CHANGES

Changing Hydro-meteorological Hazards as Analyzed by a New Generation of European Scientists

7th Framework Programme

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Presentation of Results

English version

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Introduction

This brochure is a product of the Marie Curie ITN project "CHANGES" (Changing Hydro-meteorological Risks as Analyzed by a New Generation of European Scientists), funded under the European Community's 7th Framework Programme, Grant Agreement No. 263953. The contents contain results from the work of CHANGES researchers Teresa Sprague and Kathrin Prenger-Berninghoff for the topics of "Comparing risk governance" and "The use of risk information for spatial planning and strategic environmental assessment". The research analyzes these topics within four case study sites: the Ubaye and Tinée Valleys in France, the Friuli-Venezia-Giulia region in Italy, the Wieprzówka catchment in Poland, and Buzău County in Romania.

Interviews and meetings for the research were conducted to achieve an on the ground understanding of governance strategies and spatial planning practices among the four cases and involved a wide variety of stakeholders both at the local and regional level. Types of stakeholders interviewed included: mayors, technical officers, regional authorities, spatial planners, water authorities, geological surveys, police, fire departments, civil protection, environmental protection agencies, community leaders, scientists, insurance agencies, and aid agencies.

Information gathered from these interviews was used to make a comparison of governance strategies and spatial planning practices among the four cases. The comparison helps better understand the similarities and differences among these strategies and practices at the local level and provides recommendations for future development.

It is hoped that this dissemination brochure encourages active discussion with and among stakeholders, enabling them to also have a direct input and feedback into the research process and output.

Acknowledgements

We would like to thank the stakeholders in all four of the case study sites for their time and willingness to participate in this project. We would also like to thank our project partners who have very kindly provided their time and assistance in the research process, including in most cases providing for translation. The research would not have been possible without the involvement of both the stakeholders and the project partners.

Case study descriptions

All of the project case study areas lie in mountainous terrain that is prone to flooding and landslides. At the local level, all sites are primarily rural areas. The information within this section provides a very brief description of the case studies sites' (mostly) physical and (some) social characteristics.

Barcelonnette basin in Alpes des Haute Provence, France

Image: Landscape view of Barcelonnette from hike during 2012 site visit.

The Barcelonnette basin is located in the French Alps and consists of an area featuring several communes, many of which are on the Ubaye River. The terrain is steep and features several slow moving landslides. Isolated heavy precipitation events occur and result in overtopping of the Ubaye River and flooding of settlement areas. These extreme events also cause flash flooding along torrents as well as debris and mud flows (e.g. in 1996 and 1999 the area).

The last major flood events were in 1994, 2008, and the worst event in living memory in 1957. The area strongly relies on the tourism sector and its further development. According to stakeholders interviewed, both landslides and flooding were considered equally important.

Fella River catchment in Friuli-Venezia-Giulia region, Italy

Located within the Italian Alps, the Fella River is a tributary of the Tagliamento River and runs through an area with steep slopes and high levels of precipitation. Heavy rainfall events occur within concentrated areas and cause flash flooding, erosion, and assist in triggering the many landslides in this area. Though landslides and flooding both occur, according to stakeholders interviewed, the issue of flooding is considered the most important.

Past events, such as the event in 2003, have caused casualties as well as tremendous damage to infrastructure. This event also occurred in 1903 (exactly 100 year return time). The area is depopulating, but plans are underway to increase tourism and ensure continued development.

Image: Landscape view of area around Cucco and Ugovizza in FVG during 2012 site visit.

Wieprzówka catchment in Małopolska, Poland

Image: Landscape view of area around Stryszawa in Malopolska during 2011 site visit.

The Wieprzówka catchment is located in the Carpathian mountains and foothills. Three municipalities (Stryszawa, Andrychów, and Wieprz) make up almost the entire catchment area. This area is densely populated and faces both landslides and flashfloods. According to stakeholders interviewed, flooding was considered the most important natural risk (e.g. including fluvial, urban and flash floods).

However, the type of flood depends on geographic location. Some of the most extreme events were floods in 2005, 2007 and 2010 in the municipalities of Wieprz and Andrychów. Within Stryszawa municipality, a landslide occurred in the village of Lachowice in 2001. A landslide also occurred in the village of Lanckorona in 2010. This landslide is considered to be one of the most serious landslides events to ever occur in Poland.

Nehoiu catchment in Buzău County, Romania

Nehoiu catchment lies within the Southeast Romanian Carpathian Mountains. This area faces torrential rainfall that combines with snowmelt in the summer months inducing flash flooding and contributing to the area's various and many forms of mass movements. According to local stakeholders, flash flooding seemed to be the most important at least in local areas, such as the town of Nehoiu.

However, landslides were expressed as an important issue within and outside the catchment throughout the mountainous and hilly parts of the county. One of the most violent local events was a flash flood in 2005. The population in this area has increased and is well-populated. Deforestation by the population has increased instability of the slopes and has contributed to increasing risks for landslides, mudslides, and debris flows.

Image: Landscape view of area around Gura Teghii near Nehoiu during 2012 field site visit.

Commonalities:	Differences:
• Housing/settlements built right up the river	• Some face depopulation, others densely populated
• Local population have strong attachment to the land	• Importance of type of event according to stakeholders differs by case
• Local level is rural and mountainous	• Difference in importance also related to different frequency and intensity of extreme events
• All have and continue to face the risk of changing extreme hydro-meteorological events	

What is 'good' risk governance?

Risk governance involves the interactions and decision-making processes of all actors involved in the assessment, management and communication of risks. 'Good' risk governance encourages commonly held principles of good governance, tries to reduce the commonly found negative practices, and requires an understanding of both the physical and social context in which strategies are employed.

To understand this context, it is not sufficient to only understand physical risks. It is important to additionally consider who the actors are and how they interact within and across multiple levels, what are some of the influential aspects of risk culture, and what are the essential parts of the regulatory systems within a given spatial or administrative unit (e.g. a village, a municipality, or a county)?

Why is this important?

Understanding 'good' risk governance is important in order to better understand contextual factors and respond to challenges posed by changing environments. Comparing 'good' risk governance strategies further offers insight for disaster risk reduction efforts within and across different contexts.

Actors & Organizations

One of the first considerations in comparing strategies is to look at the different important actors in each case study site. The first table provides a list of these actors in each case study and is separate by level (e.g. local, regional, and national) and by primary field of work as follows:

Red = primarily emergency management

Blue = primarily prevention

Purple = responsibilities lie equally in both

*Please note: No one actor is explicitly only one color. The colors only indicate what appears to be the predominate focus of an actor's actions and responsibilities.

This is necessary to understand who are the people creating and implementing the strategies and how the actors differ among cases (see Tables 1-3).

Observations for actors & organizations primarily involved in emergency management

The actors in this section consist mainly of emergency response and recovery entities including fire department and rescue services, civil protection, and police departments. NGOs focusing on emergency aid are also included.

Volunteer structure: Though volunteer structures exist in all case study sites at the local level, the strongest example is that of the Italian case study. This high volunteer culture is demonstrated by municipalities in which 10% of the population are volunteers. This also forms a direct connection between the population and emergency management authorities and allows for increased participation.

Role of civil protection: In some cases civil protection and the fire services are joined (e.g. Romania at 'regional level', Italy at local level). The role that civil protection plays is also differs by case. The Italian case study is unique even within Italy for its strong civil protection structure and central civil protection headquarters at the regional level. Civil protection, in this case, plays one of the most important roles of any actors. In contrast, the civil protection system in the French case study is much smaller and is affiliated as an assisting organization with the fire department.

Concentration of resources: In the Romanian site, the concentration of resources, actions, and responsibilities (especially for emergency management) are often strongest at the 'regional' level. Though this is administratively a 'county', it has greater powers and responsibilities than that of the 'county' equivalent levels in the other case studies. This is in part due to the lack of resources at the local level. This reason has also been strongly asserted for why there is no fire department system at the local level (e.g. town of Nehoiu).

Local level committees & structure: The structure for local committees for emergency management, crisis management teams, and operative centers appear to be in common across cases. However, is some cases (as is the case in the Polish case study) a crisis management team is not required at the municipal level but exists nonetheless.

Table 1: Actors & organizations primarily involved in emergency management.

