



*Living with Flood Risk
in a Changing Climate*

FLOWs Work Package 2 Report

The Social Dimension in Flood Management

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Report no.: FLOWS WP2

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Key words: flood management, perception, communication, retrofitting

Subject: **The Social Dimension in Flood Management – FLOWS Work Package 2 REPORT**

Print: NVE's printing office

Number printed: 100

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NVE, June 2006

Table of Content

Introduction - the Structure of this Report _____ 3

Activities Undertaken - the Social Dimension in Flood Risk Management _____ 4

Perspectives on FLOWS Perception and Communication Studies _____ 5

 Introduction _____ 5

 Seven lessons from risk perception research _____ 6

 Reflections on the FLOWS risk perception studies _____ 8

 Four perspectives from risk communication research _____ 13

 Reflections on FLOWS communication approaches _____ 17

 Concluding comments _____ 18

 References _____ 19

Summary of the WP2 Projects _____ 21

 Perception of Flood Risk (2A) _____ 21

 Disseminating Flood Risk Information (2B) _____ 23

 Retrofit of a Heritage Building (2Ci) _____ 25

 Retrofitting of a Residential Building (2Cii) _____ 26

 Retrofit: Office Building (2Ciii) _____ 27

 The Barrier Project in Arvika Bay (2Civ) _____ 28

 Internet Based Flood Risk Assessment and Retrofit Advisory System for Public and Private Housing (2Cv) _____ 29

 Public Risk Perception of Flooding and Flood Risk (2D) _____ 30

The Social Dimension in Flood Management

– FLOWS Work Package 2 REPORT

Introduction - the Structure of this Report

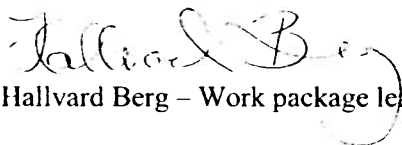
This report summarises all the activities undertaken as part of the FLOWS Project's Work Package 2. All the five FLOWS countries, Germany, the Netherlands, Norway, Sweden and the United Kingdom have participated. Some projects have been totally transnational in terms of working together on the same issues, while others have focused more on national projects.

The first part provides an introduction to the three main elements of the work package: perception, communication and retrofitting.

The second part focuses on flood risk perception and communication with the studies and selected results being viewed in a wider perspective. This analysis has been carried out by Associate Professor Ann Enander of the Swedish National Defence College.

The third part provides a summary of the 8 projects that have been carried out as part of this work package and are as follows;

- 2A: Perception of Flood Risk. Project leader Hallvard Berg, Norwegian Water Resources and Energy Directorate.
- 2B: Dissemination of Flood Risk Information. Project leader Anja Skiple Ibrenk, Norwegian Water Resources and Energy Directorate.
- 2Ci: Retrofitting of a Heritage Building. Project leader Toby Forbes-Turner, Lincolnshire County Council, UK.
- 2Cii: Retrofitting of a Residential Building. Project leader Alison McErlain, Norfolk County Council, UK.
- 2Ciii: Retrofitting of an Office Building. Project leader Matthew Hunt, Cambridgeshire County Council, UK.
- 2Civ: The Barrier Project in Arvika Bay. Project leader Anders Norrby, Arvika Municipality, Sweden.
- 2Cv: Internet Based Flood Risk Assessment and Retrofit Advisory System for Public and Private Housing. Project leader Timm Ruben-Geissler, Hamburg University of Technology, Germany.
- 2D: The Public Risk Perception of Flooding and Flood Risk, Project leader Teun Terpstra, Province of Flevoland/University of Twente.



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PART ONE

Activities Undertaken - the Social Dimension in Flood Risk Management

This work package deals with the development of planning and management systems from the human/social angle; addressing perception and personal behaviour that can be changed and adapt to living with increased flood risk.

The work package contains three main elements:

1. Studies of perception of risk among the public and experts/decision makers (project 2A) aimed at a better understanding of how people perceive and respond to flood risk. The studies have been performed in all 5 countries and include:
 - Quantitative studies in the form of a poll of the public in flood prone areas with 4000 respondents (2A), a questionnaire for experts (2A) and a questionnaire to investigate the effects of Interactive Learning Groups on risk perception (2D).
 - Qualitative studies in the form of focus groups (the public) and Interactive Learning Groups (ILGs: the public meeting experts) to investigate the public's perception of flood risk and expert panels to discuss perception and communication of flood risk.

The results are summarised and the implications for risk communication are discussed in five reports from project 2A and one report from project 2D which focuses on the theoretical aspects of the ILG concept.
2. Different techniques for communicating flood risk information to the public and decision makers (2B). A large number of activities have been performed using different techniques: school projects, awareness campaigns, information desks, improved flood warning systems, exhibitions and new ways of using symbols etc to visualise flood risk.
3. Increasing flood resilience of existing properties through retrofitting, which is illustrated in projects 2Ci – 2Cv:
 - Three projects in the UK demonstrating how residential, office and heritage buildings could be retrofitted to reduce damage during floods.
 - One project in Sweden demonstrating how the city of Arvika could be protected from high water levels in the adjacent lake.
 - One project in Germany consisting of an Internet tool designed to provide data and advice on how to retrofit properties cost effectively.

PART TWO

Perspectives on FLOWS Perception and Communication Studies

Ann Enander, Swedish National Defence College

Introduction

Dealing with risks is about hazards themselves, but also about how people perceive and react to these hazards. Changes in the risk panorama, caused for example by climate changes, will naturally affect public perceptions and reactions. Social trends and shifts in values can also lead to new concerns and changed reactions to “old” risks. Understanding how risks are perceived and awareness of the factors that can influence these perceptions is basic to all risk management and communication.

A central aim of the FLOWS WP2 studies has been to promote understanding of how flood risk is perceived, both by the public and by experts, and to apply this knowledge in developing methods of communication. Information about perceptions and assessments related to flood risk has been collected via quantitative polling studies as well as qualitative studies involving focus groups, expert panels and interactive learning groups. In parallel, different ways of representing and communicating flood risk issues have been developed and tried out. The results and conclusions from these projects can be found in specific project reports. The process of conducting these studies has, however, also generated animated discussions in the respective project groups regarding for example different methodologies, interpretations and implementation possibilities. Here it has proved valuable to try to view the FLOWS work in a broader context of research on risk perception and communication. The purpose of this report is to provide some examples of how key findings from the FLOWS projects can be related to and interpreted in terms of the considerable body of relevant research literature. In doing this, the report also touches upon some of the discussion issues recurring throughout the development of the FLOWS projects.

The report is structured in four main sections. The first section provides a selected overview of some key findings from risk perception research, presenting these in the form of seven general “lessons”. The following section then outlines some main results from the risk perception studies in FLOWS, giving examples of how these can be related to the broader research literature. In the third section the focus returns to the research literature, highlighting some principles and paradoxes from the field of risk communication studies. With these as a starting point, the fourth section then discusses some of the experiences from FLOWS communication activities. Some final comments conclude the report.

