CapHaz-Net

Social Capacity Building
for Natural Hazards
Toward More Resilient
Societies

2nd CapHaz-Net Regional Hazard Workshop: Social Capacity Building for Alpine Hazards

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Structure

Summary

The Alpine Space is a trans-national territory inhabited by 13 million people and comprising the territory of 8 countries, 83 regions and about 6,200 communities. It is characterised by a great variety in terms of natural hazard exposure. Floods, avalanches, debris flows, landslides, forest fires threaten the entire Alpine Space and are triggered by both natural and anthropogenic factors. The work described in this report focuses on this space and aims at bringing together and confronting different perspectives on the theme of social capacity building. It summarises the results of one of the work packages (WP8) of the CapHaz-Net project, which aims at identifying social capacities that contribute to making European societies more resilient to the impacts of natural hazards.

More precisely the work presented here links previous project findings (related both to central topics and specific social capacities) to the practice of alpine hazards management in Europe, underlining potentials for enhancement of resilience both in this region and in Europe as a whole.

This report is based on the preparatory work and the results of the Alpine Regional Hazard Workshop that took place in Gorizia (North Eastern Italy) on 4th and 5th April 2011. The main objectives were to provide an overview of existing institutional frames and the respective policy context at the regional scale, to better understand how social capacity building and preparedness strategies for Alpine hazards work in practice and to foster interdisciplinary and cross country dialogue between scientists and practitioners. This was done by taking into account strengths and weaknesses of existing tools and approaches and by analysing the potential for transferring best practices to different regional and hazard contexts.

To bridge the gap between research and practice both theoretical knowledge and practical experiences were taken into account. The workshop started from a description of the main characteristics of alpine hazards. Then the focus shifted on operational risk management in four different countries of the alpine arch (Austria, Switzerland, Slovenia and Italy) and finally on practices for risk mitigation in two Italian case studies (Vipiteno/Sterzing in the Trentino Alto Adige region and Malborghetto-Valbruna in the Friuli Venezia Giulia region). The SWOT methodology was used as a heuristic tool for organizing the available insights and the participants' discussion.

Natural sciences, historical perspectives as well as legal analysis have contributed to broadening and detailing the social capacity concept and more precisely to characterising and further specifying each particular capacity. Practitioners in the field of alpine hazards in different countries and residents of the two case study area also contributed by presenting and discussing their views and perspectives about prevention, mitigation, emergency management and recovery from natural disasters.

Results show that, as regards the institutional framework and the policy context, the Alpine region is characterized by similarities and differences. The former include the impact of climate change, the changing patterns in the use of the territory and the growing mobility of population, the organization of the hazard management systems according to different levels, with the basic responsibility assigned to the municipality, and the relevance of past major events in the improvement of the management systems. Differences include the internal articulation of the systems and the experimentation of a variety of solutions that are context-related but not necessarily context-dependent, thus susceptible to adaptation and application to different situations. Local

mediators, for example, emerged as key figures to favour the transfer of knowledge between local communities and risk managers. Other figures that were identified as key to enhance social capacities are the local civil protection volunteers, which seem to be the best catalysts to foster the diffusion of the culture of self-protection at local level. Also, successful experiences of management of emergency and recovery phases provided key indications of the core value of community cohesion, which is to be maintained through a careful planning of both people's relocation during emergency and the reconstitution of everyday life by building on public services and economic activities.

Efforts to improve risk awareness and preparedness through a variety of instruments, from planning to information campaigns, from structural interventions to school education programs, are widespread. The level of knowledge and technical/organizational efficiency has been continuously improving over the years. Strengthening participation at both territorial planning and hazard prevention and mitigation levels is an issue the relevance of which results with clarity, in both existing and prospective efforts and programs. A general trend towards individual responsibilisation vis-à-vis natural hazards is also clearly detectable. The paradox related to the increased levels of safety and hazard-related knowledge has also been widely discussed: The more risk management strengthens, the more the local knowledge related to risk issues seem to be forgotten and needs to be re-discovered. Increased protection provided by structural devices, dedicated institutions and expert knowledge may indeed translate into lack of risk awareness, capacities and agency on the part of residents.

The 'safety paradox' of the increase in the levels of technical competence and safety and decrease in local risk awareness and emergency preparedness is one among different emerging weaknesses and gaps in knowledge and policy implementation, corresponding to a possible heightening of the dangers to which people are exposed.

The latter include the declining significance of 'local knowledge' - in both the senses of existence and importance - as a consequence of changes in the use of territory as a consequence of changes in the use of territory (with growing capacities of technical intervention but also growing possibilities of dangerous side effects) and residential and mobility patterns; uncertainties or ambiguities related to the precise articulation of responsibilities for decisions and room for choices among the involved actors, with special relevance of financial assets for the maintenance of risk prevention and mitigation works and for the recovery-reconstruction activities; the effectiveness of communication among technical-institutional actors and between them and the local population; the need to contextualize any type of approach (technical, organizational, institutional, regulatory) to country- and site-specific political and cultural contexts.

Among the potentials that emerged as especially interesting or promising there are the singling out and sharing of good practices (like the 'Friuli model' of recovery and reconstruction), institutional innovations (like the Swiss local 'hazard advisor'), and forms and experiences of information, education and participation; the strengthening of within- and between-country opportunities of collaboration through EC-funded programs, which have already proved useful and effective; a thorough exploration of the feasibility and conditions for an extension of private insurance and social funds schemes.

1 The workshop structure

CapHaz-Net project aims at identifying social capacities that contribute to making European societies more resilient to the impacts of natural hazards. In the first phase of the project, social capacities were identified through literature reviews and analyses of good practices in risk management in Europe. In the second phase of the project the previously acquired knowledge has been "downscaled" to the local/regional scale, focusing on practices of hazard mitigation and adaptation as well as on different policy approaches for social capacity building across Europe. This has been done by means of Regional Hazard Workshops that allowed the identification of social capacities in practice and in relation to different hazards, in different contexts and with different resources at hand. The Regional Hazard Workshops addressed the following issues: Droughts and heat-related hazards in Southern Europe (Barcelona/Spain); alpine hazards (Gorizia/Italy); and river floods in Central Europe (Leipzig/Germany).

This document begins with the analysis of the alpine region as a context that is exposed to physical and social changes and that shows great heterogeneity of management in different countries. The understanding of institutional frameworks and management strategies, as well as the analysis of case studies, offers a chance to explore further the role played in practice by different social capacities and to observe operative strategies for their enhancement. The starting point has been the work carried out throughout the CapHaz-Net project. More precisely the focus has been on three work packages of the project dealing with the core themes of risk governance (WP2; Walker et al. 2010), risk communication (WP 5; Höppner et al. 2010), risk education (WP6; Komac et al. 2010) and social resilience (WP10; Kuhlicke and Steinführer 2010). Benefiting from the insights of these work packages, the aforementioned topics were contextualised and explored in practice in different alpine countries during the Alpine Regional Hazard Workshop. This work package thus links previous project findings (related both to central topics and specific social capacities) to the practice of alpine hazards management in Europe, underlining potentials for enhancement of resilience both in this region and in Europe as a whole.

1.1 Objectives

This report is based on the results of the Alpine Regional Hazard Workshop (Gorizia, 4th-5th April 2011) and on the preparatory work undergone for its realisation. The main objectives of these activities were to provide an overview of existing institutional frameworks for the management of natural hazards in different countries of the Alpine region, to better understand if and how social capacity building works in practice, to identify strengths and weaknesses as well as gaps of knowledge/implementation in existing initiatives and finally to foster interdisciplinary and cross country dialogue between scientists and practitioners.

To reach these aims and to understand the basis on which risk management operates, the policy con-text had to be taken into account. An overview of the functioning of institutional frameworks, policies and practices was built up. The topical areas that were considered were raising awareness, encouraging preparedness and prevention, and structuring the management of emergencies. Participants focussed on identifying existing gaps in knowledge and practice. This in turn was aimed at opening up the discussion on the potential for the development of new tools and methods for social capacity building vis-à-vis natural hazards in the alpine region, with the ultimate aim of making them transferable to other geographical contexts. The workshop benefited from insights provided by other CapHaz-Net work packages focused on governance

(WP2; Walker et al. 2010), risk communication (WP 5; Höppner et al. 2010), risk education (WP6; Komac et al. 2010). Useful background on these topics came also from the Alpine Conference's working group "Avalanche, Floods, Debris Flows and Landslides" report (Greminger, 2003), that put particular stress on the need to enhance integrated risk management policies, promote knowledge and education as well as effective communication strategies for the involvement of all actors, seen as relevant measures for reducing risk in the alpine region.

1.2 Key concepts and themes

The starting point of the work undertaken in this work package was the elaboration of the notions of social capacity and social capacity building developed throughout the project and summarised in the Knowledge Inventory (Kuhlicke et al., 2010).

Based on internal project discussions (see Kuhlicke and Steinführer 2010, Höppner et al. 2010) social capacity was defined as the context-related ability to decide and behave successfully in a certain situation in order to anticipate, respond to, cope with, recover from or adapt to the negative impacts of an external stressor (e.g. a hazardous event), as well as to employ the necessary resources. This ability was considered to be related to both individual and collective actors: for example, residents or whole communities at risk, or organisations in charge of risk and disaster management. At the same time during the previous phases of the project, six different types of social capacities were distinguished as relevant in the context of disaster risk reduction (Table 1.1). One of the aims of the workshop was to better understand how the social capacities described in theory work in practice, how relevant they are and what are the conditions for their realisation.

Table 1.1: Typology of social capacities

Types of social capacities	Specification/description
1. Knowledge capacities	• knowledge about the hazard and the risk • knowledge about how to prepare for, cope with and recover from the negative impact of a hazard • knowledge about other actors involved in the handling of hazards and disasters • knowledge about formal institutions such as legal frameworks and specific laws • knowledge about underlying informal values, norms and beliefs of different actors
2. Motivational capacities	• the motivation to prepare for, cope with and recover from the negative impact of a hazard • the building of a sense of responsibility for one's own actions but also for those of other actors
3. Network capacities	• the possession and exploitation of social capital, that is, the "aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance and recognition" (Bourdieu 1986, 248). • the possession or development of the ability to establish and stabilise trustful relationships among and between different organisational, local and individual actors
4. Economic capacities	• availability of financial resources to prepare for, cope with and recover from the negative impact of a hazard
5. Institutional capacities	• consideration of principles of fair governance (legitimacy, equity, responsiveness, accountability) • consideration of a variety of problem frames, multi-actor, multi-level, multi-sector, diversity of solutions, redundancy) (Gupta et al. 2010)
6. Procedural capacities	• having an understanding of how to elicit and apply the aforementioned capacities, skills and knowledge stocks

Source: Kuhlicke et al., 2010

Social capacity building is defined as a normative concept aimed at describing the process of (re-) discovering, enhancing and developing individual and collective resources, abilities, skills to decide and behave successfully in case of disaster. It is thus considered as a long-term, iterative and mutual learning process based on the cooperation and interaction of a variety of actors on different scales (Kuhlicke & Steinführer 2010).

Moreover, social capacity building is a concept the evolution of which is deemed necessary to investigate in relation to the changing nature of the distribution of responsibilities in the European societies.

Indeed in many European countries governments continue to set natural hazard policies while at the same time seeking to shift responsibility for costs and actions to other segments of society (Kuhlicke et al. 2010; Watson et al. 2009). Thus, those at risk – residents, businesses, farms, infrastructure managers, etc. – are gradually transformed into risk managers and active participants in multi-scale risk governance networks as they are encouraged or even required to take more responsibility in own and community protection.

Together with the topics developed in the other CapHaz-Net WPs, other polar concepts were introduced as materials for discussion, given their potential relevance in the context of social capacity building for alpine hazards. These concepts were identified during the workshop preparatory phase.

First of all, the polarity between risk and danger, which is a classic issue in the reflection on risk was considered. When a problem is addressed with an action, it is addressed as a risk. The action put in place creates consequences that impinge upon other people, who cannot play a role in decision-making and thus perceive it as a danger (Luhmann, 2005). In other words, hazards can be perceived differently by the different actors involved according to their sense of agency. This might create an issue in the relationship between organisations that manage risk (e.g. Civil Protection) and local communities.

Another distinction is often made for knowledge: lay/local and specialised knowledge are both very important, but are characterised by very different languages (Irwin, 1995; Wynne, 1996). What is the role played by these two different types of knowledge in the local decision making processes? How can local knowledge be effectively integrated in processes which are usually dominated by expert knowledge? How can this inclusion help in identifying and possibly solving local conflicts? How can different types of knowledge be presented in order to allow effective communication between different actors?

Another relevant topic, which has indeed been discussed throughout the project but was of obvious relevance for this workshop, is the changing relation between community and authorities (Walker et al., 2010). Especially the increased importance of self-protection is an emerging topic and thus needs to be taken into account when considering how to implement individual and community capacity building to live with natural risks.

Risk communication is also changing over time: from traditional one-way communication the approaches are moving towards two-ways flows as a mean to better cover the complexity of interaction (Höppner et al., 2010). A polarity can be identified also in the field of education: on the one side the idea that risk education must be institutionalised and empowered within educational courses is highlighted. On the other side, it should also be contextualised, since every community has different understandings and views on risk (Komac et al., 2010).

Finally evidence shows that sometimes there are tensions or confusion between different approaches for natural risk management. It is far too schematic to oppose bottom-up to top-

down approaches: however, this distinction can help to highlight the different tendencies and contradictions in these terms that might exist even within one single management system (Walker et al., 2010).

Whereas these more theoretical reflections have been used as starting points for an introduction of CapHaz-Net topics and of other potentially relevant open issues in the field of natural hazards, more specific references to the alpine region are dealt with in Section 2.

1.3 Preparatory work

1.3.1 Selection of participants and case studies

The workshop participants were chosen among the members of different "communities": scientists and researchers in different fields (sociology, natural sciences, history of natural hazards management, geography, law), practitioners (risk management bodies in different alpine countries, planners of structural measures), local authorities (municipalities provinces and regions) and civil society members from the Italian alpine regions of Friuli Venezia Giulia and Trentino Alto Adige. Participants were selected also by considering different countries and Alpine regions. More precisely, 35 participants from 8 countries (Austria, France, Germany, Italy, Slovenia, Spain, Switzerland, and United Kingdom) took part to the workshop (see Annex 2 for complete participants list). Preparatory semi structured interviews were carried out prior to workshop. This preparatory work had the first aim to identify especially relevant themes for the alpine community. Semi structured interviews were thus started a year before the workshop, covering a wide range of interviewees: Civil Protection volunteers, Civil Protection officers, natural hazard management authorities in Friuli Venezia Giulia and Trentino Alto Adige, experts in different fields related to natural hazard management (perception of risk, history of natural hazard management, risk communication, participatory processes of decision making, meteorology and early warning), local authorities, civil society organisations. Interviews and information gathering extended to the whole year prior to the workshop. They were especially aimed at collecting relevant information on institutional frameworks. Key note speakers were contacted having in mind the need for the workshop to provide an overview of the different issues emerged during the preparatory interviews, for example the relevance of an historical perspective for an improved management approach to alpine hazards and of participatory decision making processes for a comprehensive understanding of a territory and its vulnerabilities.

Whereas the initial idea for the case studies to be analysed was providing an example from each of the alpine countries represented within the CapHaz-Net consortium (Italy, Slovenia and Switzerland,), only case studies from Italy where chosen at the end (see Annex 3 for the preparatory work for the case study selection). This was partially due to logistic factors, yet it was mostly based on the perceived opportunity to offer an in-depth focus on a few cases, also building on the availability of previous studies. However, a session of presentations and group work on institutional frameworks was dedicated to a comparison between different alpine countries.

1.3.2 Preparation of the sessions

The first day of the workshop has been organised in order to include three main sessions and three working groups. The sessions were entitled as follows:

1. Alpine hazards: an overview
2. Managing alpine hazards
3. A focus on Friuli Venezia Giulia (North Eastern Italy)

The first session, namely the presentations by keynote speakers, was structured so as to provide a general overview of both physical elements of vulnerability from the point of view of natural science, and an historical perspective on alpine hazards management. While the choice to include the perspective of natural science had been previously adopted in other CapHaz-Net workshops, the historical perspective was an attempt to broaden further the multidisciplinary perspective of the project. Particularly, the examination of the final report of the Interreg III project A ALCOTRA France-Italy on the role of historical evidence on the improvement of social management of natural hazards (Favier & Remacle, 2006) suggested the exploration of memory and historical research as tools for the enhancement of social capacities. Adding an historical angle thus seemed a valid tool to enrich the work package content.

As said, initially, the intention was to work on case studies from different alpine countries, yet after a thorough discussion with project partners it was chosen to focus only on Italian cases. In depth analysis was preferred to an inevitably shallower account of a number of different national contexts. Yet in order to gather information about and stimulate exchange between other alpine countries, management bodies of alpine hazards in Slovenia and Switzerland, Austria[1], as well as the regional Civil Protection service of Friuli Venezia Giulia, were contacted in order to obtain keynote speakers from them. These speakers were given in advance the following guidelines, so as to allow them to structure their presentations in the second session accordingly:

- General overview of how management of alpine hazards is organised in the country (role of federal, cantonal or provincial/regional, and municipal institutions as well as private responsibilities)
- Main strategies and instruments of hazard management in the country including communication and education (legal rules, recommendations, tools and their intended contribution to social capacity building)
- Success of these strategies/instruments in terms of social capacity building and lessons learnt from experiences (examples)
- Main challenges for the future of hazard management

The third session was structured so as to focus specifically on the alpine hazards management in Friuli Venezia Giulia. The main theme of this session, due to the keynote speakers' specific competence, was participation. A general perspective on the possibilities and difficulties of implementing the EC Flood Directive into national and regional regulations opened the session, addressing the topics of inclusion of citizens in risk management. Then, lessons and challenges for territorial planning and post-event reconstruction were addressed. Examples of good and

[1] Natural risk management authorities from Austria (Styria) were also contacted, but could not participate due to last minute engagements. In any case they provided us with a general overview of natural risk management in Austria.

poor practices at a regional level were discusses, and their potential effects in the future were addressed.

Presentations reflected the multidisciplinary character of the panel of experts. They were structured and distributed throughout the day so as to move from a very general and trans-alpine view of physical, economic, and socio-historical aspects to a more practical level of hazard management in different countries, and then to an even more specific context at a regional level. All presentations were furthermore enriched by practical examples that illustrated the presence or lack of 'social capacities'. To this purpose, the list of social capacities (see Chapter 1.2) had been given to the keynote speakers in advance so that they could reflect upon them.

The working groups that followed the keynote presentations were structured around three themes:

- ⟶ the role of knowledge for social capacity building;
- ⟶ the role of institutional frameworks for social capacity building;
- ⟶ the role of formal/informal networks for social capacity building.

In each of these working groups, one main question was used to start the discussion: "What is the role of knowledge/institutional frameworks/formal-informal networks for social capacity building in the Alps?" Although the intention was to keep the discussions within groups as free as possible and to encourage an open debate as much as possible, using the main question only as a starting point, some back-up questions were prepared as reference points in case the debate would result too free-flowing (Annex 5 for a list of these guiding questions in each group).

1.3.3 SWOT analysis and case studies

For the second day of the workshop, two alpine case studies were chosen for analysis and identification of social capacities in practice, especially for what concerns mitigation and prevention of hydro-geological risks. As mentioned above, the cases at stake are both Italian: Malborghetto-Valbruna, a municipality in the mountainous area of Friuli Venezia Giulia, and Vipiteno/Sterzing, a municipality in the region Trentino Alto Adige.

The cases were selected mainly for the following reasons:

- ⟶ They both are located in alpine valleys in areas at high risk of flooding, debris flows, landslides, avalanches, etc.;
- ⟶ They can be considered as paradigmatic examples of two different approaches for social capacity building;
- ⟶ They both have been previously and/or are currently object of research, within the framework of other European projects (FLOODsite and MOVE[2]) which provided relevant and useful background information for the analysis;
- ⟶ However, while in Vipiteno/Sterzing the last major flood took place in 1966, in Malborghetto a flash flood/debris flow hit the municipality in 2003;
- ⟶ While in Maborghetto-Valbruna decisions and actions for risk mitigation were taken immediately following the 2003 event in Vipiteno/Sterzing all discussions, dialogues between experts and population, and risk mitigation decisions were made building on risk maps;
- ⟶ In both cases mitigation works have been completed or planned: different processes, responses of citizens and involvement of local authorities.

[2] See: www.floodsite.net; www.move-fp7.eu.

A summary of the case studies is provided in the boxes below. A detailed description, which was provided to all participants prior to the workshop, can be found in Annex 4. Participants from the two municipalities were contacted well in advance and interviewed in order to gather more information on the case studies to be added to the material available from previous researches.

The case studies have been analysed through the SWOT methodology. The rationale behind this choice can be summarised in the following:

- SWOT is a well-proven technique that has already been applied to other studies about the alpine regions and successfully used to summarise their findings. This is for example the case of the IRASMOS project (Romang, 2005) and of a preparatory study undertaken for the Alpine Space Programme (INGEROP, 2006);
- It was deemed relevant to explore a new analytical tool within this regional workshop, different from the ones previously used within the project work;
- This exploration was aimed at developing and testing a potential tool for the self-assessment of communities.

Box 1. Malborghetto-Valbruna

Malborghetto-Valbruna is a municipality (1,036 inhabitants) in the Region of Friuli Venezia Giulia-Northern Italy located in an Alpine area near Austria and Slovenia. It is located in the Valcanale valley at the confluence of the River Fella and the main streams Rio Malborghetto and Rio Uque. This is a multi-hazard location: floods, debris flows, landslides, earthquakes are the main natural hazards threatening the village.

