The perception of risk in the flood-prone area: a case study from the Czech municipality

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Abstract

Purpose – The purpose of this paper is to explore the risk perceptions and activities of people to reduce impacts of disaster.
Design/methodology/approach – Case study research has been conducted in village Podhradí nad Dyjí in the Dyje river basin in Czech Republic. Villagers from different age groups, experts, NGO members have been interviewed to understand people's perceptions of flood risks and their actions.
Findings – The research has found that changing flood insurance policy influenced people's risk perception. There is also increasing self-dependency among people to reduce impacts of disaster. They come together to support each other and develop collectivities in managing disaster. People's actions and willingness to participate in disaster management activities change with distance from the river bank.
Research limitations/implications – The village identified for the case study research has been affected by floods after implementation of the Crisis Management Act No. 240/2000 Coll. The findings of the study are influenced by geographical location of the municipality and cannot be generalised in the Czech Republic.
Practical implications – The research has listed physical as well as socio-economic and cultural indicators of risk perception in the Czech Republic. These indicators and outcomes should help to assess and identify the gaps in reducing impacts of floods.
Originality/value – The study has revealed the interconnection between physical, socio-economic, and cultural factors of risk perception after implementing the Crisis Management Act No. 240/2000 Coll. and changing strategies in disaster management in the Czech Republic.

Keywords Czech Republic, Flood, Risk perception, Disaster and emergency management, Dyje river
Paper type Research paper

1. Introduction

Floods can cause extensive damage to property and may lead to the loss of lives. The Czech Republic has faced a series of crisis situations caused by major floods in 1997, 2002, 2006, 2007, and 2013. Researchers have attributed the increasing frequency of floods in the region to widespread climatic variations (Brázdil *et al.*, 2006; Mudelsee *et al.*, 2003; Duží *et al.*, 2015). Beside increased frequency of floods, a changing governance system has also led to increased perception of flood-related risks. The conventional top-down approach of the central government has been gradually replaced with a more participatory framework, putting wider responsibility upon local authorities and community-based institutions (Dostál, 2015).

Emergency management in the Czech Republic works at the municipal, regional, and state levels. The local governments (i.e. the municipalities) are largely responsible for managing crisis situations at the grassroots level. However, municipalities in their efforts to reduce the impact of floods depend on different governmental and non-governmental agencies, with cooperation being sometimes difficult between agencies working on various scales and towards diverse aims. Efforts have been made to find technological solutions to the threats caused by natural hazards (Brázdil *et al.*, 2005; Potluka and Slavíková, 2010; ICPDR, 2009). In spite of this, damage and loss suffered due to floods, combined with a lack of adequate

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support from insurance companies, cause people to adopt independent strategies of coping with disasters (Duží *et al.*, 2015). Their coping strategies depend on their risk perception, and their trust in the flood risk reduction management system set by the government.

This paper makes an attempt to understand the perception of flood-related risks in the highly endangered area, and the relation of this perception to risk reduction strategies adopted by households at the local level. The text is based on research of vulnerability and coping strategies of households in a municipality located in a flood-prone area with recent and repeated experience of severe floods. We explore the ways in which risk perception and traditional understanding of flood-related risks can influence people to work collaboratively in reducing the risk of flooding. We also look at the ways in which the culture of dependency on the government in risk reduction influences the risk perception of households and the mode of their cooperation with government. Accordingly, the research was conducted with an aim to answer the following questions: Is the risk perception the only factor that changes people's decisions in disaster risk reduction? Does the risk perception influence people's willingness to participate in disaster risk management? How do the households coping strategies change in response to the changing governance system?

The paper continues as follows: Section 2 briefly describes the flood management system of the Czech Republic and the changes introduced into the system after the extensive floods in 1997. Section 3, introducing theoretical framework for understanding risk perception, is followed by the methodological Section 4 describing the research site and method. Section 5 presents results based on in-depth interviews with household members and local institutions representatives of a municipality highly endangered by floods, while Section 6 provides discussion of results and concludes the paper.

