto al rischio, ma anche, ad esempio, alla propria preparazione e capacità di risposta e recupero, alla solidarietà e coesione delle reti di relazione locali, all'affidabilità e competenza di tecnici e operatori. Per assolvere al compito di ridurre la vulnerabilità al rischio, la comunicazione istituzionale non può essere standardizzata né occasionale, ma deve essere continuativa e tenere conto delle percezioni e conoscenza esistenti. È essenziale inoltre una verifica che i messaggi siano ricevuti e compresi dai destinatari così che si possa stabilire una collaborazione efficace fra cittadini e istituzioni per la riduzione e gestione del rischio. A tal fine la fiducia si dimostra una risorsa chiave che va però costantemente rigenerata attraverso il dialogo e la partecipazione affinché non si trasformi in un atteggiamento di delega e disimpegno.

▸ La documentazione relativa al progetto FLOODsite è disponibile su: www.floodsite.net/html/publications.asp.

In particolare, per il task 11 sono stati prodotti i seguenti materiali in lingua inglese: 1) tre rapporti nazionali; 2) un rapporto trans-nazionale; 3) raccomandazioni per la gestione del rischio (incluse in questa brochure). In relazione al lavoro svolto nel task 11 sono state anche elaborate due tesi di dottorato di ricerca, una in italiano ed una in inglese (Scolobig 2008; Kuhlicke 2008). Alcune sintesi dei rapporti sono disponibili in italiano e in tedesco.

05 SUMMARY OF THE CASE STUDY ENGLAND AND WALES

In this chapter, some of the key results from the case study in England and Wales are presented. As outlined above, its focus was on re-analysing data from earlier studies rather than collecting new survey data. The data sets comprised: the ›Intangibles‹ study (2002–2003) of 983 flooded and 527 residents at risk; the ›Warnings‹ study (2004–2005) of 408 flooded residents; and the ›Lower Thames‹ study (2005) of 206 at risk and recently flooded residents.

The data sets were re-analysed to increase our understanding of flood event experiences, preparedness and response as well as to elaborate our understanding of the social and health impacts of flooding in the UK. The analysis explored the hypotheses that individuals or households are vulnerable or resilient to flooding in the context of particular situations, especially their risk environments, that every flood presents a combination of factors, and that the outcome in terms of vulnerability or resilience will be a combination of:

- the flood event characteristics and the flood risk perceptions and experiences of the population affected
- the characteristics and resources of the population affected
- their dwelling characteristics and
- the organisational and institutional responses to a particular event

The population samples studied differed in terms of characteristics such as gender, age, social status and income, tenure, flood experience and awareness, length of residence, and other demographic and social factors. They also differed in terms of the characteristics of the flood events and levels of impacts experienced. These differences were in turn seen to influence the preparedness for living with flood risk and responding to flood events, and individual and household vulnerability and resilience related to flooding.

5.1 Key findings

A number of driving forces of human behaviour were identified before, during and after flooding, which were seen to affect people's levels of preparedness, vulnerability and resilience related to flood events. Flood awareness and preparedness actions before and during flooding were found to be affected by the extent and frequency of previous flood experience; other factors were: riverbank location, tenure arrangements, length of residence and the receipt of flood warnings. Taking out insurance was a common form of pre-flood preparedness measure, which was seen to be influenced by personal characteristics such as age, gender, tenure, social status and income, illness and disability. Another common pre-flood measure was to move valuables, personal property and cars to safety; households containing children aged under 10 years gave this measure specific priority.

All *preparedness actions* varied according to location, indicating that each flood event is unique and that context is important. Vulnerable groups were found to be vulnerable, however the situation is complex and different groups were not vulnerable across all situations. The drivers for the *number* of pre-flood precautions taken were: awareness of flood risk, number of floods experienced and length of residence. The drivers of behaviour in taking preparedness measures were complex and varied according to particular actions; how flood risk is constructed and flood experience was seen to be influential. During and after flooding there was evidence that certain vulnerable groups were at a disadvantage in coping with a flood event. Those aged 65 or over were less active in taking actions while households with children were more active. Flood warnings were a significant driver of coping behaviour, as was current or past flood experience in the home.

All forms of *social support* varied significantly across locations; both the social composition and social cohesiveness of the neighbourhoods and the characteristics of the flood events may contribute to this variation. Vulnerable groups often received less help from neighbours and friends. Those living in vulnerable housing were less likely to receive help, which may indicate that they are less linked with social networks. Conversely, households with children received more help, perhaps indicating wider social networks. Depth and the extent of flooding were significant factors, with those who experienced more serious flooding receiving the most help. Increased support was also associated with the receipt of warning and flood experience.