A severe flash flood hit Malborghetto-Valbruna on the 29th of August 2003. The event was the result of the combination of two extreme events: a storm (355 mm of rainfall within three to six hours) and the anomalous condition of the soil, extremely dry after an anomalous drought.

The debris flow reached a peak of 4m in the centre of one of the hamlets of the village (i.e. Ugovizza). The water transported sediments, stones, shrubbery and trees into the village and caused two casualties and extensive material damage. Approximately 600 residents were evacuated and the damage caused amounted to €190 million.

Clearing away the mud took about one month. More than 400 volunteers from different parts of Italy, Austria and Slovenia were involved in this task. Damage to the basic services (water, electric power, road conditions, and telecommunication) led to problems for the local population, and rescue services alike. The drainage and the electric systems had to be completely restored, while the aqueduct was blocked for several days.

Some months after the event, a “Flood Office”, coordinated by regional authorities, was set up in every municipality in Valcanale. Its duties included the organisation of compensation procedures for people affected by the flood and technical assistance to other municipal departments. The recovery phase raised issues related to equity in the distribution of compensation payments, and disagreements among local people about the reconstruction process. The main criticisms regarded the criteria for the allocation of funds, the decisions concerning the relocation of houses (if not an entire hamlet) and structural risk mitigation measures.

Figure 1.1: The 2003 flash flood and the risk mitigation works (source: Malborghetto-Valbruna municipality)

Box 2. Vipiteno/Sterzing

Vipiteno-Sterzing is a municipality of the autonomous province of Bolzano/Bozen, in the region of Trentino Alto Adige/Südtirol in northern Italy. The province borders Austria (provinces of Tyrol and Salzburg) to the east and north and Switzerland (canton of Grisons) to the west. The municipality of Vipiteno (6306 inhabitants in its 10 hamlets, as from 2010 census), is crossed by the river Isarco/Eisack.

The area where Vipiteno-Sterzing lays has always been periodically affected by floods of the Isarco River and its tributaries. On the one hand the 'experts' indicate the flood risk in the area as very high. Vipiteno-Sterzing has been flooded quite frequently between 1965 and 1998. However, on the other hand, the lack of any major consequences and the fact that the last extremely hazardous event took place in 1966 and 1987, means the collective memory has faded, making the community's perception of risk rather low.

The INTERREG IIIB project "River Basin Agenda/Agenda Fluviale Alto Isarco" concentrated on the upper part of the Isarco/Eisack and of its two tributaries in the basin of Vipiteno. The river basin agenda project involves 11 rivers of 6 alpine states and aims at trans-border cooperation in the management of alpine river basins. The Forum Alto Isarco (Upper Isarco Forum) has been created as a space for municipalities, local administrations, organisations with interest in economic development, tourism, environment and agriculture to cooperate with experts in defining guidelines for river management, taking into account flood defence needs, environmental issues and potential future use of the territory.

After a risk assessment conducted in 2009 within the INTERREG IIIB project, the priority of the provincial office for hydraulic works became the realisation of mitigation works in Vipiteno-Sterzing. This encouraged the design of different possible projects that were presented to the population. Citizens whose land property would have had to be reclaimed for the realisation of the flood mitigation project were not happy about any of the solutions proposed and thus a new alternative was designed to meet the needs underlined by the citizens.

At the end of October 2009 the new proposal was presented to the community. The river bed would be enlarged in certain parts of the river and lowered in others, the embankments would be 'naturalised' and a fluvial park created for the recreation of citizens. This meeting was met with the protest of several landowners whose property might have been expropriated in the realisation of the works. They claimed that the information about these projects had not been transparent and that the explanations given were too general. The mitigation alternatives were also discussed by the river management forum that eventually decided for the implementation of the new option. Currently the implementation of this measure is still not agreed upon by residents that recognise the need for safety, but do not approve of the use of land for other purposes (re-naturalisation, fluvial park, town-scaping, etc.).

Figure 1.2: The river Isarco/Eisack crossing Vipiteno/Sterzing and the Isarco valley

More details on the use of SWOT for preparation and the case studies are given in Annex 4.

SWOT analysis was born in strategic planning offices created by enterprises in order to rationalise market reality, bringing together the elements that make it analytically functional, and identifying the most appropriate actions to be undertaken in order to limit the effects of negative elements and to maximise the possible effects of positive ones. The SWOT method involves both an analysis of what and how we want it to occur, between time t0 and time t1.

SWOT analysis was deemed fit to fulfil work package's aim, as it allows for the identification of internal and external factors, of positive or negative impact, that are characterised as Strengths (internal, positive), Weaknesses (internal, negative), Opportunities (external, positive) and Threats (external, negative) of a given situation.

Whereas, in fact SWOT allows the transformation of qualitative data into a quantitative evaluation (by assessing numerical values between -2 and + 2 to all the factors identified as relevant for analysis, see Table 1.2 below), for the purpose of this work it was deemed important to especially make use of the structuring potential for discussion that this tool offers, rather than making the participants work on it as an evaluative tool.

With previous research, ISIG has further adapted the SWOT methodology to strategic planning needs. Once elaborated in quantitative terms, SWOT variable and factors are used to develop intervention strategies to bring the current scenario towards its desirable projection in the mid-long term.

Table 1.2: SWOT analysis

Indicators Measurement	Internal	External
+2	**Strength (S)**	**Opportunity (O)**
+1	*Positive context*	*Positive context*
0	Neutral / non-influencing	Neutral / non-influencing
-1	*Negative context*	*Negative context*
-2	**Weakness (W)**	**Threat (T)**

Source: ISIG, SWOT Analysis (2010)

The table summarises the main procedure to turn qualitative assessment of intervening factors into quantifiable SWOT variables.

Whereas, as seen above, SWOT has the characteristic of allowing the transformation of qualitative data into a quantitative evaluation (as summarised in Table 1, Section 1.2), for the purpose of this work it was deemed important to especially make use of the structuring potential for discussion that this tool offers, rather than making the participants work on it as an evaluative tool.

After gathering data from previous field research and semi-structured interviews carried out prior to the workshop (see Section 1.3.1), relevant factors were grouped in a SWOT table by ISIG. The format chosen was a rather discursive version of the SWOT methodology. Relevant factors (see paragraph below) for the analysis of case studies were identified and then, for each case, exemplified with relevant practices and thus allocated in the SWOT grid as Strengths, Weaknesses, Opportunities or Threats for the case at hand.

In order to allow the participants not only to comment on the grid suggested by ISIG, but also to bring their own perspective and insights into Strengths, Weaknesses, Opportunities and Threats, a new table was provided, which included the list of social capacities identified in the Knowledge Inventory structured as dimensions and variables of a SWOT analysis[3]. The grid suggested was not aimed at restricting the discussion within rigid boundaries, but has rather been proposed as an aid for the systematisation of the elements characterising a situation, as a

[3] See Annex 2.2.

tool that could allow the rational organisation of ideas and points of view, so as to highlight potentials for improvement and development. The outcome of this work is summarised in Section 4 of this report.

The relevant factors identified for analysis of cases studies were:

- Perception of risk
- Awareness
- Communication
- Knowledge
- Networks
- Involvement of citizens
- Trust
- Reliability of data
- Distribution of responsibility
- Decision making processes
- Funds
- Hazard exposure
- Cooperation and coordination between agencies in charge

For each case study these were identified with practical examples and thus distributed in a SWOT table accordingly (see Box 3 and 4; Annex 4).

Box 3. Preliminary SWOT analysis for the Malborghtto-Valbruna case study

Strengths:

Involvement of citizens: Local activism for implementation of higher security standards.

Networks: Good volunteer network, with a long tradition (100 years) and young new members.

Perception: Higher risk perception of residents towards flood risk after events of 2003. Perception of risk is linked to the risk index: those who live in areas at higher risk also feel more at risk.

Knowledge: Good knowledge of the territory by some residents (ability to detect environmental signs). Several risk mitigation projects presented by the regional civil protection, also taking into account local needs.

Weaknesses:

Involvement of citizens: No strong involvement of citizens in decision making process concerning risk mitigation measures.

Decision making process: Disagreement among citizens about modalities of reconstruction process. Conflicts and disagreement in the municipal council to decide about risk mitigation, especially immediately after the event .

Knowledge: Loss of traditional knowledge.

Trust: Low level of trust towards the local authorities.

Cooperation and coordination between agencies in charge: Difficulties in the cooperation and coordination among the different agencies and services involved in risk mitigation (cross-scale issues, responsibilities).

Opportunities:

Communication: Trans-border communication between fire brigades FVG- Carinthia and Slovenia.

Networks: International network with Fire brigades from Carinthia (yearly competitions) and volunteers from Slovenia.

Funds: Funds from regional and national governments for implementation of risk mitigation measures. Funds from INTERREG IV Italy-Austria programme for SISSIE project (safety information service and simulation of emergency)

Threats:

Funds: Delayed allocation of funds for reconstruction and mitigation measures.

Distribution of responsibilities: Contrast with regional authority on the allocation of responsibility over flood protection works.

Box 4. Preliminary SWOT analysis for the Vipiteno/Sterzing case study

Strengths:

Involvement of citizens: Citizens involved in decision making process for flood mitigation measures. Acceptance of flood defence and management as a target of local spatial planning.

Communication: Creation of the River Basin Agenda within the framework of INTERREG III B Alpine Space Programme.

Networks: Strong networks within the community to provide help and support during emergencies.

Knowledge: Diffused good knowledge of the territory (streams, type of likely event in certain areas etc). Well known evacuation paths. Good knowledge of the citizens about the warning systems.

Trust: Trust between citizens – operators. People attribute their sense of security mainly to the presence of fire brigades and efficiency of civil protection.

Reliability of data: Current update of risk plans. Risk assessment done during INTERREG III B Alpine Space Programme.

Weaknesses:

Involvement of citizens: Lack of attention and time dedicated to publications and meetings on prevention of hydrogeological risk.

Communication: Major communication problem during first phase of planning of flood mitigation measures.

Perception: Population remotely aware of risk (last event occurred many years ago). Fear given by uncertainty. “no major floods have occurred in 40 years because of flood protection works built in the 70s”.

Knowledge: Loss of local knowledge about the territory and environment especially in some groups of residents (e.g. new residents).

Distribution of responsibility: Disagreement among stakeholders on private precautions and responsibilities

Trust: Mistrust in Province’s good faith, as a result of the perception of lack of transparency in first phase of communication about flood mitigation decision-making.

Opportunities:

Communication: Province created website on river management, as well as workshops, seminars and field visits.

Funds: Funds for flood mitigation measures (European fund for regional development). INTERREG III B Alpine Space Programme (funding River Basin Agenda and risk assessment).

Threats:

Awareness: High percentage of non-local population (i.e. tourists) at certain times might not be aware of risk.

Exposure: ‘Economic heart’ and sensitive infrastructures in areas of high flood risk.

1.3.4 Workshop implementation

As a result of the preparatory work described so far, the workshop started with an overview of alpine hazards offered by the invited keynote speakers. After an introduction to biophysical and social aspects related to alpine hazards and an historical perspective on their management, the second session gave an overview of national approaches to alpine hazards management in the Italian region Friuli Venezia Giulia, Slovenia, Switzerland, and Austria. This was aimed at a better understanding of institutional frameworks and policy contexts. The discussion was then narrowed down to the regional context of Friuli Venezia Giulia. Natural, legal and institutional aspects, as well as social perspectives, related to the mountainous areas of the region and their

management were explored by keynote speakers who highlighted both good practices and problematic issues.

Working groups were then structured for an in-depth discussion of the many aspects introduced in the previous sessions, focusing on knowledge, networks, regulations and organisations, in their potential role of contribution to social capacity building.

On the second day two alpine case studies (Malborghetto-Valbruna, in the region Friuli Venezia Giulia and Vipiteno/Sterzing in the region Trentino Alto Adige) were presented. They were selected not only because they both are located in alpine valleys in areas at high risk of flooding, debris flows, landslides, and avalanches, but also because they represent two paradigmatic examples of different approaches for social capacity building. The latter was analysed according to the SWOT table prepared by ISIG, that isolated for each case elements of Strength, Weakness, Opportunity and Threat (see below Section 1.3.3).

Participants were divided into working groups in order to analyse the cases they had been involved in, comparing the SWOT table proposed by ISIG with their own understanding of the situation. A table of social capacities reviewed as possible SWOT dimensions and variables was given as a basis to structure the discussion and as a grid to insert examples of good/poor practices (see Annex 4). CapHaz-Net researchers and external experts participated in the first hour of the two working group discussions to gather more information on the sites analysed. The groups then split again: practitioners reviewed the list of social capacities with relevant examples from their case studies while consortium members and external experts continued the discussion on theoretical issues emerging from their interaction with practitioners from the two groups. Results were then shared in a plenary session in order to identify lessons learnt, policy implications and highlight remaining questions (the workshop programme is appended to this report in Annex 1).

In the following chapters a summary of the workshop results is presented. It is grounded mostly on the workshop minutes (Bianchizza et al. 2011) and other contributions, inputs and reflections from WP8 partners.

2 Alpine hazards

2.1 The Alps in Europe: environment and community

An introduction to the alpine region of Europe needs to start with an acknowledgement of an important document that nowadays represents the key point from which an analysis of this area should start: the Alpine Convention. The Convention came into force in 1995, with the aim of fostering cooperation and coordination towards protection and sustainable development of the Alpine Space, a trans-national territory "inhabited by 13 million people" and comprising "the territory of seven countries, 83 regions and about 6,200 communities" (Mitreva, 2005). The parties to the convention are Austria, France, Germany, Italy, Switzerland, Liechtenstein, Slovenia, Monaco and the EU. The alpine territory is a trans-national region that for its integrated management requires cooperation and coordinated action.

The Alpine Convention works in this sense in terms of 'sustainability', focusing on actions related to both production (economy) and preservation (ecology), according to necessity and in order to promote opportunities. The alpine region is a particularly sensitive ecosystem and 'any mistake made with regard to land use have faster and more dire repercussions there than in lowland areas. […] Greater care at the level of prevention and faster reactions in terms of repair" are thus required[4]. Also the INTERREG IIIB Alpine Space Programme underlines the importance for the development of the Alps of the concept of sustainability and the focus on territorial policies. All this, given the trans-national nature of the alpine region, is by the Alpine Space Programme framed within the enhancement of cooperation strategies (Dax & Parvex, 2006). On a strategic level these strategies are implemented not only by the Alpine Space Programme and the working group of the Alpine Convention, but also by the Platform on Natural Hazards of the Alpine Convention PLANALP[5] and the International Research Society INTERPRAEVENT[6]. The latter is also fostering the exchange of information and experiences on the level of research institutions and regional authorities (Greminger 2003a, Greminger 2003b).

The need for cooperation and transnational collaboration in the Alpine Space derives also from the fact that the Alps in Europe are subject to increasing demographic, social and economic changes, which cross national borders and strongly affect the structure and the vulnerability of the local communities. Aging population, depopulation in rural areas and intensive urbanisation processes are at present (and are forecasted to be) key trends in the Alpine Space (Bausch et al. 2005). Mean population ages is increasing, and, as a consequence, there will be probably more people living with greater vulnerability. This over-aging is polarized between cities including their surroundings and peripheral/economically weak areas. It is not difficult to imagine that the availability of resources to look after and protect this ageing population will be increasingly stretched, particularly in the poorer parts of the region (Alpine Space 2004). Regarding population there are diverging trends in the Alpine Space: indeed there are depopulation processes in mountain/rural areas and, at the same time, intensive urbanization processes around the main cities. Additionally, since centuries the alpine population has been going through significant seasonal fluctuations, due to tourism and an increasing trend towards work mobility. This is also related to the economic restructuring in the Alps, with the decline of traditional agricultural and forestry activities, the development of new specialised activities as well as of tourism, services

[4] http://www.alpenallianz.org/en/the-alps-and-the-alpine-convention/the-alps
[5] http://www.planalp.at/
[6] http://www.interpraevent.at/?tpl=startseite.php&menu=41

and welfare state. In large parts of the Alps an increasing settlement pressure, the opening up of transport routes, the strong growth rates in tourism have brought about a considerable increase in the spatial extent of endangered areas as well as values prone to hazards (PLANALP 2010, Rudolf-Miklau et al. 2011). In the future, the alpine region is likely to become more polarized in demographic, economic and social terms, with great diversities from area to area. As a result, the marginalised and depopulated mountain areas – for example – may find it harder, to gather the resources to cope with hazards and, more general, it will become even more challenging to provide any like universal standards of protection and resilience. Taking into account these reflections, the workshop attempted at isolating some elements and good practices that could be exported, notwithstanding the heterogeneity of the environment and society in the Alpine Arch.

2.2 Alpine hazards

In the Alpine countries, natural hazards constitute major threats for human life, human activities, settlements and economic areas, transport routes, supply lines and other infrastructure. Among the events resulting in the largest overall losses all over Europe in the last ten years (1998-2009), we find at the second place the floods affecting Italian, French and Swiss Alps in the year 2000 (EUR 12 billions), which follow the floods in central Europe in 2002 (EUR 20 billions) (EEA 2010).

Natural sciences recognise the main trigger of alpine hazards in both natural and anthropogenic factors. From a physical perspective, when talking about increase in alpine hazards a reference is made to climatic changes and particularly to modification of precipitation patterns and temperatures. There is indeed some evidence that climate change is contributing to increasing the frequency and intensity of weather related natural hazards and it is projected that the effects of climate change could intensify in the future (EEA 2010, IPCC 2007). Furthermore, the warming in the alpine area has been recorded to be higher and is projected to keep being more pronounced than in lowland areas. This expected increase has implications not only for the occurrence of hazards, but also for the certainty with which such risks can be assessed, and therefore for the knowledge about risks that can be claimed, utilized and communicated. Winter storms, with likely consequent floods are expected to increase in intensity and frequency, causing great economic losses to densely populated mountain areas. While this is true for the northern side of the Alps, the southern slopes face instead a decrease in precipitation, with the likely increase of forest fires (Jetté-Nantel, 2006). Many studies have been undertaken on possible changes in natural hazards processes and all have shown that the losses from natural events will increase, if water is the main driving agent. This is the case for floods, landslides and debris flows. According to one of the key speakers (Sven Fuchs)[7], the same can be said for rock falls and rock slides, with the exception of areas that are currently characterised by the presence of permafrost and that will thus undergo severe changes when the ice melts due to the temperature increase. While extreme weather events and changes in precipitation patterns increase risk exposure, human induced factors (e.g. increase in urbanisation, industrial and economic activities in risky areas, deforestation, building of new infrastructures etc.) further contribute to an increase in the likelihood and adverse impacts of hazards.

[7] See the presentation “Natural hazards and risk in the Alps - Paradigms revisited” by Sven Fuchs in workshop minutes (Bianchizza et al. 2011).

Apart from the floods mentioned before, prominent natural hazards events in the alpine region were also the snow avalanches which hit Switzerland and Austria in 1999. This represented the heaviest snowfall in 50 years where the death toll reached more than 60 fatalities. Even if during the recent decades many areas have been putting in place an integrated system of avalanche risk management, a common policy at EU level is still missing, whereas this is not the case for floods for example (EU 2007).

Landslides and debris flows also represent a major threat for the alpine communities and their potential damage is strongly aggravated as a result of land use management that involves uncontrolled urbanization. Other events that, as seen above, are triggered by climatic changes, but made more likely by the intervention of humans factors are forest fires, for which prevention policies were created starting in 1992 (EEA 2010).

With regard to the workshop, the preparatory work and the feedback from experts and keynote speakers made it clear that the stakeholders involved are mainly concerned with hydrogeological events, especially floods. This comes as no surprise, since the Alpine Space is particularly sensitive to climatic changes (think only of the significance of glacier meltdown) and especially the variation of precipitation patterns affects the occurrence of natural hazards[8].

Also for this reason the workshop concentrated mainly on prevention/mitigation of hydrogeological hazards in the alpine region. Thus, both communicative and educational aspects were taken into account, as well as the building of structural measures and their impact on communities and environment. Although the theme of public participation in the decision making processes about risk issues was not meant initially to be the main topic of discussion, in fact the debate during the workshop lead repeatedly to it as a still unresolved issue and a field full of potential for the enhancement of social capacities vis-à-vis alpine hazards.

2.3 An historical perspective on alpine hazards

As already noticed in Section 1.3.2, an historical perspective on alpine hazards and their management was introduced to this workshop. It offered many insights and reflections that added a new angle to debates on participation, role of memory, individual and public responsibility in hazard management.

A first reflection from this perspective[9] pointed out that modern, technological societies created progressively the illusion of the possibility of 'zero risk', due to an increasing trust in technology and science. In many cases the more risk mitigation structures are built, the more the local population's feeling of safety increases. As a collateral effect, however, risk awareness and interest in getting a good acquaintance with the territory and risky events may decrease. Further insights into this issue came from Session 2 (see Chapter 3). A second reflection, confirmed throughout the workshop, highlighted that memory of past events is progressively lost as well as knowledge of the territory, that from an historical perspective dates hundreds of years back. Thus, it has been underlined that the currently much-stressed 'local knowledge' is often a theoretical abstraction, and thus sometimes even an ideology, since due to the loss of collective memory and the high mobility of populations it is in practice currently confined only to certain individuals within the communities.

[8] See the presentation “Natural hazards and risk in the Alps - Paradigms revisited” by Sven Fuchs in workshop minutes (Bianchizza et al. 2011).

[9] See the presentation “On contemporary risk management making societies vulnerable” by Anne-Marie Granet, in workshop minutes (Bianchizza et al. 2011).