2. Managing the impact of floods in the Czech Republic

Floods have been the most destructive natural hazards in the Czech Republic. While many severe floods were recorded since the sixteenth century, their frequency began to decrease during the second half of the twentieth century (Vávra *et al.*, 2017). Between 1900 and 1997, a total of 588 reservoirs including 123 large dams were built in the Czech Republic, with flood prevention being among primary reasons for their construction (Brázdil *et al.*, 2005). They helped to decrease the number of flood events during the twentieth century. After the Second World War, system of intensive cooperative agriculture has significantly changed the land-use pattern of the Czech countryside. The potential for natural water retention was not only decreased by merging plots of arable land, abolishing balks, changing grassland into arable land, tamping the soil with modern agricultural machinery, but also by modification of river beds, shortening of the river courses, shifting mixed forests into coniferous monocultures, and through introducing industrial activities in flood plains. The land-use changes which had been introduced during the decades of intensive agricultural and industrial development under the socialist planned economy are now considered to be an important cause of recent major floods (Vávra *et al.*, 2017, Brázdil *et al.*, 2011, p. 480). The extensive floods in the Morava River basin in 1997 were so destructive that the event was followed by a major political, academic, and professional discussion about the changes in the nature of flood management (Brázdil *et al.*, 2011; Dostál, 2015; Duží *et al.*, 2015; Potluka and Slavíková, 2010). It has become evident that the conventional policy based on physical protective measures is not the sufficient solution to prevent major floods in the Czech Republic.

After 1989, the centralised system of flood risk management was slowly decentralised with self-governing local municipalities, re-established in 1990, assuming a more active role in the system (Čamrová and Viktorová, 2006). However, the systemic changes began to be discussed and implemented only after the destructive floods on Morava River in 1997. In 1998, the emergency response system of the Czech Republic was modified by the

Constitutional Act No. 110/1998. Still deeper changes in the disaster management system were introduced in 2000 by the Act No. 239/2000 Coll., on the Integrated Rescue System (IRS), which redefined the competences of various governmental and non-governmental bodies in carrying the preventative measures and rescue operations. The IRS functions in coordination of the five national government departments, the Police, the Medical Rescue Service, and the Fire Rescue Service. Volunteer fire brigades, which are organised in almost every Czech municipality, are an important part of the IRS at the grassroots level (Vilášek *et al.*, 2014; Ministry of Interior of the Czech Republic, 2015).

According to the Act No. 239/2000, it is a legal responsibility of the government to minimise the impacts of natural hazards through early warning, evacuation of citizens, sheltering and protecting lives and health of inhabitants, and protecting property and environment. The system of flood risk management is based on competences shared among the national government, regional authorities (Provincial governments), local governments (municipal authorities), and individual citizens. The national government is responsible for crisis/emergency management as well as risk management, and it provides most of the necessary assistance, including finance. The regional and local governments focus largely on flood risk management. Municipal representatives, in particular, are directly engaged in risk management at the most elementary level. They take steps to evacuate residents, protect properties, and prevent future loss and damage. The new approach to disaster management has increased the responsibilities of local governments, and directly affected the coping mechanisms and disaster mitigation strategies of households. However, there exists a gap between the strong legal position of local governments and the weak involvement of citizens in the different phases of the flood risk reduction management (Potluka and Slavíková, 2010).

3. Understanding risk perception

Risk is associated with judgement rather than fact. It is a way of expressing uncertainty and accumulating individual perception about natural hazards. Risk perception is the process of collecting, selecting, and interpreting signals related to uncertain natural hazards (Wachinger *et al.*, 2013, p. 1049; Slovic, 1987). It is an image of a natural hazard that is about to happen. The image has been developed through interpretation of direct and indirect sources of information (Wachinger *et al.*, 2013, p. 1049). It is an image formed by sources of information, changed by an individual experience of the person, and modified by the socio-economic and cultural environment. Perception of risk is an intuitive judgement made by individuals or groups in the context of limited and uncertain information (Raaijmakers *et al.*, 2008, p. 308).

Risk perception is based on risk characteristics that are the result of dread, knowledge, and degree of control over the risk. In the context of natural hazards, "dread" is worry, "knowledge" is awareness, and "degree of control over the risk" is preparedness (Slovic, 2000). Risk perception refers to the relationship between worry, awareness, and preparedness. Each of these characteristics determines societal preferences in reducing such risk or conserving benefits. Awareness is developed through individual experience and external awareness programmes. Worry depends on awareness about the risk of disaster and its possible impacts. The more people worry about the risk of disasters, the more they will demand precautionary measures. As Savage (1993) argues, if people worry about natural hazards, there will be a "willingness to pay" on their part in order to minimise the potential damage. Awareness leads to a higher or lower level of worry that in turn helps in generating a higher or lower degree of preparedness. Awareness and preparedness are also influenced by public policy, which helps to educate people and enhance the preparatory measures. However, the level of worry is not influenced by public policy, even though it influences the awareness and preparedness of people (Raaijmakers *et al.*, 2008, p. 313).