France	Italy	Poland	Romania
'Local' Level			
(communes within the Barcelonnette Basin) -Municipal Professional Fire Brigade -Municipal Volunteer Fire Brigade -Local Civil Protection Volunteers -Civil Fire Brigades Centre (SDIS) -Gendarmarie (incl. Mountain specialized unit of military officers, PGHM) -Police	**(municipalities in the Fella River Catchment)** -Municipal Fire Brigade -Local Civil Protection -Municipal Volunteer Organizations -Municipal Operative Rooms -Media	**(municipalities and counties within Wieprzówka Catchment)** -Municipal Professional Fire Brigade -Volunteer Fire Brigade -Municipal Crisis Management Team* -Municipal Police** -County Crisis Management Centers -County Police -Media	**(towns in the Nehoiu Catchment)** -Local Emergency Volunteers -Local Committees for Emergency Situations -Local Operative Center -Town Police -Media
'Regional' Level			
(Alpes-de-Haute-Provence Département) -Departmental Level Fire and Rescue Services (CODIS) -Operations Centre of the Fire and Emergency Services -Interdepartmental Crisis Management Operations Centre	**(Friuli-Venezia-Giulia Region)** -Regional Civil Protection Headquarters -Councilor of Civil Protection -Regional Operative Room (SOR) -Provincial Fire Departments -Media	**(Małopolska Voivodeship)** -Provincial Commandant of the State Fire Service -Provincial Crisis Management Center -Caritas -Police -Media	**(Buzău County)** -Emergency Situation Inspectorate (ISU Buzau) -Regional Operative Room (SOR) -County Committees for Emergency Situations -Red Cross -Police -Media
(Provence-Alpes-Côte d'Azur Provence) -General Secretariat of the Defense Zone -Civil Security Zone Headquarters Staff -Zonal Defense Operations Centre -Interregional Civil Security Operational Co-ordination Centre (COZ)			
'National' Level			
(France) -Directorate of Civil Defense and Security (DSC) (supported by CODIG) -Interministerial Operational Crisis Management Centre (COGIC) -Civil Protection (primarily volunteer based) -French Red Cross -CRS Montagne (specialized members of National Police, collaborate with PGHM) -Media	**(Italy)** -Civil Protection Department (incl. National Commission "Great Risks", National Commission for Prediction and Prevention of Major Risks, Operative Committee (Operative organizations e.g. Fire Brigade, Armed Forces, Police Forces, and Italian Red Cross)) -National Civil Protection Service (NCPS) -Media	**(Poland)** -Chief Commandant of the State Fire Service -National Rescue and Firefighting System -Office of Emergency Management and Civil Protection -Government Crisis Management Team (GCMT) -Government Center for Security -Media	**(Romania)** -ISU national office -National Committee for Emergency Situations (Committees for Emergency Situations, Ministerial operative Centres, General Inspectorate of Emergency Situations (National Operative Center) - Professional Public Services and organizations - On Site Commander) -Media

*A Municipal Crisis Management Team is not legally required

**Does not exist at all municipal levels.

Observations for actors and organizations primarily involved in risk prevention

The actors working primarily in a prevention sphere are predominantly spatial and sectoral planners (sectoral e.g. meteorological service, geological survey, water boards, environmental protection agencies, scientists). These actors provide informational inputs for risk assessment (e.g. risk and hazard related information).

Outsourcing risk assessment resources: Often small localities haven't the resources and expertise for risk assessment. At the local level in Romania much of the information used relies heavily on local expert knowledge. This is helpful in the case that the local urban developer knows the local terrain. However, in all cases, external firms and/or scientific institutions are hired to provide risk assessment related information.

Access to risk information: In some cases, information exists but is not available and accessible or is out of date and requires local levels to come up with their own assessments (e.g. Romanian case study site).

Prevention focus vs. emergency management: In all cases actors indicated that the role of prevention is a if not the most important phase for disaster risk management. However, in interviews with the prevention focused actors, it became clear that in practice emergency response and recovery are given more attention and often substantially more funding (e.g. Polish case study site). However, there are some cases in which prevention is structurally more integrated and well-developed into the governance system (e.g. France).

Role of forestry agencies: historically, in call cases, the role of the forestry agency has proved very important. In the French, Italian, and Romanian cases this has been exemplified in substantial reforestation efforts. However, in some cases reforestation is still trying to outpace logging and timber production.

Table 2: Actors & organizations primarily involved in risk prevention.

France	Italy	Poland	Romania
'Local' Level			
(communes within the Barcelonnette Basin) -Local Level Forestry Agency (RTM)	**(municipalities in the Fella River Catchment)** -Municipal Planners -Architects (spatial planners)	**(municipalities and counties within Wieprzówka Catchment)** -Municipal Planners -Local Water Authority	**(towns in the Nehoiu Catchment)** -Town Planners
'Regional' Level			
(Alpes-de-Haute-Provence Département) -Environmental Protection Agency (DREAL) -Regional Planning Department (DDT) -Regional Level Agency Forestry (RTM) -Scientists/Academia -Urbanistes (spatial planners)	**(Friuli-Venezia-Giulia Region)** -Environmental Protection Agency (ARPA) -Regional Soil Defense -Forestry Services -Scientists/Academia -Geological Survey -High Adriatic River Basin Authority	**(Małopolska Voivodeship)** -Environmental Protection Agency -Regional Water Basin Authority (RZGW) -Regional State Planning Offices -Private Planning Firms	**(Buzău County)** -Environmental Protection Agency (Buzău) -Private Forestry Agencies -Geological Institute of Romania -Private Planning Firms -Cadastral Office -Chief Architects office (check affiliation if county council or prefect)
(Provence-Alpes-Côte d'Azur Provence) -PACA Region Environmental Protection Agency (DREAL PACA) -Risk Center (Pôle Risques)			
'National' Level			
(France) -French Association for the Prevention of Natural Catastrophes (AFPCN) - Council Direction for the Prevention of Major Natural Risks (COPRNM) -National Forestry Agency (ONF) -Geological Survey (BRGM) -Indemnification of Natural Disasters (CatNat) -Central Reinsurance Agency (CCR)	**(Italy)** -National Research Institute (CNR) -Agency for Environmental Protection and Technical Services (APAT) -State Forest Corps	**(Poland)** -National Water Basin Authority -Institute of Meteorology and Water Management -Polish Geological Institute (PGI-PIB)	**(Romania)** -Institute of Geography of the Romanian Academy -National Hydrological Institute -National Meteorological Administration -Romanian Waters National Administration -National Insurance Agency (PAID)

Observations for actors & organizations equally involved in both emergency management and risk prevention

Most of the actors in this table have legally defined decision-making power and are equally responsible for all phases of disaster risk management (prevention, preparedness, response and recovery).

Primary decision-maker at local level: This is the mayor in all cases. This primary responsibility is legally defined in all cases.

Coordination and cooperation between levels: In the French site, there are new efforts to improve cooperation especially at the local level between administrative actors (e.g. through the Mixed Syndicate and the CCVU).

Democratic structures: Similar democratic structures exist at all levels in terms of heads of administration, councils, and boards. However, more administrative delineations exist in France than in any other case study. In all cases, trust between the levels of these structures is stronger at the more local levels. This is particularly true when considering interview responses from the local community leaders (public). Most interview responses indicate higher confidence in lower levels of authority due to closer proximity and understanding of the local environment.

Divisions of power: The degree of decentralized vs. centralized structure varies by case. E.g. in Poland appears to have greater decentralization of powers to the local level (i.e. municipality) than any other case study. Though decentralization laws exist in all other cases, in-practice there is a stronger degree of centralization.

Table 3: Actors & organizations equally involved in both emergency management and risk prevention.

France	Italy	Poland	Romania
'Local' Level			
(communes within the Barcelonnette Basin) -Public/Community Leaders –Mayors -Municipal Technical Officers*** -Municipal Council -Mixed Sydicate -Community of Communes of the Ubaye Valley (CCVU) -Sub-Prefect	**(municipalities in the Fella River Catchment)** -Public/Community Leaders -Mayors -Municipal Technical Officers*** -Municipal Council -President of the Province -Prefect of the Province -Provincial Council	**(municipalities and counties within Wieprzówka Catchment)** -Public/Community Leaders -Mayors -Municipal Technical officers*** -Village Heads -Municipal council -Municipal Board -County Council -County Board	**(towns in the Nehoiu Catchment)** -Public/Community Leaders -Mayor - Municipal Technical Officers*** -Local Council
'Regional' Level			
(Alpes-de-Haute-Provence Département) -Departmental Prefect -Department-Level Assembly (Provence-Alpes-Côte d'Azur Provence) -Préfet de Région (state representative/administration) -Administration of the Region (local administration) -Regional Level Assembly	**(Friuli-Venezia-Giulia Region)** -Regional Administrative Authorities -President of the Region -Regional Council	**(Małopolska Voivodeship)** -Marshal -Assembly -Voivodeship Board -Voivode	**(Buzău County)** -Prefects Office -County Council
'National' Level			
(France) -President -Prime Minister -Council of Ministers -Parliament (National Assembly and Senate)	**(Italy)** -President -Cabinet (Prime Minister and Council of Ministers) -Bicameral Parliament (Chamber of Deputies and Senate of the Republic) -Presidency of the Council of Ministers	**(Poland)** -President -Cabinet (Prime Minister and Council of Ministers) -National Assembly (Upper and Lower Houses)	**(Romania)** -President -Government Cabinet (Prime Minister and Council of Ministers) -President of the Council of Ministers -Bicameral Parliament (Chamber of Deputies and Senate)

***Pre-/post- disaster focus depends on technical expertise.

The following tables provide information based on the dialogue and perception of actors in all four case study sites. A brief summary is given highlighting first the issues identified by different actors (Tables 4-6) and then good practice examples (Table 7). Tables 4-6 highlight potential learning points while Table 7 provides potential knowledge transfer opportunities. A brief explanation is given for each and supports the concluding short learning points section.