This loss of contact with the alpine territory has been caused by and in turn causes progressive increase in external interventions in areas that until the 1950s had been mostly self-regulated by the communities inhabiting them. In fact, whereas in the past centuries alpine communities had always adopted an empirical approach to the choice of their settlements (e.g. building in an area subsequently destroyed by a landslide, and thus re-building the village in a safer area) and had always operated these choices internally, from the 1950s economic development imposed external structures in the delicate equilibrium of these lands. Highways, roads, pipes, dams have been built in alpine valleys by states, regions, provinces, without consulting the local population and adding elements of danger in areas of human settlement. For example, a highway built across a river bed is at risk of being flooded. More infrastructures will then have to be built to protect it, which in their turn can cause further modifications in the river dynamics, determining novel problems. This mechanism is an example of changes to the territory and subsequent interactions between different phenomena that potentially create danger for settlements that have been safe for centuries. It exemplifies also the concrete relevance of the previously mentioned polarity between risk and danger (see Section 1.2 of this report). This progressive distance created between the mountain territory and its inhabitants has produced a void where knowledge, memory, participation, that had been endogenous elements of alpine communities for centuries, are progressively disappearing[10].

The historical perspective underlines the lack of such knowledge as an element that inhibits the effective participation of citizens to the management choices on natural hazards. The reconstruction of past events is key to strengthening people's awareness of risks they are exposed to. This can be done using archive material, oral narrations of people experienced with natural hazards in the area, written reports of past events etc. The population can thus be guided to constructing a map of its village/town/city that takes into account all these elements that thus can be represented in a language understandable to all. In this process, the presence of a mediator is important. This figure should bridge the gap between experts (historians, operators of risk management, planners etc.) and ‘lay’ people, speaking a language understandable to both and taking into account both side's expectations and needs. The figure of the 'mediator' also emerged in other workshop sessions and its relevance and role are further discussed in the final section of this report. In sum, historical knowledge can be used as a tool for getting a comprehensive understanding of past experiences of successes and failures. It can help reinforce the memory of the past as an instrument to strengthen present awareness.

[10] See the presentation “Living the Alpine Space”, by Moreno Baccichet, in workshop minutes (Bianchizza et al. 2011).

3 Institutional and legal frameworks

The Alpine Space is a trans-national region. The Alps cross 8 countries and natural hazards do not stop at national borders but might affect more than one state/country at the same time. European trans-national projects involve the countries of the alpine region and create opportunities for collaboration in natural hazards prevention and management. Yet, each country still is characterised by its own management and regulatory framework. It is thus very important to understand the different systems operating in the alpine countries, so as to discover further potentials and possible obstacles to trans-national cooperation.

The three alpine countries represented within CapHaz-Net consortium (Italy, Slovenia and Switzerland) as well as Austria (represented by one member of the Advisory Board), were taken as samples to understand differences and common factors in mountainous European regions. This summary does not aim to draw a detailed picture of the whole alpine region; it focuses on different institutional and legal choices in the organisation of natural hazards management, trying to highlight potentials for improvement and good practices to be further explored.

In the following section the aspects of monitoring and prevention, early warning, emergency and reconstruction, as well as communication and education practices for each country are described. A sub-paragraph on future challenges closes each country section, highlighting the aspects that need improvement in the field of natural hazards management.

The information presented in the following section derives mainly from the workshop presentations (see Annex 1, Session 2; Bianchizza et al. 2011) and the contributions of the consortium partners.

3.1 Italy

Italy is divided into 20 administrative regions, 103 provinces and 8,102 municipalities. Even if a devolution process has been on-going since 1944, the country still has a centralized structure. The Italian Constitution of 1947 established a principle of decentralisation of certain powers to Regions (art. 116). These were distinguished in Regioni a Statuto Speciale, also known as Regioni Autonome (5 Special Statute Regions or Autonomous Regions), and Regioni a Statuto Ordinario (15 Ordinary Statute Regions).

Monitoring and prevention

Monitoring and prevention in Italy are done at different levels for different types of natural disasters. Events are classified as:

- Type A: events that can be managed by local authorities as part of their routine duties;
- Type B: events that require coordinate intervention of more authorities at local and regional level, as part of routine duties;
- Type C: events of great intensity and extent that require coordination and intervention at national level.

Thus the programming is distributed in the following manner:

- A National Programme that coordinates management and support of monitoring and prevention activities to be performed by the National Committee for Prediction and Prevention of Great Risks and of the Civil Protection Operation Committee is contained in law 225/92 and in legislative decree 112/98.
- Regional programming is also done on the basis of national guidelines for type B events.
- Provincial Civil Protection Committees are responsible for these activities for type B events of provincial relevance.
- Municipalities are responsible at local level for implementation of forecasting, monitoring and prevention activities established by regional programmes and plans.
- When type C events occur, the Council of Ministers, on proposal from the President of the Council, deliberates on the state of emergency, determining its duration and extent strictly with respect to the quality and nature of the events. Emergency interventions are implemented following this declaration, also using appropriately motivated legal dispensations, though in compliance with general legal principles.

The monitoring and prevention of phenomena of hydro-geological nature in the Italian mountains, systematic assessment of landslide/flood hazard and risk is performed by the River Basin Authorities, as stated by Article 12 Law 183/1989. At present there are 40 river basin authorities on the national territory. Six of them operate at national level, 13 at interregional, 19 at regional and 2 at provincial level.

The activity of these Basin Authorities is coordinated at national level by the Ministry of Environment (Ministero per l' Ambiente e la Tutela del Territorio e del Mare, MATTM), that also establishes plans and policies and allocates financial resources for their activities, namely the production of basin plans, hazard and risk maps and advice on prevention and mitigation measures.

The enforcement of the European Water Framework Directive (2000/60/EC) caused a new restructuring of the river basins in district basins. The Directive was officially acknowledged in the Italian legislation in the year 2006, with the law-decree 152/2006 which introduced the concept of hydrographical basins (i.e. streams, rivers and lakes which flow into the sea only with one mouth) and districts (i.e. soil or sea area which correspond to one or more hydrographical basins and their surface or underground waters, which constitute the main units for the management of hydrographical basins). The country has been divided in 8 hydrographical districts.

The decree 152/2006 stated the replacement of the river basin authorities with the new District Basin Authorities. All previous authorities were to withdraw in favour of these new district basin authorities, but unfortunately this did not happen. In 2009 a new law was promulgated (l.13/2009) which, in the absence of the district authorities, gave some national authorities the power to coordinate the elaboration of the district plans.

At present the evaluation of flood risk is conducted at the level of each hydro-graphic district. Special Plans (Piani Straordinari) include areas exposed to higher risks, as resulting from historical data, on-site evaluations and hazard/risk assessment. The River Basin Plans (PAI: Piani per l'Assetto Idrogeologico) comprise areas at high hydraulic risk according to return times that are compatible with those indicated in the EC "Floods Directive" (2007/60/EC). These plans also contain indications concerning both structural and non-structural risk mitigation measures. More detailed hazard and risk maps may be produced by regional, provincial or municipal authorities on demand. The hydro-geological risk assessment is also aided by further data specifi-

cally produced by the Regional Agencies for the Environment, the National Research Council, and the different units (Centri funzionali, literally “Functional Centres”) of the National Department of Civil Protection or research centres of universities, following specific requests.

At the national level, the Presidency of the Council, acting under the coordination of MATTM and by agreement of other Ministries and Departments sets out guidelines for land use planning for areas at risk of landslides and floods. At local level the responsibility for the implementation of these land use planning criteria is given to the region, the province and the municipality. These authorities are also responsible for the implementation of measures contained in the Basin Plans, adopted by the Basin Authorities under the supervision of the Ministry of Environment (De Marchi et al. 2007, OECD 2009).

Forecasting and early warning

The National Department of Civil Protection (under the Presidency of the Council of Ministers) coordinates actions of forecasting and early warning at national level. The Department and the regional civil protection units work together and are linked through the national network of Functional and Competence Centres to provide constant updates to national early warning system. This system has a forecast and monitoring unit for landslides, floods, forest fires, and other hydro-meteorological risks.

The National Commission for Prediction and Prevention of Major Risks and the Public Weather Forecast and Meteorological Service - managed by the National Air Force - give support to the Head of the Department of Civil Protection at national level. Whereas the forecasting system of the National Air Force is the official source of data for spreading alert and emergency messages, it works on a very broad scale and thus might be not always very accurate. As a result, alarms of meteorological emergency are diffused more often than actually needed[11].

Forecasting is performed on a regional scale and thus more accurately by the Regional Agencies for Environmental Protection (ARPAs), that work very close to Basin Authorities or are Basin Authorities themselves. These agencies however are not evenly spread across the national territory. Whereas the regions of Northern Italy all have an ARPA, this is not the case for central and southern regions, where functions of ARPA are covered by private companies or ARPAs do not exist at all. While ARPAs can provide more accurate forecasting and monitoring, they tend to communicate their results in a very technical jargon; therefore lay people or local operators might not always be able to interpret them.

Emergency management

In Italy the Civil Protection Service (professionals and volunteers) is primarily in charge of the management of emergency and reconstruction after a natural disaster.

The National Department of Civil Protection coordinates the Government’s actions relative to emergency management, support, and rescue. Under the label of the National Civil Protection Service there exist several operational structures, namely: national fire brigades, the army, police forces, the forestry national service, national technical services, some institutions and groups of scientific research, the Italian Red Cross, the structures of the National Health Service, voluntary organisations, the national Alpine Rescue Service. All of them operate under the regional Civil

[11] From an interview with Luca Mercalli, director of the Italian Meteorological Society, April 2010. Confirmation on the excessive frequency of emergency alarms came from interview with councillor of Civil Protection of the municipality of Malborghetto-Valbruna, Gianluca Bellina, February 2010.

Protection when a “state of emergency” is declared. Following a disaster the local government of the affected area (municipality, province or the entire region according to the extent of the disaster) may petition for a ‘Declaration of State of Emergency’. The Council of Ministers deliberates on the state of emergency if the event is deemed to be of ‘Type C’. The State of emergency is determined in its duration and territorial extent and is called off through the same procedure when conditions no longer require it. All the actions of emergency intervention can then be implemented through appropriately motivated legal dispensations.

Regions, Provinces and Municipalities prepare programmes for emergency forecasting, prevention and planning (e.g. general zoning plans, provincial coordination plans, civil protection emergency plans, etc.). At the local level, contingency plans and emergency response are coordinated by the Prefect12 together with the local Civil Protection services (at regional, provincial and municipal level).

The volunteers that work at municipal level are the backbone of the operative branches of Civil Protection. They are strongly rooted in the territory, usually well prepared and are the first to intervene when an emergency strikes. International networks of volunteer groups are also very important in case of emergency. Some examples are illustrated below in the description of the Malborghetto-Valbruna case study.

Recovery and reconstruction

The Italian government intervenes directly in case of emergencies by providing ex post financial aid and enacting *ad hoc* measures (so called “emergency legislation”). No private insurance scheme is available for covering disaster damage.

Usually the President of the Region establishes an *ad hoc* commission to undergo the evaluation of damages and monitor reconstruction works. The Department of Civil Protection acts as an intermediary and technical expert body throughout the process and has a leading role in the reconstruction phase.

Communication and education

In regard to the promotion of risk awareness and preparedness, each Prefecture[13], as a national authority, is in charge of providing information to the population. Locally, it is the municipality that has to communicate appropriate behaviours to be enacted in case of an emergency. Each municipality has to prepare an emergency plan including all the indications needed in case of emergency (e.g. warning and evacuation procedures). Each municipality has a Municipal Operations Centre (COC), in which managers of authorities and municipal operation units work together to define the intervention strategy, and an operations room organised by function.

Also in this case the role of local volunteers is especially relevant, as they are obviously rooted in the territory, therefore acting as mediators between formal bodies of civil protection and population.

The national Civil Protection also provides activities of risk education that schools can include in their curricula. These are also undertaken by volunteers of the local units of Civil Protection. Some projects are also created and implemented together with environmental NGOs, such

[12] The Prefect is a State representative authority with responsibilities over public safety at the provincial level (L. 121/1981).

[13] The Prefecture is a provincial agency depending from the Italian Minister of the Interior. Its head is the Prefect.

as Legambiente[14]. For further details, see “Italian experience with risk education”, Appendix 9.1 of Risk Education report (Komac et al., 2010).

Challenges for the future

A critical point is found in the communication and reliability of weather data to the local units of the Civil Protection Service. An enhancement of the ARPAs and a harmonisation of their function and distribution in the whole national territory seem to be key to the provision of adequate and region-specific meteorological information. Furthermore, the simplification of the messages delivered by such agencies seems to be very important for the transformation of meteorological data into appropriate behaviours on the side of the citizens.

In regard to the implementation of the EC Floods Directive (2007/60/EC), River Basin Authorities have to update their plans with climate change scenarios and impacts of hydrogeological events. Thus, structural risk mitigation measures in the most endangered areas have to be designed accordingly. Also, data from different basins will have to be homogenised to be put together in hazard/risk maps. The plans also will have to be updated with cost-benefit analysis, environmental quality standards and protection of the water resources from all sources of pollution. Additionally, not only homogeneity in data gathering but also in the methodologies for analysis is needed. More precisely a standardised methodology for hazard/risk assessment at the national level is key to ensuring comparability in hazard zoning and risk maps across different river basins (Scolobig 2010).

Finally, in regard to risk education, the situation is not balanced across the national territory. Risk education and natural hazards are not part of the national curricula. Schools can choose whether or not, among possible complementary activities, they want to include these topics. Also, activities are often performed by external actors that for schools represent a cost (Komac et al., 2010). Therefore, schools have an arbitrary choice about inclusion of risk education in the curricula; also, the financial burden might mean that such education activities cannot be affordable for all schools. Since knowledge of territory and risk has been identified throughout the workshop as a capacity often lacking, improvement of these conditions seems to be a key challenge for social capacity building.

3.2 Slovenia

Monitoring and prevention

In the Republic of Slovenia, the activity of prevention against natural hazards is regulated by legislation at the local level and varies all over the territory of the country. It is governed by principles set by Ministry of Interior (Administration for Civil Protection and Disaster Relief), Ministry of Defence, Ministry of Environment and Ministry of Agriculture.

The Administration for Civil protection and Disaster Relief (ACPDR) plays a central administrative role in the management of natural hazards. It has a special organisational unit (a sector) for prevention. The management of natural hazards is a consistent part of the system of national security together with the defence systems and the security system. It is organised as a subsidiary and interdisciplinary activity based on common objectives and principles.

The system connects all emergency services and other dedicated organising forces. Thus, responsibilities are allocated to the directors of public and commercial companies (Road Ser-

[14] Italian environmental association that bases all its campaigns and work on sound scientific data (www.legambiente.it).

vice), institutions (Institute of Water) and other organisations, and to citizens in regard to some rules of self-protection. There are 9 Emergency Response Plans (ERP) that work at national level, while at the same time every municipality is also compelled to have its own ERP. Industries and companies also need ERPs. The ACPDR has the role of coordination for the drafting of all these plans.

Hazard and risk assessment of natural hazards is prescribed by law. Every municipality should have detailed hazard and risk assessments to natural hazards which would be used in spatial planning. The main burden of prevention activities as regards natural hazards is on local communities, although the state and private companies are also involved. However until now only few municipalities (e.g. Ljubelj, Tržič) have elaborated such assessments (of landslide, avalanche, rockfall and erosion hazard) and included them in their spatial plans. Therefore, a gap exists between elaboration of hazard assessments and spatial planning.

For what concerns avalanches, a systematic hazard assessment has been elaborated in the middle of 1990s' and an avalanche cadastre was prepared. However the cadastre has not been improved since then and is thus of limited use. No detailed hazard assessment has been elaborated at national scale and only assessments at community level exist.

Landslide hazard has been analysed at national scale (1:250,000) but only for some communities at local level (Bovec, Nova Gorica) although the landslide hazard is rather high in some regions of the country.

In regard to floods the national and regional hazard assessments have been elaborated and efforts are being put into synchronisation activities as regards the Floods Directive; local flood risk plans are being elaborated.

Early warning

The ACPDR is one of the constituent bodies of the Ministry of Defence of the Republic of Slovenia, to which it organisationally belongs. It runs a national notification centre and 13 regional logistic and notification offices which are responsible for receiving and submitting information on hazardous events (early warning).

Both central and regional offices function as monitoring, notification and warning centres, through GIS-assisted information systems, an own mobile radio system, a public warning system and the presence of emergency notification centres, reachable by citizens 24 hours/day and 365 days/year, through the single European emergency number, 112. Close cooperation with the Police and Fire-fighters' Service also exists as regards early warning and security of people.

Emergency

The 112 emergency number was introduced in 1997 and allows citizens to reach fire-fighters, ambulances services, police and other rescue services in case of emergency, from land line and mobile phones, free of charge. The service works well, even if the effort produced to advertise it (e.g. brochure, and information campaigns) made it known to only 25% of the population (which is anyway very close to the European average of use of this service and higher than other countries, like Italy for instance).

Management in emergency situations is based primarily on local and also on regional and national levels. The structures mainly consist of:

(a) 70% (42,000) volunteers (fire fighting service, mountain rescue service, underwater rescue service, cave rescue service, rescue dog guides, the Red Cross, the Caritas, and scouts). The fire fighting volunteers can be considered as a factor contributing to resilience, due to their strong networks that extend both across the country and internationally. There are almost 133,000 members of fire fighters organisations in Slovenia (60,000 of them are active, 25% of them are young and 23% are women) who work in 1,363 volunteering fire-fighting organisations – one per 4 settlements,

(b) 5% (2800) professional units (Professional Fire-fighters Association, people employed in municipal fire brigades, Emergency Medical Service, Service for Protection and Rescue in Case of Ecological and Other Disasters at Sea, the Forensic Unit of the Forensic Institute at the Medical Faculty, mobile meteorological unit, mining rescue units etc.),

(c) 25% (15,000) duty bound formations – Civil Protection Service at local (210 municipalities), regional (13 regions) and national level. There is also the possibility of using police and the Slovenian Armed Forces[15].

Their activities are coordinated at the local level whereas contingency plans and emergency response are co-ordinated by the Mayors (in cooperation with head of local Civil Protection Service).

Recovery and reconstruction

Administration for Civil Protection and Disaster Relief is also responsible for damage assessment.

Recovery and reconstruction activities after a natural hazard in Slovenia are provided by the Ministry of Environment. Since the 1998 earthquake a special national law regulates the recovery phase after every large disaster, as well as the flow of financial aid from the state to individuals and companies. The state mainly pays reconstructing firms which do the work directly – no money is given to local people. The latter have to pay a certain share of reconstruction and are given a loan by state; its amount depends on their social status (e.g. farmers and deprived people) and location (e.g. mountains, natural parks, etc.). In the case of the 1998 earthquake 84% of money for reconstruction was given by the state, 12% was obtained by loans and 4% was paid by private citizens.

Minor disasters are managed by local communities (which sometimes provide financial help to people) and individuals. Insurance companies are not involved in reconstruction activities and only since the 1998 earthquake they offer earthquake insurance.

Communication and education

Depending on the spatial level of natural hazard (disaster), the information on measures, behaviours, facilities are provided by (1) mayors in cooperation with local Civil Defence Authorities, (2)

[15] See the presentation “Slovenian system of protection against natural and other disasters”, by Branko Dervodel, in workshop minutes (Bianchizza et al. 2011).

regional Civil Defence Authorities, and (3) national Civil Defence Authorities. The activities rely on municipal (local), regional and state crisis management plans.

Education activities for the professionals dealing with natural hazards (fire-fighters, members of the Civil protection) are performed by the Education Centre of the Administration for Civil Protection and Disaster Relief. Education for school children is performed by teachers of subjects that are related to natural sciences (e.g. geography and biology) and only rarely subjects of social sciences (history). A big step forward was achieved in 2010. Since then, the non-obligatory subject "Protection against natural and other hazards" is taught in primary schools (levels from 7 to 9). The curricula has been prepared by the Administration for Civil Protection and Disaster Relief who also educate (and train) teachers involved in this subject. Administration for Civil Protection and Disaster Relief is also responsible for public communication during and after (pre-, post-event) natural disasters.

Challenges for the future

Challenges identified for the future of natural hazards management in Slovenia include a) the improvement of cooperation with neighbouring and European countries, especially for what concerns education and training activities, and exchange of experts; b) awareness raising to natural hazards through different activities that involve the population; c) improvement of the safety of population in case of major disasters (e.g. traffic and sea); d) improving the legislation (laws), concerning volunteer organisations.

3.3 Switzerland

The dominant alpine natural hazards in Switzerland are avalanches, landslides, rock falls, debris flows and inundations. Additionally, Switzerland is also experiences hail, storms, heat waves and earthquake. However, the latter processes are not attributed to the group of alpine natural hazards, to which the following text is related to. The legal framework for dealing and mitigating the consequences of natural hazards is composed by the Federal law on land use planning, the Federal law on the forests and the Federal law on flood control.

Change from a hazard-oriented approach to a risk-based approach

Due to several natural hazard events in the past decades, the general paradigm for dealing with natural hazards has changed. While it was hazard-oriented for almost 100 years, the flood in 1987 caused a change. Before it, the main criterion for realising mitigation measures was to protect an area affected by an event against a comparable event in the future. The costs of the mitigation measures were not considered as a key criteria in the decision making process. The goal was, e.g. to protect a village against a 100-year flood. Since the tragic flood in 1987, the comparison between the residual risk and the associated costs of mitigation measures started to be considered as a priority for effective decision making. After the 1999 events (snow avalanches, floods and storm) this trend became even clearer and the National Platform for Natural Hazards started to develop a strategy for dealing with natural hazards in Switzerland. This strategy has been put into practice in 2004. The basic principle behind this strategy is that risk management should aim for an equal level of protection for everyone in Switzerland (risk below protection goals). Risk reduction should follow economic criteria (cost-effective), and should be socially

acceptable and environmentally sound[16]. Mitigation follows the principle of the risk cycle for prevention, intervention and recovery, which are regarded as complementary components of risk management.