Risk can be reduced if individuals and groups are prepared for the consequences of natural hazards (Kron, 2002). A community that is well prepared has less reason to worry about risk (Raaijmakers *et al.*, 2008, p. 312). The level of preparedness depends on the social, technical, economic, and institutional measures. There are studies claiming that a higher level of risk perception leads to a greater emphasis on actions reducing the risk (Raaijmakers *et al.*, 2008; Kraus and Slovic, 1988). The perception of risk is accompanied by a set of choices. After examining the risks, people usually have three choices: accepting the risk, reducing it, or avoiding it altogether. The choices are based on a trade-off between perceived risks and perceived benefits in disaster risk reduction activities (Raaijmakers *et al.*, 2008; Fischhoff *et al.*, 1978).

Risk perception is influenced by public opinion about effectivity of technical and environmental measures introduced to minimise the risk (such as dikes, dams, or polders in the case of flood protection). Personal experience and experience shared by friends and neighbours make people aware of the risk, but the level of awareness also depends on the interpretation of the risk. Keller *et al.* (2006) found that emotions developed through direct or indirect experiences encourage people to take decisions in order to reduce the risk. Even negative experiences may lead to positive decisions that enhance the ability to reduce the risk in future. Survivors of the tsunami in Thailand and the hurricane in El Salvador believe that they have the positive knowledge necessary to cope with future uncertainty (Terpstra, 2011, p. 1659).

The level of education does not have much influence on risk perception, as was demonstrated by studies conducted in the Czech Republic (Vávra *et al.*, 2014; Lapka *et al.*, 2011). Jóhannesdóttir and Gísladóttir (2010, p. 418) have explained the correlation between disaster risk perception and vulnerability. Traditionally, physical, socio-economic, and cultural factors of vulnerability have been studied to explain human behaviour during disasters (Cutter, 1996; Wisner *et al.*, 2003; Cantrill, 1998; Brody *et al.*, 2004, p. 235; Botzen *et al.*, 2009). However, the traditional indicators of vulnerability are inadequate to explain coping strategies and capacities; in particular in the condition of an increasing frequency and impact of natural hazards (Brody *et al.*, 2004, p. 233). The enhancement of coping capacity is required to reduce vulnerability in the "risk society" (Adger *et al.*, 2009).

People in the Czech Republic are aware of the fact that floods are not purely natural hazards. A considerable part of the population believes that the governance system has the ability to manage floods (Vávra *et al.*, 2017). During the long period without severe floods after the 1940s general population as well as most professionals considered construction of dams to guarantee sufficient protection against floods. This has changed after the extensive floods in the Morava River basin in 1997. After this disaster the non-structural measures have received some attention as well. There exists general awareness of the connection between increased occurrence of floods and climate change. It has been acknowledged that structural measures may not be sufficient for reducing damage in future, and at the same time non-structural measures, incorporating local knowledge, experience and risk perception, have the potential to mitigate the risk (Vávra *et al.*, 2017). However, such change in policy assumes a change in the role of people at the grassroots level: from passive beneficiaries of technical measures implemented by government agencies to active participants in decision making and implementation of non-structural measures. Such change demands a change in thinking, both on part of residents living in flood-prone areas and on part of politicians and professionals responsible for implementation of strategies.

4. Research methodology

To understand the relation between flood risk perception and resulting decisions and actions, in the context of changing approach to the flood risk reduction management, we conducted qualitative research in a municipality known for frequent floods and recent and

repeated experience of severe floods. The selected municipality is Podhradí nad Dyjí, located in the Dyje River basin of the Czech Republic.

The municipality Podhradí nad Dyjí is located in the Jihomoravský Kraj province of the Czech Republic, close to the state boundary of the Czech Republic with Austria (Figure 1). The remoteness of the region is reflected in a low offer of job opportunities, especially for skilled employees, consequently resulting in long-term outmigration. At the same time, the locality and surrounding region serves as a popular holiday area due to beauties of cultural landscape of the Dyje River valley. The attractiveness of the municipality for tourism is enhanced by its closeness to the National Park Podyjí. The contrast between the weak economic position of the region and its high tourist attractiveness resulted in construction of a large number of summer holiday homes in the area, most typically in locations close to the river.