Issues Identified

Tables 4-6 provide information related to the comparison of issues revealed from stakeholder interviews and fieldwork observations. These tables are separated by issues that fall most closely within risk communication, risk management, and risk assessment.

Observations for Risk Communication

There appeared to be several trends emerging from stakeholder interviews with regard to risk communication. Much of this related to the use of local knowledge and how to provide information to the public (e.g. how to communicate, to whom, by which means).

Openness & transparency of information: There is a wide range of the level of available and accessible data among the case study sites. In some cases information is secret or not available or is made available only at extremely high costs. This is often the case with meteorological data. However, there are some very good examples for public access to data especially in the information provided by municipal and 'regional' level emergency services' websites.

Awareness through risk communication: The perception amongst different stakeholders in different cases in terms of whether or not public has enough risk related information and if the public is aware greatly varies. However, there are some trends. For example there is some indication that scientists and sectoral planners feel the public does not have enough information or enough awareness, administrative stakeholders tend to think there is enough information, while individual citizen's perceptions are mixed.

Importance of integrating local knowledge: This was evident in all cases. Importance is placed on the knowledge of local stakeholders as they are expressed as having the best understanding of the terrain and local context.

Balancing between a population that is aware vs. afraid: This was an issue in multiple case studies. Specifically, authorities struggle with how much information is too much? What enables an informed but not panicked population?

'Active' public participation: Though not elaborating in this section explicitly, there is substantial evidence to support that the public is consulted. However, it remains to be seen whether 'active' participation is strongly supported. ('Active' participation here refers to the existence of two way communication in which the public can provide as well as receive input and have an influence in the decision-making process).

Table 4: Issues Identified for Risk Communication

Issue	France	Italy	Poland	Romania
SMS options for alerts to improve openness & transparency of information	Currently working on a system for SMS alerts at local level (currently used for road closures in Winter)	Currently used for volunteers for water level alerts and local emergency management communication (some concern for providing too much information via public SMS)	Currently used by aid organizations, & emergency management (however, concern expressed for providing too much information and potential lack of interest for public SMS)	Currently using SMS between ISU and local emergency management (considering SMS alerts to alert population)
Need for communicating with new populations	Importance revealed in targeting tourists and new residents, especially retirees. Strong local networks help improve communication over time	Need stressed for communicating risk information to new residents and for more information for public self-prevention measures	Some stress on need for informing people from Krakow and abroad who are not familiar with the local terrain	Is less stressed than other cases, more focus on importance of and use of local knowledge (concern for public not wanting more information due to other priorities)
Need to encourage education on risk related issues for children	All cases have campaigns to target education for school children and stress this as a high priority			
Need to use risk communication to build a culture of disaster risk memory & awareness	Stressed as important to keep awareness and culture of risk alive (encouraged through continued efforts & activities of scientists, administration, and cultural centers)	Repeated statements that disaster memory is not so long and that people forget over time (encouraged through film of previous event & scientific partnerships)	Reiterated that people don't believe something will happen if it has been a long time since they've experienced an event (there is a saying "wisdom of the Polish people comes from experience")	Repeated that people are not so aware unless they have previously been directly affected by an event (most awareness information passed through family)
Importance of integrating local knowledge into risk communication	Seen as highly important and encouraged through the respect and attention paid to the local knowledge of the RTM	Utilized through volunteer organizations, especially for monitoring the many structural measures put in place	Considered highly important through emphasis placed on decentralized, bottom-up approach for emergency communication	Local knowledge used as the primary input for communicating risk related information

Observations for Risk Management

Though there are many more comparative points to be made for risk management, the issues addressed here primarily target topics related to clarity of roles and regulations as well as to relationships and cooperation between stakeholders (e.g. the issue of maintenance being a specific point and connecting to limited resources).

Clarity of roles and responsibilities: Evidence from the interview responses indicates there is in general (across cases) a clear understanding of the differentiation of roles and responsibilities between stakeholders at least during a time of crisis. In some cases an overlaps of responsibility do exists.

Effectiveness of maintenance for mitigation measures: Ineffective maintenance was seen as an issue in all cases. The reasons for this vary; however, common reasons included lack of resources and or lack of regulation enforcement.

Relationships between population and local authorities: There appears to be a general trend amongst all cases that there is a strong relationship between the public and local authorities than with regional authorities (e.g. due to strong local actor networks). This can be seen as positive for building trust; however, this can also influence decision-making toward riskier development (e.g. building permits).

Role of civil protection and rescue services: In some cases there these services are already joined together (e.g. this was done in the Romanian case in order to improve coordination and cooperation of the two services which already had substantial overlap). This prompts the question of the role of civil protection and how concentrated its powers should be?

Table 5: Issues Identified for Risk Management

Issue	France	Italy	Poland	Romania
Issue of maintenance for mitigation measures, and resources to provide for this long term	Funding costs for structural measures high (currently trying to improve funding sharing through improved local level cooperation between communes)	Visual lack of clearing away material (e.g. Ugovizza), informed this is due to funding issue (e.g. municipalities cannot pay)	Limited structural measures (landslide stabilization requires no maintenance, one major reservoir)	Check dams filled with sediment, but cost higher to remove material than to build new dam, so new dam built when needed (e.g. town of Nehoiu)
Clarity and distribution of general roles and responsibilities	In general roles and responsibilities are well defined (exceptions in-practice exist with aid organizations, and the fire departments and private ambulance companies)	Overlaps exist in responsibilities for managing landslides (however, database created to help encourage better cooperation between e.g. geological survey, forestry agency, and civil protection)	Municipalities cannot regulate the rivers even though regularly floods when have heavy rain (e.g. Andrychow), is responsibility of water authorities	Overlapping responsibilities for clearing riverbeds (e.g. cannot just have the people receiving social help do this work because they can be fined by the Romanian Waters Authority)
Close relationships between local authorities and the population	Apparent (in all cases) to be positive in terms building trust between the population and local authorities, however can influence decision-making in favor of riskier development			
Role of civil protection and rescue services	Civil protection plays a less central role, acts rather as support for fire and rescue services	'Regional' civil protection has central role, some stakeholders argue the role is too much	Civil protection well integrated into general crisis management system (e.g. includes all services)	Civil protection and fire rescue services combined at 'regional' level and perceived to be a good and effective system
Clarity and effectiveness of regulatory system	Generally, laws are quite clear, however some stakeholders feel there are many laws and that these can be restrictive (e.g. the well-known concept of the "umbrella" or the "principle of precaution")	Reiteration that (in general) there are too many laws, and that laws are not clear, (it is not necessarily that laws are incomplete but that there are issues with interpretation and implementation	Laws for who does what are clear, but issue with who will bear responsibility to pay for what (no one wants to pay), however improvements seen in recent changes (Act of 26 April 2007 on Crisis Management	Laws seem to be respected when fines can AND are charged (however, if fines not enforced, this is a different outcome) (e.g. examples include penalties for respecting management plans)

Observations for Risk Assessment

Several issues arose in relation to assessing risks, particularly the level of acceptable risk, the available information resources for assessment, and the need to take a comprehensive view of the terrain.

To relocate or not to relocate: This was related to assessing the level of risk the population will accept. In most cases a strong attachment to the land meant there is a strong disincentive for people to move. Some solutions (e.g. as in the Italian case study) sought to build structures and improve safety of the area.

Availability of resources for risk assessment and updates: There was a wide range between cases. However, money is always an issue (often related to issues for creating new and for updating information).

Consideration for entirety of territory: The need to take into account the entirety of the territory was often expressed. This stressed the importance of field visits to understand both the physical and social needs of the territory when designing solutions to reduce risk (e.g. in building structures like dams, etc.).

Table 6: Issues Identified for Risk Assessment

Issue	France	Italy	Poland	Romania
Assessing the tolerable level of risk to determine relocation vs. no relocation	Strong attachment of local population to land, high difficulty in attempting relocation (e.g. expensive process, little land in which to relocate)	Very low incentive to encourage relocation (desire to maintain population). Affected areas rebuilt with large structural measures	If land too risky, municipality will try to purchase affected land (however, expensive to do this, better to prohibit building first)	Strong attachment of population to land, relocation occurs in instances where previous events have destroyed homes
Informational resources available for assessing risk	Resources appear adequate for the majority of stakeholders; however, some difficulties if no risk prevention plan(PPR)	Resources appear to be adequate for planners, geologists and, water authorities, as well as civil protection	Currently working on improving landslide inventory, some financial limitations to conduct more assessment studies at the local level	Some information secret, local knowledge is primary basis, scientific partners assist this basis (e.g. landslide inventory)
Issues related to updating plans	To update PPR have to revise all but can focus on particular points (e.g. revising is complicated process)	At the local level do not have funds to make whole new plan, part of plan updated	Desire to have more maps (cover entire area) prior to updating; however, need funding to fulfil	Do not have funds to make whole new plan, usually update part of plan
Need to take into account entirety of territory, including terrain visits for on the ground assessment	RTM has comprehensive knowledge base of territory; however, some private firms assessments considered less accurate	Issue with some private firms (quality of some assessments considered questionable if e.g. planning consultants do not visit terrain)	Field visits commonly conducted by private planning firms, indicating pursuit of improved terrain understanding	Issue with some private firms (quality of some assessments considered questionable if e.g. planning consultants do not visit terrain, use only google earth)

Issues and good practice examples identified

The follow section provides good practice examples as described by stakeholders during interviews. The items listed appeared to be reiterated throughout multiple interviews and presented a common theme.