Organisational aspects and stakeholders

The tasks related to the different phases of the risk cycle are distributed across three levels: the confederation (federal level), the 26 cantons and the 2,551 municipalities. Municipalities hold the majority of the responsibility.

Federal level

Federal agencies work on a conceptual and strategic level with the responsibility for basics and finances. As a special feature, the National Platform for Natural Hazards (PLANAT) as a non-parliamentary commission focuses on prevention and risk reduction on a strategic, national level.

The Federal authorities are in charge of formulating policy and financial guidelines, providing financial support as well as support to research, education, alerting and warning. The main authorities are the Federal Office for the Environment (FOEN), the Federal Office for Civil Protection (FOCP) and the Federal Office for Spatial Development (FOSD). Additionally, the Federal Roads Office (FEDRO) as responsible authority for national roads and the Swiss Railway Company are the main organisations responsible for safety on traffic routes along with other national and cantonal authorities. An important document issued by these authorities in 1997 was a federal guideline for developing hazard maps in the Swiss municipalities. In 2008 the steering committee LAINAT for intervention against natural hazards was founded and included five federal authorities and institutes. It meets on a regular basis to exchange information and coordinates the collaboration during emergency. It also coordinates the project “Optimisation of early warning and alerting for natural hazards (OWARNA)”. In this context, recently, FOEN, the Federal Office for Climatology (Meteo Switzerland, the national weather service) and the WSL Institute for Snow and Avalanche Research SLF, responsible for national avalanche forecasting, developed the Common Information Platform (GIN), which represents the information platform for warning and intervention. In the following years the National Earthquake Service will also join the platform.

Another measure implemented within the OWARNA project is the training for ‘local natural hazard’ advisors.

Cantonal level

The cantons are responsible for enforcing national laws and cantonal laws. They are in charge of planning cantonal hazard mapping and of emergency management for protecting people and material assets. On a technical level, the cantonal authorities mostly determine the operational implementation of risk management: they advise the municipalities on different tasks of risk management, they consider applications for mitigation measures, they approve or reject municipal land use planning, which has to include hazard maps, they take a main responsibility for warning systems, etc. All cantons in Switzerland have departments for natural hazards or similar sections.

[16] More precisely, since 1 January 2008 every mitigation project with an investment of > 1 million CHF (880'000 €, exchange rate 30 Aug 2011) has to be checked against its benefits (risk reduction) - cost (of mitigation measures) - ratio. Both, the risk reduction and the cost is expressed as annual cost while humans are valued with 5 million CHF per averted fatality (VSL).

Municipal level

Legally, the final responsibility for dealing with natural hazards is situated at the municipality level. This reflects the principle of subsidiarity in Swiss federalism, which states that matters ought to be handled by the lowest competent authority. Within the range of their responsibilities, they mainly exert influence on land use planning by issuing building permissions and initialising hazard mapping. They are also the first level of emergency management, which is managed according to the civil protection system (made up of 5 partner organisations: fire, health care, technical services, protection and support services), operating at municipality but also cantonal level.

The private sector finally elaborates risk reduction projects on behalf of the municipalities, such as hazard maps and early warning systems. Generally, experts' opinions play an important role in Swiss risk management. Therefore, Switzerland has a well-developed market of engineering and consulting companies.

Insurance companies are major additional risk management players in Switzerland. In 19 cantons there is a mandatory housing insurance, which means that all house owners are insured against fire and damages due to natural hazards, except for earthquakes and volcanic eruptions. The 19 cantonal building insurances cover over 80% of the Swiss building structure. The cantonal building insurance of the canton Zurich is the only one also covering earthquake damages. The mandatory building insurances are obligated to provide insurance service to building owners in their canton. The reason why they can do this at remarkably low insurance rates, is the existence of the intercantonal reinsurance (IRV) and the intercantonal risk community (IRG) representing a solidarity fund of the 19 cantonal insurances. Another key element is the guiding principle "Secure and insure" ("Sichern und Versichern" in German) meaning that cantonal building insurances are engaged also in prevention. In the seven cantons, Geneva, Uri, Schwyz, Ticino, Appenzell Inner Rhoden, Valais and Obwalden (so-called GUSTAVO-cantons) buildings are insured by private insurances, although housing insurance is not mandatory in the cantons of Ticino and Valais and in parts of the canton Appenzell Ausser Rhoden. However, most of the buildings are also insured in these cantons.

The residual risk (not covered by mitigation measures financed by public money and insurances) has to be held by the population. For example, house owners can be obliged to build object protection (e.g. reinforced walls) if their house is highly endangered. The total sum being spent for the handling of and protection against natural hazards in Switzerland by all stakeholders amounts to almost 3 billion Swiss Francs (app. €2.3 billion, mean exchange rate May 2011) (Wegmann et al., 2007).

Challenges for the future

Although a lot has been achieved since 2005, there are still challenges to be dealt with in regard to risk management in Switzerland. Particularly, cross-sectoral collaboration needs further improvements, as well as the definition of institutional hierarchies that would involve local actors.

Another challenge concerns the communication of information between the national, the cantonal and the local level. The official information is still too scientific, complicated and sophisticated to be understood and used by operators working at local level.

Improvement is also needed in terms of strengthening of responsibility of local actors and private citizens in risk mitigation and emergency.

3.4 Austria[17]

Austria is administratively divided into 9 Laender (federal states), 99 administrative districts and 2359 municipalities. For what concerns the management of natural hazards the competences are so distributed: the Federal government is in charge of the federal police and army and of the matters of public health. The Laender are the first responsible authorities of disaster management, fire brigades and emergency rescue services. It is worthwhile also to mention that Austria is one of the few countries in Europe (together with Germany and Slovenia) where fire fighters in rural areas and smaller towns are exclusively based on a voluntary basis; only big cities have professional fire fighters.

The responsibilities at the different levels are held by the National Crisis Management committee, the Crisis Management of State governments (Laender) and the District Administration Authorities. At all these levels both experts/professional operators and volunteers participate in the risk management.

Monitoring and prevention

An Austrian service for torrent and avalanche control conducts surveys, provides technical advice and expert opinions to the operators of risk management. Also, in the country there are 7 Avalanche Warning Centres that support organisations and authorities of disaster management by optimising avalanche protection and prevention activities. Committees of Avalanche Warning services support local authorities in prevention, monitoring and management of avalanches and of economic activities. In Styria (one of the 9 Laender) there are 37 committees for 47 municipalities.

Early warning

A Federal Alarm Centre is in charge of early warning in the national territory. This is a contact point always connected with warning centres of neighbouring countries. A nation-wide test on alarm sirens is performed every year in April, July and October. Each Land then has its own Alarm and Warning Centre, connected with the information networks that operate at Laender level.

Emergency

The example of Styria shows the high frequency and magnitude of hydro-geological events in the years from 2005 to the present day. Floods, landslides and tidal waves have yearly caused disasters that amount in total to €1.3 billion damage. In the same period, the Government funds for reconstruction amounted to €37 million euro.

The Department for Civil Protection and Crisis Management intervenes in emergencies with a coordination unit for emergency and disaster medicine, a coordination unit for psychosocial care and a control unit for voluntary organisations. The crisis management authorities, in the case of Styria, coordinate the different task forces, provide technological equipment, and take over the costs of rapid emergency measures.

[17] Although the Austrian authorities could not attend the workshop, they sent information on their natural risk management system. This paragraph benefits from information kindly provided by Mr. Kurt Kalcher and Mr. Günter Hohenberger, of the Civil Protection and Crisis Management Office of the state government of Styria.

Challenges for the future

Currently, climatic changes represent a major source of threat, as they increase the number of disasters taking place. At the same time, government funding for the management of natural hazards is scarce. The population and mass media are very sensitive to the topic.

In order to overcome these difficulties, more studies on future developments and implications of climatic changes in the field of civil protection, economic activities (such as tourism) and energy supply are needed.

The responsibilisation of citizens also is regarded as in need of enhancement through adequate policies and strategies, while early warning also should be made more efficient through adequate assessment equipment and communication strategies.

3.5 Overview of existing institutional frameworks

Natural hazards that are most common in the alpine regions across Europe are of hydro-geological nature. In the following we present some summary Table 3.1-Table 3.5 of the information presented so far.

Table 3.1: Monitoring and prevention

	Main authorities/agencies in charge	Main tools/programmes
Austria	Decentralized system on federal state level: Administration for Civil Protection and Disaster Relief Municipalities and local authorities Federal Ministry of Life Austrian service for Torrent and Avalanche Control Commission/Section for Water Environment Agency Austria	Hazard/risk – assessment and plans Special regional arrangements increasing the resilience against natural hazards
Italy	Decentralised system, regulated mostly by legislation at the regional level Municipalities are in charge of the implementation at the local level Regional and River Basin authorities are in charge of risk assessment	Hazard/risk assessment and plans National or regional programmes depending on the type of event
Slovenia	Decentralised system, regulated by legislation at the local level - municipalities are in charge of the implementation at the local level Administration for Civil Protection and Disaster Relief (national and 13 regional offices)	Hazard/risk assessment plans
Switzerland	Federal Office for the Environment (FOEN) and the Federal Office for Spatial Development Federal roads office FEDRO Federal Office for Transport FOT Swiss Railway Company SBB Cantonal Departments for Natural Hazards (Federal system) are responsible for enforcing the national and cantonal laws Municipalities are in charge of the implementation at the local level	Subsidisation of mitigation measures Hazard indication maps (cantonal level) Hazard maps (Municipality level) River development plans National and cantonal hazard inventories (avalanches, debris flow, floods, rock fall, landslides) Risk assessments for infrastructure and buildings Benefit-Cost-Analysis of mitigation measures (EconoMe)

Table 3.2: Forecasting and early warning

	Main authorities/agencies in charge	Main tools/programmes
Austria	Decentralized on federal state level: Administration for Civil Protection and Disaster Relief 9 National alerting- and warning centres Central Institute for Meteorology and Geodynamics (ZAMG)	GIS assisted information system Threshold sensor monitoring system radio controlled public warning system avalanche warning system Weather radar system, satellite systems, etc.
Italy	Functional and competence centres (under the direction of the National Department of Civil Protection) National Commission for prediction and prevention of major risks Public Weather Forecast and Meteorological Service Regional Agencies for Environmental Protection (ARPA)	GIS assisted information system, mobile radio system, public warning system, emergency notification centres Thresholds established at national/regional level (depending on the hazard)
Slovenia	1 national notification centre and 13 regional logistic and notification offices Public weather forecast system and meteorological service (Agency of environment)	GIS assisted information system, mobile radio system, public warning system, emergency notification centres
Switzerland	Steering Committee LAINAT for intervention against natural hazards Federal Office for Climatology (national weather service): weather warnings WSL-Institute for Snow and Avalanche Research SLF: avalanche warnings Cantonal departments for Natural Hazards are responsible for cantonal warning systems Municipal fire brigades and avalanche commissions are responsible for immediate warnings	National information platform for warning and intervention GIN (GIS based information system) Project “Optimisation of early warning and alerting for natural hazards” OVARNA Training for “local natural hazard” advisors Cantonal and municipal alerting systems (e.g. IFKIS)

Table 3.3: Emergency management

	Main authorities/agencies in charge	Main tools/programmes
Austria	Civil Protection authorities on local, district and state level	Declaration of a disaster by law in case of severe events from local authorities up to the state level
Italy	The Council of Ministries deliberates on the state of emergency in case of events of great intensity and extent Civil Protection service (volunteers and professionals) Municipality through the Operational Centres (COC) Prefect (State representative authority responsible for public security)	Emergency plans Warning systems
Slovenia	Duty bound formations (Civil Protection on local, regional and national level) Professional units (e.g. fire fighters) Volunteers (most of the fire fighters’ service depends on them), scouts, red cross	Emergency plans Warning systems
Switzerland	Executive staff municipal level Executive staff cantonal level Partner organisations of civil protection at municipal and cantonal level (fire brigades, police, sanitary, technical aid, civil protection) National Emergency Operations Centre (part of Federal Office for Civil Protection) coordinates the collaboration during emergencies on national level (if necessary)	Regulation of 18th April 2010 on warning and alarm [Verordnung vom 18. August 2010 über die Warnung und Alarmierung (Alarmierungsverordnung, AV)] (Web-based) emergency schemes Guidelines for evacuations Guidelines for building a Cantonal Executive Staff or Committees (including partner organisations of civil protection and departments for natural hazards) Guidelines for building a Local Executive Staff

Table 3.4: Recovery and reconstruction

	Main authorities/agencies in charge	Main tools/programmes
Austria	Decentralised on federal state level: Administration for Civil Protection and Disaster Relief	Private and Public insurance schemes available Disaster fund on state level (reimbursement)
Italy	National Civil Protection and President of the Region	Only public insurance schemes available Ad hoc "reconstruction legislation" at regional level (reimbursement etc.)
Slovenia	Administration for Civil Protection and Disaster Relief (responsible in the aftermath of the disaster, so called intervention phase) Ministry of Environment (responsible for reconstruction)	Special law was implemented for managing the reconstruction activities after the 1998 earthquake which has been also used in case of large events later on (2000 debris flow); the law made possible for the state to take over the responsibility for reconstruction and spatial development of areas in danger (in general, communities are responsible for their own spatial development) Private insurance schemes offered only for some hazards (e.g. floods and earthquakes)
Switzerland	Federal Office for Civil Protection Federal Office for Environment (immediate protection measures) Cantonal departments against natural hazards (immediate protection measures) Cantonal and private building insurances Municipality authorities	Mandatory insurance schemes (only few exceptions) National initiative for solidarity (Glückskette)

Table 3.5: Communication and information

	Main authorities/agencies in charge	Main tools/programmes
Austria	Civil Protection authorities from local authorities up to the state level Local volunteers	Communication about emergency plans Information booklets, homepages, etc. from the Austrian Civil Protection Association about measures to combat natural hazards and their effects to the infrastructure and people
Italy	Prefectures and municipalities Local volunteers as mediators between formal bodies of civil protection and the population	Communication about emergency plans Risk education activities are integrated in some schools' programmes
Slovenia	Municipalities (usually mayor or the municipality press office where available) in cooperation with local civil defence authorities (mayors are often also heads of local civil defence authorities) Regional civil defence authorities National civil defence authorities	"Protection against natural and other hazards" is a subject taught in primary school Programmes provided by the Education Centre of the Administration for Civil Protection and Disaster Relief (mainly professional trainings)
Switzerland	National Platform for Natural Hazards (PLANAT) promotes programs for risk communication and risk dialogue National Office for Civil Protection (FOCP) informs about emergency plans Cantonal departments for natural hazards inform about immediate risks Cantonal building insurances inform about risks and risk prevention	Education program for regional experts, local natural hazard advisors and municipality authorities Information events and brochures Involving the public and/or local stakeholder groups in projects and planning activities National information platform for warning and intervention GIN (GIS based information system) will in future also offer information tools for the wider public

In different countries different bodies are in charge of risk management of natural hazards, and with different roles:

1. In Italy when major disasters take place the responsibility is of the National Department of Civil Protection. For all the other events, the administrative structure of the country (i.e. the fact that it the country is administratively divided in regions) identifies the core of activities of Civil Protection at the regional scale;
2. This is not the case for Slovenia, where regions do not exist;
3. And it is yet different in Switzerland, divided in cantons and in Austria, where a major role is played by the Laender.

In all these countries the first responsible authority for civil protection is the mayor and particular relevance is given thus to the municipal level of natural hazard management.

A substantial difference between these systems regards the presence in legislation of a mandatory requirement for insurance of buildings and properties against natural hazards for buildings and properties. This is present in Switzerland, but not in Italy, Austria and Slovenia. The example of Switzerland is a very interesting starting point for developing the insurance debate in other countries in Europe.

Also, while the Swiss system has acknowledged (at least at the National level) a shift from a hazard- to a risk-oriented approach, the management of hazards seems instead very event-driven in both Italy and Slovenia.

In Austria, Slovenia and Italy the role of volunteers and volunteer networks, both at local and trans-national level, is one of the back bones of Civil Protection's/fire fighters' actions and presence on the territory. Also in Switzerland, the local volunteer organisations of fire brigade and mountain rescue place a significant role in emergency events. This is an example of how the volunteers can become institutionalised actors of natural hazard management thus enhancing communities' resilience.

An interesting insight concerning communication challenges comes from Switzerland, where the effectiveness of the figure of the local natural hazard advisor to bridge the gap between centralised technical expert knowledge and residents is at present under testing in some pilot sites. There is a need to "translate" technical expert information at the local level. The creation of a connection between the two levels seems to be extremely important in all the countries analysed below. The difference is that in Italy and Slovenia, as well as in Austria, this function is to some extent covered by the strong and historically rooted presence of volunteers in the municipal territories, whereas in Switzerland a new actor is being introduced specifically to this purpose (but also here, a historically rooted presence of volunteer organisations form the basis for the local emergency service). The presence of a 'mediator' seems thus, in different contexts, to be helpful in bridging the gap between practitioners/experts and 'lay people'.

4 Case studies

In this section the cases analysed are presented, highlighting especially the practitioners' perspectives that emerged during the workshop and created debate among participants. The case studies are preceded by some remarks on the natural hazards management in the respective regions. The more extensive part on Friuli Venezia Giulia is based on literature research and the presentations given at the workshop. The regulatory set up and operative management of natural hazards, with a focus on the historical grounds for the spread of volunteer networks are illustrated as a background to the case study of Malborghetto-Valbruna. The introductory paragraph on the Province of Alto Adige also is aimed at contextualising the case of Vipiteno/Sterzing. It is important to keep in mind that from an administrative point of view, the territory of the Trentino-Alto Adige Region (to which Vipiteno/Sterzing belongs), is unique in the Italian administrative structure, as it consists of three different autonomous and independent bodies, the region and the two provinces of Trento and Bolzano (Bozen). Following the reform of the Special Statute (common to the three bodies) in 2001, the two provinces presently accrue most competences, including legislative, administrative, executive and electoral ones. As mentioned above, this is a unique situation, as the provinces in the other Italian regions have very limited jurisdiction and no legislative power.

Further details on both case studies can be found in Annex 4 as part of the material provided to participants prior to the workshop.

4.1 Natural hazards management in Friuli Venezia Giulia

Friuli Venezia Giulia is one of the five Italian regions that due to historical and geographical reasons have a higher degree of autonomy from the state in certain matters (so called 'regioni a statuto speciale', see Chapter 3.1).

For what concerns natural hazards management, the Region is part of the national service of Civil Protection as established by the national law 225/1992. Its statute of autonomy furthermore states the Region's legislative power in matters of prevention and rescue in case of natural calamities.

The Region signed a protocol with the National Department of Civil Protection in 2002. The aim of this protocol is the creation of a synergic operative model in which region and state could cooperate in the coordination of actions and structural organisation needed to manage natural hazards. Another protocol has been signed in 2005 by the Region and the prefectures. This document promotes their collaboration in case of natural hazards and other disasters. Prefectures are in charge of armed forces, fire fighters, the national forest forces, etc., that provide technical rescue services in case of emergency. The Regional Civil Protection service is responsible for management and coordination of mayors, municipalities, volunteer groups and associations as well as of the operative and technical units of the region in the monitoring, prevention, emergency rescue and recovery and reconstruction after a disastrous event. Regional law no. 64/1986 on "Organisation of regional structures and interventions of civil protection" identifies the regional administration as the main responsible for the coordination of all organisational and operative aspects of actions aimed at guaranteeing the safety of people and goods in case of events that need actual and immediate intervention. This law organises the functions of the Regional Civil Protection as a whole and defines it as an autonomous service within the regional organisation.

Through Protocols, the Civil Protection of the Region seeks to ensure maximum mutual cooperation among the organizations involved in risk management in carrying out the tasks of protecting the integrity of life, property, settlements and the environment in case of emergency in the region, particularly in border areas. The Protocols also represent a suitable instrument for the sharing of operational procedures, technology and computer systems.

Operatively, the Regional Civil Protection service has a Coordination Centre (in the town of Palmanova) that works as a control, monitoring and communication centre, where all the monitoring data concerning hydro-geological and seismic events as well as forest fires from the whole region converge.

A catastrophic event, such as the earthquake that hit the mountainous area of Friuli Venezia Giulia in May and September 1976, particularly influenced the risk management culture of the Region. This earthquake definitely represented a catalyst for building up a 'culture' of Civil Protection, known as the 'Friuli model' that still survives today (Strassoldo and Cattarinussi 1978; Cattarinussi and Pelanda 1981). During the winters of 1976 and 1977 about 80,000 people had to leave their municipalities, destroyed by the earthquake, and reach the coastal areas of the region and the tourist mountain places. People however were not relocated, sparsely and randomly, into hotels and vacation apartments. On the contrary, communities were reunited in the neighbourhoods of these coastal towns, around a municipal office. Whole municipalities found themselves temporarily recreated in a different place. Children were sent to school with the same classmates and adults involved in the reconstruction travelled every day to their home villages to rebuild what the earthquake had destroyed. Another crucial element of what would become the Friuli model was that the reconstruction priority was given to the economic activities, and only subsequently to private settlements. People, moreover, participated directly in reconstruction choices and works, creating networks and re-claiming their own land.

Based on this experience and due to a strong historical tradition established at the time of the Austro-Hungarian Empire, in the region Friuli Venezia Giulia every municipality has a unit of volunteers of civil protection and/or fire fighters. Although the tradition is ancient, civil protection volunteer units involve young operators constantly updated on latest technologies. The regional civil protection depends locally on municipalities, defined as the primary responsible entity for the management of natural hazards episodes that can be dealt with within the frame of the municipality's ordinary functions. Article 7 of Regional law no. 64/1986 attributes to the municipality also a role in rescue plans and programmes, the organisation and management of rescue services in accordance with other bodies in the regional or provincial territory, the coordination of voluntary bodies and the management of activities aimed at increasing risk awareness and emergency behaviour in the population. Due to this capillary organisation, currently there are 218 municipal units of civil protection, one for each municipality of the region. They represent the extended branches of the regional operative system and are always in contact with the main operative centre of Palmanova.