The municipality Podhradí nad Dyjí is located directly on the banks of the Dyje River, under the ruins of a medieval castle. The municipality is composed of two administrative units, or cadastres: the village proper and the summer homes area. The vulnerability to floods in both settlement units is high. Grecmanová (2011, p. 105) has shown that Podhradí nad Dyjí has a high level of flood risk, mainly during spring and summer. Even though the Dyje River basin as such was not affected by larger floods between 1909 and 2002, the municipality itself experienced floods in 1935, 1941, 1947, 1948, and 1951. However, in consequent years the floods have stopped, even in flood-prone locale such as Podhradí nad Dyjí (Grecmanová, 2011). It was attributed to the construction of technical measures upstream, including dams (CHMI, 2005). The long period without serious floods resulted in high level of trust in the effectivity of technical preventative measures, as well as in low level of flood risk perception. However, the floods in 2002, followed by two severe flood events during the following four years, have changed the floods risk perception of both the local residents and non-resident owners of properties. The research was conducted in such context of increased awareness of the vulnerability.

The research conducted in the municipality focussed mainly on the relation between risk perception, strategies of flood risk reduction, and the flood management strategies introduced by governmental institutions (including the local government). The principal method of collecting information was in-depth interviews with adult household members and with local professionals. The questions asked during interviews stemmed from the conceptual frameworks introduced in the Figure 2.

Two sets of interviews were organised: the first set with the senior household members living in the municipality, the second set with members of the local institutions incorporated in the IRS (municipal office, mayor, and volunteer fire fighters). The interviews with household members were divided into two sections: the first section concerned risk perception and mitigation strategies of the household, the second section concerned risk perception and strategies of the community (i.e. the village). The questions concerning risk perception, opinion on structural

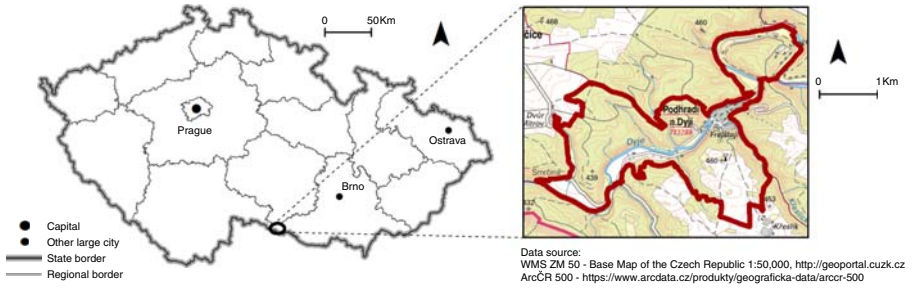

Figure 1.
Land-registered area of the municipality Podhradí nad Dyjí (right) and its location in the territory of the Czech Republic (left)

measures, on trust in government system of floods management, and its changes were included in both sections of interviews with household members. The local government and NGO members were asked to explain the following: the particular flood management strategies, the recent changes in their role within the national flood management strategy and associated changes in their local level responsibilities, and their opinion on the relation between risk perception and the culture of dependency on government in risk management.

Themes of the interviews:

(1) Interviews with household members – household level strategies:
- past experience of floods;
- awareness of the flood risk zone;
- trust in physical measures and the government preventative strategies;
- functioning of the early warning system;
- preparedness measures;
- disaster coping strategies;
- disaster recovery and humanitarian assistance; and
- motivation to arrange flood insurance.

(2) Interviews with household members – community level strategies:
- community activities during emergency;
- factors influencing collective activities;
- mutual help in community during and after the floods;
- involvement in the IRS as a volunteer fire fighter; and
- effectiveness of government and NGO activities during emergencies.

(3) Interviews with local institution members:
- responsibility of the institution;
- challenges in risk reduction measures;
- activities of the IRS in emergency management;
- coordination among institutions and cooperation with the residents;
- governance system in disaster reduction; and
- opinion on changes in governmental flood management strategy.