Seven lessons from risk perception research

Risk perception research has contributed to a more sophisticated understanding of how individuals and groups react to different hazards and risk situations. Influencing factors include those related to the hazard itself, to societal frameworks and processes and to individual and group characteristics. Seven significant lessons from this research are outlined in this section.

i) People are concerned about aspects of risk other than the probability of loss

Risk is subjectively defined by individuals on the basis of influences from a wide array of psychological, social, institutional and cultural factors. Thus perception of risk is affected not only by probability and estimates of damage or fatalities, but is sensitive also to factors such as perceived voluntariness, scientific knowledge about the risk, controllability and potential threat to future generations.

In the early work these factors were grouped into two main dimensions, reflecting the degree to which the risk from a particular hazard is understood and the degree to which the risk evokes a feeling of dread (Slovic, 2000). In later work, Sjöberg (2000) has presented evidence that the perception that a risk is “tampering with nature” contributes significantly to perception of risk. Risks are perceived as greater if they are judged to be “unnatural”, a finding which has been linked to moral and ethical evaluations. Concern about risks includes a moral valuation, capturing assessments of what is deemed natural and justifiable.

Evaluations related to a particular hazard are not static, but are liable to change with shifts in knowledge and values. Thus, as hazards become more familiar, they tend to be perceived as less risky. Shifts in societal values, for example regarding what is viewed as “natural” or “unnatural”, are likely to influence how risks are perceived.

ii) People tend not to think that risks will affect them personally

One of the most consistent findings in risk perception research is that people tend to perceive greater risk for others than for themselves. This is particularly true of life style risks, where people tend to feel that they have some personal control over the risk. But the phenomenon, sometimes termed unrealistic optimism (Weinstein, 1984) and related to a sense of personal control, can be observed over a wide range of groups and risk contexts.

This illusion of invulnerability may make people less aware of risks to themselves and less motivated to take personal safety precautions. However, psychologists also point out that a sense of being personally invulnerable has positive implications for everyday mental health. Some research findings have linked high risk awareness to negative emotional and health factors such as depression, anxiety, burn-out and physical symptoms (Hellsöy et al. 1998). These findings accentuate the importance of not just making people aware of the risks they run, but also ensuring that they become aware of what measures they can take to reduce these risks or protect themselves. Furthermore, people can be concerned about risks for others, even if they do not think the risk will affect them personally. Thus personal risk assessment tends to be a poor predictor of more general concern about societal risk.

iii) Possible consequences influence demand for risk reduction more than probability

People tend to be concerned about consequences. How important people consider it to be that authorities deal with a certain risk is determined more by the perceived consequences than by the perceived likelihood of an event occurring (Sjöberg, 1999). According to Slovic (2000), lay people tend to take a broader perspective when considering consequences, including factors such as the long-term social and psychological effects of a major accident. Expert calculations tend on the other hand to focus on fatalities and material damage. This difference in the way that risks are viewed has implications for the demands on authorities, and for what actions people are themselves prepared to take.

How people react to the occurrence of an emergency or a disaster is not simply related to the number of fatalities or extent of the damage. Some events with few or no fatalities can still give rise to strong emotional reactions because of the significance people attach to them. Thus disasters involving technological failures can arouse strong reactions because they can be seen to symbolize vulnerability and the limits of human control. People can also react strongly to reports or images of such events. There is however little knowledge as yet as to the emotional and social effects in a society where more and more such images are communicated to the public via media.

iv) People differ in how they perceive risks

Differences in risk perception have been mapped in the context of various individual, demographic and social factors. Many studies have demonstrated that women generally tend to rate higher risks and greater need for risk-related information than men. It can be noted that differences may not just be a question of degree, but also of the associations attached to different risks. Thus ratings of risk for violence in society have been shown to reflect differing concerns among men (physical violence) and women (sexual violence) respectively. Differences between groups tend to increase when risks are diffuse or controversial. It is reasonable to expect that the more complex and diffuse the future hazard panorama, the greater the scope for different appraisals of risk within society.

An influential line of research in this field has been concerned with cultural theory and risk perception among different socio-political groups (for a review of this work see Lupton, 1999). Another approach has focused on differences attributable to gender and to socio-cultural factors, and to the linking of these two (Flynn et al., 1994). This work has identified a subgroup among (North American) white males who demonstrate extremely low risk perceptions in comparison to other groups, and who also differ markedly from others in a number of attitudes and beliefs. Regardless of whether these latter findings are applicable in other cultures, (which has been questioned), they have stimulated to a greater focus of interest also on the mechanisms underlying lack of concern about societal risk.

v) Perception of risk is dependent on context

Risk issues are perceived and evaluated within a specific context. Experimental studies demonstrated early on how decisions about risk could be influenced by the way in which a problem was presented or “framed” (Tversky & Kahneman, 1981). The discussion of the framing phenomenon has later been broadened from the laboratory setting to decision-making about environmental, technological and other public health risks (Vaughan & Seifert, 1992). The framing of risk problems in public debate can intensify conflicts, depending on for example which individuals are highlighted as being at risk, or how the focus on potential gains versus losses is presented.

In a broader context, the social amplification framework proposed by Kasperson et al. (1988) suggests that peoples’ reactions are shaped by the interaction between aspects of risk events and psychological, social, institutional and cultural processes in society. Thus as hazard events (actual or hypothesized) are communicated in society they are filtered through various social and individual “amplification stations”, such as the media, government and other agencies, stakeholder groups etc. Such filtering can lead to attenuation or amplification of an issue, and to secondary or “ripple” effects which can go far beyond the initial impact of the hazard information or event.

Thus concern about a particular hazard will depend not only upon characteristics of the hazard itself, but also on how the problems related to the hazard are framed and processed through society. A major accident or hazard event may for example drastically change these frames and processes, as amply evidenced by developments since 11th September 2001.

vi) Risk perception is about cognitions and emotions

Risk perception research has developed primarily within a cognitive framework. More recently interest in the influence also of emotional factors has increased. According to these ideas our assessments of risk may be affected and in some cases guided by emotional reactions which are activated in certain situations. These positive or negative feelings have become associated to different

phenomena through life experiences, creating an “affective pool” of emotional images. Finucane et al (2000) suggest that people when judging risk issues use an “affect heuristic” summoned from this experientially developed pool. This idea is something of a parallel to the cognitive heuristics, such as availability, vividness etc, described by Tversky & Kahneman (1981).

We tend to think of emotions as “clouding” rational judgement. However, new light has been shed on the role of emotions in judgement through the work of neuroscientists such as Damasio (1994), who have demonstrated that logical argument and analytic reasoning cannot be effective unless guided by emotion and affect. Thus there is increasing support for the idea that emotions related to risk need to be recognized and taken into account. Fear associated to thoughts about flooding has been shown to be a powerful motivator for purchase of flood insurance (Zaleskiewicz et al., 2002).

vii) People do not necessarily “learn from experience”

It might seem reasonable to expect that personal negative experiences of a hazard would influence perceived risk. A person who has experienced flooding would be expected to be more aware of the risks and more prepared to take measures. However, research on the effects of experience has demonstrated mixed and sometimes surprising results. The critical factor concerns how the individual interprets these experiences. Generally, experience of a hazard may increase risk awareness. However, individuals who have experienced a hazard but have come through fairly unscathed may become less aware of the risks – “after all, it wasn’t as bad as expected” (Halpern-Fisher et al., 2001).