4.2 Malborghetto-Valbruna: confronting researchers' and practitioners' perspectives

The SWOT table prepared by ISIG as a starting point for discussion (see Section 1.3.3.) underlined the strong positive role played by the presence in the municipality of voluntary groups of civil protection, both for what concerns the management of emergency and the presence on the territory of informed and prepared citizens. The working group (mayor of Malborghetto-Valbruna and two technical experts of the Regional Civil Protection service) remarked this factor of

strength even further, identifying the volunteer corps and their international networks (with the Austrian Land of Carinthia and with Slovenia and Germany) as valuable elements in the process of recovery from disaster as well as in the long term communication activities connected with social capacity building and prevention of natural hazards. Whereas the data gathered in previous research (De Marchi et al. 2007) showed a low level of citizens' trust in the municipal authorities during the process of reconstruction after the flood of 2003, the group discussion highlighted a different perspective. In fact, the long relationship of collaboration started after the earthquake of 1976 between the Regional Civil Protection, the municipality and the citizens was agreed upon as a very positive element that contributed to a fast and careful reconstruction in 2003.

As some of the local participants in civil protection underlined, immediately after the event, there was a difficult interaction with local people. They have a somewhat different perception of what should be done to that of the experts “coming from outside”.

Therefore, after the event many inhabitants wanted to actively take part in the decision making process. Some of them helped the experts in identifying further sourced of danger (e.g. a new stream) and others established a Local Committee for safety to address local authorities and ask for more protection. The regional Civil Protection joined the Committee in their claims to municipal authorities. This shows how local knowledge was somehow taken into account in risk mitigation decisions.

In this respect, the mayor of Malborghetto underlined the high relevance that in these circumstances is played by communication and negotiation between the local authority and the private citizens, especially when choices of risk mitigation need to be taken. It can thus be observed that, although no formal participation process took place, the dialogue between citizens, local authority and Region has been very intense and constant, especially due to a clear assumption of responsibility by the mayor in overseeing the reconstruction process. This underlines once again the crucial role played by municipal authorities in fostering and developing (already existing) social capacities to face adverse events.

As an element to be improved and deemed of great relevance there is the need to take into account local people's needs and expectations before (and not after) mitigation decisions are taken. This relates more generally to the feeling of belonging to the territory (explored further in Section 6 of this report) and to the participative implementation of risk management plans. In both domains, it is crucial to strengthen already existing public-private partnerships and/or to build new ones aimed at fostering dialogue between the many stakeholders involved.

A further aspect that has emerged from the discussion is the time projection of mitigation and monitoring structures and technologies. In twenty years, the monitoring of the territory and the maintenance of already existing mitigation works are expected to become more and more crucial. Not only more resources should be devoted to both of them, but also the allocation of responsibilities for the maintenance of structural mitigation measures needs to be clarified.

Finally, risk mitigation in Malborghetto-Valbruna proved to be effective also because of the immediate availability of funds, as it can happen only in case of type C events (see Chapter 3.1), which are ruled by a specific legislation. More precisely, a law in the year 2002 (no. 286/2002) conferred full authority on the Prime Minister to undertake actions upon the outbreak of an extraordinary emergency situation, thus centralising the emergency and recovery management and allocating more responsibility to the National and Regional Civil Protection Corps.

4.3 Natural hazards management in Alto Adige /Südtirol

Since the site of Vipiteno/Sterzing analysed during the workshop belongs to the Province of Bolzano/Bozen, this paragraph briefly illustrates the province's competences in natural hazards management.

The statute of autonomy of Alto Adige/Südtirol includes among the primary competences of the Province the regulation of all actions and structures of prevention and rescue of the population in case of calamities. Furthermore, the Province can expropriate lands and properties for public purposes, for what concerns all the competences listed in its statute of autonomy, thus including prevention of natural hazards. This element is of particular relevance in the case of Vipiteno/Sterzing, where – as emerged at the workshop – the conflict between what is established by law and what is politically and economically convenient determines the balance of decision.

The Province is composed of several Departments. One of them is the Department for Local Authorities, Civil and Forest Protection, Hydraulic Works and Forestry and Agricultural Experimentation. The authority (the Office for Hydraulic Works) that started the planning related to natural hazards and has been in charge of the mitigation works in Vipiteno/Sterzing belongs to this department (further details on the case study can be found in Annex 4).

4.4 Vipiteno/Sterzing: confronting researchers' and practitioners' perspectives

A preliminary SWOT summary table made by ISIG showed a strong polarity between technical and social dimensions of risk management. The experience of people directly involved, instead, stressed especially the **relevance of economic and political elements** as strong incentives for decisions. Cost-benefit analysis, the amount of money needed for expropriating the private lands for the construction of mitigation structures, or the willingness of people to give up part of their property to see their safety increased, were fundamental questions in the mitigation choices made in Vipiteno/Sterzing. The working group, formed by planners, researchers, members of the municipal council of Vipiteno/Sterzing and of the Provincial Office for Hydraulic Works, underlined the need to acknowledge and find solutions to the contrast between immediately perceivable losses and long term and uncertain natural hazards. The value of land is real and tangible, while a flood might one day destroy the property.

As a consequence, the regulatory requirement of following the 'safest mitigation option' turned out as largely theoretical. Planners of mitigation measures as well as provincial officers underlined the strong conflict that emerged in the decision making process for flood mitigation measures in Vipiteno/Sterzing between private and public interests. Public safety is clearly a public issue; however, private landowners' resistance to giving up their land entailed the adoption of sub-optimal measures. While people in theory agree on the 'need for safety', when their own property has to be taken for the realisation of flood protection they strongly complain. Local authorities have in theory the possibility to expropriate the land even without consent, if this is deemed necessary for public interest. However, in a small municipality landowners are also part of the municipal council and in any case have political weight. Adopting measures against local private interest is obviously problematic for the local administration and the political personnel.

Such relevance of economic and political factors was not obvious from the material collected during the workshop preparation or from previous on-site research on Vipiteno/Sterzing. The issue of 'lack of knowledge of the territory' was expected to play a bigger role in the discussion.

However, the theme of local knowledge was also touched upon. The focus was mainly put on the great degree of occupational mobility and the rapid changes in the resident population. Tourism also plays a major role in this dynamic. Newcomers and tourists do not know the territory and thus it is up to the municipality to make sure hazardous areas and natural risks are correctly and effectively brought to their attention.

It was also noticed that while the table prepared by ISIG contained only a duality between 'experts' and 'lay people' knowledge, in practice the differentiation of knowledge is much more nuanced, with consequent frictions in decision-making processes. The ‘knowledge’ embedded in political and economic considerations, for example, was stressed as very relevant.

A difference with the case of Malborghetto-Valbruna was highlighted as very important for analysis and comparison. No flood had hit Vipiteno/Sterzing for more than 40 years when planning of flood mitigation started. Thus, citizens were not highly motivated in being involved apart from what concerned the protection of their immediate, private interests.

A very positive feedback concerned the evaluation of the River Basin Agenda, considered as a unique opportunity for the involvement of stakeholders in a forum of discussion and decision-making that could really take into account different economic, ecological, social and infrastructural concerns.

5 Social capacity building in practice

Social capacities, as identified by the Knowledge Inventory of CapHaz-Net findings (Kuhlicke et al., 2010) and summarised in Table 1 (Section 1.2) of this report have been discussed throughout the workshop, with reference to case studies and other practices of alpine hazards management. This paragraph synthesises the main observations and findings of the workshop participants regarding the concrete existence and relevance of these capacities.

5.1 Knowledge capacities

Many participants highlighted that **local knowledge** concerning both the territory (morphology, dangerous areas, etc.) and its management (abandonment or exploitation, control and monitoring, etc.) seems to be forgotten. More precisely the more risk management strengthens, the more this knowledge and the risk awareness carried with it seem to be forgotten and need to be re-discovered. Some discussed research results highlighted how the monopolisation of knowledge by the technicians is leading to a gradual loss of knowledge or at least to the silencing of the population concerned. This local knowledge was based on experience and observation, on realising things concerning the surrounding environment and transmitting the related practices to the next generations. This loss is gradually leading to the disappearance of habits appropriate to a vulnerable territory and of knowledge of the behaviours to be adopted in case of disaster.

Several interpretations may be formulated, according to the results of the workshop discussion, about the causes of such loss of local knowledge. For example traditional knowledge keepers are no longer present, due to migration, societal changes and the depopulation of the mountain areas in the past decades. Also the networks and community links that in previous times ensured the transmission of knowledge from generation to generation have weakened. Finally the scarce presence of people on the territory, which once was ensured by different occupational patterns and life styles, implies a lowered control and monitoring of the risky areas, thus reducing further the level of knowledge of the local population.

The loss of local knowledge is, in any case, one of the factors that have been mentioned to explain the fragility and vulnerability of our contemporary societies in relation to what can be termed a ‘safety paradox’: namely, the presence of dams, embankments, barriers, protection works may induce in the residents the false belief of being fully protected, discounting the existence of a “residual risk”, which the experts know cannot possibly be eliminated. In other terms, the decrease in risk awareness, as a consequence of the decline of local knowledge and the expansion of safety measures, entails – according to the mechanism described in Section 1.2 – a possible increase in the dangers to which the interested population is exposed. Of course, given also the already mentioned possibility of side effects of technology as applied to the territory, it is extremely difficult to estimate the trade-off between levels of safety on one side and risk/danger dynamics on the other. Yet, in terms of social capacity, the re-building of local knowledge and the creation of a culture of risk education were deemed in any case as very relevant factors to strengthen community ability to face natural hazards.

5.2 Motivation capacities

Throughout the workshop it was obvious that the capacities related to motivations need to be built during the time between a disastrous event and the implementation of mitigation/prevention

measures. It was highlighted that the involvement of people in the processes of mitigation and prevention is stronger if this phase coincides with the reconstruction. In other words, if the event has just happened and people face its consequences directly, their involvement and willingness to give up part of their personal interests is higher – a **'window of opportunity'**, in this sense, opens up.

However, this is conditional to the situation. In fact, involvement and participation may work, even in the aftermath of an event, provided that the population is given a possibility to really take part in the decisions. This can be seen in the example of the earthquake that hit Friuli in 1976. As said, the event was followed by a reconstruction phase generally regarded as successful (the 'Friuli model'). Despite some flaws, such as the adoption of models of reconstruction that did not always take into account the local specificities, the main factor that determined the overall success of the process was the cohesion kept by the communities (as already hinted, the post-event period was organised so as to allow children to keep going to school with the same classmates, families to keep united and villages to be temporarily 're-created' in the areas of the region where they had been relocated) and their direct involvement in the reconstruction. The population, one can say, chose their own priority and their own method of reconstruction. Economic activities were re-started first and private settlements were erected subsequently.

5.3 Network capacities

The relevance of networks was especially discussed. **Volunteer civil protection and fire brigade networks** are an historical, well rooted reality in the areas of the former Austro-Hungarian Empire. Moreover Slovenia, northern Italy and the Austrian region of Carinthia have not only strong volunteering but also **cooperative trans-alpine networks**. The volunteers' corps have the characteristics of an institutionalised body for risk and especially emergency management. Volunteers represent the link between the operators and experts and the community. They are prepared in case of emergency and also have a strong presence in the territory. They are the operative branches of civil protection that intervene first when a disastrous event occurs. Thus they are also an important source of the networks at local and regional level. In Italy for example in 2010 the voluntary system included a total of 3,322 organisations with altogether 1,200,000 volunteers (i.e. almost 2% of the national population; Renzulli 2010). As it is clear from these figures too, the voluntary organisations are one of the main pillars on which the Italian Civil Protection rests. There is also a professional component to these organisations that plays a crucial role for what concerns technical expertise and coordination of actions.

Other networks considered of great relevance are the ones created within **European projects**. For instance, the 'River Basin Agenda' that the municipality of Vipiteno/Sterzing benefited from was created within INTERREG III B. International networks allow the exchange of experience and expertise and are deemed as valuable by the local authorities that thus strengthen trans-national cooperation.

5.4 Financial and institutional capacities

Financial and institutional capacities were considered as being in practice **closely related to each other**. The distribution of responsibility established by the institutional framework, determines the responsible body which will have to carry the financial burden of natural hazard mitigation and prevention. An example was given in the Malborghetto-Valbruna working group. Regulations are ambiguous about the mitigation structures built in the municipality as being property

of the region or of the local administration. This is very relevant since the owner has also the responsibility for maintenance: a small municipality like Malborghetto needs to know in advance whether or not it will have to take charge periodically of such work and find financial resources to cover the expenses.

The distribution of responsibility is also very relevant for what concerns **insurance schemes**. In Switzerland, where such instrument is mandatory, responsibility is allocated in a compulsory way to the citizens. A question that was raised and deserves a dedicated study concerns the cultural context: does a mandatory insurance scheme work only in countries where the level of individual responsibility is already high, or will the introduction of such tool favour a more individual-based culture of risk, the appreciation of which is spreading across Europe? Also: can such schemes work in connection with social funds schemes?

A final remark needs to be made for what concerns **European programmes** such as the European Alpine Space Programme, platforms (PLANALP) and other initiatives (INTERPRAEVENT). While we have seen their relevance for the creation of trans-national networks of cooperation and exchange of expertise, they also provide a framework for such exchanges as well as financial means for realising projects.

5.5 Procedural capacities

Local mediators emerged as a very important connecting figure between local communities and risk management experts and bodies. While in Friuli Venezia Giulia, Austria and Slovenia this figure is somewhat embedded in the local culture – volunteers of civil protection are capillary present and have a strong historical rootedness in the territory – in other contexts this has been created on purpose. A relevant example addressed at the workshop is the 'local natural hazard advisor' in Switzerland. Yet another example comes from the 'local champions' of UK. However, in countries with a strong presence of volunteers, mediators of different nature are likely to be needed as well, in order to bridge the gap between the different domains of knowledge pertaining to the variety of actors involved in natural hazards management.

6 Lessons learnt

As remarked at the beginning of this report, the Alpine hazards workshop had several goals, namely:

1. providing an overview of existing institutional frames and policy context at the regional scale;
2. offering insight into the concrete operationalisation of social capacity building and strategies for raising awareness and preparedness;
3. singling out strengths and weaknesses and identifying gaps of knowledge and implementation in existing initiatives, practices and legal tools in relation to hazard mitigation;
4. assessing the potential for developing new initiatives, practices, legal tools, decision processes and identifying new chances and challenges.

Initial evidences in relation to these questions came from the preparatory work. Some of them were confirmed and strengthened at the workshop. Others were modified or reinterpreted. Novel insights also emerged during discussions.

Also, despite the focus of the workshop was on some specific regional areas, natural hazards and experiences, it is reasonable to argue that the general insights generated by analysis and discussion can be extended to other contexts.

In this section the main findings vis-à-vis the goals of the workshop are first summarised, then assessed according to the extent to which the initial evidence was strengthened, additional insight was gathered, and weaknesses and potentials for improving the existing situation emerged, together with indications for further research.

6.1 Summary of findings

As regards the first point, that is the **institutional framework and the policy context**, preparatory analysis and workshop discussion showed that the situation in the Alpine region is characterized by similarities and differences at regional and even sub-regional level.

Similarities include the basic types of geophysical vulnerabilities, where the expected effects of climate change, the changing patterns in the use of the territory and the growing mobility of population take a special relevance. Similarities include also the organization of the hazard management systems according to different levels, where the first and basic responsibility is however assigned to the lowest one (that is the municipality level). Similarities include also the relevance of major past events in prompting rethinking and improvement of the management systems.

Differences include the internal articulation of the systems, as regards for example the relevance of volunteers (generally high, but to different degrees of significance) and their coordination with institutional emergency services, and the specific distribution of technical, administrative and decision-making competences. Differences include also the experimentation of a variety of solutions, from the mediating figure introduced in Switzerland (‘local natural hazard’ advisor) to the ‘Friuli model’ of emergency and reconstruction management.

As regards the second point, **social capacity building**, what emerges is, in general terms, a shared effort to improve risk awareness and preparedness through a variety of instruments, from planning to information campaigns, from structural interventions to school education programs. Strengthening participation at both territorial planning and hazard prevention and mitiga-

tion levels is an issue the relevance of which is generally stressed. Similarly, a general trend towards individual responsibilisation vis-à-vis natural hazards is clearly detectable. As said above, efforts have been often prompted by specific emergency experiences and the related learning processes. Partially as a consequence of this, but also of the different cultural and institutional traditions, the specific outline, content and significance of these instruments varies from country to country and also, within each country, from area to area. A well-known typology (cf. e.g. Lindblom 1965; Simon 1983; March and Olsen 1988) distinguishes between four basic models of policy action: Olympic or synoptic rationality (full capacity of optimal decision); limited rationality (decision under uncertainty, tendency to follow established patterns of behaviour), incremental rationality (results depend on the overlap of uncoordinated but interdependent decisions), garbage can (problems and solutions are taken up according to contingent evidence and availability). Bearing this in mind, the picture emerging from background analysis and workshop discussion suggests that the operationalisation of social capacity building can be schematically visualized as gradually evolving from garbage can to incremental and to limited rationality, with the sharing of experiences, institutional and organizational approaches and of examples of good practices pointing towards a gradual approximation of the (of course never fully attainable) synoptic model.

Moreover the operationalisation of social capacity through the typology developed during the CapHaz-Net project (see Chapter 2.1) provided a useful framework of reference, not only to summarise the workshop results, but also to better identify further directions for improving social capacities (see Section 5).

As regards the third point, namely the **emerging strengths, weaknesses and gaps of knowledge** and implementation in existing **initiatives, practices and legal tools** in relation to hazard mitigation, one can say that the level of knowledge and technical/organisational efficiency has been continuously improving over the years in all the areas considered, despite – as remarked – the specific solutions are affected by the different institutional set ups and the concrete events faced in the past. The historical perspective introduced in the workshop discussion helped to highlight weaknesses and gaps, which seem especially related to some major factors, namely:

(a) The declining significance of ‘local knowledge’, as a consequence of generalized changes in the approach to and use of the territory, with significant decisions coming from ‘outside’ the local community, technical instruments becoming increasingly powerful (with growing capacities of intervention but also growing possibilities of dangerous side effects), the composition of the resident community and its relationship with the territory undergoing significant changes and the mobility of population facing a generalized increase.

(b) Uncertainties or ambiguities related to the precise articulation of responsibilities for decisions and room for choices among the involved actors, with special relevance of financial assets for the maintenance of risk prevention and mitigation works and for the recovery-reconstruction activities, as well as of issues of economic activities and private properties, which may affect the soundness of decision-making from a technical viewpoint.

(c) The effectiveness of communication among technical-institutional actors and between them and the local population. This includes what is often depicted as inadequate institutional/technical coordination and integration at different scales and across different

types of competences This includes also issues of technical language and understanding vis-à-vis lay local perspectives. Again, this includes also what we have termed ‘paradox of safety’, that is the inverted relationship between hazard-related technical knowledge and levels of safety on one side, and local knowledge, risk awareness and emergency preparedness on the other; a situation that in practice may correspond to an increase in the dangers to which people are exposed.

(d) The need to contextualize any type of approach (technical, organizational, institutional, regulatory) to country- and site-specific political and cultural contexts.

As for the last point, namely the emerging **potentials for developing new initiatives, practices, legal tools, decision processes and identifying new chances and challenges**, the latter are of course represented by the issues described above. Among the potentials that emerged as especially interesting or promising, it is worth stressing at least the following:

(a) the singling out and sharing of good practices (like the ‘Friuli model’), institutional innovations (like the Swiss ‘advisor’), and forms and experiences of information, education and participation;

(b) the strengthening of within- and between-country opportunities of collaboration through EC-funded programs, which have already proved useful and effective;

(c) a thorough exploration of the feasibility and conditions for an extension of private insurance and social funds schemes.

In the next sections some of the points summarized above are expanded according to their relationship to initial evidence, the emergence of additional insights with reference to weaknesses and potential for improvement, the resulting indications for further research, and the utility of the discussion methodology implemented at the workshop.

6.2 Strengthening of initial evidence

They key concepts illustrated in Section 1.2 were explored throughout the workshop through the presentations of key note speakers, groups discussions and debates.

For what concerns the polarity risk-danger chosen as the initial step of the reflection on alpine hazards, this has been identified in practice in the imposition of structures ‘alien’ to mountainous areas that had previously been in 'balance’. In fact, whereas the risk of flooding to which settlements in these areas had been exposed to had progressively been diminished over the centuries by the communities through the relocation of villages, the endogenous structures crossing alpine valleys since the 1950s (highways, dams, pipes etc.) have added an element of danger to these same areas. These structures represent source of hazard since: a) the communities inhabiting the valleys have not been involved in the choice of their construction; b) their construction in fact changed the morphology of areas that had already reached an hydro-geological equilibrium over the centuries; c) their construction implied the construction of further structures for their protection from hydro-geological events; d) all this, repeated in a vicious circle, created a progressive distance between the mountain and its inhabitants and a loss of interest over and awareness about the territory by the communities.

This mechanism that started the transformation of a territory, once used to be known and ‘owned’ by a community, into a hazardous land, also touches upon the topic of knowledge. The lack of involvement of citizens in choices of land use planning that had been endogenous to the

community for centuries creates a sense of distance with the territory they inhabit. This is happening in many communities in the European Alps and is also due to the general increased mobility of people and the tendency of young families to move more easily, especially for occupational reasons.

When thinking of the alpine population it is thus important to keep in mind trends that affect the whole of Europe (occupational mobility, increased distance between the everyday life of people and the land they inhabit, exogenous choices – of European or national, rather than exclusively the local scale - related to infrastructure building and other land uses).