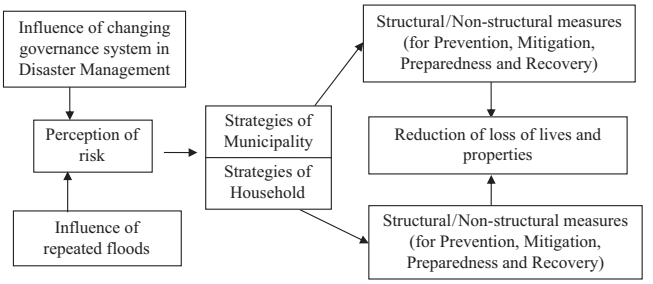

Figure 2.
Conceptual framework

The affected households were subjected to unwanted interest of media and so called flood-tourists during recent disasters. Therefore, the residents at first replied with apprehension to our request for interview on flood-related themes, and it took time to gain their confidence. The information about the research disseminated by municipal office helped to develop their trust in the research. In total, 30 in-depth interviews with household heads and local institution members were recorded, using both closed and open-ended questions. The transcribed interviews were interpreted using the approach known as circular model of research process (Flick, 2002), where the analysis of data is based on collected facts and their interpretation that establishes insights into the relations among different groups of local residents and local institutions.

5. Results

The level of risk perception was high immediately after the floods which affected the municipality in August 2002, March 2006, and July 2006. Before the recent floods, the village residents were not aware of the potential risk and did not take the risk seriously. It was thought that recurrent minor floods are under control and that floods do not pose any substantial threat. The risk perception increased substantially after the three major flood events during 2002-2006. However, the households did not adopt any "radical" strategies of risk reduction, such as either relocating their homes, i.e. building new house at a higher ground or extensive reconstruction of the current building, leading to elevation of the ground floor. The owners of the summer homes as well as larger recreation facilities, located on the river banks, have also made no substantial modifications of their buildings. In order to build a new house or elevate the ground floor significant investment is required, which was found out of reach for most of the households. Well-off households preferred investment in house construction improvements in the current location, combined with purchase of insurance.

Outmigration as another possible radical risk-reduction strategy was not common either. According to the opinion of the mayor and senior residents, the former residents who did leave the village did so for economic reasons, not as a result of increased risk perception. Similarly, none of the interviewed households considered seriously the possibility of outmigration. Their sources of income were related to local tourism and non-farming activities while residents in retirement, not dependent on local source of income, felt attached to the place itself by family obligations or emotional ties: "It is the landscape that attracts me and makes me continue living at the river bank. Moreover, I can rely on good insurance" (Participant K).

In spite of this, the relationship between the risk perception and coping strategies adopted by individual households can be identified. The specific strategies used to reduce the risk develop in accordance with individual or family subjective experience, but also with their ability to arrange flood insurance, their age and health and, lastly, their socio-economic status. The location of the workplace of economically active residents is another determining factor, specifically whether the major source of income comes from economic activities taking place in the municipality or is dependent on commuting.

Risk perception and resulting strategies are strongly conditioned by the location of the homes with respect to the river course. Residents living in high-risk zone near the river manifest a higher level of risk perception. They are aware of the risk, but are not particularly worried: risk has become a regular part of their daily life. These households adopt multiple strategies to cope with risk. The adopted strategies depend on the economic situation of a household. The strategies also vary with subjective flood-related experience. Village residents do not consider floods as a disaster unless they affect their livelihood. Residents living in low-risk zones still have high risk perception but adopt few mitigation strategies. They are confident about their ability to deal with floods

considering the geographical location of their homes. At the same time, they are worried about the possibility of disastrous floods in the future, which they attribute to the changing climatic condition.

The residents of Podhradí nad Dyjí judge the risk subjectively and develop cognitive "risk maps" based on their experience and knowledge of the factors at play. Their risk maps differ from those developed by government institutions (see also Siegrist and Gutscher, 2006). Most of the interviewed residents are not aware of the risk maps created by expert institutions or even of the practice of flood-risk zoning. Their understanding of flood risk is governed by direct experience. The markings of the flood levels experienced during the recent floods, and the memories evoked by the mass of water present in the area itself, remind them of the risk.

Couple of interviewees led as to places where marking points are kept indicating the water levels reached during past floods.