Observations

Many of the good practice examples are comprised of database and data sharing capabilities. In several instances, these present potential knowledge-sharing opportunities between case study sites. The examples provided also demonstrate relate to the good level of trust, cooperation, and coordination involved in the creation of these capacities amongst different kinds of actors at different administrative levels. Many also involve the provision of information to the public and efforts to increase public awareness. This assists in strengthening local capacities, particularly the capacities of the individual citizen.

France

Good integration of science and culture for raising awareness in the local community

• Scientists as well as cultural & historical centers and associations inform and encourage awareness of population (e.g. museum exhibits, public meetings, conferences, publications)

• Scientists have had an especially significant impact in informing and encouraging awareness of the population while working with local authorities (e.g. Seolane Centre).

RTM (local forestry agency) database

• This is an online database that is available to public and contains measurements RTM has made in the field (This is featured on website of the IFN).

BRGM (geological survey) platform

• This is a new platform, providing public data and consolidating a previously fragmented collected of data related to the geophysical risks and hazards.

Italy

Web-based GIS System for risk information sharing and decision making

• Coordinated by FVG Civil Protection, this provides resources for emergency management and administrative actors (e.g. can provide information input) as well as the public.

Well-developed volunteer culture

• Volunteers trained and used for monitoring activities at most local level (e.g. for checking dams and other structures).

Database for landslide inventory

• Assists in preventing too much overlap of actions and responsibilities through sharing of data between e.g. civil protection, geological survey, and forestry services.

Romania

Incentive for teacher participation in communication of risk information to students

• Instructors receive some kind of recognition for participating in emergency preparedness exercises. This has proven beneficial for encouraging engagement with schools and enthusiasm for emergency drills with students.

Good dissemination examples of information to the public via private and public firms

• E.g. BLOM (a planning company) and also with information on the Romanian Waters website and the Environmental Protection Agency websites.

Very strong level of cooperation and trust with central emergency management actor (ISU Buzău)

• Information, supervision and guidance given and overall relationship between all other actors perceived as positive and of a high level of confidence (this is similar to the positive example of the RTM in France).

Poland

Protocol Procedure: Wieprz Municipality

• Committee is responsible for social care and includes 1-2 municipal staff members and people who have been affected (3 people go to the each affected home).

ARCUS 2005 Information System (established in some not all Polish regions)

• The municipal & district level provide information on events that occur, their actions and resources.

• Templates are used depending on the emergency type (includes wide variety of information, including numbers and contact data of all units) and are available at all levels, municipality, district and region.

Website to view individual parcels (online webportal, Wieprz Municipality)

• Linked to parcels for sale where citizens can go and view their parcel or a parcel they are interested in and see if there is a risk.

Learning points for future policy development

Improving capacity for long term, strategic vision:

Discussing a strategic, long term goal in many cases proved difficult due to the uncertainty of future events. In some cases, this was attributed to a lack of resources, but more often this was because of a feeling of deep uncertainty for the future, especially for future events.

Building a 'Risk Culture':

This concept differs between cases, though some similarities exist with the attachment the local population has to their land and the importance of using local knowledge. Building a 'risk culture' appeared to be synonymous with 'building a culture of safety'. This referred to increasing awareness and encouraging especially the local level and the public to take self-preventative actions.

Encouraging a focus on prevention:

Though in nearly all interviews stakeholders stated that prevention is one of if not the most important part of reducing disaster risks, there is often little implementation, elaboration, and attention (e.g. funding) given to prevention as compared to response and recovery after a disaster. This was almost universally recognized by all stakeholders as a common issue that demands further investigation and improvement.

Types of hazard and risk maps

Due to different legal-administrative frameworks, planning systems and planning cultures, approaches and procedures of how to deal with natural hazards and how to integrate risk information into land-use planning differs among European countries. This is expressed – among others – by the different types of hazard and risk maps produced in the countries and/or regions concerned and they way they are used in local land-use planning. In the following, the four national approaches of how to display and communicate information about hazards and risks will be presented.

Poland

Before the changes in Water Law in 2011, a flood protection study was done of the borders of areas at direct and indirect flood risk and those areas under special land development. This study determined the boundaries of flood lines for different return periods, i.e. their probability of occurrence as well as flood protection guidelines. Studies allowed for more than one flood zone to be displayed on the map. The maps prepared by the RZGW Kraków, for instance, included seven flowage lines (see Fig. 1).

Local plans usually considered the 100-year-flood demarcation as areas directly endangered by floods. While the demarcations and the regulations of flood protection studies are legally-binding, the preparation of a local land-use plan is not. So the restrictions of the flood protection studies only came into force, when their contents were integrated into the local land-use plan.

After the European Flood Risk Directive was implemented into national law in 2011, flood protection studies will now be replaced by flood hazard maps (Fig. 2). Flood hazard maps will be compiled for three different probabilities and therefore display areas where the probability of flooding is low and amounts to once every 500 years (0,2%), once every 100 years (medium hazard level, probability of the occurrence of flooding is 1%) and once every 10 years (high hazard level, probability of occurrence of flooding is 10%).

Flood hazard maps need to be taken into consideration in spatial planning starting from 2014 (or as soon as they are available). The areas exposed to floods with a medium and high probability (1% and 10%) are particularly exposed and endangered, which means that local spatial plans will need to follow building bans in these areas.

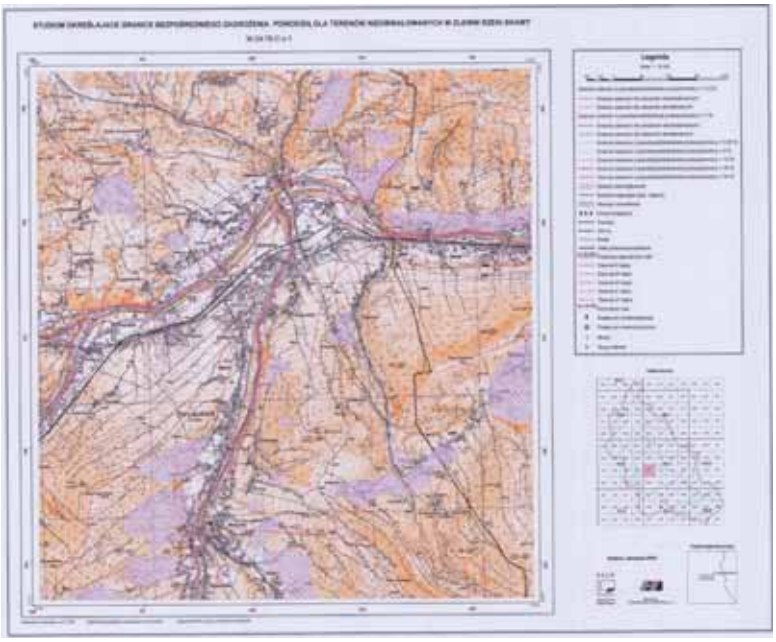

Figure 1 Example of a flood protection study for the Skawa River catchment (Source: RZGW Krakow, 2004)

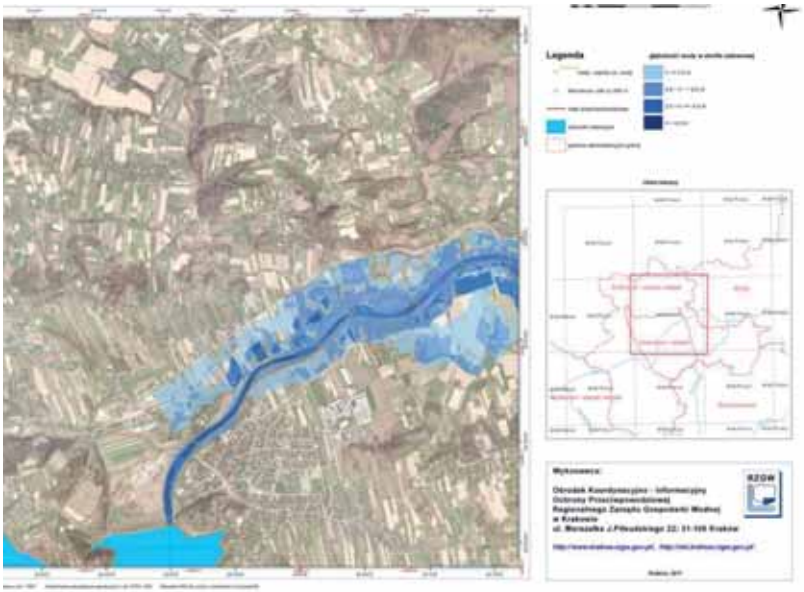

Figure 2 Example of a Food Hazard Map for the River Raba (Scenario Q1%) (Source: RZGW Krakow 2011)

As regards landslides, the online information system SOPO ("System Osłony Przeciwosuwiskowej") is currently under construction in the Polish Carpathians and should support a better identification of areas at landslide risk for urban planning purposes and simultaneously impose a task of formulating adequate land-use regulations.