Knowledge of the territory is thus often nowadays more concentrated in the hands of 'experts' rather than population. This topic has been very present throughout the workshop and identified as a problem that needs to be tackled. The diffusion of knowledge of territory and of hazards among 'lay' people seems key to the achievement of the culture of self-protection that is increasingly called for in Europe. Responsibilisation of citizens can occur if they are better informed and more aware. Not only: a mere informative campaign is likely to be insufficient. Difficulties in communication between 'experts' and public, and also among all the other actors involved in the risk management (authorities, volunteers, stakeholders and operators of various types) have been underlined as actually hampering the formation of a diffused 'culture of civil protection'. The flow of information should be multi-directional and knowledge, coming from different sources, be made use of in the right context. Case studies and regulations (the reconstruction of Friuli after 1976; the EC Floods Directive, etc.) have been used as examples of how a bottom-up approach, implying participation and real involvement of citizens in territorial planning choices, is key to a meaningful and robust development of alpine hazards management, one which builds on a close connection with the territory, knowledge, awareness, choice and finally, responsibility.

Practical suggestions and concrete steps emerged during workshop, as well as insights on potential further research are listed in the paragraphs below.

6.3 Additional insights, weaknesses and potential for improvement

As anticipated in the previous section, **participation** was regarded as a particularly relevant element for what concerns social capacity building. This outcome confirms the recommendations of the working group "Avalanche, Floods, Debris Flows and Landslides" of the Alpine Conference, that highlighted the importance of "targeted and consistent promotion of a risk dialogue with all participants for the improvement of prevention in risk management and of risk awareness and acceptance among the general public" (Greminger, 2003) as measures for reduction of risk. During the workshop, however, some issues were raised concerning the **practical limits to an effective participation**. These concerned:

(a) the fact that the involvement of population is often difficult due to the different 'languages' spoken by lay people and risk experts and the different knowledge at play;
(b) the fact that the often romanticised 'local knowledge' is in fact disappearing, or at least decreasing in its relevance and diffusion. Many people that reside in the alpine region do not have a very accurate knowledge of the territory and thus their participation in planning decision is difficult, unless some background knowledge is provided from the outside;
(c) the fact that economic interests and political equilibrium may prevail over choices of risk mitigation in participatory processes;

(d) the lack of knowledge by many local authorities on how to effectively implement public participation, especially as a result of the EC Directives (e.g. 2007/60/EC).

In order to overcome these difficulties some suggestions have been made and some good practices have been taken as valuable examples.

At policy level, it was observed that since hydro-geological events are the natural hazards that mostly affect alpine regions, from a regulatory point of view it is important **to work on the implementation of the EC Floods Directive (2007/60/EC)** at the national and regional scale. In particular, this should focus on the creation of real opportunities of **involvement for the population**, through information about risk exposure and assessment, education about the territory, awareness of risks and understanding of the importance of risk aware behaviours. Also, some **forms of funding to cover potential damages from natural hazards** should be provided, either through mandatory insurance or the institution of social funds, so that economic concerns will not weigh too much in risk mitigation decisions. It is also important to underline that if policies involve first and foremost the public authorities at the appropriate level, they can provide suitable frameworks for participation that is for including bottom-up insights into relevant issues and concerns.

What the historical perspective has suggested, is that **knowledge of the territory can be retrieved by involving communities in the development of community maps** (i.e. spatial and social representations of the community characteristics). They are maps in which, with the aid of a facilitator and archives of natural hazards that took place in the past, the population can 'reconstruct' the memory of its own territory and gain awareness on its risks. These maps have to be considered as complementary to the already existing hazard and risk assessments.

In regard to the involvement of population in the post-event reconstruction, the example of the region Friuli Venezia Giulia after the earthquake of 1976 stresses the importance of maintaining community identity and restoring a normal everyday life as soon as possible and as much as possible after a disastrous event. More precisely, the strength of the 'Friuli model' builds on a threefold strategy which, in its general terms, is suitable to application in a variety of contexts: a) the maintenance of community cohesion even if its temporary relocation is mandatory; b) the recovery of those elements of community life that are first and foremost important for recreating everyday life in the original site; c) the involvement of population in the basic decisions concerning the reconstruction model and process..

To better understand communities and their structure it was again suggested to rely on community maps, which may turn out to be useful during the different phases of the disaster cycle, as well as a useful tool for raising a community's risk awareness and for communities' internal and external communications about risk, danger and safety. Public confrontation and debate on post-event reconstruction, as well as questioning and debating the expected orientation of development, in order to ground and legitimate reconstruction choices (rather than following standardised models that might not suit a specific territory) were deemed of great importance.

Other topics have also been debated that did not relate directly to participation. Namely, it was highlighted that it is very important that allocation of responsibilities for what concerns the maintenance of structural mitigation measures is very clear before construction starts, so that projects could also take into account the actual maintenance funding available and be designed accordingly.

A more general consideration also emerged and was deemed very important in regard to the exportability of good practices. It was observed in different instances throughout the workshop that good practices are not exportable as such from one community to another. What works in one context might result useless in others. From this perspective, the understanding of 'context' provided by SWOT analysis was very relevant. Furthermore, as the analysis of the 'Friuli model' of reconstruction showed, while it is not possible to export practices as they are applied to one context, it is possible to single out the elements that proved to be relevant for its success. In the case of Friuli, the key to success, as remarked, was the preservation of the cohesion of the communities, the application of models of reconstruction tailored to particular community and territorial contexts, rather than a standardised one, and specific prioritizations in the reconstruction process. This approach can arguably find application elsewhere, of course without aiming at a faithful reproduction of the Friulian case.

6.4 Indications for further research

Relevant hints for further research are already present in the subsections above. Yet it may be useful to stress three additional points. The first one concerns the Swiss system of alpine hazards management. It has been noticed that this system has developed a high capacity of evolution since the major floods of 2005 (with the creation of the Steering Committee for Intervention against Natural Hazards and OWARNA project, see Section 3.3). This suggests that it would be worth exploring in more detail the relevance and feasibility of systems of organizational self-evaluation for successful improvement strategies in different institutional contexts.

The second point regards the analysis of the institutional frameworks, which revealed not only the high level complexity of the single national risk management systems, but also the numerous similarities and differences among them. It would be worthwhile exploring not only these issues, but also the historical evolution of the legal tools and policies in order to analyse trends in disaster policy making. Also the drivers of change in risk management in the past deserve more attention, especially in order to understand the potential changes that may occur in the future. This study will also allow researching the consequences of the adoption of a specific tool/policy for the implementation of social capacity building, a topic which definitely needs further exploration.

The third point concerns the topic of mandatory insurance schemes and the institution of social funds. The importance of this topic emerged very clearly, being highly debated throughout the workshop. Participants were unable to converge on a shared vision on whether and to what extent these tools can be usefully implemented in different European countries. Research on this topic is already available, yet the presence of different funding schemes for reconstruction and recovery and the vividness of the debate at the workshop suggest the need of further research. The latter should arguably be focused not only on the economic feasibility of different funding schemes but also on the role played by the institutional and cultural context in sanctioning their likely success or failure.

6.5 Utility of methodology

Finally, for what concerns the methodology of work adopted at the workshop, a short consideration can be made on the application of tools and terms borrowed from SWOT analysis. While the tables prepared by ISIG were merely summary tables of more complex research results, the division of elements into 'Strengths', 'Weaknesses', 'Opportunities' and 'Threats' helped to engage

participants in debated reflections upon the internal or external nature of factors of influence, and on their positive or negative impact. This positive experience can represent the basis for further refinements of the approach.

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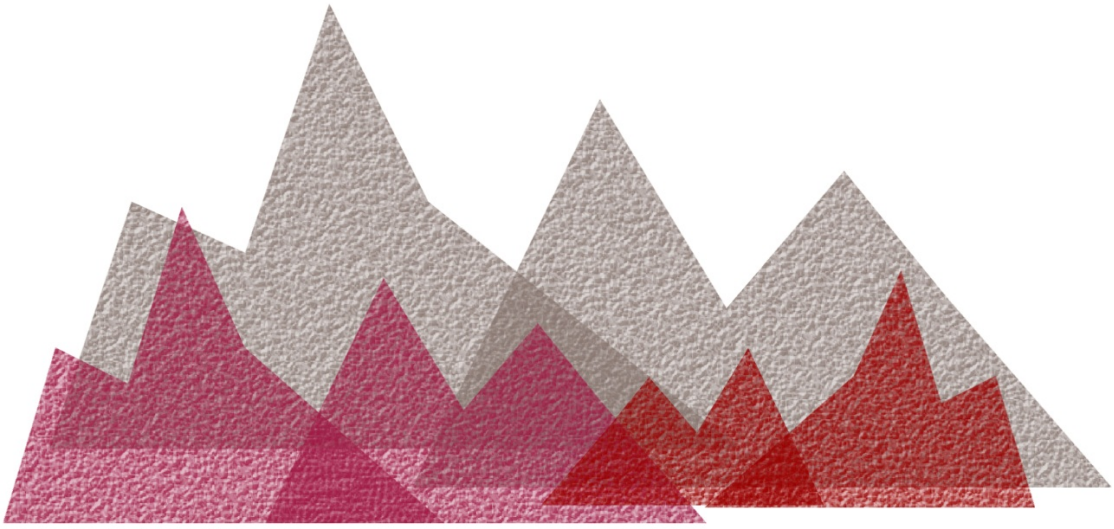
8 ANNEXES

8.1 Annex 1 - Workshop programme

CapHaz-Net

Social Capacity Building for Natural Hazards Toward More Resilient Societies

I S I G
Istituto di Sociologia Internazionale di Gorizia



REGIONAL WORKSHOP:

SOCIAL CAPACITY BUILDING FOR ALPINE HAZARDS

SEVENTH FRAMEWORK PROGRAMME

FONDAZIONE Cassa di Risparmio di Gorizia

Gorizia (Italy), 4-5 April 2011
Conference Hall "Conte G. Della Torre"
Via Carducci, 12 - Gorizia

What is CapHaz-Net?

CapHaz-Net is a coordination action, funded by the European Commission within the activities of the 7th framework programme. The name of the project stands for ›Social Capacity Building for Natural Hazards: Toward More Resilient Societies‹. We understand it both as an open and grow-

ing network of researchers, practitioners and stakeholders from across Europe sharing an interest in the social dimensions of natural hazards as well as a research project. However, CapHaz-Net does not conduct ›first hand‹ empirical research. It rather builds upon existing knowledge. We review and synthesise previous and on-going research and aim at stimulating discussion and exchange. Thus, sharing experiences between researchers and practitioners is at the heart of CapHaz-Net's activities.

What is CapHaz-Net about?

Despite long-lasting attempts to mitigate and reduce the damages due to natural hazards and a constant accumulation of scientific and practical knowledge, the human and economic losses caused by disasters are not decreasing. On the contrary, they have increased significantly in Europe over the past decades. Why is it like that – and what can research and societies do about it? To find explanations for this paradoxical development, CapHaz-Net is particularly concerned with people's capacities and how they are influenced by contextual conditions – we thus speak of »social capacities« to stress this intention. CapHaz-Net is not considering the physical conditions of a hazard. We rather regard the occurrence of a disaster as a result of people, communities and organisations lacking capacities to anticipate, cope with and recover from the impact of a natural hazard. It is these conditions which transform a natural hazard in a social disaster. The central question CapHaz-Net is dealing with is therefore:

How can we enhance the capacities of European societies to prepare for, cope with and recover from the negative impacts of a ›natural‹ hazard?

Which institutes take part in CapHaz-Net project?

CapHaz-Net's consortium is made up of 8 partners from 6 European countries. These are:

- Helmholtz Centre for Environmental Research – UFZ, Leipzig, Germany
- Institute of International Sociology of Gorizia (ISIG), Gorizia, Italy
- Middlesex University (MU), Flood Hazard Research Centre (FHRC), London, United Kingdom
- Autonomous University of Barcelona (UAB), Institute of Environmental Science and Technology (ICTA), Barcelona, Spain
- Scientific Research Centre of the Slovenian Academy of Sciences and Arts (ZRC-SAZU), Anton Melik Geographical Institute (GIAM), Ljubljana, Slovenia
- Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) & Institute for Snow and Avalanche Research SLF, Birmensdorf & Davos, Switzerland
- Dialogik Non-Profit Institute for Communication and Cooperative Research (DIA), Stuttgart, Germany
- Lancaster University (LU), Lancaster Environment Centre (LEC), Lancaster, United Kingdom

PROGRAMME 4 April 2011

8.45-9.15 Registration

9.15-9.45 Welcome address

9.45-10.00 Introduction to CapHaz-Net

Annett Steinführer/Christian Kuhlicke - CapHaz-Net coordinators, UFZ/vTI

10.00-10.15 Introducing the alpine hazards regional workshop

Luigi Pellizzoni - ISIG

10.15-11.15 Session 1 – Alpine hazards: an overview

Chair: *Annett Steinführer, vTI*

- Hazardous risks in the Alpine Space
  Sven Fuchs, University of Natural Resources and Applied Natural Sciences, Vienna
- Social management of risk in the Alpine Space
  Anne Marie Granet Abisset - University of Grenoble 2

11.15-11.30 Coffee break

11.30-13.15 Session 2 – Managing alpine hazards

Chair: *Blaz Komac, GIAM*

- Management of alpine hazards in the region Friuli Venezia Giulia
  Guglielmo Berlasso, Director of Civil Protection Friuli Venezia Giulia
- Management of alpine hazards in Austria
  Kurt Kalcher, Head of the disaster management authority in Styria
- Management of alpine hazards in Slovenia
  Borut Horvat, Administration for Civil Protection & Disaster Relief of the Republic of Slovenia
- Management of alpine hazards in Switzerland
  Franziska Schmid, Steering Committee Intervention against Natural Hazards, Swiss Federal Office for the Environment

13.15-14.30 Buffet Lunch

14.30-15.30 Session 3: A focus on Friuli Venezia Giulia

Chair: *Chiara Bianchizza - ISIG*

- Implementing EC Directive 2007/60 in alpine river basin management
  Francesco Lettera- expert of the Servizio Superiore Lavori Pubblici
- Territorial stress and participation: experiences on the Friulian mountains. Participatory processes in Friuli Venezia Giulia
  Mauro Pascolini - University of Udine
- Living the Alpine Space
  Moreno Baccichet - University of Ferrara and 'Legambiente'

15.30-16.30 Session 4: Working groups

Three working groups, to discuss the previous sessions with the aid of guiding questions related to the main topics of CapHaz-Net

- Working group 1: the role of knowledge in social capacity building for alpine hazards
- Working group 2: the role of formal and informal networks
- Working group 3: the role of institutional frameworks

16.30-16.45 *Coffee break*

16.45-17.15 Plenary session: sharing the issues emerged in the working groups and outlook on day 2 of the workshop

Chair: *Matthias Buchecker – WSL*

PROGRAMME 5 April 2011

9.00-10.00 Session 5: Presentation of cases and introduction to SWOT analysis

- Risk mitigation in Malborghetto Valbruna: presentation of the case and preliminary SWOT analysis prepared by ISIG
  Anna Scolobig, ISIG
- Risk mitigation in Vipiteno/Sterzing: presentation of the case and preliminary SWOT analysis prepared by ISIG
  Chiara Bianchizza, ISIG

10.00-12.00 Session 6: Working groups

Coordinator: *Daniele Del Bianco, ISIG*

[In this session, each group of practitioners and stakeholders works on the elaboration of the preliminary SWOT analysis of the case in which they are directly involved]

- Malborghetto Valbruna
- Vipiteno/Sterzing
- CapHaz-Net consortium and experts developing a theoretical model for a SWOT analysis on alpine hazards

12.00-13.30 Buffet Lunch

13.30-15.00 Plenary Session: presentation of results of session 6 and discussion

Chair: *Luigi Pellizzoni, ISIG*

15.00-15.30 Conclusions

Annett Steinführer/Christian Kuhlicke, vTI/UFZ

Alberto Gasparini, ISIG Director

15.30- 16.00 *Farewell Coffee*

16.00-17.30 Consortium meeting

8.2 Annex 2 - List of participants

	Name	Email	Institution
ISIG	Anna Scolobig	scolobig@iiasa.ac.at	IIASA, Vienna; Istituto di Sociologia Internazionale di Gorizia (ISIG)
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	Christian Kuhlicke	chris-tian.kuhlicke@ufz.de	Helmoltz Centre for Environmental research UFZ, Leipzig, Germany
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	Blaz Komac	blaz.komac@zrc-sazu.si	Scientific research centre of the slovenian Academy of Sciences and Arts; Anton Melik Geographical Institute (GIAM); Ljubljana, Slovenia
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	Primoz Pipan	primoz.pipan@zrc-sazu.si	Scientific research centre of the slovenian Academy of Sciences and Arts; Anton Melik Geographical Institute (GIAM); Ljubljana, Slovenia
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	Michael Bruendl	bruendl@slf.ch	Swiss federal Institute for forest, snow and landscape research; institute for snow and avalanche research, Birmesdorf & Davos, Switzerland
	Roland Nussbaum	roland.nussbaum@mrn.asso.fr	CEA's Natural Hazards Working Group, Managing Director of Mission Risques Naturels, Paris, France.
Key note speakers	Mauro Pascolini	mauro.pascolini@uniud.it	Dipartimento di Geografia Umana, Università degli studi di Udine
	Francesco Lettera	francesco-lettera@tin.it	Lawyer, Expert of Servizio Superiore Lavori Pubblici
	Moreno Baccichet	bccmrn@unife.it>	Università di Ferrara; "Legambiente" Friuli Venezia Giulia
	Guglielmo Berlasso	guglielmo.berlasso@protezionecivile.fvg.it	Director of Protezione Civile, regione Friuli Venezia Giulia
	Anne Marie Granet	anne-marie.granet@wanadoo.fr	UFR Sciences Humaines, Grenoble 2
	Sven Fuchs	sven.fuchs@boku.ac.at	University of Natural Resources and Life Sciences, Vienna
	Franziska Schmidt	franziska.schmid@bafu.admin.ch	Steering Committee Intervention Against Natural Hazards, Switzerland
	Branko Dervodel	mateja.berglez@ursz r.si	Deputy of the General director of the Administration of Civil Protection and Disaster Relief, Slovenia
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	Daniele Zelloth		Comune di Malborghetto Valbruna
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8.3 Annex 3 – Preparatory work on alpine hazards case studies

Switzerland

Prepared by the WSL team

Flaz, Samedan

Situation: After a flood event in 1987, the canton of Grisons (CH) initiated a project for flood protection. As the local authorities did not pursue the project, the canton declared in 1997 substantial parts of the building zone of Samedan as high risk zones. In the same year, the population of Samedan voted for a purely technical flood protection alternative, but the new mayor launched in 1998 an initiative to convince the population for a more sustainable river restoration.

Risks involved, risk cycle, impacts: Flooding of the settlement, infrastructure and agricultural land; static prevention

Relevant measures: A regional working group was then launched (led by the mayor), as well as an ecological monitoring committee. These two working groups, in cooperation with the Grison Cantonal Office for Civil Engineering, worked out several scenarios. Throughout the entire planning and decision-making process, the local public was continuously and very openly informed via the monthly community newsletter. Further, the mayor established weekly office hours to answer local inhabitants' questions. Samedan's citizens finally voted for the maximum scenario, involving a dismantling of the dams in the area, a relocation of parts of the River Flaz and extensive ecological restoration measures along the new Flaz bed.

Initiative, actors, experts: Grison Cantonal Office for Civil Engineering, Mayor of Samedan (initiators), the Grison Cantonal Office of Environment, farmers, environmental organisations, Berit Junker (expert).

Appraisal: Excellent example of an encompassing communication process, involving all the stakeholders in their specific way.

Stilfs, risk communication

Situation: The municipality of Stilfs in South Tyrol (I) faces many natural hazards (landslides, avalanches, mud flows), but so far risk communication was very limited in spite of latent conflicts. An empirical study on local stakeholders' perception of natural hazards in the context of other relevant local risks revealed that there existed four partly conflicting risk discourses in the municipality.

Risks, risk cycle, impacts: All relevant environmental, social and economic risks were considered. The goal was to develop a strategy for integral risk management.

Relevant measures: A workshop on local risks was organised by the municipality and the researchers, in which stakeholders exchanged their perceptions of risks and preferred coping strategies. It showed how different people's problem perspectives were and how important public discussions on risk management are.

Initiators, actors, experts: Researchers of WSL, Mayor of Stilfs (initiators), residents of the municipality, Christine Jurt

Appraisal: Example for a public discussion on integral local risk management

Kander, integral catchment management concept

Situation: In the last decades, the Kander valley (CH) was saved from larger flooding events, but the protection infrastructure has come into age and there is a need for ecological enhancements.

These improvements are very costly, and therefore a long-term strategy of the catchment management is needed.
Risks, risk cycle, impacts: Flooding, further erosion of the protection infrastructure, prevention strategy
Relevant measures: A plan with the main deficiencies (infrastructure, ecology) within the catchment of the Kander River and a plan with priorities of measures was elaborated. The population of the Kander valley was involved in two steps: in the early stage to identify need of action on a local level and in the later stage to discuss goals and accepted measures on a catchment level.
Initiators, actors, experts: Cantonal Office of Fishery, Cantonal Office of Water Engineering, municipalities of the Kander valley, Cantonal Foundation of River Restoration, Willi Müller
Appraisal: Good example of a participatory catchment management process with a more diversified communication strategy embedded in anticipatory long-term planning.