Reflections on the FLOWS risk perception studies

In the next section some of the main findings from the FLOWS risk perception studies are summarized and discussed in relation to previous knowledge and some practical implications.

The poll studies

The poll investigations were conducted among people living in areas at risk of flooding. Data were collected in February-March in Norway, the Netherlands and the UK, in October-November 2003 in Sweden and April-May 2004 in Germany. Details of the sample selection, methods and results are given in the report by Krasovskaia (2004).

The questions in the poll study focused on the following issues:

- General awareness and concerns about the flood hazard
- Previous experiences from floods / flood assessment
- Reasons for living in a flood prone area
- Knowledge about flood assessment in home region and information channels
- Willingness to “buy safety” / adapt to risk (risk vs benefit)
- Personal background

Results

Main findings from the polls indicate a general lack of awareness regarding flood risk and are summarized in the report as follows:

- Limited interest in flood hazard
- Sentimental rather than logical reasoning for living in areas at risk of flooding
- Poor orientation in flood issues
- Passiveness with respect to raising flood safety of own homes

- Reluctant attitude towards moving
- Responsibility is propagated to public authorities but the confidence in their ability to handle the problem is not very high
- Acceptance of major changes in environment to raise flood safety
- Newspapers and radio / TV are still the preferred information channels (except in UK), but information is insufficient or inadequate
- Misunderstanding of the nature of floods

The report notes that there are more similarities than differences between the countries in the way that people in flood-prone areas of the North Sea region perceive flood hazard. Major differences that are particularly noted in the report are the following:

- A somewhat better awareness of flood hazard by the Norwegians
- Very low awareness of living in a flood prone area from the German respondents
- Low concerns about flood hazard from the Dutch respondents
- Lower tolerance for flooding of own houses in Germany
- Somewhat lower confidence in the ability of public authorities to handle flood issues among the German respondents and somewhat higher among the Swedish
- Higher willingness to invest in flood safety among the Germans and higher unwillingness among the British respondents
- Higher acceptance of environmental changes to increase flood safety in the Netherlands
- Local authorities rather than central are given responsibility for the costs of raising flood safety by the Swedes
- Leaflets with information about flooding are the preferred information link by the UK respondents

Comments

Flooding is a familiar, “old” risk which tends to be perceived as a consequence of natural phenomena. In this sense it is typical of risks that people tend to underestimate and to which they react less strongly. This seems to be reflected in the polling results in all countries, since perceptions of risk tend to be low.

It may seem surprising that the people surveyed in the polls appear to have a limited interest in flood hazards, considering that they were all selected because they live in areas identified as being at flood risk. In risk perception research similar findings have been explained through psychological mechanisms such as unrealistic optimism (“it won’t happen to me”) or as an example of how people adjust their beliefs to avoid the phenomenon known as cognitive dissonance. Belief that one lives in a risk area is difficult to reconcile with contentment in everyday life, so people tend to seek justification to downplay the risks. This can for example take the form of underestimation of risks, or of a willingness to believe that sufficient preventive measures have been taken by authorities. Similar effects were demonstrated in a study of flood perception in Portugal (Correia et al., 1998).

When choosing to live in an area at risk of flooding people tend to apply other rationalities than strictly logical reasoning. They apply personal risk / environment trade-offs when making a choice of location (Fordham, 1998). Attachment to a familiar location and the symbolic importance of living near water may be considered more important than the possible risk of flooding. Research focusing on the concept of “place-identity” suggests that an individual has more complex relations to the environment than simply living in it, emphasizing instead that man interacts with his environment in ways that are important to his identity. This reasoning has recently been linked to risk perception and reactions to environmental hazards (Wester-Herber, 2004). Viewed from this perspective, living in flood risk areas becomes something rather more than merely “sentimental attachment”. The possibility

that place-identity can contribute to increased motivation to become involved in community safety have not yet been explored.

The fact that the majority of respondents had not taken any steps to increase the safety of their homes is attributed to among other things lack of knowledge of what can be done. Similar results have been found in previous studies of public perceptions of flood risk (Lave & Lave 1991). People may be poorly informed about what to do, and may also have limited faith in the efficacy of different measures. In a study of emergency preparedness among the Swedish public the most common reason for doing nothing was lack of knowledge about what to prepare for and how (Larsson & Enander, 1997). It is interesting also to note the differences between countries regarding how people view the responsibilities of central or local authorities. Again, it would be of interest to examine how these differences might affect reactions to different forms of risk communication.

Previous research has demonstrated that the effects of hazard experience are not always straightforward. The different patterns of responses regarding flooding experience present a similar picture. A number of factors may affect how people view and react to their own experiences, for example how recent the experience was, how often it has occurred, how serious the damage, how psychologically stressful, how well authorities are perceived to have coped, etc.

A challenging finding is that people attribute responsibility to authorities, but do not always have high confidence in the ability of authorities to deal with risks. A number of studies have shown that social trust is a complex and multidimensional concept. One focus of behavioural science research has concerned the determinants of trust, identifying components such as belief in competence, openness, fairness, credibility and care/empathy. The role of trust in relation to risk perception is under some debate. There is some agreement that trust plays a more important role when the level of knowledge is low. When people feel they know little about a risk themselves, then trust in experts becomes more important. The results seem to indicate some cultural differences between the five countries, perhaps reflecting different traditions in expectations and also experiences. Previous negative experiences may for example decrease trust. Within the framework of FLOWS risk communication approaches it is of interest to examine whether such differences in trust might be reflected in differing responses in the respective countries.

The focus groups

The polls mapping risk perception in the different countries provide an overview of how people respond to set questions, enabling frequencies to be calculated and compared. The results also raise a number of unanswerable questions regarding the thinking and reasoning underlying different responses. In order to find out more about these qualitative aspects focus group sessions were carried out in Norway (2) and in England (2). Participants in these focus groups were people randomly picked from those who have property and/or live in an area directly affected by flooding. The results from these focus groups are summarized in a FLOWS report. In the present context, only some key findings are briefly outlined and discussed with a view to shedding more light on different ways of perceiving flood risk.

Comments

Most respondents believe the danger of flooding has increased as a consequence of direct human interference in nature, and with the global change of climate. This seems to reflect a tendency seen in other areas that hazards are increasingly viewed as natural-technical phenomena, emphasizing the influence of man on nature. Such a shift in perceptions may also affect how the risks are perceived and the demands for risk reduction.

Views voiced in the discussions illustrate that perception of flooding risk is a complex phenomenon. There are distinctions between different types of flooding depending on for example what is considered measurable and predictable, and what is immeasurable and seen as “an Act of God”. Issues of justice and responsibility play a significant role. Flood risks are associated with strong emotions. Interestingly different experiences appear to be associated with different emotions. In the Norwegian groups previous experience could be related to feelings of helplessness in the face of repeated flooding, but also to a sense of mobilization in the face of a possible future extreme flood threat. Interviews among Swedish farmers affected by radioactive fallout after the Chernobyl accident revealed similar differences between an apathetic and helpless reaction pattern among some respondents, and a contrasting active and demanding self-sufficient reaction among others (Enander, 2005).