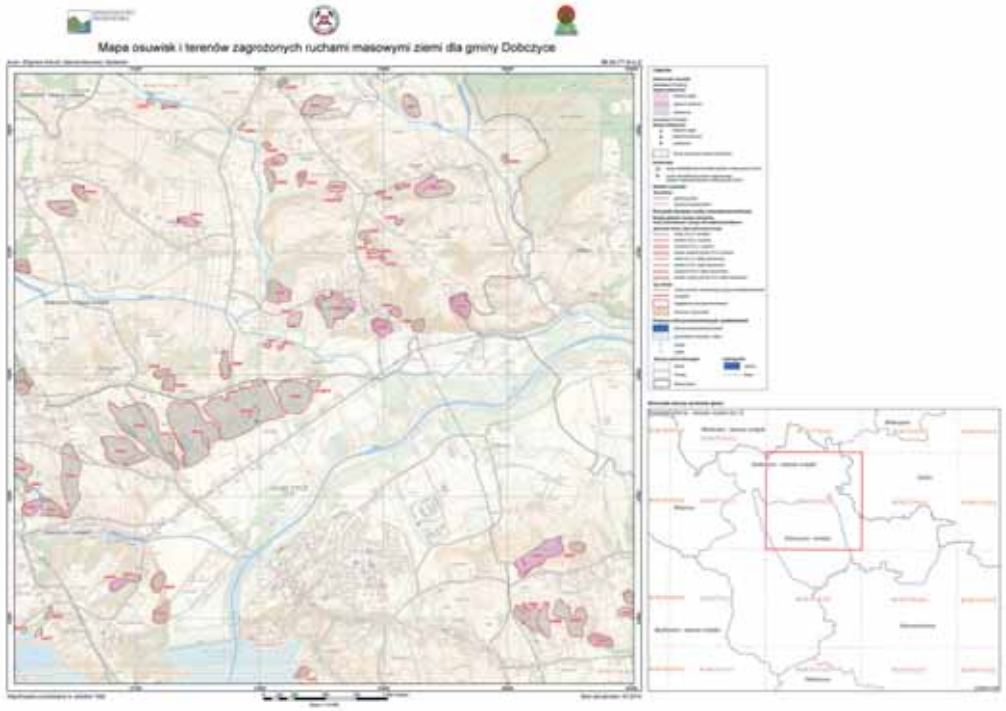

Figure 3 Mapa osuwisk i terenów zagrozonych ruchami masowymi dla gminy Dobczyce (Source: Koluch, Z., Nowicka, D., PIG 2010)

So far planners working in the Carpathians, although legally obliged to take landslide risk into account, have had a real problem in finding adequate information. However, adequate information is an essential prerequisite for plan making and supports the planner in his decisions. Now that the second stage of the construction of SOPO is approaching the end, new maps occur on the SOPO website almost every day. From a planning point of view these maps are very much appreciated and shall facilitate planning decisions.

France

In the year 1995 the French government has implemented a very strong and influential risk prevention instrument which has essential effects for non-developed areas: the so-called "Plan de Prévention des Risques Majeurs", PPR (Risk Prevention Plan) (Fig 4). The PPR is an instrument designed for the prevention of any type of hazard, including, among others, floods, landslides, rock falls, earthquakes and avalanches.

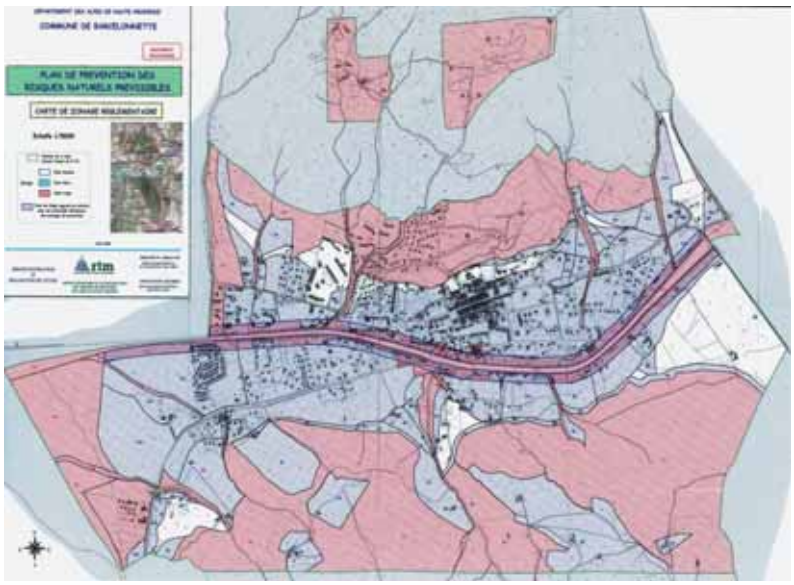

Figure 4 Risk prevention plan of the commune of Barcelonnette (Source: RTM, 2006)

Risk zones of a PPR are determined by first carrying out a historical analysis of the occurrence of major natural phenomena that affected the study area. Based on this analysis hazard maps are compiled which allows to evaluate the importance of predictable phenomena. After a local and public consultation and after an analysis of local issues related to security and development, the hazard map forms the basis for the PPR.

The PPR then determines where building is allowed (white zone), not allowed (red zone), or allowed under certain conditions following specific regulations (blue zone). It is therefore particularly important in terms of prohibiting new development in risky areas (red zone) or adapting building structures to present risks (blue zone). However, it is also a very restrictive instrument, because it is annexed to the local plans (the ScOT and the PLU), which means that it rules above all planning related decisions. The mayor of the commune must attach the approved PPR to an already existing PLU within 3 months. Problems evolve for spatial

planners if there is no PPR available for a commune they prepare a PLU for. The preparation of a PPR is in the responsibility of the state, in form of the prefect who represents the State in the department. Not all communes are subject to a PPR; whether a municipality sets up a PPR mainly depends on its affectedness and its size. Municipalities that are exposed to just on type of hazard or small communes with a low number of inhabitants often do not have a PPR.

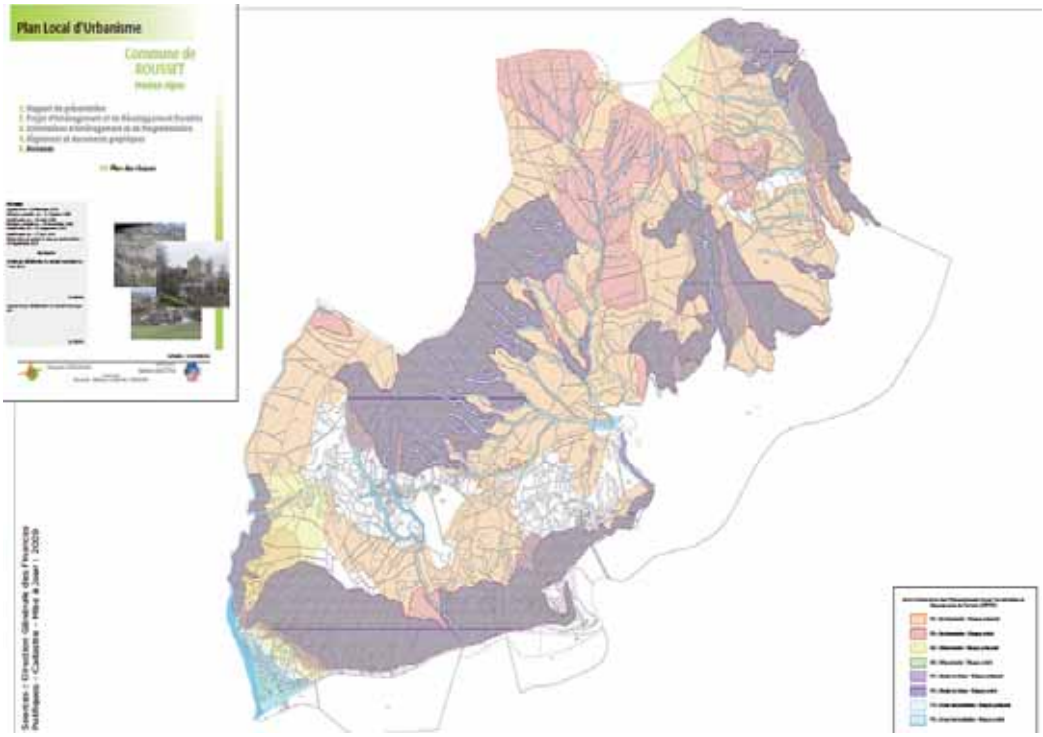

Figure 5 Example of a CIPTM for the commune of Rousset (Source: Direction Générale de Finances, 2009)

In such cases spatial planners often have troubles finding and using appropriate information as an evidence base. For some natural hazards there are so-called "cartes informatives" (informative maps). But for many other natural hazards there is nothing apart from the PPR or a couple of local studies. Besides, information is often only available in a very small scale. Therefore the Department "Hautes-Alpes" decided in 2009 to cover all those communes with informative maps for all major natural hazards that have not been mapped yet. But while the PPR is obligatory, these CIPTM ("Cartes Informative des Phénomènes Torrentiels et de Mouvements de terrain") (Fig. 5) are not. However, in other departments they don't even have those maps. They are using maps that are even twice as big and that are hardly usable for planners. Or communes have to ask consulting agencies to prepare specific studies, whose results can then be used in the planning process and PLU making.