Linth, warning system
Situation: The small catchment of the upper Linth River (CH) is very diverse including glaciers, steep Alpine slopes, artificial lakes and flood plains. Some highly industrialised areas in the flood plain lie in high risk zones.
Risks, risk cycle, impacts: The main risk for these areas is flooding. Static prevention measures have been implemented as far as possible. For extreme events, emergency measures such as closure, evacuations or mobile flood protection measures are needed.
Relevant measures: Based on existing measurement stations, in the project IFKIS-Hydro WSL has developed an automatic early warning system including meteorological, hydrological and data from observers data. These data and observations are interpreted by experts and warnings are communicated to the local emergency organisations. Along with the warning system, a coordination of these local organisations, like e.g. fire brigades, have been conducted.
Initiators, actors, experts: The project was initiated by a research group of WSL in cooperation with the Office of Engineering of the Canton of Glarus. Involved were also the local emergency organisations. Experts: Jakob Rhyner (WSL-SLF), Massimiliano Zappa (WSL) and Jürg Walcher (Canton of Glarus).
Appraisal: Good example of coordinating expert knowledge and local emergency organisation to face natural hazards.

Lötschental, warning system
Situation: The valley “Lötschental” in the canton of Valais (CH) is endangered by various Alpine natural hazards, like avalanches, debris flow and floods. Providing avalanche safety in winter need the collaboration of different avalanches services.
Risks, risk cycle, impacts: The main risk, considered here, is avalanche risk. Avalanche in “Lötschental” have the potential to cause damages to buildings and infrastructure but also to interrupt important transalpine traffic routes.
Relevant measures: Along with different technical measures, organisational measures play an important role. The key issue of this case study is the presentation of close collaboration of various safety services and the communication of decisions to stakeholders and to the public. In particular, decisions for avalanche safety were challenging because of considerable economic interests of the affected companies power plant “Lötschen”, the construction site for the transalpine railway route “NEAT” and several tourist organisations.

Initiators, actors, experts: In 1998, the avalanche commission of the valley was new organised including representatives of all affected stakeholders. In the first winter, the avalanche winter 1999, the new organisation had to stand its first test. André Henzen, the president of the avalanche commission between 1998 and 2009, now working at WSL-SLF, will be the expert.
Appraisal: Several innovations introduced during the last ten years, which favoured the effective conduction of organisational measures, providing an excellent platform for investigating stakeholder participation, collaboration between safety services, and information dissemination with modern facilities.

Sörenberg
Situation: Sörenberg in the municipality of Flühli, canton Luzern (CH), faces a number of natural hazards. Most notably, it is prone to slope instability generating mass movements such as debris flows and landslides.
Risks, risk cycle, and impacts: This situation poses a threat to considerable parts of the built-up area, including residential homes and vital infrastructures. After heavy rainfalls in the spring of 1999, a number of debris flows caused serious damage to properties. A subsequent revision of local risk maps revealed that over 700 flats were actually located in a zone of high risk.
Relevant measures: Residents opposed to change the legal status of the endangered zones to non-building areas. Alternatively, a warning system has been installed along with technical measures to prevent mass movements. Attempts to convince residents of the need for more fundamental measures and to mediate conflicts between them and responsible authorities over risk reducing measures have seemingly failed.
Initiators, actors, experts: Luzern Cantonal Office for Agriculture and Forest, Unit Natural Hazards, Rene Graf (http://www.lawa.lu.ch); Municipality of Flühli (LU), Markus Zimmermann (NDR Consulting)
Appraisal: Good example to learn about challenges to risk communication and expert-public dialogue in low frequency-high impact risk settings.

Saarner See
Situation: The shores of Sarner See (Sarner Lake), located in the canton Obwalden (CH), are popular residential areas. It appears though that the frequency and severity of flooding events have been increasing during the last couple of years.
Risks, risk cycle, and impacts: Flooding of residential areas is the single most important risk. In 1999, 2004, but particularly in 2005 high water levels of the lake caused considerable economic damage of about 200 Mio Swiss francs.
Relevant measures: In response to these events, the canton endeavoured to improve flood protection through structural measures. Workshops were conducted to involve affected stakeholders and residents to assess and evaluate risks and potential measures. Remarkably, these measures had not been developed by experts but had been suggested by residents. From the evaluation process three alternative planning scenarios emerged. In subsequent workshops one of these scenarios was selected by majority vote. However, after consultation with the responsible federal authorities who favoured a different since less expensive plan, the canton followed the recommendation of federal authorities rather than the result of the workshops. This led to some frustration and opposition among local stakeholders and residents.

Initiators, actors, experts: Interessengemeinschaft (community of interest) Hochwasserschutz Sarnen (http://ig-hochwasserschutz-sarnen.ch); Office for Forest and Spatial Development, Canton Obwalden; Municipality of Sarnen
Appraisal: Good example to hear about how interactive communication tools such as workshops were used to involve residents in assessing and evaluating the risks and in the planning of measures. Furthermore, this process might be useful for discussing risk communication in its wider context of enabling or constraining political structures.

Slovenia

Prepared by the AMGI team

The Savinja 1990 floods

Situation: In November 1990, the upper part of the Savinja catchment area received over 220 mm of rainfall in 48 hours, and the subsequent disaster caused enormous damage in the upper Savinja drainage basin while in the lower part of the basin a large part of Celje (population 40,000) was also flooded. On recent alluvial fans, strong erosion and accumulation processes occur during flash floods. Settlements on older alluvial fans are completely safe from floods (mountain farms or small villages are almost exclusively located on older fans) while recent alluvial fans are extremely flood-prone.

After the floods extensive research and flood protection measures were initiated but the situation has not improved until then. Big effort was put on technical flood protection measures (building of dams) and new Law on water was put into force. According to the law building is not allowed in the 15 m distance from the rivers but this may be ignored by the governmental act. In the last few years a national spatial plan is being prepared for the area. The main problem is that the flood plain is already highly populated and there is not much space left for inundation basins that are planned. Here, the problem of communication to people arose lately.
Risks involved, risk cycle, impacts: Flooding of settlements, infrastructure and agricultural land; static prevention; law prevention
Relevant measures: A working group mainly composed of hydrologists was launched. Several scenarios have been made and used in the planning activities. The local public has been informed via media but they are not an important factor in the decision-making process.
Initiative, actors, experts: Institute of water/Inštitut za vode Republike Slovenije, Mayor of the Celje town, Karel Natek (expert).
Appraisal: Example of a continuing and not finished process with many problems on the communication, planning and realization levels.

Log pod Mangartom, integral management concept

Situation: In Slovenia, debris flows can be triggered in alpine or subalpine environments. Their triggering depends on rock composition, surface inclination, and the intensity of precipitation. Until 2000, we were unaware of any major debris flows and the professional literature contained descriptions of only a few minor such events. In November 2000, a landslide was triggered in the Julian Alps. Due to a massive water inflow, the mass became waterlogged and a debris flow was triggered after a day and a half. More than 700,000 cubic meters of material was deposited on an area of fifteen hectares in the village of Log pod Mangartom. The main cause for the landslide

at the Stovžje site was the 100–200 meter thick beds of limestone, marly limestone, marlstone, and shale. However, the trigger of the debris flow was abundant precipitation.

Risks, risk cycle, impacts: Debris flow, danger of future events, demolishing of houses and infrastructure (2 bridges on a Slovenia-Italy road), further river-erosion, prevention strategy and measures.

Relevant measures: After the event the alarm system was established (still in operation), provisional water-deviation systems were built that were soon demolished by movement of the material.

A national spatial plan was introduced (meaning that the municipality spatial plan is no longer valid for the area), endangered buildings were demolished, new ones were built, infrastructure in the village was completely renewed (road, sewage system, water supply, 2 bridges). The local population was not involved in the top-down process led by the Ministry of environment, namely they were relocated for 3 months after the event and were not allowed to approach their village for a month or so.

The Ministry used a special law on natural disasters that was established after the 1998 earthquake and enables the state to take over the decisions, leads the money flow and puts all decision-force about the preventive and reconstruction measures to the hands of state-established agency. Local people are more or less only informed about the situation and preventive measures by public meetings.

Also, the problems of money flow arose when two companies fought for anti-erosion works (their case was brought to judgment to an Austrian third-party company; due to suspicion of corruption a man who led the Ministerial reconstruction agency had to withdraw silently).

Initiators, actors, experts: Municipality of Bovec – mayor, Ministry of environment, Civil protection agency (post-event measures), experts: Matjaž Mikoš, Bojan Majes (http://giam.zrc-sazu.si/?q=en/node/114)

Appraisal: An example of a finished but non- or low-participatory management process with big involvement of research but low-level communication to inhabitants who were overwhelmed by the power of the government; also a case of problematic connections (problematic public calls) between the governmental agencies (influencing the laws) and industrial enterprises (using the connections with governmental agencies). In the end, the village is safe from similar events but the amount of money spent seems to be too high.

The Slano Blato landslide

Situation: Landslides are also frequent on the north-western edge of the Dinaric Mountains. Above the Vipava valley, the Mesozoic carbonate rock of the Dinaric high plateaus thrusts over the younger Eocene flysch of the Vipava valley. On the slopes along the thrust, layers of scree dozens of meters thick accumulated, mostly of Pleistocene age, and numerous abundant contact springs contribute to their lability. Near the village of Selo, there is a huge Pleistocene landslide with a volume of about 100 million m^3. After abundant precipitation, the one-kilometre-long Slano blato landslide was triggered above the village of Lokavec near Ajdovščina in November 2000. In recent years, the expressway to Italy was built on these unstable slopes, and in 2005 the 400,000 m^3 Rebrnice landslide was triggered above an expressway cutting. The slope gradient is 15°–20° and the depth of the sliding plane was 10–20 meters. This landslide also occurred on the site of a larger fossil landslide. A similar lithological contact is found between the limestone Čičarija plateau and flysch Istria in Croatia where landslides have been recorded as well.

Risks, risk cycle, impacts*:* Landslide, known past events and danger of future events, danger to population, erosion- and landslide prevention measures.
Relevant measures: Fast response was needed, the material was removed from the landslide by trucks, people were not relocated, a material-collecting reservoir and 30-m-deep water-collecting-wells were built, the danger was lessened.
Initiators, actors, experts: Municipality of Ajdovščina – mayor, Civil protection agency, Ministry of environment, experts: Matjaž Mikoš
Appraisal: An example of good practice-management process from the technical and communication point of view.

Italy
Prepared by the ISIG team

Vipiteno-Sterzing and Val di Vizze, Trentino Alto Adige Region, Northern Italy
Situation: Vipiteno/Sterzing and Val di Vizze are two medium-sized town at the confluence of the Rio Ridanna/Ridnaunerbach Torrent with the Isarco/Eisack River, near the border with Austria. Both towns has often been flooded in recent years (1998, 1997), but without severe consequences. Major events happened in 1956 and 1987. Risk analysis and assessment reveal that the two towns, and especially Vipiteno/Sterzing, are highly at risk from flooding, as confirmed also by an INTERREG project (INTERREG IIIB Alpine Space Programme http://www.flussraumagenda.de) results, which have been published in 2006. Local authorities are convinced that the local population is not aware about the risk and this increases their worries regarding future events.

After the report publication in 2006, the two municipalities together with the provincial services in charge of risk mitigation started a process to discuss and decide about different flood mitigation and river management alternatives with the local population (http://www.hochwasserschutzsterzing.it/). The process started in December 2008 and is expected to end in 2010. It has been articulated in several phases including several meetings with the residents aimed at collecting their opinions and observations about the alternatives for flood mitigation.

At the beginning of the process three alternatives have been presented together with the criteria (e.g. total cost, ecology, building constraints, etc.) to evaluate them. Thanks to the observations of the residents, a fourth alternative has been presented, which represents a compromise between medium-high safety standards and economic development needs. In December 2009 the municipal councils of Vipiteno/Sterzing and Val di Vizze together with the Flussraumforum Alto Isarco/Eisarck voted in favour of the fourth alternative which is now under implementation. The project based on this alternative will be financed by the European Fund for Regional Development (Programma Operativo “Competitività Regionale ed Occupazione FESR 2007 – 2013).
Risks, risk cycle, and impacts: Flash flood, 30 year return period
Relevant measures: The four alternatives for flood risk mitigation and river management reflect different safety standards and are characterised by the adoption and implementation of different structural and non-structural risk mitigation measures. Environmental protection, leisure activities

along the river, socio-economic and tourist development have also been considered in the design of each alternative.
Initiators, actors, experts: the municipality of Vipiteno/Sterzing and the Hydraulic Protection Works Service of the province of Bolzano/Bozen are the initiators of the project. Some technical experts of private firms have been involved for the risk assessment. The local population has been invited to participate to all the different phases of the project.
Appraisal: Good example of public participation regarding decisions about flood risk mitigation measures and river management

Vermiglio-Rio Cortina, Trentino Alto Adige Region, Northern Italy
Situation: Between 14 and 17 November 2000, four different rainfalls and debris flows events caused the deposition of 1,600 m³ of sediment on the Rio Cortina, crossing one of the nuclei (frazioni), which together constitute the municipality of Vermiglio, and particularly the neighbourhood of Cortina. On 17 November a debris flow deposited over the parking lot of the village, damaging some buildings. The stream broke its banks three times, destroying three bridges and causing the deposition of a large amount of sediment downstream the national road. Immediate interventions from the local fire brigade and civil protection units prevented more serious damage. River structures and check dams were built to mitigate the flood and debris flow risk and about one hundred people were evacuated for some days/one week maximum. Two years later, on 14 November 2002, a new debris flow event occurred on the Rio Cortina, causing damages in the same area hit during the previous events.
Risks, risk cycle, and impacts: flash floods, debris flow
Relevant measures: A new check dam was built to mitigate the flood and debris flow risk, taking into account observations from the last event.
Initiators, actors, experts: provincial civil protection and local authorities
Appraisal: good example to learn about local practices of risk mitigation and about the transmission of local knowledge about flash floods from generation to generation. Problematic issues related to risk and hazard mapping because of the scarce space available for new urban developments (quite key for the community whose main activity is tourism)

Malborghetto-Valbruna, Friuli Venezia Giulia Region, North-eastern Italy
Situation: After a flood event in 2003, the recovery phase raised issues related to equity in the distribution of compensation payments, and disagreements among local people about the decisions about the reconstruction process. The main criticisms regarded the criteria for the allocation of funds and the decisions concerning reparation, reconstruction, demolition, or relocation of houses. Issues such as flood mitigation, the construction of protection works in the floodplain and their maintenance, the monitoring and control of the streams and rivers, the floodplain zoning and regulation, and the restoration of the fluvial ecosystems were discussed at regional and local levels. One of the most discussed issues regarded the decisions about protection measures, and in particular the construction of structural devices in the most dangerous streams initiated by the regional Civil Protection. While several projects started immediately after the flood, others were delayed due to different reasons, such as expectation of funds or of a favourable geological advice, as required by flood regulations.
Risks, risk cycle, and impacts: flash floods, debris flow

Relevant measures: The construction of protection works encountered opposition from residents claiming that local authorities had not consulted the relevant interest-groups during the decision making process. They contested the decisions about the localisation and the quantity of protection works based on equity claims about hydrogeological risk distribution among residents.
A group of residents concerned with the security of their properties established a Local Committee for Safety. They demanded the construction of new hydraulic works upstream to ensure the total protection of their properties; lately the regional Civil Protection joined the Local Committee for Safety in their claims to municipal authorities.
Initiators, actors, experts: regional civil protection, geologists, municipality of Malborghetto-Valbruna, municipal opposition coalition, local residents, local committee for safety, local voluntary fire brigades, environmentalists (only at a regional level)
Appraisal: Good example to learn about challenges to local authorities-public dialogue + comparison with Slovenian event in Rateče
Contacts: mayor and civil protection head of Malborghetto-Valbruna

8.4 Annex 4 – Participants materials

An introduction to SWOT Analysis in the Alpine context

The project: CapHaz-Net stands for "Social Capacity Building for Natural Hazards: Toward More Resilient Societies" and is a European research project, a so-called Coordination Action; it thus aims at collecting relevant data and information from other projects as well as practical experiences in the field of natural hazards management from across Europe.

In this perspective, while framing this Alpine hazards workshop into a context analysis, European projects and programmes concerning the Alpine Space have been taken into account as a basis for the contextual framework.

SWOT Analysis: SWOT analysis has been chosen as a method for the discussion of the selected alpine cases. We provide here a brief explanation of SWOT and its contextualisation within CapHaz-Net, as well as a brief overview of other European studies that have looked at the Alps through SWOT methodology.

"SWOT" is an acronym for Strengths, Weaknesses, Opportunities and Threats, internal and external factors that positively or negatively describe a given situation. For instance, if we look at an Alpine site exposed to natural hazards, we could identify the following:

Strengths (positive factors internal to the area of study): efficient infrastructure, high level of trusts among stakeholders, etc…

Weakness (negative factors internal to the area of study): low level of preparedness of local actors, lack of contingency plans, inadequate forecasting technology, etc.

Opportunities (positive factors external to the area of study): sufficient inflow of earmarked funds from national authorities, existing cross-border networks for joint intervention, European contingency plans or policies available, etc.

Threats (negative factors external to the area of study): insufficient awareness at the national level about the level of risk of the local area; lack of European funds to develop efficient local response strategies and infrastructure; absence of contact with relevant neighbouring stakeholders.

Once all factors are identified and selected as internal or external and evaluated as positive or negative it is possible to arrange them in a SWOT table:

Table 8.1: Exemplary SWOT table.

Strengths: *Infrastructure* efficient river banks; … *Trust* Trust among stakeholders; Citizens trust in local authorities; … *Etc.* …	Weaknesses: *Preparedness* low level of preparedness of local actors; inadequate forecasting technology; …
Opportunities: *Funds* sufficient inflow of earmarked funds from national authorities; … *Networks* existing cross-border networks for joint intervention; …	Threats: *Funds* lack of European funds to develop efficient local response strategies and infrastructure; … *Awareness* insufficient awareness at the national level about the level of risk of the local area; …

This process allows for

1. the rational organisation of all factors perceived as concurrent aspects in the characterization of a given situation;
2. the elaboration of appropriate strategies. In fact, depending on which type of factors is prevalent strategies will:
    a. work on existing strengths to alleviate possible weaknesses; or
    b. work to hinder the weaknesses by, for instance, capitalizing on existing opportunities; or
    c. work to hinder external threats setting stress on an otherwise internally positive situation;
    d. etc.

Previous SWOT Analyses of the Alpine region: SWOT methodology has been used in a number of previous projects and EU reports. For instance, within the Alpine Space Interreg III Programme (2007-2013), SWOT analysis of the Alpine region was carried out in order to identify the priorities for action and research in the area and also to have a set of indicators that could function as criteria of evaluation of projects undertaken within the programme. The work done by the Urban Planning Institute of the Republic of Slovenia on behalf of the European Commission highlights that SWOT functions as a tool “enabling to set a synthesis” of different information concerning the alpine area, drawn from other projects, trans-national and ESPON (territorial development and cohesion)studies etc. The main issues emerging from this synthesis become in turn an input for both the identification of priorities and the formulation of strategies. Different stakeholders have interacted in this analysis, so that the Alpine Space programme could be used as a practical tool for development of the area.

Starting from an ‘inventory SWOT’, based on priorities set by the Lisbon strategy (growth, employment and competitiveness), the Gothenburg strategy (sustainable development) and a frame created by ESPON, the analysis has then been enriched by the contribution and participation of stakeholders, called to define the Strengths, Weaknesses, Opportunities and Threats of the Alpine Space from their point of view.

Other projects have also used SWOT analysis as a tool of comparison of different realities in the Alps. This is namely the case of the IRASMOS project (Integral Risk Management of Extremely Rapid Mass Movements), more specifically related to the natural hazard issues that also CapHaz-Net considers. Summing up the results of SWOTs carried out in Switzerland, France, Italy, Austria and Norway, the Swiss Federal Institute for Forest, Snow and Landscape Research WSL /SLF produced a SWOT containing all the elements of Strengths, Weaknesses, Opportunities and Threats emerged in the Alpine area under study and suggested different strategies according to differentiated outcomes of the comparison.

Table 8.2: An example of SWOT analysis as drawn by IRASMOS project and planning of Alpine Space Programme

Strengths • long tradition and experience; • presence of national standards; • knowledge and techniques; • good (reliable) data • professional networks (of Civil Protection, fire brigades etc.) • attitude of professionals • compulsory building insurance • diversity of culture/traditions • environment as key productive factor	Weaknesses • risk quantification is complicated • no inclusion of benefits (in insurances) • weak knowledge on certain more specific hazards (e.g. rock avalanches) • risk management is event-driven • administrative difficulties • weak controlling system • weak formation of people concerned • conflict of use (water, land consumption...) • exposure to natural hazards in specific areas • accessibility within alpine core is unequal • environmental impacts of growth
Opportunities • natural hazards top-ranked on the political agenda; • public perception of risk is high; • administrative changes; • implementation of Directive 2007/60/CE s opportunity for harmonisation of measures for trans-border cooperation and policies • valorisation of heritage	Threats • increasing demands for public safety; • decreasing individual responsibility; • short memory (of past events) • increasing mobility and extension of settlements; • socio-political conflicts; • no legal definition of risk; • slowness of administrative processes • climate change- • competition between agriculture and tourism for land use

Source: author's summary from above mentioned sources

CapHaz-Net SWOT ANALYSIS: For our workshop, preliminary SWOT analyses of two alpine cases, chosen for their relevance, were prepared by ISIG starting from the data gathered during two other European projects, FLOODsite and MOVE.

See tables of SWOT analysis of the two cases in "Participants' materials 2".

Our aim is now to improve this SWOT analysis with your first-hand insights!

The aim is manifold:

⟶ SWOT analysis is tested as a potential tool for facilitating and structuring discussion for participatory decision making and evaluation.

⟶ It helps recognising the specific elements characterising a situation/event/area under the label of different social capacities highlighted by the CapHaz-Net project so far;

⟶ It helps to better understand the circumstances under which different approaches to alpine hazards management work better; this in turn may aid in the identification of transferable methods to address communication, vulnerability, etc.