It might be presumed that concerns about flooding are mainly focused on the serious threats to life and health. Interestingly the hierarchy of concerns developed from the discussions places the extra bothers and inconvenience arising from the consequences of flooding at the highest level. This concern about all the extra bother is a reminder of the fact that maintaining everyday life is psychologically and socially important also in times of stress and difficulty. Many of the concerns voiced by people in disaster situations tend to be focused on maintaining the flow of everyday routines as far as possible.

The observations from the focus groups serve as a useful reminder of two important principles for risk communication. The first is that discussions about risk are concerned with far more than probability and consequences. The second is that people react differently and there is a need for differentiated communication.

Changing perceptions of risk: interactive learning groups

Within the FLOWS project, the study of Terpstra & Gutteling (2006) has contributed to insight in public perceptions of flooding and flood risk by investigating whether and how risk perceptions of flooding and flood risk change through group discussions and activities related to this risk. In this study two groups of subjects (13 and 11 participants respectively) were treated according to a recently developed concept referred to as “Interactive Learning Group (ILG)”. This concept is based on the idea of a learning process with the following four stages/elements: i) concrete experience; ii) observation and reflection, iii) forming abstract concepts and iv) testing in new situations. The experiences in these two groups, who participated in four ILG sessions during a period of four months, were compared with those of a conventional focus group (one discussion session) and a control group (no treatment).

The idea of conducting interactive learning groups was to gain further insights into risk perceptions, but also to actually raise awareness of flood risks among the participants. Using measures based on the psychometric paradigm, risk perception was compared between a pre and post test according to a number of aspects.

The results of the study showed both stability in group risk perceptions and unidirectional shifts in group risk perceptions which might be attributable to the group discussions. Some of the main findings highlighted in the report (Terpstra & Gutteling, 2006) are:

- Floods and flood risks are perceived as increasing risks by all groups, and these perceptions were not changed by any of the group discussions.
- Flood risks are not dreaded – mainly because people cannot imagine flooding actually occurring.
- ILG participants gained a more positive image of their own knowledge of flood risks, while still regarding themselves as rather ignorant in comparison with experts. Focus

group participants, on the other hand, tended to reveal a more negative perception of their own knowledge after the discussions, but also did not find it necessary to learn more.

- Participants in the ILG sessions showed decreased confidence in the general public's willingness to support risk mitigating measures. This is partly attributed to an increased awareness of the difficulties involved in managing a water system in a complex society.
- ILG sessions showed a (non-significant) tendency to increase trust in public authorities, particularly in the group with some distrust prior to the ILG discussion.
- Belief that the risk of flooding is known in science and by experts appeared to increase as a result of the ILG sessions, again primarily among the group who had expressed some lack of confidence prior to the sessions.
- There was a tendency towards greater polarization of views (more extreme views) among the focus group participants regarding trust in the openness of authorities and confidence in the degree to which flood risks are known to science.
- The ILG sessions appeared to contribute to participants perceiving greater control over their own safety in case of flooding and greater ability to protect against flooding (self-efficacy). Focus group participants on the other hand revealed a decrease in perceived control.

An ILG was also run in Hamburg according to similar principles.

Comments

The results from the ILGs must be considered in relation to the nature of the participants. Participants in the Dutch ILGs were people who either were active in local organizations (Flevoland) or had run for a position in a Waterboard election (Friesland). In Hamburg the target group was defined as "ordinary uninformed citizens", but difficulties were experienced in recruiting this category of participant, primarily due to lack of interest.

Participation in ILGs is demanding in terms of both time and effort, and is therefore most likely to attract people already interested in flood risk issues. In one way this can of course be viewed as a limitation for the method. However, an interesting observation is that ILGs can be a way to create ambassadors for local governments or water boards. A follow-up of how participants use and possibly disseminate their increased knowledge would be of interest. There are examples in other contexts where community members who gain special knowledge within a risk-related area can become important information nodes in the local community (Enander, 2005).

The knowledge gained from participation in the ILGs is clearly not only related to the risks themselves, but very much also to the broader context. Thus participants appear to have become more aware of the complexities of dealing with flood risks, indicating perhaps a change in the framework within which they perceive and assess these issues. Again, follow-ups would be interesting to ascertain how experiences from the ILGs might affect how participants evaluate subsequent information about flooding.

Four perspectives from risk communication research

Risk communication is a broad term describing a very varied range of activities and purposes. Ultimately the purpose of risk communication is to inform, persuade and consult in order to enhance knowledge, change attitudes and behaviour and provide effective conditions for dialogue and conflict resolution (Renn, 1998). In terms of the FLOWS focus, all these aspects are relevant. A complete review of the risk communication literature is beyond the scope of this report. However, the report by Terpstra & Gutteling (2006) provides an overview of the literature and some of the research findings pertaining to different forms of risk communication. As they point out in their report, while a great deal has been published concerning best practice risk communication principles, surprisingly little empirical work has been done to test these principles in reality.

As a background to the risk communication applications developed in WP2, this section will briefly focus on four perspectives from the research literature which can be useful to bear in mind when considering these experiences. The first outlines some paradoxes which may need to be addressed and balanced in different communication situations. The second perspective is a reminder of the need to tailor the message according to the needs of the public with which one wishes to communicate. The third suggests criteria for evaluating risk messages. The fourth perspective touches on the current focus on participation and public involvement.

1. Paradoxes of risk communication

Risk communication guides tend to give general advice concerning openness, clarity of message, etc. However, in real-life contexts there are often problems of a principle nature that need to be addressed. In an often-cited report the researchers Otway and Wynne outlined some paradoxes which they contend have been insufficiently considered in developing risk communication (1989). Results from the expert panels and discussions in FLOWS indicate that authorities and experts recognize and have experience of a number of these problems in various flood-related activities. The paradoxes as outlined by Otway and Wynne are presented below together with examples from the FLOWS perception studies:

- *The reassurance-arousal paradox* concerns activating people to prepare for serious threats without causing undue or unnecessary fear. (The importance of achieving this balance was recognized by the experts in panel discussions.)
- *The information-targeting paradox* concerns the problems in differentiating information between groups of people exposed to different degrees of threat. (There might be problems for example in simultaneously addressing people in high and low flood risk areas).
- *The information cultures paradox* reflects that different organizations each have their own culture, creating difficulties for collaboration. (The importance of avoiding conflicting messages and of working in partnership is emphasized in panel discussions)
- *The information demand paradox* describes the apparent instability of public demand for information. People may show little interest in information under normal circumstances, while the demand increases dramatically in situations of threat. (The polling data indicate a passive attitude towards information among the respondents under everyday circumstances)
- *The body language paradox*. This may be evident in discrepancies between what authorities say and the message they convey through other channels. (A FLOWS example

might be the reactions among UK focus group participants commenting on new housing sites being built up in areas with high flood risk.)