The analyses also explored the hypothesis that the manner in which people may respond to flooding, and their capacity to recover, may be affected by their *subjective severity of the flood impacts.* Subjective severity of flooding was measured in the larger ›Intangibles‹ study using the General Health Questionnare-12, a measure of mental well-being widespread among psychologists. Analysis looked at the subjective stress of the flood on households and the overall subjective severity rating of the effects of the flood. Four sets of factors were analysed: the flood event characteristics; the social characteristics of the individuals and households affected; the dwelling and residence characteristics; and post event and intervening factors such as help received.

The results indicated that flood characteristics, such as depth and the extent of flooding and perception of contamination, were significant explanatory factors. Certain variables, such as age and ill-health or disability, were significantly associated with indicators of social vulnerability. However, the relationship between age and vulnerability was not linear. Social characteristics were *not* associated with all vulnerability variables. There were striking and significant differences in the rating of flood effects between men and women, with women giving a higher rating than men

to almost all effects. Other significant factors were: tenure, vulnerable housing, experiences with insurers/builders, and help from outside the household. Getting the house back to normal was rated as the most serious flood impact, followed by the stress of the flood event itself (these variables were closely associated). Having to leave home and worry about future flooding were also highly rated impacts. Overall, social vulnerability remained difficult to explain; a complex set of factors appears to be involved in the susceptibility to health and other flood impacts.

5.2 Lessons from the research

Overall, the UK data helped to further understand the impacts of flooding and the factors influencing human behaviour before, during and after flood events. It also contributed to further understanding of the preparedness, vulnerability and resilience of households and individuals in relation to such events. Lessons can be learned (albeit in the context of specific populations and locations) on how individuals and households may be able to increase their resilience to flood impacts and their capacity to recover. No single social variable or set of indicators explained all aspects of social vulnerability and resilience. Certain groups within communities can be identified as more or less vulnerable in certain situations and as more or less resilient in others, although the research revealed the complexity of these issues. Different factors were relevant in the different phases of a flood event which indicates that the situations and responses revealed are much more complex and diverse than the concept of social vulnerability implies. Results from the study will hopefully be of use to those people living in flood risk areas and to those agencies with a responsibility to respond to flooding in order to improve pre-flood preparedness and post-flood recovery.

06 Implications for flood risk management and future research

06 IMPLICATIONS FOR FLOOD RISK MANAGEMENT AND FUTURE RESEARCH

A major outcome of our research might seem – at first glance – a bit disappointing from a cross-European perspective: with respect to communities' vulnerability and resilience to flooding, *context remains key*. Each location, its flood history, culture of self-protection, community structure, tenure distribution, and physical conditions are specific – and all of these factors need to be taken into account to understand the course and impact of a certain flood and to be able to anticipate future events as well as people's behaviour in order to reduce damages. This might sound rather mundane but for the practice of flood risk management it is probably the greatest challenge since the specifics of the single case are so obviously in contrast with the intentions of harmonising and standardising approaches to flood risk management across Europe.

Thus – and this is our *final and most general recommendation* – flood risk management strategies must be accomplished locally and need to be developed in consultation with local stakeholders, including the residents at risk. Flood risk management needs to take into account people's knowledge and interpretations – and it has to understand and accept them and their (non-)actions. Moreover, continuous efforts with regard to awareness raising, two-way risk communication as well as mitigation and adaptation are indispensable. A one-time effort is a waste of public resources. This implies that for research activities and stakeholder involvement alike continuous work is needed, also in the future.

In our work, we came to a more satisfactory concept of *social vulnerability* to flooding by taking into account time, context and event characteristics. Based on that, we suggest that a suitable vulnerability approach is required to be

- CONTEXT-SENSITIVE: Institutional arrangements, earlier flood experience, regularity of floods, location, community size etc., do matter. They can be summarised under the umbrella-term ›risk culture‹ which differs between and within regions.
- EVENT-SPECIFIC: Every flood is unique and requires a careful reconstruction from the perspective of the people affected that is necessary to understand their behaviour.
- OPEN-MINDED: Taxonomic approaches to vulnerability (suggesting that the poor, children etc. are more vulnerable than others) are a good start but need to be proven empirically with respect to different contexts and events.