Italy

Spatial planning can currently contribute in terms of prohibiting new construction in hazard-prone areas thanks to the so-called "Piano stralcio di assetto idrogeologico" (PAI), a legally-binding plan providing one map each for geomorphological (Fig. 6), hydrological (Fig. 7) and avalanche hazards. The PAI promotes a risk reduction oriented spatial planning and all of its maps display areas exposed to hazards in four different levels (moderate, medium, elevate, highly elevate).

In addition, the map for geomorphological hazards also shows the elements at risk, i.e. a parameter for vulnerability, and existing structural defence works. Contents and prescriptions of a PAI need to be considered in all planning documents, i.e. their provisions are legally binding for local authorities as well as for the private sector. However, a PAI only takes full effect when a new local plan is made or an existing one is amended. It has not direct binding effects, it only becomes binding through actual planning regulations within a local spatial plan.

The local land-use plan needs to be accompanied by a geological study which. examines the compatibility of the provisions of the plan with the geomorphological, hydraulic and avalanche conditions of the territory (i.e. the PAI). This report is accompanied by maps, which consider potential hazardous situations and the intended use permissible in the area. It shall be elaborated by qualified professionals that have the respective competences in their field of expertise. The Geological Report is one of the most important tools addressing risk prevention at local level and forms an essential part in land-use

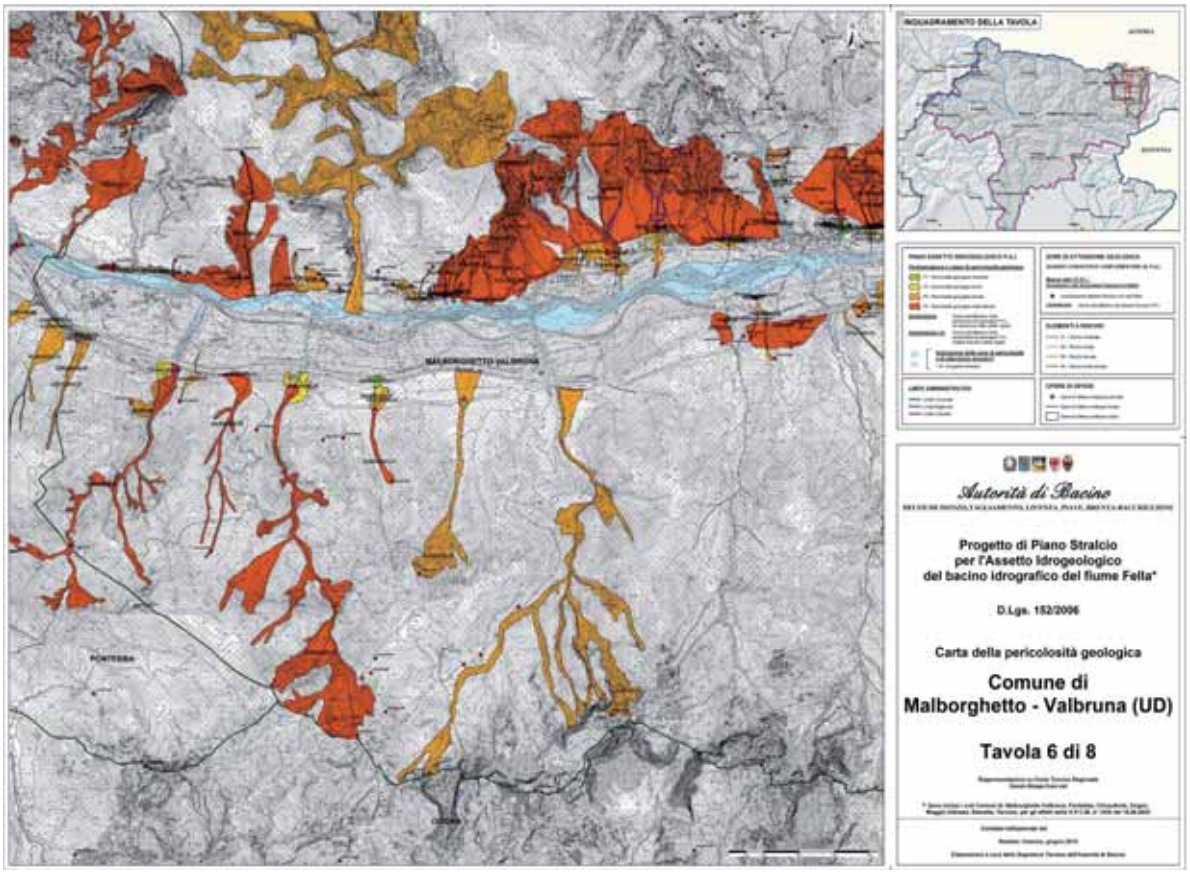

Figure 6 Example of a geomorphological hazard map of the commune of Malborghetto Valbruna (Source: Autorità di bacino dei fiumi dell'Alto Adriatico, 2012)

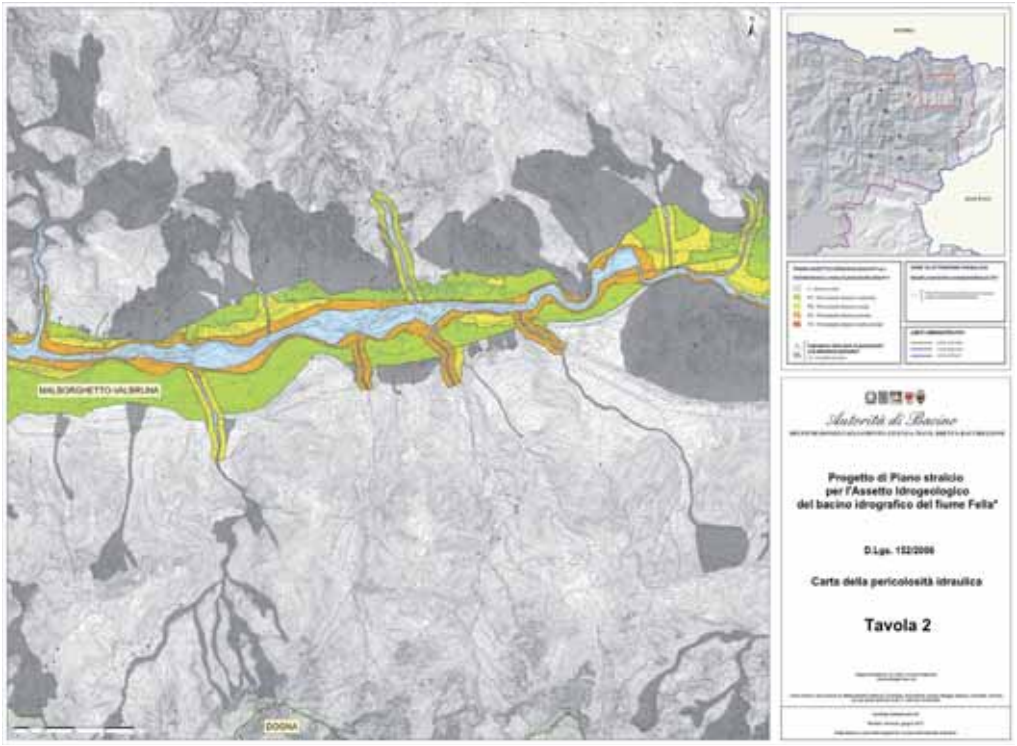

Figure 7 Example of a hydrological hazard map of the commune of Malborghetto-Valbruna (Source: Autorità di bacino dei fiumi dell'Alto Adriatico, 2012)

Romania

The elaboration of hazard maps in Romania is based on Law 575/2001, which provides the legal basis for the development of flood, landslide and earthquake hazard maps for every municipality lying in a hazard-prone area. Until recently, landslide mapping in Romania was basically restricted to mapping smaller areas and was solely carried out for important objects.

Hazard maps shall include information about potential dangerous hazards and events, existing development and the population and possible prevention measures. After the hazard maps have been produced, they will be included in the local spatial plan, so that the suggested prevention measures can be implemented as part of local land-use planning.

In quite a few areas hazard and risk maps have already been completed. In particular areas at high risk of floods and landslides like the Danube river catchment, for instance, have been subject to funded projects, financed through County or Local Councils. Some collaborative research projects for flood risk mapping have been carried out that were funded at the initiative of the Government through the Ministry of Environment.

One example is the FLOODRISK Danube project which aimed at laying the foundation for ensuring sustainable development along the Danube River by providing effective flood hazard and risk maps for the river basin. For example, flood extent maps (see Fig. 8) and maps displaying elements vulnerable to floods (Fig. 9) were prepared for Giurgiu City, a town located in Southern Romania at the left bank of the river Danube. While the flood extent maps shows the potential extent of floods based on 30, 100 and 1000 year scenarios, the vulnerability map shows all buildings (residential, public, industrial) as well as the statistical distribution of the population.