- *The credibility-complacency paradox.* There is a strong emphasis on the need for public trust in authorities, but it must also be recognized that unrealistic confidence can breed complacency and reduce motivation for taking personal safety measures. (Again, the need for a balance between trust in authorities and personal initiatives among the public is recognized in the expert panels)
- *The credibility-authenticity paradox.* Credible information, what people are likely to believe, is not always the same as authentic information. Authentic information may be more complex and requires a basis in relationships of mutual trust. (In the ILG study one group was reluctant to believe the risk information concerning local flood risk – not finding it credible).

As the examples above indicate, work within the FLOWS programme has faced a number of the paradoxes related to risk communication.

2. Communication and behavioural change

Risk communication with the purpose of informing people is generally less complex than communication aimed to convince people to take preventive measures or change risky behaviours. Efforts to influence behaviours need to be based on a sound knowledge of how these are influenced by different factors. Thus understanding how people perceive risks and assess their own ability to act forms an important basis for developing effective communication. Another aspect to consider concerns the process of behaviour change. Adopting safety measures is generally not a one-time decision, but rather a gradual process of increased awareness, understanding and acceptance of the possible courses of action. A model presented by Weinstein (1988) illustrates this idea and outlines psychologically different stages through which an individual will pass in adopting preventive measures. This stage theory model is illustrated in the figure below (1).

According to the stage theory model an individual is at first i) unaware of the risk and/or the possible safety measure, ii) aware but not personally involved, iii) personally involved but unsure of how to act, iv) in a decision phase, deciding not to act or v) deciding to act; vi) taking action and vii) maintaining this action. In terms of flood mitigation actions this model would describe how an individual might first be unaware of the need to take any action, then learn of a possible action, consider taking this action and finally decide to act. The main point of this stage theory is the idea that people are susceptible to different types of information and incentives depending on at which stage they currently find themselves. The kind of communication effective in raising awareness (from stage 1 to stage 2) may differ from the incentives inducing the decision to take action (from stage 4 to 5). A large-scale experiment attempting to get people to test their homes for radon showed considerable support for stage theory, demonstrating that people were disposed to take heed of different types of communication at different stages (Weinstein, et al. 1998).

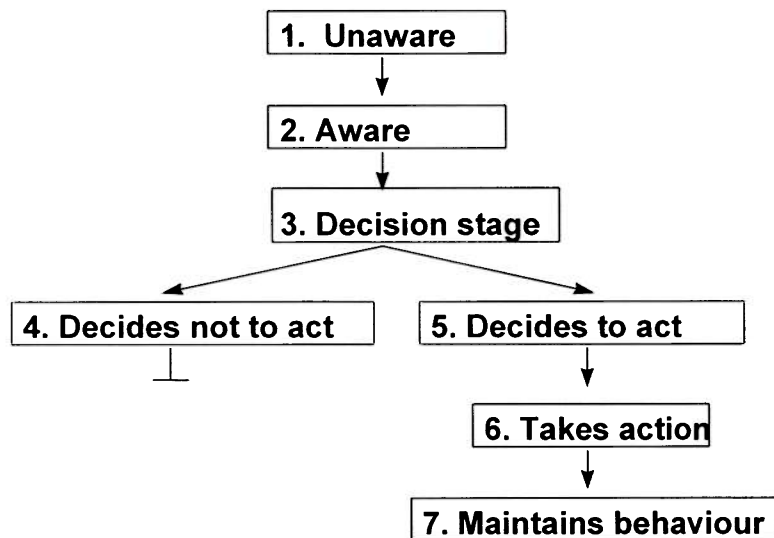


Figure 1. Stages leading to adoption of safety behaviours (adapted from Weinstein, 1988)

A major finding from the FLOWS risk perception studies indicated lack of awareness about flood risk among the people living in risk areas. Correspondingly, much of the focus of the communication approaches has concerned ways to raise awareness, rather than to promote changes in behaviours. The results from the risk perception studies could however be used to examine more closely factors indicating different stages of risk awareness, and correspondingly different needs for information and support. A significant indicator might for example be whether or not the target group has personal experience of flooding.

3. Criteria for evaluating risk messages

In communicating risk there is a temptation to equate a satisfied (uncomplaining) target audience with success. Weinstein and Sandman (1993) propose seven criteria which they suggest might be more appropriate indicators of success:

- *Comprehension* (Does the audience understand the content of the communication?)
- *Agreement* (Does the audience agree with the recommendation or interpretation contained in the message?)
- *Dose-response consistency* (Do people facing a higher dose of a hazard perceive the risk as greater and/or show a greater readiness to take action than people exposed to a lower dose of this hazard?)
- *Hazard-response consistency* (Do people facing a hazard that is higher in risk perceive the risk as greater and/or show a greater readiness to take action than people exposed to a hazard that is lower in risk?)
- *Uniformity* (Do audience members exposed to the same level of risk tend to have the same responses to this risk?)

- *Audience evaluation* (Does the audience judge the message to have been helpful, accurate, clear, etc?)
- *Types of communication failures* (When different types of failures are possible, are the failures that occur of the more acceptable variety?). For example: is it more serious if the message is too weak to involve people or if it is so strong that some people become frightened?

Within the FLOWS communication projects the approach has emphasized innovations and new ideas, rather than strict evaluations of effects. Questions regarding how the impact and effects of different efforts might be assessed have however formed a significant part of the discussions. Since raising awareness has been a key aim, the criteria of *comprehension* and *audience evaluation* seem to have been the main evaluation criteria.

4. Public participation and involvement

Risk communication must strike a balance between informing people with a view to changing behaviours and establishing dialogues in order to find out and incorporate the values and concerns of the public into community planning. Fischhoff (1998) has described the development of risk communication over the past 20 years or so as a progression through the following stages:

- All we have to do is get the numbers right
- All we have to do is tell them the numbers
- All we have to do is explain what we mean by the numbers
- All we have to do is show them that they've accepted similar risks in the past
- All we have to do is show them that it's a good deal for them
- All we have to do is treat them nice
- All we have to do is make them partners
- All of the above

The message is that telling people statistics is not enough, we need to find ways to involve the public as partners with a joint responsibility. Finding out more about stakeholder perceptions is recognized as a first step in finding ways to incorporate different views in flood risk management (see e.g. Vari et al., 2003). However, in flood risk management as in other areas, genuine community involvement and participation is not so easily achieved. While recognizing some favourable developments, Fordham (1998) has criticized flood hazard mitigation as being dominated by top-down, technocentric approaches which are slow to change.

The FLOWS studies illustrate differences between experts and laymen, and also differences between different countries regarding such issues as assignment of responsibility, community participation and acceptability of different measures. While recognizing the difficulties, the FLOWS projects do also provide some interesting examples of how arenas for dialogue have been established and of how community involvement can be strengthened (one notable such initiative is the UK National Flood Forum).