SOCIAL VULNERABILITY: THE MOST IMPORTANT RESULTS FROM THE CROSS-COUNTRY COMPARISON

- Vulnerability is highly context-specific.
- There is no single variable, which explains the vulnerability of specific social groups coherently and for all of the disaster phases.
- No specific group is *per se* highly (or less) vulnerable: The same group may be vulnerable at a certain point in time of the flood event and not vulnerable at others. The same group may be vulnerable in one place (e. g. in England) but not in another (e. g. in Italy). The same group may be vulnerable in relation to certain aspects – e. g. preparedness, risk awareness, capacity to receive help during the event, flood impact – and not vulnerable in relation to others.
- Sometimes it is the extreme groups (e. g. the very young or the very old), which in certain respects turn out to be more vulnerable than those ›in-between‹. In other words: some relationships between social characteristics and vulnerability are far from linear.

Social resilience should not simply be treated as the other side of the coin of vulnerability, but its specific potential – stemming from its origins in ecology – should be exploited. One suggestion is to treat it as a normative concept and to (re-)interpret research results in the light of a desired state.

SOCIAL RESILIENCE: THE MOST IMPORTANT IMPLICATIONS FROM THE CROSS-COUNTRY COMPARISON

- Awareness-raising concerning the possibility of being flooded and specifically the likely flood impacts are required as a continuous effort. This might help to increase the number of people taking actions to prepare for flooding.
- Government assistance in the form of grants to pay for preparedness measures might support individual behaviour. They are being discussed for England and are already available in Wales.
- Where evacuation is necessary, attempts should be made by authorities, insurers and contractors to limit the length of time involved and to reduce the length of disruption to households and communities. The methods with which institutions within the community respond to and deal with flood events, and particularly with the post-event recovery, therefore need to be reviewed. For example, insurance companies could improve the ways in which they deal with insurance claims and offer a more consistent level of service to claimants. Similar levels of service should also be encouraged regarding the post-flood restoration of properties. Where respondents have experienced impaired mental health as a consequence of being flooded, support in the form of counselling should be made available from the health authorities.
- Extensive compensation – as in the German case – contributes to a rapid recovery, personal well-being and high satisfaction; however the other side of the coin is that it is rather counterproductive with regard to personal preparedness.

One of our main findings is that we learnt to question many – apparently compelling (and, from the perspective of flood risk management, desirable) – linear relationships, e. g. between ›being affected‹ and ›having a higher risk awareness‹ or ›being affected‹ and ›applying preparedness measures‹. Empirical reality is much more diverse, contradictory and difficult to explain.

As for *social constructions of flood risk* and their consequences for flood risk management, it was found that in order to take any risk reducing measures people need to be both aware of the risk of being flooded and be able to attribute a certain significance to the measures that they undertake. Effective flood risk management will only work with the involvement of the public. While the new paradigm of flood risk management is already well established within the scientific community and among flood-risk managers, more ›traditional‹ assumptions about flood protection still prevail among the population at risk. Dikes and retention basins as well as effective risk management agencies may make residents at risk feel more fully protected. But the public therefore tends to rely completely on such expert systems and delegate any personal responsibility for its own safety to them. Therefore placing greater responsibility on private shoulders (›privatisation of risk‹) is likely to be ineffective, unless new partnerships and synergies are created between citizens and public institutions. Moreover, it is compelling to understand the motives, perceptions and the actual behaviour of the people at risk, but also why they *don't take* certain actions.

REMAINING GAPS IN KNOWLEDGE

1. Which consequences does the increasing »privatisation of risks« (i. e. the tendency to transfer more expectations and responsibilities to the residents at risk) have both with regard to social vulnerability and coping with flood risks? What does this mean for vulnerability research, which at its large is still searching for the ultimate taxonomic, indicator-based conceptualisation?
2. How can both flood risk management and flood research come to terms with the ambivalence of a high degree of context-specifics of the investigated issues on the one hand and the challenge to provide new insights, guidance and recommendations on (at least) the European-wide level on the other?
3. How can we make flood risk management a living paradigm, not just one of policy-makers, flood risk managers and researchers? In particular: how can the ambitious claims of the European Floods Directive with regard to the involvement of the public become real?
4. How can people at risk be further encouraged to adopt private preparedness measures? Are financial incentives one such way and is this the only one?
5. Which impact will the far-reaching demographic changes (ageing, increasing / decreasing population densities in flood-prone areas, immigration, a growing number of one-person households, increasing ethnic diversity in urban places) have on preparedness, coping and long-term recovery?

14 Flood marker reminding of the 2002 Mulde flood in Bennewitz Photographer Maria Hagemeier-Klose

Flood risk management can therefore be said to be a great challenge for practitioners, policy-makers and researchers who will be increasingly required to talk *to and with* the people at risk and perhaps most importantly, to *listen* to them if the actual outcome is to include them within the decision-making processes and overall risk governance. Finally, a more realistic picture of the people at risk will also be required – and with our results we hope to have shed some light on ongoing myths in the mutual perceptions of ›experts‹ on the one hand and ›lay‹-people on the other, but also to have provided some clarifications with regard to people's opinions and actual behaviour.