SWOT analysis can thus help in reaching the answer to CapHaz-Net's central question: How can we enhance the capacities of European societies to prepare for, cope with and recover from the negative impacts of natural hazards?

The exercise: The workshop participants are divided in two groups: one group works on the Malborghetto-Valbruna case study and the other on the Vipiteno/Sterzing case study. Both groups are composed by local authorities, citizens and experts with first-hand experience on the case at hand.

The starting point for each group will be the discussion on the SWOT prepared by ISIG. Each group will then discuss the variables identified and preliminary assessed and will propose one (or several) alternative SWOT to the ones given by ISIG, pooling together their knowledge and experiences of the situation.

It is expected that there will be no unanimous agreement on the proposed analysis and that the participants, due to their heterogeneity, will show different points of view among themselves.

In order to facilitate the discussion, it is suggested to follow/compile the following table, based on the list of social capacities identified during the work done by CapHaz-Net so far and summarised in the Knowledge Inventory (Kuhlicke et al. 2010; see next page). This table is designed to identify concrete examples of social capacities' and thus to aid the discussion.

Table 8.3: Social capacities identified during the work done by CapHaz-Net

DIMENSIONS/ CAPACITIES	VARIABLES	CONCRETE EXAMPLES	INTER-NAL/ EXTER-NAL		POSI-TIVE/NE GATIVE	
			Int	Ext	☺	☹
	of hazards and risk;					
	on how to anticipate, deal with and recover from effects of a natural hazard					
Knowledge	about network of actors involved in the management of risk and the impact of natural hazards					
	about laws and legal frameworks					
	about the informal values, social norms and beliefs					
	to anticipate, deal with and recover from effects of a natu-					
Motivation	as creation of a sense of responsibility towards individual actions,					
	as creation of a sense of responsibility towards community actions,					
Networks	the possession and exploitation of social capital, that is, the social networks formed by family members, friends, neighbours, colleagues, etc., that people establish and maintain.					
	the possession or development of the ability to establish and stabilise trustful relationships among and between different organisational, local and individual actors					
Financial capacities	existence of financial resources to anticipate, deal with and recover from effects of a natural hazard					
Institutional capacities	consideration of principles of fair governance (equity, reactivity, responsibility, legitimacy, accountability)					
	consideration of a variety of problem frames, multi-actor, multi-level, multi-sector, diversity of solutions, redundancy					
Procedural capacities	capacity to make the above mentioned principles operative					

Source: Kuhlicke et al. 2010

CapHaz-Net expert group: During the working-group session, the CapHaz-Net consortium will meet to further explore the key topics of SWOT analysis in a less context-specific way, but still within the context of alpine hazards. The focus of the discussion will be on the theoretical SWOT analysis model to be used for evaluation of other cases and on new strategies for social capacity building in the alpine context. The discussion will be based on: i) insights from previous presentations and discussions; ii) partners experience with regard to the other central topics of CapHaz-Net: risk governance, social vulnerability, risk perception, communication and education.

Starting from the list of social capacities outlined in the Knowledge's inventory, the following SWOT analysis grid (Table 2) was elaborated. Here the social capacities are 'interpreted' as dimensions and variables of a SWOT model.

The aim now is to develop this grid by identifying new relevant variables which could be used as analytical variables to describe any given case study in the Alpine region.

From previous research work developed by ISIG on the evaluation of cross-border cooperation, SWOT analysis grids proved to be an appropriate method to analyse a given context, to allow for the self-evaluation of actors involved and to develop comparison between different contexts.

Once compiled the grid gives a set of variables making up a dimension. Variable which are evaluated as positive in one context, can be negative or non-relevant in another. Scores can be eventually given to each variables thus allowing for a quantitative analysis of each context in a comparative perspective.

In order to facilitate the discussion, the SWOT analysis table (see page 4) drawn by the IRASMOS project and planning of Alpine Space Programme results is suggested as starting point to identify new relevant variables.

Table 8.4: New relevant variables

DIMENSIONS/ CAPACITIES	VARIABLES	INTERNAL/ EXTERNAL	
		Int	Ext
1. Knowledge	- of hazards and risk;		
	- on how to anticipate, deal with and recover from effects of a natural hazard		
	- about network of actors involved in the management of risk and the impact of natural hazards		
	- about laws and legal frameworks		
	- about the sub-layer of informal values, social norms and beliefs		
2. Motivation	- to anticipate, deal with and recover from effects of a natural hazard		
	- creation of a sense of responsibility towards individual actions and actions of other actors involved		
3. Networks	- existence of social capital		
	- use of social capital		
	- trust between different actors		
4. Financial capacities	- existence of financial resources to anticipate, deal with and recover from effects of a natural hazard		
5. Institutional capacities	- equity, reactivity, responsibility		
	- diversification of approach for different actors		
6. Procedural capacities	- capacity to make the above mentioned principles operative		
7. _____			
8. _____			

Introduction to the case studies

The sites of Malborghetto Valbruna and Vipiteno-Sterzing have been chosen as case studies for several reasons:

- ⟶ they represent two different approaches for social capacity building in Alpine areas;
- ⟶ they both have been previously and are currently object of research, within the framework of other European projects (www.Floodsite.net; www.move-fp7.eu);
- ⟶ they both are located in areas that are at high risk of flash flooding, in Alpine valleys;
- ⟶ however, while in Vipiteno-Sterzing the last major flood took place in 1965, in Malborghetto-Valbruna the last flash flood hit the municipality in 2003;
- ⟶ in both cases mitigation works have been completed or planned: different processes, responses of citizens, involvement of local authorities.

1. MALBORGHETTO-VALBRUNA

Description

Malborghetto-Valbruna is a municipality (1036 inhabitants) in the Region of Friuli Venezia Giulia-Northern Italy located in an Alpine area near Austria and Slovenia. This municipality is divided in six hamlets: Ugovizza, Malborghetto, Valbruna, Bagni di Lusnizza, Cucco and Santa Caterina (3 different ethnic groups). Malborghetto-Valbruna is located in the Valcanale valley at the confluence of the River Fella and the main streams Rio Malborghetto and Rio Uque. This is a multi-hazard location: floods, debris flows, landslides, earthquakes are the main natural hazards. This site was chosen as a case study also because it represents an example of the challenges faced by local authorities in the phase of (post-event) decision about risk mitigation.

The event

A severe flash flood hit Malborghetto-Valbruna (in particular three of its hamlets: Cucco, Malborghetto and Ugovizza) on the 29th of August 2003. The event was the result of the combination of two extreme events: a storm (355 mm of rainfall within three to six hours) and the anomalous condition of the soil. The debris flow reached a peak of 4m in the centre of the hamlet of Ugovizza. The water transported sediments, stones, shrubbery and trees into the village and caused two casualties and extensive material damage. Approximately 600 residents were evacuated and the damage caused amounted to 190 million euro.

Warning and impact

The regional civil protection had been warned long before the 29th of August, even if the predicted rainfall was around 150 mm, less than a half of the actual rainfall. On the 29th, the call for evacuation was raised at around 5 p.m. for the most affected areas in Malborghetto, around 6 p.m. for those in Ugovizza (and the day after for the entire hamlet), and around 7 p.m. in Cucco. Warning sirens sounded in Malborghetto and Ugovizza; they should have been heard also in Cucco. However, this didn't happen due to noise caused by the heavy rainfall. At that time the hamlets were almost completely isolated because of restricted road access: the main roads, (i.e. the motorway and the county road) were blocked in more than one point due to numerous landslides.

Cucco remained completely isolated during the first hours of the flash flood and, of the three hamlets, this is the one where the evacuation plan worked less effectively. Clearing away

the mud took about one month in Ugovizza and Malborghetto and two weeks in Cucco. More than 400 volunteers from different parts of Italy, Austria and Slovenia were involved in this task. Damage to the basic services (water, electric power, road conditions, and telecommunication) led to problems for the local population, and rescue services alike. The drainage and the electric systems had to be completely restored, while the aqueduct was blocked for several days in Ugovizza.

Recovery

Some months after the event, a “Flood Office”, coordinated by regional authorities, was set up in every municipality in Valcanale. Its duties included the organisation of compensation procedures for people affected by the flood and technical assistance to other municipal departments. Malborghetto-Valbruna has been the most damaged municipality in the valley, as it suffered damages equal to 190 million Euros. The recovery phase raised issues related to equity in the distribution of compensation payments, and disagreements among local people about the reconstruction process. The main criticisms regarded the criteria for the allocation of funds and the decisions concerning the relocation of houses (if not an entire hamlet) and structural risk mitigation measures.

Issues

Issues such as flood mitigation, the construction of protection works in the floodplain and their maintenance, the monitoring and control of the streams and rivers, the floodplain zoning and regulation, and the restoration of the fluvial ecosystems were discussed at regional and local level.

One of the most discussed issues regarded the decisions about protection measures, and in particular the construction of structural devices in the most dangerous streams initiated by the regional Civil Protection. While several projects started immediately after the flood, others were delayed due to different reasons, such as expectation of funds or of a favourable geological advice, as required by flood regulations.

The construction of protection works encountered opposition from residents claiming that local authorities had not consulted the relevant interest-groups during the decision making process. They contested the decisions about the localisation and the quantity of protection works based on equity claims about hydro geological risk distribution among residents.

A group of residents concerned with the security of their properties established a Local Committee for Safety. They demanded the construction of new hydraulic works upstream to ensure the total protection of their properties; lately the regional Civil Protection joined the Local Committee for Safety in their claims to municipal authorities. The new civil protection project was completed in 2007.

Below, preliminary SWOT undertaken on the basis of the data collected during the FLOODsite project fieldwork. Semi-structured interviews have been undertaken to collect further information on crucial topics.

Table 8.5: SWOT Analysis Malborghetto Valbruna

Strengths: *Involvement of citizens* Local activism for implementation of higher security standards *Networks* Good volunteer network, with a long tradition (100 years) and young new members *Perception* Higher sensibility of residents towards flood risk after events of 2003. Perception of risk is linked to the risk index: those who live in areas at higher risk, also feel more endangered. *Knowledge* Good knowledge of the territory by some residents (ability to detect environmental signs) Several risk mitigation projects presented by the regional civil protection, also taking into account local needs	Weaknesses *Involvement of citizens* No strong involvement of citizens in decision making process concerning risk mitigation measures *Decision making process* Disagreement among citizens about modalities of reconstruction process Conflicts and disagreement in the municipal council to decide about risk mitigation, especially immediately after the event *Knowledge* Loss of traditional knowledge *Trust* Low level of trust towards the local authorities *Cooperation and coordination between agencies in charge* Difficulties in the cooperation and coordination among the different agencies and services involved in risk mitigation (cross-scale issues, responsibilities)
Opportunities: Communication Trans-border communication between fire brigades FVG- Carintia and Slovenia Networks International network with Fire brigades from Carintia (yearly competitions) and volunteers from Slovenia Funds Funds from regional and national governments for implementation of risk mitigation measures Funds from INTERREG IV Italy-Austria programme for SISSIE project (safety information service and simulation of emergency)	Threats: Funds Delayed allocation of funds for reconstruction and mitigation measures Distribution of responsibilities Contrast with regional authority on the allocation of responsibility over flood protection works

2. VIPITENO-STERZING

Description:

Vipiteno-Sterzing is a municipality of the autonomous province of Bolzano/Bozen, in the region of Trentino Alto Adige/Südtirol in northern Italy. The province of Bolzano/Bozen, is also known as Alto Adige or Südtirol. Its inhabitants speak an Austro-Bavarian dialect of German, while a quarter of the population speaks Italian and a minority speaks Ladin. The name Alto Adige (upper Adige) refers to the main river of this area, the Adige. The province borders Austria (provinces of Tyrol and Salzburg) to the east and north and Switzerland (canton of Grisons) to the west. Because of its nature as border area and the coexistence in its territory of different languages and cultures, the province of Bolzano/Bozen has been granted an autonomous status that allows for a considerable level of self-government, exclusive legislative power and a fiscal regime that grants the province almost 90% of all the levied taxes.

The municipality of Vipiteno/Sterzing (6306 inhabitants in its 10 hamlets, as from 2010 census), is crossed by the Isarco/Eisack River, which later on, south of Bolzano, becomes a tributary of the Adige.

The area where Vipiteno-Sterzing lays, at an altitude of 948 metres above the sea level, has always been periodically affected by floods of the Isarco River and its tributaries. This phenomenon has been statistically calculated to have a return period of 30 years, while also inhabited areas will keep expanding, with an expansion of tar roads and a progressive reduction of green areas.

While on the one side the 'experts' indicate the flood risk in the area as very high, the fact that the last hazardous event of this kind that took place is far enough in time (1966 and 1987) for the collective memory to have faded, makes the community's perception of risk rather low.

Vipiteno-Sterzing has in fact been flooded quite frequently between 1965 and 1998, but without any major consequences. Here follows the chronicle of events as reported by FLOODsite report (De Marchi et al. 2007).

- 1965, July: the Isarco/Eisack overflowed in many towns and villages, including Vipiteno-Sterzing;
- 1965, September: after 2 days of heavy rain (130 mm) the flooding of the rio Mareta/Mareiterbach torrent destroyed the river banks and a number of bridges. The lower portion of Vipiteno-Sterzing and the national road were flooded;
- 1966: minor flooding event;
- 1978: intense precipitation and heavy winds, causing damage in the rio Ridanna/Ridnauerbach torrent valley. The downstream portion of Vipiteno-Sterzing was flooded;
- 1980: after heavy rains the Isarco/Eisack flooded areas north of Vipiteno-Sterzing. The rio Mareta/Mareiterbach torrent broke its banks and flooded airfield area of Vipiteno-Sterzing;
- 1985: 92 mm of rain in 24 hours. Some villages around Vipiteno-Sterzing and its airfield were flooded;
- 1987: more than 200 mm precipitation in 24 hours, and an abnormal ice melting (July) caused the rio Ridanna /Ridnauerbach torrent an the Isarco/Eisack to break out of their banks, submerging the railway lines;
- 1997: after 2 days of rain, airfield and grassland near the highway were flooded by rio Ridanna/Ridnauerbach torrent;
- 1998: areas of Vipiteno-Sterzing along the highway A22 and the national road were flooded by the rio Ridanna/Ridnauerbach torrent.

The River Basin Agenda

The work of the INTERREG IIIB project "River Basin Agenda/Agenda Fluviale Alto Isarco" (www.flussraumagenda.de) concentrated on the upper part of the Isarco/Eisack and of its two tributaries, Rio Ridanna and Rio Vizze, in the basin of Vipiteno.

The river basin agenda project involves 11 rivers of 6 alpine states and aims at transborder cooperation in the management of alpine river basins. In Alto Adige the projects that have been implemented are related, among other topics, to the coordinated planning of the river management. In this province, in fact, the mountain valleys are used intensely for human activities and settlements: hydraulic engineering along watercourses therefore involve and affect directly individuals and groups of citizens. For experience built throughout the project, the Provincial Office for Hydraulic works has understood that for this necessary cooperation in planning, citizens need to be directly involved in decision making. Therefore, the Forum Alto Isarco (upper Isarco forum) has been created as a space where representatives of municipalities, local administrations, organisms with interest in economic development, tourism, environment and agriculture can discuss and cooperate with experts in defining the guiding lines for river management and planning, taking into account flood defence needs, environmental issues and potential future use of the territory.

Flood protection works

A priority of the provincial office for hydraulic works became then the realisation of mitigation works in Vipiteno-Sterzing. In order to reduce the risk of floods, already in 2008 the provincial office of hydraulic works intervened on several watercourses in the area of Vipiteno-Sterzing, in the Val Giovo, Val di Fleres and Val Ridanna areas.

The flood mitigation project for Vipiteno-Sterzing involved the design of different possible projects, realised by the engineers of the M&M office of Bolzano/Bozen, that came up with 3 different proposals in May2009:

- Proposal A: it implied a deepening of the river bed and the building of higher embankments. It would have triggered a small impact on the town structure, and the risk of flood would have remained high.
- Proposal B: it implied the enlargement of the river bed and realisation of a fluvial park, inside and outside town.0,9 hectares of private land and 1,6 hectares of green areas would have had to be expropriated.
- Proposal C: according to this project, the Isarco would have had to be deviated, in case of emergency, in a tunnel between two neighbouring villages. This project was evaluated as very costly, also due to the fact that a system of protection for the inhabitants in case of heavy flooding would also have to be considered.

Issues

After many protests by the citizens, land owners and stakeholders whose land property would have had to be reclaimed for the realisation of the flood mitigation project, a new alternative was designed to meet the needs underlined by the citizens.

At the end of October 2009 the 4th proposal was presented by Mr Guntar Mintha of M&M, during a public meeting with citizens of Vipiteno-Sterzing. Proposal D was created as compromise between the landowners (it would require the expropriation of only 0,5 hectares of private land and 1,4 hectares of public land) and the need for flood defence. The river bed would be enlarged in certain parts of the river and lowered in others, the embankments would be 'naturalised' and a fluvial park created for the recreation of citizens.

This meeting began with the protest of several citizens, owners of lands that might have needed to be reclaimed. They claimed that the information about these projects ad meetings had not been transparent and the explanations given too general. Also, it was argued that the proposals made were far too general to well adapt to the specific characteristics of Sterzing.

The river management forum discussed the alternatives and decided for the implementation of the 4th option.

Currently the implementation of this measure is still not agreed upon by residents. They agree on the need for safety, but do not approve of the use of land for other purposes (re-naturalisation, fluvial park, town-scaping, etc.)

Below, preliminary SWOT analysis prepared by ISIG starting from data gathered during research for FLOODsite project. Also, issues were discussed more in depth for the preparation of this material with Thorsten Ulbrich, EURAC researcher involved in MOVE project (Vipiteno-Sterzing is a case study within this project).

Table 8.6: SWOT Analysis Vipiteno-Sterzing

Strengths: *Involvement of citizens* Citizens involved in decision making process for flood mitigation measures Acceptance of flood defence and management as a target of local spatial planning *Communication* Creation of the River Basin Agenda within the frame-work of INTERREG III B Alpine Programme *Networks* Strong networks within the community to provide help and support during emergencies *Knowledge* Diffused good knowledge of the territory (streams, type of likely event in certain areas etc.) Well known evacuation paths Good knowledge of the citizens about the warning systems *Trust* Trust between citizens - operators People attribute their sense of security mainly to the presence of fire brigades and efficiency of civil protec-tion *Reliability of data* Current update of risk plans Risk assessment done during INTERREG III B Alpine Space	Weaknesses *Involvement of citizens* Lack of attention and time dedicated to publications and meetings on prevention of hydro-geological risk *Communication* Major communication problem during first phase of planning of flood mitigation measures *Perception* Population remotely aware of risk (last event many years ago) Fear given by uncertainty “no major flood since the 40 years because of flood protection works built in the 70s” *Knowledge* Loss of local knowledge about the territory and environ-ment especially in some groups of residents (e.g. new residents) *Distribution of responsibility* Disagreement among stakeholders on private precau-tions and responsibilities *Trust* Mistrust in Province’s good faith, after perception of non-transparency in first phase of communication about flood mitigation decision-making
Opportunities: *Communication* Province created website on rive management and workshops, seminars, field visits *Funds* Funds for flood mitigation measures (European fund for regional development) INTERREG III B Alpine Space Programme (funding River Basin Agenda and risk assessment)	Threats: *Awareness* High percentage of non-local population (i.e. tourists) at certain times, who might not be aware of risk *Exposure* ‘Economic heart’ and sensitive infrastructures in areas of high flood risk

8.5 Annex 5 - List of guiding questions for working groups

Following the main questions of the knowledge inventory:

- ⟶ actors involved (Who?)
- ⟶ type of relationship (level of autonomy)
- ⟶ goal and scope of action
- ⟶ timing (when actors are involved and how long?)
- ⟶ emerging problems (for whom and from whose perspective?)
- ⟶ who defines the level to be reached? Is there an objective ‘optimal’ level of social capacity building?

The following potential guiding questions were elaborated for each group:

Group 1

Main question: what is the role of KNOWLEDGE in social capacity building to alpine hazards?

Specific questions:

- What knowledge? (list of domains of knowledge considered as crucial by group members in relation with social capacity building)
- What channels for spreading (and getting) different kinds of knowledge (communication/education)? Specific targets, or for everyone? Which topics should be given priority in communication activities? What are the information needs of the different actors? Which tools /techniques proved to be more effective?
- Who should be in charge? Who should decide which knowledge is relevant and why? How (i.e. decision making process)?

Group 2

Main question: what is the role of FORMAL/INFORMAL NETWORKS in social capacity building to alpine hazards?

- Example of formal/informal network in alpine context? When are networks effective? Why?
- Example of formal/informal network in alpine context?
- What are the deficits and barriers for creation of networks?
- What is the added value of a network, if any?
- How is effectiveness of networks affected by perception of risk?
- Is there any actual or possible interaction between formal and informal networks for social capacity building? What conditions (may) ensure that such interaction is constructive?
- How does distribution of responsibility work in these networks? (also examples)

Group 3

Main question: what is the role of INSTITUTIONAL FRAMEWORKS in social capacity building to alpine hazards?

- What aspects need to be especially regulated? At what level (national, regional, European..)? What is right and wrong (or lacking) in current regulation?
- What is good and problematic in current organizational layouts? What are the interactions between organisations working at different levels (e.g. municipal. Regional, national)? Are there any problems in coordination/cooperation between services and authorities?
- What is the current (perception of) distribution of responsibilities and competences?
- And the 'ideal' distribution of responsibilities and competences?
- What is the current (perception of) distribution of resources?
- And the 'ideal' distribution of resources?
- What are the opportunities (and the problems, if any) coming from European legislation/frameworks for social capacity building in the alpine region?
- What are the barriers to harmonisation of European framework?