Reflections on FLOWS communication approaches

One general criticism of many risk communication efforts has concerned the lack of adequate analysis of the needs and requirements of the target group. Thus one aim of the FLOWS projects has been to apply knowledge from the risk perception studies in developing communication approaches. While this may not always have been fully possible, certainly a number of links between perception findings and communication strategies can be identified. Thus for example the lack of risk awareness demonstrated in the public perception studies has formed a central focus to be addressed in communication strategies. Another lesson from the focus group studies revealed strong emotions relating to consequences of flooding experience and concerns about the bother and work involved in recovering from flood damage. Several communication approaches have also tried to find ways to convey this reality of flood damage – the sights, smells and distresses - to residents in risk areas.

The FLOWS communication approaches can be considered in relation to a number of themes which characterize the general risk communication literature. Three such themes are briefly discussed in this section.

Reaching the right target group

Here experiences from FLOWS, for example the road shows and mobile communication projects, illustrate some of the difficulties. Capturing the attention of those already interested is far easier than involving the unaware or unconcerned. Important factors that need to be taken into account include the design of the communication approach, the geographical location and timing. In some areas of risk communication research attempts have been made to identify “windows of opportunity” when different target groups might be more easily reached. These “windows” can be found in relation to events (such as major accidents) or seasonal changes (weather conditions), but also to certain phases in peoples lives (purchasing a home, having children). Reaching the right groups is only part of the challenge, the form of communication also needs to be adapted to the needs of the group in question.

Different approaches have been applied in the different countries. Building on some of the differences observed in the polling work, it would have been interesting to try some comparative work using similar approaches in different countries. Factors such as trust in authorities, local experiences and traditions are likely to be important for the outcome of communication efforts, but there is a lack of systematic knowledge in this area.

Involving the community

Several FLOWS projects have specifically been directed towards schoolchildren. On the one hand it might be argued that this choice reflects an “easy target”, since school classes can be involved via their teachers. On the other hand, the experiences from these projects also indicate that the school projects seem to have opened up contacts within the community, attracting families, media attention and even politicians. The issue here is perhaps primarily about finding effective routes into community life. More and more the view of risk communication has come to focus more upon building relationships rather than disseminating “parcels of information”. Closer examination of some of the FLOWS experiences can perhaps reveal other examples showing how significant community relationships can be established.

Involving well-known people and finding media-friendly angles are good examples of how “ripple” effects can be achieved in connection with communication opportunities. These effects may be difficult to establish objectively, but can have strong impact (as outlined in the social amplification framework described by Kasperson et al., 1988).

Finding effective symbols

Several projects have focused on development of symbols and artwork capturing experiences of flooding. These symbols can express collective memories and form nodes for community experiences.

While the significance of symbols and collective memories is well-recognized in disaster research (Boholm, 1998) little work has been done to evaluate reactions to and effects of different ways of depicting hazards. It would therefore be of interest to follow-up some of the FLOWS symbol projects and study what role these symbols can play in maintaining community awareness. A related theme concerns the role of emotions in risk communication. The importance of maintaining a balance between creating fear of flood hazard and encouraging sense of self efficacy has been discussed in relation to many of the projects. Again, follow-ups of how this balance is perceived by the public would clearly be of interest.

Concluding comments

The focus on risks in society has increased markedly in recent decades. Increased attention to risks can be seen, not only in the media, but also in the political and other arenas (Lupton, 1999; Sjöberg et al., 1998). Thus people are having to deal with an increasing amount of information about hazards from a number of different sources. There is a popular view that information about risks mainly generates exaggerated and misplaced fears (Glassner, 1999). The empirical evidence suggests, however, that this is an overly simplistic view, and that the effects of an increased awareness of risk are more complex. Nonetheless, the increased background "noise" of risk messages from different sources needs to be overcome in all specific risk communication efforts. It has consequently become all the more important that communication of real significance for public safety is designed to be useful, effective and accepted. In this context the results from the FLOWS work – both the successes and the disappointments – provide important lessons for understanding risk perceptions and improving communication. Viewed from the perspective of research in this field, the FLOWS results illustrate familiar phenomena such as lack of personal risk awareness and differences between experts and the public, but also provide interesting insights regarding learning processes, community involvement and international comparisons.

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PART THREE

Summary of the WP2 Projects

Perception of Flood Risk (2A)

Background and aim

The effective transfer of the flood hazard message to the public is considered decisive for the success of the participatory approach and is at the heart of all problems related to risk management.

The aim of this project was to study the perception of risk and vulnerability by the inhabitants, decision-makers and experts with the focus on similarities and differences in a search for a definition of a commonly acceptable risk (if possible).

Methods

Risk perception was studied using different methods:

1. Quantitative studies using the Expressed Preferences Approach aimed at the public living in flood prone area (poll, in total 3996 telephone interviews) and experts/decision makers (questionnaire, in total 161 responses).
2. Qualitative studies employing expert panels, focus groups and Interactive Learning Groups (ILGs).

Results

The interviews with the public in all the countries exhibited limited interest in flood hazard and passivity with respect to increasing the safety of their own homes from flood. People seemed ready to hand over responsibility to the public authorities in spite of a lack of confidence in their ability to deal with the problem. Apart from the UK, newspapers and radio/TV are still the preferred information channels, although information remains inadequate. The focus groups showed that people have strong negative feelings associated to flood, and the fear of flood affected their quality of life.

Professionals had a high awareness of flood hazard, and they considered information on floods to be adequate. They appreciate the ability of websites to disseminate information much more than the public do. The public in general rely on the ability of the public authorities to provide flood safety. However, the professionals often consider flood defense and protection measures inadequate, and they considered individuals at risk to have responsibility as well.

The expert panels and the ILGs included a dialogue between experts/decision makers and representatives from the public, which is considered crucial for the future development of flood management.

Project partners

Norwegian Water Resources and Energy Directorate (project lead)
University of Oslo, Norway
Province of Flevoland, the Netherlands
Province of Friesland, the Netherlands
Water Board of Friesland, the Netherlands
Province of Groningen, the Netherlands
University of Twente, the Netherlands
Hamburg University of Technology, Germany
City of Hamburg, Germany
Cambridgeshire County Council, United Kingdom
Norfolk County Council, United Kingdom

County of Värmland, Sweden
Swedish Rescue and Services Agency

Where to get more information about the project

The following reports can be downloaded from the www.flows.nu;

- WP 2A -1: Perception of Flood Hazard in Countries of the North Sea Region of Europe
- WP 2A -2: Expert Panel Study
- WP 2A -3: Qualitative Studies of the Public's Understanding of Flood Risk - Case studies from the UK and Norway
- WP 2A-4: Combating Flooding Together
- WP2A-5: Interactive Learning Groups

Project leader: Hallvard Berg, Norwegian Water Resources and Energy Directorate.

E-mail: hbe@nve.no



Disseminating Flood Risk Information (2B)

Background and aim

The need for communication activities has been clearly illustrated by the perception studies performed by FLOWS. Public awareness and knowledge about flood risk has been demonstrated to be rather poor, and the public and professionals evidently perceive flood risk issues differently. All activities undertaken have the common aim of raising awareness about flood risk and of getting both the members of the public and the authorities to respond to flood risk in a more effective way so as to reduce the negative impacts of flood.