07 REFERENCES

► * All FLOODsite reports are available from www.floodsite.net/html/publications.asp (last access 15 May 2009).

ADGER W N (2000), *Social and ecological resilience: are they related?,* Progress in Human Geography 24, 347–364.

BLAIKIE P, CANNON T, DAVIS I, WISNER B (1994), *At Risk: Natural hazards, people's vulnerability, and disasters*, London: Routledge.

BOURDIEU P (1986), The forms of capital, In: Richardson J G (ed.), *Handbook of theory and research for the sociology of education,* New York: Greenwood, 241–258.

BROWN J D, DAMERY S L (2002), *Managing flood risk in the UK: Towards an integration of social and technical perspectives,* Transactions of the Institute of British Geographers 27, 412–426.

DE MARCHI B (1995) *Uncertainty in environmental emergencies: a diagnostic tool,* Journal of Contingencies and Crisis Management 3, 103–112.

* **DE MARCHI B, SCOLOBIG A, DELLI ZOTTI G, DEL ZOTTO M** (2007), *Risk construction and social vulnerability in an Italian Alpine Region,* FLOODsite report T11-06-08.

DKKV [DEUTSCHES KOMITEE KATASTROPHENVORSORGE] (ED.) (2003), *Hochwasservorsorge in Deutschland – Lernen aus der Katastrophe 2002 im Elbegebiet,* Bonn.

DOWNING T E, FRANKLIN, S (2004) *Resilience and vulnerability, SEI poverty and vulnerability programme /* GECAFS Briefing Paper, Stockholm: Stockholm Environment Institute, 4 pp.

EU [EUROPEAN UNION] (2007): *Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks,* Official Journal of the European Union L 288, 27–34 (English Version).

FELGENTREFF C (2003), *Post-Disaster Situations as ›Window of Opportunity‹? Post-flood perceptions and changes in the German Odra River region after the 1997 flood,* Die Erde 134, 163–80.

* **FLOODSITE** (2005), *Language of risk. Project definitions,* FLOODsite report T32-04-01.

FOLKE C (2006), *Resilience: The emergence of a perspective for social-ecological systems analyses,* Global Environmental Change 16, 253–267.

FOLKE C, CARPENTER S, ELMQVIST T, GUNDERSON L, HOLLING C S, WALKER B (2002), *Resilience and sustainable development: building adaptive capacity in a world of transformations,* Stockholm: Environmental Advisory Council to the Swedish Government.

FUREDI F (2007), *From the narrative of the blitz to the rhetoric of vulnerability,* Cultural Sociology 1, 235–254.

GREEN C (2004), *The evaluation of vulnerability to flooding,* Disaster Prevention and Management 13, 323–329.

HANDMER J (2003), *We are all vulnerable,* Australian Journal of Emergency Management 18(3), 55–60.

HOLLING C S (1973), *Resilience and stability of ecological systems,* Annual Review of Ecology and Systematics 4, 1–23.

JOHNSON C, PENNING-ROWSELL E, PARKER D (2007): *Natural and imposed injustices: the challenges in implementing ›fair‹ flood risk management policies in England,* Geographical Journal 173, 374–390.

KLEIN R J T, NICHOLLS R J, THOMALLA F (2003), *Resilience to natural hazards: How useful is this concept?,* Environmental Hazards 5, 35–45.

KUHLICKE C (2008), *Ignorance and vulnerability. The 2002 Mulde flood in the city of Eilenburg (Saxony, Germany),* PhD Thesis, University of Potsdam.

KUHLICKE C, DRÜNKLER D (2004), *Vorsorge durch Raumplanung?* Raumforschung und Raumordnung 62, 169–176.

KUHLICKE C, STEINFÜHRER A (2006), Wie vorbereitet ist die Bevölkerung auf ein Hochwasserrisikomanagement? Lehren aus dem Hochwasser 2002. In: Jüpner R (ed.): Beiträge zur Konferenz *›Strategien und Instrumente zur Verbesserung des vorbeugenden Hochwasserschutzes‹* 23.–25. November 2006 in Tangermünde, Aachen: Shaker, 45–55.

KUHLICKE C, STEINFÜHRER A, DE MARCHI B, SCOLOBIG A (2009, forthcoming), Risk management, participation and public perceptions. In: Schanze J et al. (eds.): *Natural hazards and risk reduction in Europe. From science to practice,* Berlin et al.: Springer, ca. 10 pp.