However, often insufficient or missing funds are the main reason why some areas exposed to risks still lack adequate hazard and risk maps. As confirmed during the conducted interviews, there are no hazard and risk maps in the case study area of the CHANGES project yet.

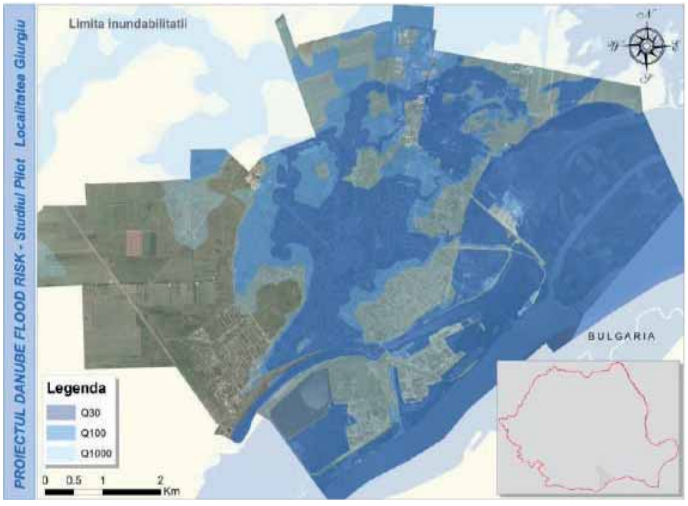

Figure 8 Flood extent map of Giurgiu municipality (Source: Ministry of Environment and Forests, Romania, 2012)

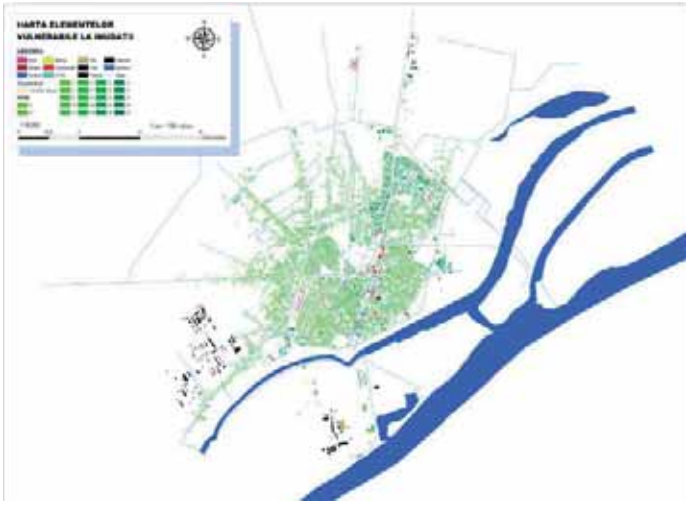

Figure 9 Map of elements vulnerable to floods of Giurgiu municipality (Source: Ministry of Environment and Forests, Romania, 2012)

Advantages and disadvantages of the described procedures

The described types of maps and ways to incorporate risk information into planning differ between the case study sites. This can be traced back to differences in legal-administrative settings, planning systems and socio-cultural settings. Each of the approaches has advantages and disadvantages or strengths and deficiencies, which will now be further specified:

Poland

Advantages and strengths	Disadvantages and deficiencies
Amendments in the Water Law of 2011 (Implementation of EU Flood Risk Directive)	
• Regulations now ensure actual realization of preparing flood hazard and risk maps, their consideration in planning processes and implementation of their contents in spatial plans (before, elaboration and consideration of flood protection studies in planning processes was not obligatory)	• Responsibilities of preparing flood hazard and risk maps changed from regional level (i.e. Regional Water Management Boards (RWMB)) to national level (Central Water Management Board (CWMB)) which lead to internal conflicts that have indirect consequences for spatial planning
• Municipalities are now required to respect the floodplain borders in their spatial plans and consequently to carry out rational and prevention-oriented land development in flood zones	• While the RWMB deemed important to map all rivers and prepared maps also for smaller river catchments and streams, the CWMB identified 10 main river basins with potential significant flood risks and will only prepare hazard and risk maps for these -> less areas will be covered with maps
• Existence of a flood plain is no sole reason for prohibiting development and the head of the Regional Water Management Board has the power to reverse a restraint in individual cases, provided the primary goal of flood protection is not impaired (individual studies will allow to realize a project)	• The RWMB can still give an opinion about spatial plans, but municipalities are only legally required to use the hazard and risk maps of the CWMB; the RWMB has more studies and maps available - even for smaller rivers - their consideration, however, is not necessarily and legally required
Dealing with landslide hazards	
• Currently, new landslide hazard maps distinguishing between four types of areas (permanently active, periodically active, non-active and landslide-endangered areas) occur on the SOPO website almost every day, thus contributing to a better understanding and assessment of landslide risks which have to be taken into account by planners	• Interpretation of SOPO maps and formulation of legally binding planning regulations can be challenging for planners: Problems appear in particular when there are existing buildings in areas designated at risk; when areas previously allocated for development should be converted back to agriculture or forestry since landowners can then claim compensation if their land loses its value and finally when the landslide risk is relatively low and even geologists cannot judge if the new construction should be allowed or not

France

Advantages and strengths	Disadvantages and deficiencies
Characteristics of the PPR	
• The PPR represents an efficient instrument and it is undeniable that the PPR offers more comprehensive means for risk reduction than those provided in cases where a PPR does not exist	• Integration of risks into spatial planning documents is in most of the cases only endured by following the provisions of the PPR, while it is mainly ignored in cases where a PPR is non-existent
• The PPR has proven particularly useful in restricting urban development and imposing protective and adaptive measures on new constructions	• One important lack constitutes the difficulty to designate preventive measures for areas with existing developments/buildings
• Though being restrictive, the PPR also constitutes a reason for justification, since mayors can ascribe certain land-use decisions to regulations of the PPR	• The PPR faces critics in form of local authorities who assume to be limited in their urban planning objectives and projects and perceive it as a restraint imposed by the State
Application and use of the PPR	
• For the planners the PPR constitutes an instrument that is easy to handle and to interpret, because it is quite clear what they are allowed and not allowed to do	• The PPR is not prepared for all communes exposed to a hazard -> places that do not dispose of a PPR have to use other sources of information, such as the CIPTM in the Département Hautes-Alpes or – even worse – information at a very small scale, hardly usable for planners
• The PPR is a risk prevention instrument that takes account of different natural hazards, which are all included in the risk assessment (floods, landslides, earthquakes, avalanches etc.) to the end of ensuring a multi-risk approach	• No weighing up of different interests within the planning process (this happens earlier in the process) → The PPR mostly neglects the interests of the local community for future progress and development
Development goals	
• Risk prevention as promulgated by the PPR has complemented a rather defensive approach followed before and clearly conforms to a sustainable and resilient approach, a main target of territorial development	• Minimum knowledge required for the implementation of hazard maps (cartes d'aléa) and transcription into zoning regulations remains mainly insufficient for a couple of events (e.g. landslides, earthquakes etc.); principle of precaution is often applied in order to compensate for an insufficient knowledge level, which can be detrimental and costly for the society
• Much progress over the last years and decades to advance an integrated territorial development approach that takes account of different issues, remaining, however, quite challenging	• Until today the two approaches of urban planning and risk prevention could not be integrated: The juxtaposition is done by imposing a sectoral approach (PPR) on an integrated approach (PLU), i.e. the PPR prevails by excluding areas at high risk from a comprehensive and overall consideration of all available information and marking them a priori as non constructible → Risks are solely considered within a sectoral approach, rather than a systematic, integrated approach

Italy

Advantages and strengths	Disadvantages and deficiencies
Integration of risk prevention and spatial planning	
• Risk prevention/mitigation is one of the main goals of spatial planning, both at regional and local scale, whereas the PAI ensures the consideration of hydrogeological hazards in spatial plans	• Risk prevention and spatial planning do not constitute a system, but land-use decisions are based on piecemeal studies and reports, prepared by different agencies and at different scales → No unique strategy (like the French PPR) connecting geological reports to all sectoral plans and hazard assessments (they are only loosely connected)
• Risk more and more considered as a result from the interaction between hazards, land-uses and economic and social factors; in-depth vulnerability analyses, however, are not very frequent yet	• Main weakness of local planning instruments: Translation of hazard assessments in land-use decisions is often too simplistic, as most critical situations are merely interpreted as building restriction → Possibility to graduate prescriptions regarding permitted land-uses according to different hazard levels often not taken into account, i.e. just one response strategy applied (leaving areas free of development)
• Regional and provincial plans responsible for collection and representation of information related to hazards and risks within their territory → Based on existing knowledge of risk conditions they have to guarantee safety of new and existing settlements	• In many cases no available information on hazards other than hydrogeological hazards at regional or provincial level nor on risk conditions
Characteristics of PAI and geological report	
• Municipalities are forced to face all the hazards menacing their territory due to the compulsory elaboration of a geological report as part of local spatial plans	• The PAI represents a big problem for small mountain communes because it is very restricting and it is blocking further urban development (more than before its introduction)
• Geological report promotes better relationship between planning and hazard analysis and assessment; reasons are: provision of maps complying with scale of respective planning level and provision of spatial planners with feasibility maps defining acceptable land uses	• Often geological reports do not provide probabilities, but produce a descriptive picture of the area and its natural conditions, i.e. no sufficient enquiry about the notion of planning and simple reaction with building restrictions for an identified hazard area, without trying to define more elaborate, tailored rules
• After approbation of the PAI and before adoption, municipalities are legally entitled to communicate their own observations and opinions about hazard levels on their territory (maps might include mistakes), they can submit comments during the consultation phase and suggest corrections	• Even demarcations of hazard zones of the PAI are negotiable (e.g. during the consultation phase) → Different local interests are already weighed up when making maps for the PAI, which is inconsistent as the weighing-up process should come later in the planning process and it deteriorates the credibility of the information