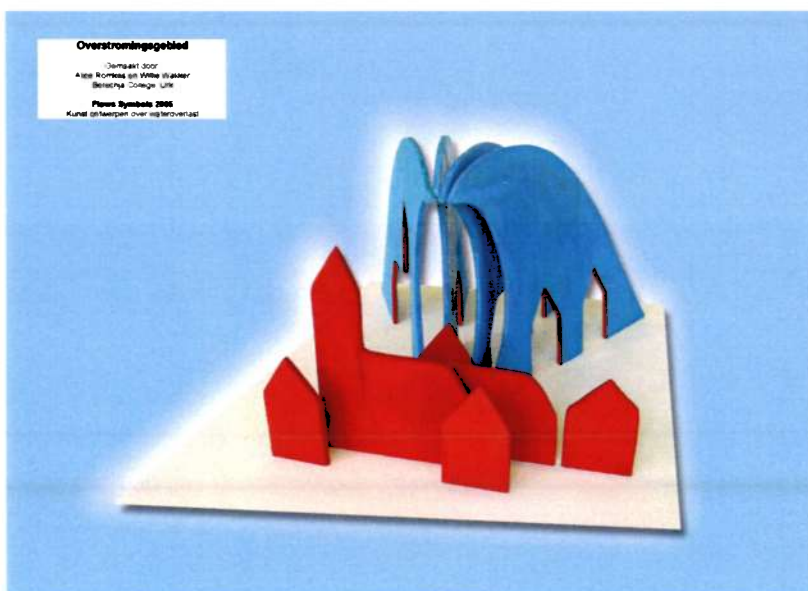
Methods

Various techniques have been used, including some of an innovative character. The techniques may be categorised as follows:

- School projects
- Physical models to visualise flood issues, e.g. artworks, models, symbols
- Providing information “face-to-face”
- Broad information, e.g. leaflets, seminars, web sites, flood alarm systems, in order to reach a large number of people

Results

- Simple and easily understandable information in non-technical language is important.
- Visualised flood risk may be more effective than words.
- Authorities’ involvement of schools and universities demonstrates the potential for mutual benefits.
- Media coverage has been shown to increase the audience significantly. The media can be directed more actively so as to spread the desired message to the public.
- When local, regional and national authorities and other stakeholders work together, there is scope for reinforcing messages. Common initiatives create a meeting place and allow for an easier exchange of information between the participating partners.



Project partners

Norwegian Water Resources and Energy Directorate (project lead)

Bærum Municipality, Norway

Åsnes Municipality, Norway

Hedmark County Council, Norway

County Governor of Hedmark, Norway

Hamburg University of Technology, Germany

Water Board of Friesland, the Netherlands

Province of Friesland, the Netherlands

Province of Flevoland, the Netherlands

Province of Groningen, the Netherlands

Karlstad Municipality, Sweden

Swedish Rescue Services Agency

Cambridge County Council, United Kingdom

Lincolnshire County Council, United Kingdom

Norfolk County Council, United Kingdom

Suffolk County Council, United Kingdom



Where to get more information about the project

The different communication activities have been reported in the 19 fact sheets, which can be downloaded from www.flows.nu.

Project leader: Anja Skiple Ibrek, Norwegian Water Resources and Energy Directorate.

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Retrofit of a Heritage Building (2Ci)

Background and aim

This project provides a demonstration of how a building with high historic value can be protected from flood risk using retrofitting measures that do not detract from the historic fabric of the building. The aim of the retrofitting work is to increase the resilience of the building to flooding, reduce flood damage and minimise the recovery time of the building and its contents after a possible flood event.

Methods

A search for a suitable building with historic value and that is located in a flood risk area was carried out. The Guildhall building, in the town of Boston in Lincolnshire was chosen. It was built around 1390 and has Grade I listed building status making it of high heritage value. Research into suitable retrofitting techniques was carried out and the types of measures being implemented include the installation of flood proof heating systems, application of flood resistant paint to timbers, installation of removable flood panels for doors and fitting of flood proof electrical wiring systems.

Results

A demonstration project showing how flood risk damage can be mitigated against on a building with high heritage value in the town of Boston in Lincolnshire. Best practice measures developed showing users of the building how to be prepared if flooding does occur in relation to the building and its contents.



Project partners

Lincolnshire County Council
Boston Borough Council
English Heritage
East Midlands Development Agency

Where to get more information about the project

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Retrofitting of a Residential Building (2Cii)

Background and aim

A demonstration project was arranged to encourage householders to see the benefits of making their homes more resilient to flooding. The aim was to promote self-help, raise awareness of flood resilient building alterations and point out potential group or community measures, such as a flood alarm system.

Methods

Look for a publicly owned property, preferably one that had suffered from flood, in a flood risk area. An agreement with the housing association and a willing tenant was required. Organise specification for building work, assess tenders and select bids. Detailed logistics had to be worked out to ensure the tenant was not unduly disadvantaged during the works. Regular meetings with Norwich Union and their PR company to plan publicity and promotion were needed. A media event timed to coincide with the Environment Agency's autumn flood warning campaign was organised by the PR company and included wide national, regional and local coverage.

Results

A residential retrofit scheme for the ground floor of a three-bedroom property in Aldwyck Way, Pakefield, Lowestoft (just outside Norfolk), owned by the Cotman Housing Association. A community flood alarm system was installed in conjunction with the retrofitted house.

Project partners

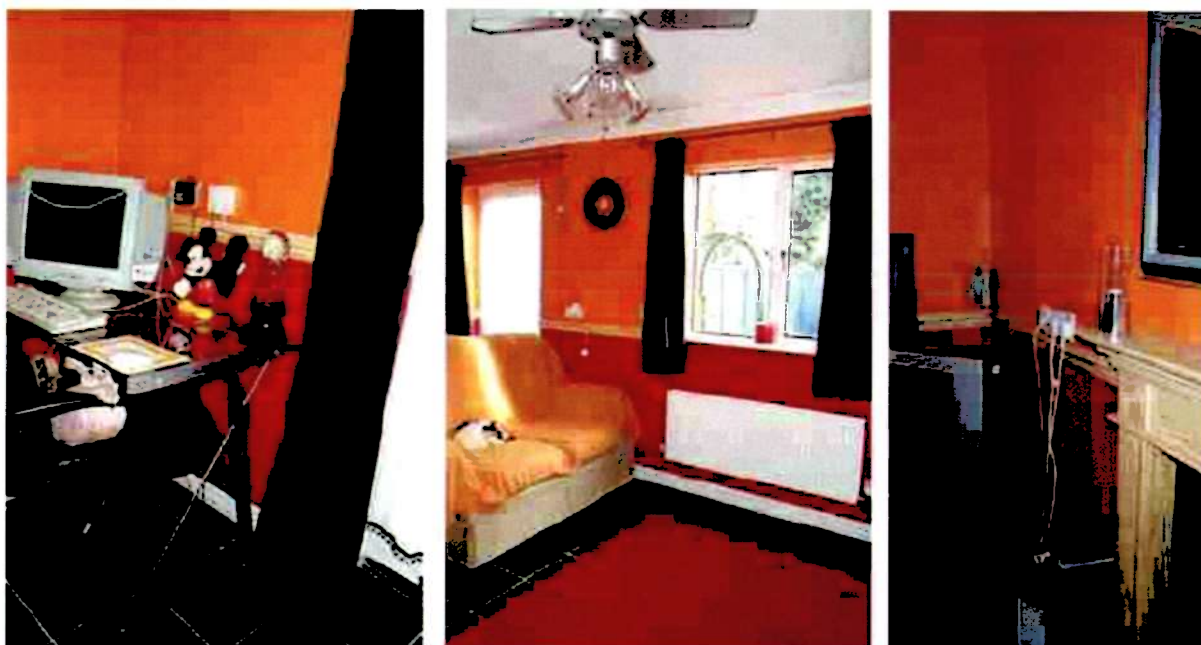
Norfolk County Council
Norwich Union Insurance Ltd