MCCARTHY S, PARKER D J, PENNING-ROWSELL E C (2006), *Preconsultation social survey, community based flood risk reduction options reach 4:* Walton Bridge to Teddington, Middlesex University London: Flood Hazard Research Centre.

MECHLER R, WEICHSELGARTNER J (2003), *Disaster loss financing in Germany: The case of the Elbe River floods* 2002. Interim Report IR-03-021, Laxenburg: International Institute for Applied System Analysis.

RPA/FHRC [RISK AND POLICY ANALYSIS, FLOOD HAZARD RESEARCH CENTRE] ET AL. (2004), *The appraisal of human-related intangible impacts of flooding.* Report to Defra / Environment Agency. R&D Project fd2005, London: Defra.

SAMUELS P G, MORRIS M W, SAYER P, CREUTIN J-D, KORTENHAUS A, KLIJN, F, MOSSELMAN E, VAN OS A, SCHANZE J (2008), Advances in flood risk management from the FLOODsite project. In: Samuels P, Huntington S, Allsop W, Harrop J (eds.): *Flood risk management: Research and practice,* Leiden: CRC Press/Balkema, 433–443.

SCHWARZE R, WAGNER G G (2007), *The political economy of natural disaster insurance: Lessons from the failure of a proposed compulsory insurance scheme in Germany,* European Environment 17, 403–415.

SCOLOBIG A (2008), *Le dinamiche sociali del rischio e della vulnerabilità. L'esperienza di Malborghetto-Valbruna,* PhD Thesis, University of Udine.

SCOLOBIG A, CASTÁN BROTO V, ZABALA A (2008), *Integrating multiple perspectives in social multicriteria evaluation of flood-mitigation alternatives: the case of Malborghetto-Valbruna,* Environment and Planning C: Government and Policy 26, 1143–1161.

SCOLOBIG A, DE MARCHI B (2008): Dilemmas in land use planning in flood prone areas. In: Samuels P, Huntington S, Allsop W, Harrop J (eds.): *Flood risk management: Research and practice. Leiden: CRC Press/Balkema, 1185–1192.*

* **STEINFÜHRER A, KUHLICKE C** (2007), *Social vulnerability and the 2002 flood.* Country Report Germany (Mulde river), FLOODsite report T11-07-08.

* **STEINFÜHRER A, DE MARCHI B, KUHLICKE C, SCOLOBIG A, TAPSELL S, TUNSTALL S** (2008 a), *Recommendations for flood risk management with communities at risk,* FLOODsite report T11-07-14.

STEINFÜHRER A, KUHLICKE C, DE MARCHI B, SCOLOBIG A, TAPSELL S, TUNSTALL S (2008 b), Towards flood risk management with the people at risk: from scientific analysis to practice recommendations (and back). In: Samuels P, Huntington S, Allsop W, Harrop J (eds.): *Flood risk management: Research and practice.* Leiden: CRC Press/Balkema, 945–955.

* **STEINFÜHRER A, DE MARCHI B, KUHLICKE C, SCOLOBIG A, TAPSELL S, TUNSTALL S** (2009), *Vulnerability, resilience and social constructions of flood risk in exposed communities. A cross-country comparison of case studies in Germany, Italy and the UK,* FLOODsite report T11-07-12.

* **TAPSELL S M, TUNSTALL S M, GREEN C, FERNANDEZ A** (2005), *Task 11 social indicator set,* FLOODsite report T11-07-01.

TERPSTRA T, GUTTELING J M (2008), *Households' perceived responsibilities in flood risk management in the Netherlands,* Water Resources Development 24, 555–565.

TUNSTALL S, TAPSELL S, FERNANDEZ-BILBAO A (2005), *The damage reducing effects of flood warnings: Results from new data collection,* Middlesex University London: Flood Hazard Research Centre.

* **TUNSTALL S, TAPSELL S, FERNANDEZ-BILBAO A** (2007), *Vulnerability and flooding: a re-analysis of FHRC data (Country Report England and Wales),* FLOODsite report T11-07-11.

TUNSTALL S, TAPSELL S, GREEN C, FLOYD P, GEORGE C (2006), *The health effects of flooding: Social research results from England and Wales,* Journal of Water and Health 4, 365–380.

WISNER B (2004), Assessment of capability and vulnerability. In: Bankoff G, Frerks G, Hilhorst D (eds.), *Mapping vulnerability: disasters, development and people,* London: Earthscan, 183–193.

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