Romania

Advantages and strengths	Disadvantages and deficiencies
Amendments in legal regulations	
• Law 575/2001 (regarding the approval of the National Spatial Plan – Section V – Natural risk areas) is accompanied by a guide for the preparation of landslide risk maps which foresees the elaboration of landslide hazard maps for the whole territory of the country → This national landslide inventory ensures that all affected areas are mapped	• Application for EU funds requires a long and often complicated process, which is why a large amount of funds which could be designated for hazard mapping is not even retrieved
• Finalized hazard maps will be included in local spatial plans so that suggested prevention measures can be implemented as part of local land-use planning	• Often insufficient or missing funds are the main reason why some areas exposed to risks still lack adequate hazard and risk maps
Risk prevention and spatial planning	
• The ongoing preparation of new and more detailed information about hazards will require an update of local spatial plans and therefore a more thorough consideration of existing risks	• Spatial planning as a contributor for risk management is not considered as a strong element: Dams and other built structures are thought to be more powerful prevention measures
• Preparation of hazard and risk maps will be of particular importance, as maps can support decision-making in land-use planning (among others) and provide justification for building prohibitions	• Current practices prohibit constructions in zones where the landslide risk is known, but building is allowed in cases where the landslide risk is unknown → This means authorization for construction will usually be given in potentially landslide-prone zones
	• Illegal building constitutes a problem and adds to an increasing risk
	• Spatial planners are not necessarily always aware of all the different risks menacing a territory or they judge hazards differently, respectively

Conlusions and recommendations

Poland

- Smaller catchments will not officially be covered with flood hazard and risk maps (as being implicated in the new Water Law 2011), but according to representatives from the RZGW Krakow, flood hazard maps are made for many more rivers than actually required by law.

  → As suggested by the RZGW Krakow it would be beneficial if maps they had already prepared before the adoption of the Flood Risk Directive could be made legally binding, since all areas exposed to fast and violent (flash) floods would be adequately taken into account in the planning process
- More precise instructions or indications on how to proceed with landslide-exposed areas with already existing buildings as well as with areas potentially at risk of landslides would be an asset for planners.
- The Strategic Environmental Assessment could also be helpful in supporting risk assessments during the planning process, not only in regard to impacts of the plan on the environment, but also in regard to potential impacts of the environment on the plan – or provisions of the plan. SEA could play a supportive role when it comes to weighing up different interests and the consideration of different alternative options at an early stage of the process.

France

- In order to better consider risks in spatial planning documents a more integrative approach is needed, involving an overall diagnostic of the territory and weighing up all political interests and concerns.
- Monitoring and revision of specific prevention measures should continuously take place: PPRs are not necessarily updated regularly and potential improvements in the existing level of risk – or more precisely reduction of vulnerabilities – are not accounted for unless a regular revision is accomplished

  → Procedures in place should allow for reasonable and timely revision of planning decisions in order to adjust and adapt to changing situations.
- Further improvements in securing available information, monitoring and evaluation would not only support better knowledge and understanding of all actors involved, but it could also help promoting most effective decisions and regular adjustments.

Italy

- An integrated, comprehensive approach to risks is still lacking.

→ Efforts should be made to establish a multi-risk approach which combines risk prevention and spatial planning into an integrated system and consider for different response strategies

- Implementation of prevention policies aiming at risk reduction needs improvement. Laws and legal regulations are good, implementation however shows weaknesses, as often regulations are ignored or not purposefully considered and applied:
  - Urban planning codes should be reinforced by robust enforcement measures (through inspections or evaluations)
  - Higher incentives to retrofit could support the realization of preventive measures
  - Harsher penalties for violations could be introduced in order to deter people from building (illegally) in hazard-exposed areas (e.g. through efficient sanctions to hinder inappropriate use of land)

Romania

- Non-structural mitigation measures should be promoted: Rather juridical means, such as sanctioning activities which increase the possible risk (e.g. illegal building), could be implemented
- Training and awareness raising are necessary in order to improve knowledge about existing hazards and their potential consequences, so that spatial planners can better assess possible impacts
- Implementation of legal regulations could be improved, as rules are sometimes ignored or decisions taken in favor of competing issues

→ Local authorities should sometimes be stricter in making sure regulations are being followed

→ There should be more penalties and fines for breaching rules

Responsibilities and needs of planners for implementing risk management strategies and/or measures

It is one of the many tasks of the spatial planner to coordinate different local preferences and contexts as well as stakeholder initiatives. These local preferences have to be put into a wider context of socioeconomic and biogeographical/natural processes. This means that planners have to consider different demands on available space as well as external conditions in a weighing up process. Such an integrated approach ensures an overall diagnosis of the territory that considers all political interests and concerns regarding its development. However, due to different planning cultures, the actor "planner" has different roles and responsibilities depending on the respective national system. An integrated planning approach is not necessarily facilitated by the existing system. Besides, different legal regulations and planning practices determine the specific need of planners for risk information. In the following, characteristics of responsibilities and needs will be listed.

Poland

Actual responsibilities of the planner to use, work with and transform risk information	Needs of spatial/urban planners for risk information
• Actual responsibilities of planners are considered high: urban planning is a discipline that is really wide and planners need to have a certain background knowledge (of different issues and demands that exist) in order to take the right planning decisions, consider different interests and weigh them up against each other • It is also the planners responsibility to get sufficient information about risks: They need to have enough knowledge about the area and the conditions to estimate what they need, so that they can search for and collect adequate information, e.g. information about the potential extent of floods when there is a river near the area to be developed	• Need for specific, meaningful and clear information at the scale of the planning level that requires not much own interpretation • Need for clear, predetermined sources of information in order to avoid contradictory data and information (in case information is taken from several/different sources) • Easy access to information (preferably free of charge) to ensure consideration of all important information available

Romania

Actual responsibilities of the planner to use, work with and transform risk information	Needs of spatial/urban planners for risk information
• Planners are responsible for an appropriate transformation of risk information within the planning process • Quite a few urban plans are not conscientiously made in regard to zoning regulations and often permit new construction near a water course	• Decisions about hazard zoning in urban planning are often based on local knowledge, experiences, historical records and intuition, since hazard and risk maps for floods and landslides have not been finalized yet countrywide • Once envisaged hazard assessments will be finished they could constitute an important evidence base for planners • Training for planners about the use of hazard and risk maps and a closer link to information providers could be an asset (also in terms of awareness raising)

Italy

Actual responsibilities of the planner to use, work with and transform risk information	Needs of spatial/urban planners for risk information
• Planners do not have strong competences and do not take any hazard-related decisions • Actual responsibility regarding compatibility of spatial plan with given hazard profile of the territory lies in the hands of professional geologists and hydrologists • Planners have to use and respect implications of the PAI, but their pre-evaluation has no validity • A certain lack of knowledge and difficulties in understanding existing hazard maps was ascribed to spatial planners by sectoral planning entities	• Little need for information about hazards, as planners themselves do not consider themselves responsible and competent enough to take hazard-related decisions • The PAI is only used for a pre-evaluation of the hazard level • A "translation" of hazard information does not take place, although a closer collaboration between with geologists and hydraulic engineers is regarded as beneficial, since planners are the ones who need to consider existing hazards in the first step

France

Actual responsibilities of the planner to use, work with and transform risk information	Needs of spatial/urban planners for risk information
• An existing PPR limits the planners in their decision-making, because it defines a priori which areas can be developed and which cannot • In cases the law allows own interpretation (e.g. if the law says building is not allowed unless (…)), the planner needs to decide whether this condition applies or not, which may constitute a challenge, as planners have to estimate the risk • In case a PPR does not exist, planners need to consider and integrate all other available information about hazards, this means it is their responsibility to search and collect useful information about hazards	• Planners consider the PPR as suitable information base, because it clearly shows which areas are constructible and which are not. • In case a PPR does not exist, planners need information at an adequate scale in order to estimate the risk for the area concerned • Important information can also be collected when talking to the older population or to farmers (in mountain areas) who usually have quite a good and detailed knowledge about existing risks • Geological maps are also very important. Special soil studies can be helpful in cases where there is a doubt. However, information from such surveys needs to be "translated" for the planner by the responsible consulting office so that it can be correctly applied

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For any questions, comments, or desired input, please do not hesitate to contact us in your native language or in English using the following contact details:

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