High-risk zones around the river are built-up by family homes, summer holiday homes, and tourist accommodation facilities. Even though construction of new houses in the high flood risk zone is prohibited by the national Water Act (Law No. 254/2001), the enforcement of the law is weak and several buildings have been built even after recent floods. Residents living in these homes explained their decisions by their attachment to the place. Residents living in the high-risk zones are interested in and generally satisfied with flood-related decision making and related activities of local government. "Government provided us assistance immediately after the floods. Although local government could not offer much relief, its support was adequate and on time when we needed it. When the municipality invites us to discuss decisions in flood management, I will definitely come" (Participant D). One theme of such discussions is approach to owners of abandoned buildings standing near the river which may cause blockage of flood water, resulting in increased risk of flooding of the occupied houses.

The level of trust in structural measures implemented by government varies as well depending on geographical location. Village residents living near the river support construction of technical preventative measures even though the investment in such measures means that other needed investments have to be put aside, whereas households living at more elevated grounds have shown very little interest in such measures.

Flood insurance proved to be another significant issue occurring in the interviews. The motivation to purchase flood insurance has increased after the series of recent floods. However, growing insurance cost, limited benefits offered, as well as rules and restrictions attached to insurance contracts act upon the household decision making related to purchase of insurance. For households with children the flood insurance is a high priority: "Our household includes small children and elderly parents. Flood insurance has become expensive but we renew it regularly. The insurance company has paid for all our losses and damages experienced during the last floods", said a wealthy interviewee (Participant K). However, flood insurance often creates a false sense of security causing people to remain ignorant of the risk. Some households in Podhradí nad Dyjí that have purchased flood insurance spend very little money on physical building improvements in order to increase the protection of their houses.

Flood forecasting and functioning of the early warning system were evaluated satisfactorily by both the local government (dissemination of information from central and regional levels to municipality) and by the household participants. Modern information and communication technologies have made the information flow fast and less hierarchical. Households that include young-aged members now receive hydrologic forecasts and early warning messages instantly via mobile apps, while households composed of senior residents still rely on traditional ways such as village broadcasting or telephone. Despite general satisfaction with the local and national early warning system, some participants

also subscribe to forecasts from the neighbouring Austria, which they consider more accurate for their location.

Flood risk related strategies and activities of households and local institutions mentioned in interviews are listed in Table I.

6. Discussion and conclusion

Flood risk in Podhradí nad Dyjí is not imaginary but real as has been testified by the frequent occurrence of floods. The risk perception and the related behaviour of local residents is strongly influenced by geographical location of their homes, economic situation of the households, and by social factors. Households situated in the high-risk zones near the river banks are aware of the risk involved and adopt suitable strategies based on their risk perception and coping capacities.

Prevention	Mitigation	Preparedness	Measures during flood	Recovery
Municipal government				
1. Identifying flood risk areas 2. Building dykes 3. Building drainage channels with lock gates	1. Regular inspection of flood plains 2. Prohibiting new structures at flood plains 3. Preparing flood protection plan 4. Ensuring early warning system 5. Reporting and filing documentation 6. Organisational and technical cooperation 7. Cleaning flood plain areas	1. Early warning through centralised dissemination system 2. Activating the IRS 3. Coordinating with other government agencies	1. Increased flood protection through sand bags 2. Stopping power, gas and water supply 3. Rescue service	1. Humanitarian assistance 2. Providing health services 3. Re-installing power, gas and water supply 4. Providing assistance in communication with insurance companies
Households living at flood plain				
1. Volunteer participation in dykes construction 2. Willingness to participate in government activities in risk reduction	1. Covering the household premises using pebbles 2. Improving wall structure and ground floor construction 3. Increasing height of ground floor in newly built houses 4. Shifting at safer place or permanent outmigration	1. Arranging flood insurance 2. Regular updates on functioning of the early warning system 3. Arrangement of measures protecting the households during emergency	1. Relocating family members to safe place 2. Moving valuable materials at higher and safe place 3. Regular updates on warning	1. Assistance from the government, NGOs, friends and neighbours 2. Cleaning debris and mud 3. Claiming insurance benefits
Households living at high land				
1. Low trust in dykes construction 2. No participation in governmental activities aimed at risk reduction	Not important	1. Regular updates on functioning of the early warning system	1. Helping affected households to move materials at safe place 2. Creating photo documentation	1. Regular contact with affected households 2. Material and emotional support to survivors

Table I. Activities of the local government and households in different phases of flood emergency

Flood insurance and the policies of insurance companies are a major factor that determines risk-reduction strategies. After the destructive floods in 1997, insurance companies increased considerably the price of flood insurance in the Czech Republic. In cases of properties situated in extremely endangered locations they even refuse to provide insurance. Under such policy some households are not eligible to purchase insurance, and many others cannot afford to pay the high insurance price (Duží *et al.*, 2015, p. 5). The willingness of households to pay insurance is another factor that derives from their evaluation of costs related to either the purchase of insurance or the investment in protective measures (see Figure 3). As a result, households that purchased flood insurance are less willing to contribute additional resources and time in preventative measures and risk-reduction strategies adopted at the community level (Duží *et al.*, 2015, p. 10).