Where to get more information about the project

A flood support web site, hosted by Norwich Union Insurance Ltd, has been created to provide information, links to relevant web sites for further information, a flood simulator and fact sheet help guides to flood resilient repairs. The address is <http://www.floodresilienthome.co.uk/>

Project leader: Alison McErlain, Norfolk County Council, United Kingdom

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Retrofit: Office Building (2Ciii)

Background and aim

This project aimed at modifying an existing showcase commercial building to demonstrate best-practice techniques for minimising damage caused by floodwater. The goal was to show practical, innovative and cost effective solutions that could be readily adopted by small to medium-sized enterprises and which would allow for the practical application of current research for existing buildings in flood areas.

Methods

Under guidance from the County Council an external consultant was employed to assess the site and propose measures to improve its flood resilience. The consultant also operated as project manager for the works. As the site was an educational centre for young children, access for engineering and maintenance work was limited.

Results

Technical alterations to the building involved

- The drainage system
- Airbricks, which provide below-floor ventilation to prevent damp
- Doorways
- Windows
- Electrical equipment

Other project outputs included a guidance document relating to flood-proofing and retrofitting, which is targeted at businesses, and signage provided on-site to raise awareness of the work. Communicating the aims and results of the project has targeted various audiences; small to medium-sized enterprises/businesses (SMEs), school children who are associated with the study site and wide public, politicians and climate change professionals.



Project partner

Cambridgeshire County Council

Where to get more information about the project

A guidance document has been developed, and can be downloaded at www.cambridgeshire.gov.uk/flooding or www.flows.nu. A copy of the document with additional documents and images related to the project are available on request.

Project leader: Matthew Hunt, Cambridgeshire County Council, United Kingdom

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The Barrier Project in Arvika Bay (2Civ)

Background and aim

The city of Arvika has been heavily impacted by floods. The last huge flood was in 2000 and caused damage that was estimated at around €30 million. The aim of this project was to investigate the conditions for building a barrier that will make it possible to regulate the water level and thus protect the city.

Methods

Technical and environmental studies have been carried out, including dimensioning of pump facilities, water exchange studies, inventory of flora and fauna and development of detailed maps of water depths. Most of the studies have been undertaken by consultants.

Results

The studies show that the barrier project is realistic. The regional environmental court in Sweden is now assessing the application to construct this barrier. During the pre-feasibility studies, politicians and officials in Arvika Municipality gained a greater understanding and awareness about flood issues and the measures required to reduce potential damage.



Project partner

Arvika municipality

Where to get more information about the project

Project leader: Anders Norrby, Arvika Municipality, Sweden

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Internet Based Flood Risk Assessment and Retrofit Advisory System for Public and Private Housing (2Cv)

Background and aim

This project is based on the concept of “living with floods rather than fighting them” and focuses on individual flood mitigation measures and increasing public awareness of flood hazard so that individuals are able to make their homes more resilient by applying adequate flood mitigation measures.

The main objective of the project was to develop a system for educating stakeholders in flood resilience management by means of a web-based advisory tool on a micro scale level tailored to the user’s own property.

Methods

The main activities of the project may be summarised as following:

1. Data collection (mainly damage data, geo data, hydrologic data)
2. Inventory assessment of existing retrofitting measures
3. Inventory of state of the art measures for damage assessment and development of a damage matrix that relates flood damage to different flood parameters
4. Development of a web-based dissemination strategy
5. Development of a decision making concept and data mining algorithms for the selection of flood mitigation measures
6. Damage matrix and impairment functions
7. Catalogue of retrofitting measures
8. Database design
9. Integration of the single components into an integral system (FloReTo)
10. Validation and testing
11. Implementation in concrete cases (case study)

Results

The project’s final product is the Flood Resilience Tool (FloReTo), which comprises the features of building materials and theoretical knowledge of how they behave as well as the best practices of mitigation strategies. FloReTo is an internet based system that enables one to determine suitable retrofitting strategies in order to improve the flood resilience of private and public housing. As the system’s final product, the user receives different flood retrofitting scenarios for own property along with a cost benefit analysis (CBA).

The tool also provides the user with information related to flood management and helps him understand the main terms and concepts of flood protection and mitigation.

Project partner

Hamburg University of Technology

Where to get more information about the project

The system has a client/server architecture and will be available on the web from October, 2006.

Contact person is Natasha Manojlovic (natasa.manojlovic@tuhh.de)

Project leader: Timm Ruben Geissler, Hamburg University of Technology, Germany

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Public Risk Perception of Flooding and Flood Risk (2D)

Background and aim

Insight into how the general public perceives risks is particularly important for developing a form of communication that contributes to people's awareness of risks and disaster-preparedness. Citizens in all layers of society who are exposed to flood risk should be aware of those risks and be able to respond to them.

Our study aimed to provide insight into public perceptions of flooding and flood risk by investigating whether and how risk perceptions of flooding and flood risk change as a result of group discussions and activities related to this risk.

Methods

Different types of group discussions and activities, which are referred to as 'treatment', were organised. Three groups were treated. Two of these groups were treated according to a newly developed concept referred to as 'Interactive Learning Group (ILG)'. In addition, a control group was established as a benchmark for 'maturation effects' in the groups treated. The ILG's were set up around the learning cycle developed by Kolb. This theory distinguishes four stages/elements in a learning process: (1) concrete experience, (2) observation and reflection, (3) formation of abstract concepts and (4) testing in new situations.

Results

As expected, we found significant statistical evidence pointing at changes in risk perception as a result of the group discussions in the ILG sessions as well as in the focus group sessions. Whereas the control group revealed basically stable perceptions, the participants from two groups showed significant and significantly similar patterns of change. Thus, although participation in focus group sessions also seems to have resulted in changes in perception, the kinds of changes sometimes differed from the changes observed in the ILG's.

Whereas changes in perception of the ILG participants seem to point consistently and predominantly in one direction as the result of a learning process, the focus group participants experienced a radicalization of their initial views. We would claim that the ILG sessions have contributed to an increased awareness of flood risk and related topics.



Project partners

Province of Flevoland
University of Twente

Where to get more information about the project

This study has been reported in FLOWS Report WP 2D.

Project leader: Teun Terpstra (PhD student at the University of Twente, the Netherlands).

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