Flood insurance is an important component of mitigation measures that enhances confidence among households. Although flood insurance becomes expensive, it reduces financial burden for a household in a post-disaster period. The individual motivation to purchase insurance is strongly dependent on the location of a particular home and on the risk perception (Zaleskiewicz *et al.*, 2002). Therefore, participants from Podhradí nad Dyjí were interested in the cooperation with the government in flood risk reduction strategies, even in cases when they have purchased the insurance. None of the measures is sufficient to counterweight the perceived risks.

People living in Podhradí nad Dyjí have had first-hand experience of floods multiple times. For many of them, living in a state of risk instead of moving to a safer place was a conscious choice. They are aware of the probability of increased frequency of floods and yet they choose to stay and prepare their households for the possibility of a future emergency. The conclusions drawn from the research conducted in Podhradí nad Dyjí contradict the results of Terpstra and Gutteling (2008) who found low levels of risk perception among people of Friesland and their reliance on flood prevention under complete governmental control. Contrary to such conclusion, people living in flood-prone zones in Podhradí nad Dyjí show reliance on measures implemented by government, but at the same time they have high risk perception and they are prepared to adopt individual strategies to mitigate the risk.

The important factor that affects the perception of risk is the ties among individual residents and the sense of community. "We had to help each other, it is our individual responsibility" (Participant L). A strong sense of communal responsibility and solidarity helps residents to manage the risk perception and enhances their capacity to cope with disasters. Social networks and community bonding are also an important source of information and support. People who live within these networks never feel isolated, and they are able to develop a greater resilience in order to confront an uncertain future (Raška, 2015; Geis, 2000).

The sense of community is also essential for the participation of residents in flood risk reduction activities at the municipal level. The complementarity with the central and regional government flood risk management programmes is more problematic. Even though the national approach to floods prevention and management has transformed significantly from a centralised top-down system to a model putting more responsibility and

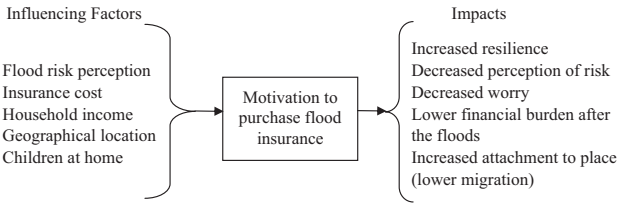

Figure 3.
Factors and impacts of flood insurance

competencies at the local level, it was not followed by a change in people's perception of the system. On the one side, the greater responsibility achieved by the local government resulted in increased participation of residents in local flood prevention activities and in greater trust in local institutions, yet on the other side, it has not increased the low level of trust in regional and national authorities. At the same time, from the point of view of the mayor of the municipality, the participation of local leaderships has become a common part of crisis management in Czech Republic and is considered as largely effective.

Returning to the questions asked in the Introduction, we can conclude with the following: first, the perception of risk is a crucial factor influencing household strategies of risk reduction in a highly endangered locale such as Podhradí nad Dyjí. However, the choice of strategies is influenced by other factors as well, both subjective such as experience of past floods or attachment to place, and objective such as economic position of the household or geographical location of its source of income. Second, the willingness to participate in the governmental risk reduction management decision making and implementation activities is strongly influenced by the geographic location of the given household. The households living in the high-risk zones near the river proved to be more interested and active in discussion and implementation of preventative measures, irrespective of whether they are insured or not, while households living at higher grounds are not interested in the debate. Third, the changes introduced in the national flood prevention strategy, which included a partial shift in responsibility from central to regional and local governments, resulted in closer cooperation between the residents and the government at the local level (municipality), and in greater trust of inhabitants in local government and its capacity to face the emergency. At the same time, the trust in national and regional government policies of flood reduction has not changed and remains low, at least from the point of view of residents of the peripheral municipality.

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